7210 Service Access System

Release 26.9.R1

7210 SAS-Mxp, R6, R12, S, Sx, T Basic System Configuration Guide

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1 Getting started

This chapter provides an overview of the document organization and content, and describes the terminology used in this guide.

1.1 About this guide

Note:
Unless explicitly noted otherwise, this guide uses 7210 SAS-Dxp to refer to the 7210 SAS-Dxp 12p, 7210 SAS-Dxp 16p, and 7210 SAS-Dxp 24p platforms.

This guide describes system concepts and provides configuration examples to configure the boot option file (BOF) on the following 7210 SAS platforms, operating in one of the modes described in Table 1: Supported modes of operation and configuration methods. If multiple modes of operation apply, they are explicitly noted in the topic.

- 7210 SAS-Mxp
- 7210 SAS-R6
- 7210 SAS-R12
- 7210 SAS-Sx/S 1/10GE
- 7210 SAS-Sx 10/100GE
- 7210 SAS-T

See 7210 SAS modes of operation for information about the modes of operation supported by the 7210 SAS product family.

Note:
Unless explicitly noted otherwise, the phrase "Supported on all 7210 SAS platforms as described in this document" is used to indicate that the topic and CLI commands apply to all the 7210 SAS platforms in the following list, when operating in the specified modes only.

- network mode of operation

  7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-T

- standalone mode of operation

  7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE

- standalone-VC mode of operation

  7210 SAS-Sx/S 1/10GE

If the topic and CLI commands are supported on the 7210 SAS-T operating in the access-uplink mode, it is explicitly indicated, where applicable.

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1.1.1 Document structure and content

This guide uses the following structure to describe features and configuration content.

Note:
This guide generically covers Release 26.*x*.R*x* content and may include some content that will be released in later maintenance loads. See the *7210 SAS Software Release Notes 26.x.Rx*, part number 3HE 27852 000*x* TQZZA, for information about features supported in each load of the Release 26.*x*.R*x* software.

- This guide is organized into functional chapters and provides concepts and descriptions of the implementation flow. Each chapter describes a software area and provides CLI syntax and command usage to configure parameters for the functional area.
- Command outputs shown in this guide are examples only; actual displays may differ depending on supported functionality and user configuration.
- See the *7210 SAS-Mxp, R6, R12, S, Sx, T Basic System Configuration Guide* for boot options to configure the satellite mode of operation on the router. See the 7750 SR software user guides for information about service and protocol provisioning, and operating the 7210 SAS router in satellite mode.
- Unless explicitly noted, the CLI commands and their configuration is similar for both network and access-uplink operating modes for features applicable to both modes of operation.

1.2 7210 SAS modes of operation

Unless explicitly noted, the phrase "mode of operation" and "operating mode" refers to the current operating mode of the 7210 SAS router. Each operating mode provides configuration access to a specific group of CLI commands.

Note:
Not all CLI commands are supported on all 7210 SAS platforms in all modes of operation. Users can only configure CLI commands supported by the current operating mode of the router. See the *7210 SAS Software Release Notes 26.x.Rx*, part number 3HE 27852 000*x* TQZZA, and to the appropriate 7210 SAS software user guide for information about features and capabilities supported by a 7210 SAS platform when operating in a specific mode.

The following modes of operation are supported by the 7210 SAS product family.

- **access-uplink**

  In the access-uplink operating mode, the 7210 SAS router uplinks to the network using Layer 2 Ethernet VLAN switching (without IP/MPLS).

  Platforms Supported: 7210 SAS-D, 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C, and 7210 SAS-T

- **network**

  In the network operating mode, the 7210 SAS router uses IP/MPLS uplinks to the network. The IP routing protocols and MPLS functionality is available; see the appropriate 7210 SAS software user guide for more information about supported features.

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Platforms Supported: 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C, 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-T

- **satellite**

  In the satellite operating mode, the 7210 SAS platform uses high-capacity uplinks (for example, 10GE ports on the 7210 SAS-Mxp and 100GE ports on the 7210 SAS-Sx 10/100GE) to connect to the 7750 SR host. The 7210 SAS router is managed by the 7750 SR host. There is no direct CLI access to the satellite node, and all services and protocols are configured on the host.

  Platforms Supported: 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE

- **standalone**

  In the standalone operating mode, the 7210 SAS platform supports IP/MPLS uplinks. It is operated and managed independently.

  The functionality and features available on the standalone 7210 SAS platform are similar to the network operating mode. The standalone mode is primarily used to differentiate between a node being managed by the 7750 SR host (in the satellite operating mode), and a node managed independently (standalone operating mode).

  Platforms Supported: 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE

- **standalone-VC**

  In the standalone-VC operating mode, a set of 7210 SAS devices are stacked to provide larger 1GE/10GE port density and control-plane redundancy. The stack of nodes is provisioned and managed as a single chassis, and not as individual nodes.

  The functionality and features available on the 7210 SAS platform are similar to the network operating mode, with additional capabilities, such as control-plane redundancy with non-stop routing and non-stop services.

  Platforms Supported: 7210 SAS-Sx/S 1/10GE

For 7210 SAS platforms that support multiple explicit modes of operation (Table 1: Supported modes of operation and configuration methods), the operating mode must be configured in the Boot Option File (BOF) to ensure the router boots up in the specified mode. For example, the 7210 SAS-T supports access-uplink and network modes of operation, and the 7210 SAS-Sx/S 1/10GE supports satellite, standalone, and standalone-VC mode of operations. In some cases, the 7210 SAS router operates in a specific mode implicitly, and explicit configuration is not required.

See the appropriate *Basic System Configuration Guide* for boot options and information about how to boot the 7210 SAS platform in a specific operating mode.

The following table lists the supported modes of operation and the configuration methods for the 7210 SAS platforms. Unless explicitly noted otherwise, the operating mode is supported on all variants of the specific 7210 SAS platform.

Table 1: Supported modes of operation and configuration methods

7210 SAS platform	Mode of operation and configuration method				
	Network	Access-uplink	Standalone	Standalone-VC	Satellite
7210 SAS-D		Implicit	Implicit		
7210 SAS-Dxp		Implicit	Implicit		

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7210 SAS platform	Mode of operation and configuration method				
	Network	Access-uplink	Standalone	Standalone-VC	Satellite
7210 SAS-K 2F1C2T		Implicit	Implicit		
7210 SAS-K 2F6C4T[1]	Port Mode Configuration[2]	Port Mode Configuration[2]	Implicit		
7210 SAS-K 3SFP+ 8C[1]	Port Mode Configuration[2]	Port Mode Configuration[2]	Implicit		
7210 SAS-Mxp	Implicit[3]		Explicit BOF Configuration		Explicit BOF Configuration
7210 SAS-R6	Implicit		Implicit		
7210 SAS-R12[4]	Implicit		Implicit		
7210 SAS-Sx/S 1/10GE[4]	Implicit[3]		Explicit BOF Configuration	Explicit BOF Configuration	Explicit BOF Configuration
7210 SAS-Sx 10/100GE	Implicit[3]		Explicit BOF Configuration		Explicit BOF Configuration
7210 SAS-T	Explicit BOF Configuration	Explicit BOF Configuration	Implicit		

1.3 7210 SAS port modes

Unless explicitly noted, the phrase "port mode" refers to the current port configuration of the 7210 SAS node. The 7210 SAS platform supports the configuration of the following port modes.

- **access port mode**

  Access ports are configured for customer-facing traffic if Service Access Points (SAPs) are required. The appropriate encapsulation type must be configured to distinguish the services on the port; services are configured on the port based on the encapsulation value.

  Access ports can be configured on all the 7210 SAS platforms.

- **access-uplink port mode**

1 By default, the 7210 SAS-K 2F6C4T and 7210 SAS-K 3SFP+ 8C boot up in the network mode of operation. These platforms also allow the use of access-uplink port mode (without explicit BOF configuration), which provides the option to use Layer 2 uplinks instead of IP/MPLS uplinks to the network core, similar to the 7210 SAS-K 2F1C2T router.

2 See 7210 SAS port modes for information about port mode configuration

3 Implicitly operates in network mode when standalone mode of operation is configured

4 Supports MPLS uplinks only and implicitly operates in network mode

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Access-uplink ports provide native Ethernet connectivity in service provider transport or in an infrastructure network. With this option, the encap-type can be configured to only QinQ. Access-uplink SAPs, which are QinQ SAPs, can only be configured on an access-uplink port to allow the operator to differentiate multiple services being carried over a single uplink port.

This is the default port mode of a 7210 SAS node in the access-uplink mode of operation.

- **network port mode**

  Network ports are configured for network-facing traffic in the service provider transport or infrastructure network, and provide IP/MPLS uplinks.

  This is the default port mode of a 7210 SAS node in the network or standalone mode of operation.

- **hybrid port mode**

  Hybrid ports are configured for access and network facing traffic, and allow a single port to operate in both access and network modes.

Port modes available for configuration on a 7210 SAS node are determined by the current mode of operation of the router.

Note:
The 7210 SAS-K 2F6C4T and 7210 SAS-K 3SFP+ 8C are unique; all port modes listed in Table 2: Supported port modes by mode of operation are available for configuration on the router, regardless of the current mode of operation.

The following table lists the port mode configuration support per 7210 SAS mode of operation.

Table 2: Supported port modes by mode of operation

Mode of Operation	Supported Port Mode			
	Access	Network	Hybrid	Access-uplink
Access-Uplink	✓			✓
Network	✓	✓	✓	
Satellite[5]				
Standalone	✓	✓	✓	
Standalone-VC	✓	✓	✓	

The following table lists the port mode configuration supported by the 7210 SAS product family. See the appropriate *Interface Configuration Guide* for more information about configuring the port modes for a specific platform.

5 Port modes are configured on the 7750 SR host and managed by the host.

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Table 3: 7210 SAS platforms supporting port modes

Platform	Port Mode			
	Access	**Network**	**Hybrid**	**Access-uplink**
7210 SAS-D	Yes	No	No	Yes
7210 SAS-Dxp	Yes	No	No	Yes
7210 SAS-K 2F1C2T	Yes	No	No	Yes
7210 SAS-K 2F6C4T	Yes	Yes	Yes	Yes
7210 SAS-K 3SFP+ 8C	Yes	Yes	Yes	Yes
7210 SAS-Mxp	Yes	Yes	Yes	No
7210 SAS-R6 IMM-b (IMMv2)	Yes	Yes	Yes	No
7210 SAS-R6 IMM-c 100GE (IMM-c 1QSFP28)	Yes	Yes	Yes	No
7210 SAS-R12 IMM-b	Yes	Yes	Yes	No
7210 SAS-R12 IMM-c 100GE (IMM-c 1QSFP28)	Yes	Yes	Yes	No
7210 SAS-Sx/S 1/10GE	Yes	Yes	Yes	No
7210 SAS-Sx 10/100GE	Yes	Yes	Yes	No
7210 SAS-T	Yes	Yes[6]	Yes[7]	Yes[8]

1.4 7210 SAS system configuration process

The following table lists the tasks necessary to configure boot option files (BOF) and system and file management functions. Each chapter in this book is presented in an overall logical configuration flow. Each section describes a software area and provides CLI syntax and command usage to configure parameters for a functional area. After the hardware installation has been properly completed, proceed with the 7210 SAS-Series device configuration tasks in the following order:

6 Network ports are supported only if the node is operating in network mode.

7 Hybrid ports are supported only if the node is operating in network mode.

8 Access-uplink ports are supported only if the node is operating in access-uplink mode.

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Table 4: Configuration process

Area	Task	Chapter
CLI Usage	The CLI structure	CLI usage
	Basic CLI commands	Basic CLI commands
	Configure environment commands	CLI environment commands
	Configure monitor commands	CLI monitor commands
Operational functions	Directory and file management	File system management
Virtual Chassis	Configure virtual chassis	Virtual chassis
Boot options	Configure boot option files (BOF)	Boot options
System configuration	Configure system functions, including hostname, address, domain name, and time parameters	System management
Reference	List of IEEE, IETF, and other proprietary entities	Standards and protocol support

1.5 Conventions

This section describes the general conventions used in this guide.

1.5.1 Precautionary and information messages

The following information symbols are used in the documentation.



DANGER: Danger warns that the described activity or situation may result in serious personal injury or death. An electric shock hazard could exist. Before you begin work on this equipment, be aware of hazards involving electrical circuitry, be familiar with networking environments, and implement accident prevention procedures.



WARNING: Warning indicates that the described activity or situation may, or will, cause equipment damage, serious performance problems, or loss of data.



Caution: Caution indicates that the described activity or situation may reduce your component or system performance.

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Note: Note provides additional operational information.

Tip: Tip provides suggestions for use or best practices.

1.5.2 Options or substeps in procedures and sequential workflows

Options in a procedure or a sequential workflow are indicated by a bulleted list. In the following example, at step 1, the user must perform the described action. At step 2, the user must perform one of the listed options to complete the step.

Example: Options in a procedure

1. User must perform this step.
2. This step offers three options. User must perform one option to complete this step:
   - This is one option.
   - This is another option.
   - This is yet another option.

Substeps in a procedure or a sequential workflow are indicated by letters. In the following example, at step 1, the user must perform the described action. At step 2, the user must perform two substeps (a. and b.) to complete the step.

Example: Substeps in a procedure

1. User must perform this step.
2. User must perform all substeps to complete this action:
   a. This is one substep.
   b. This is another substep.

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2 CLI usage

This chapter provides information about using the command-line interface (CLI).

2.1 CLI structure

Nokia's Operating System (OS) CLI is a command-driven interface accessible through the console, Telnet and secure shell (SSH). The CLI can be used for configuration and management of routers.

The CLI command tree is a hierarchical inverted tree. At the highest level is the ROOT level. Below this level are other tree levels with the major command groups; for example, **configuration** commands and **show** commands are levels below ROOT.

The CLI is organized so related commands with the same scope are at the same level or in the same context. Sublevels or subcontexts have related commands with a more refined scope.

2.2 Navigating in the CLI

This section provides additional navigational and CLI syntax information.

2.2.1 CLI contexts

Use the CLI to access, configure, and manage Nokia 7210 SAS devices. CLI commands are entered at the command line prompt. Access to specific CLI commands is controlled by the permissions set by your system administrator. Entering a CLI command makes navigation possible from one command context (or level) to another.

When you initially enter a CLI session, you are in the ROOT context. Navigate to another level by entering the name of successively lower contexts. For example, enter either the **configure** or **show** commands at the ROOT context to navigate to the **config** or **show** context, respectively. For example, at the command prompt, enter **config**. The active context displays in the command prompt.

```
A:ALU-7210# config
A:ALU-7210>config#
```

In a CLI context, you can enter commands at that context level by entering the text. It is also possible to include a command in a lower context as long as the command is formatted in the correct command and parameter syntax.

The following example shows two methods to navigate to a service SAP ingress level:

Method 1:

```
A:ALU-7210# config service epipe 6 sap 1/1/2 ingress
```


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Method 2:

```
A:ALU-7210# configure
A:ALU-7210>config# service
A:ALU-7210>config>service# epipe 6
A:ALU-7210>config>service>epipe# sap 1/1/2
A:ALU-7210>config>service>epipe>sap# ingress
A:ALU-7210>config>service>epipe>sap>ingress#
```

The CLI returns an error message when the syntax is incorrect.

```
A:ALU-7210>config>service>epipe# sapp
                                 ^
Error: Bad command.
A:ALU-7210>config>service>epipe#
```

2.2.2 Basic CLI commands

The console control commands are the commands that are used for navigating within the CLI and displaying information about the console session. Most of these commands are implemented as global commands. They can be entered at any level in the CLI hierarchy with the exception of the `password` command, which must be entered at the ROOT level. The console control commands are described in the following table.

Table 5: Console control commands

Command	Description
<Ctrl-c>	Aborts the pending command.
<Ctrl-z>	Terminates the pending command line and returns to the ROOT context.
back	Navigates the user to the parent context.
clear	Clears statistics for a specified entity or clears and resets the entity.
echo	Echos the text that is typed in. Primary use is to display messages to the screen within an `exec` file.
exec	Executes the contents of a text file as if they were CLI commands entered at the console.
exit	Returns the user to the previous higher context.
exit all	Returns the user to the ROOT context.
help ?	Displays help in the CLI.
history	Displays a list of the most recently entered commands.

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Command	Description
info	Displays the running configuration for a configuration context.
logout	Terminates the CLI session.
oam	Provides OAM test suite options. See the OAM section of the 7210 SAS-Mxp, R6, R12, S, Sx, T OAM and Diagnostics Guide.
password	Changes the user CLI login password. The password can only be changed at the ROOT level.
ping	Verifies the reachability of a remote host.
pwc	Displays the present or previous working context of the CLI session.
sleep	Causes the console session to pause operation (sleep) for one second or for the specified number of seconds. Primary use is to introduce a pause within the execution of an `exec` file.
ssh	Opens a secure shell connection to a host.
telnet	Telnet to a host.
traceroute	Determines the route to a destination address.
tree	Displays a list of all commands at the current level and all sublevels.
write	Sends a console message to a specific user or to all users with active console sessions.

The list of all system global commands is displayed by entering **help globals** in the CLI. For example:

```
A:ALU-7210>config>service# help globals
      back            - Go back a level in the command tree
      echo            - Echo the text that is typed in
      enable-admin    - Enable the user to become a system administrator
      exec            - Execute a file - use -echo to show the commands and
                        prompts on the screen
      exit            - Exit to intermediate mode - use option all to exit to
                        root prompt
      help            - Display help
      history         - Show command history
      info            - Display configuration for the present node
      logout          - Log off this system
      oam             + OAM Test Suite
      ping            - Verify the reachability of a remote host
      pwc             - Show the present working context
      sleep           - Sleep for specified number of seconds
      ssh             - SSH to a host
      telnet          - Telnet to a host
      traceroute      - Determine the route to a destination address
      tree            - Display command tree structure from the context of
                        execution
      write           - Write text to another user
A:ALU-7210>config>service#
```

The following table describes command syntax symbols.

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Table 6: Command syntax symbols

Symbol	Description
|	A vertical line indicates that one of the parameters within the brackets or braces is required. **tcp-ack** {**true**|**false**}
[ ]	Brackets indicate optional parameters. **redirects** [**number seconds**]
< >	Angle brackets indicate that you must enter text based on the parameter inside the brackets. **interface** <*interface-name*>
{ }	Braces indicate that one of the parameters must be selected. **default-action** {**drop**|**forward**}
[{ }]	Braces within square brackets indicates that you must choose one of the optional parameters. **sdp** *sdp-id* [{**gre** | **mpls**}] **vpls** *service-id* [**svc-sap-type** {**null-star** | **dot1q** | **dot1q-preserve**}]
Bold	Commands in **bold** indicate commands and keywords.
Italic	Commands in *italics* indicate command options.

2.2.3 CLI environment commands

The CLI **environment** commands are found in the **root>environment** context of the CLI tree and controls session preferences for a single CLI session. The CLI environment commands are described in the following table.

Table 7: CLI environment commands

Command	Description
alias	Enables the substitution of a command line by an alias.
create	Enables or disables the use of a create parameter check.
kernel	Enables **kernel** commands for Nokia technical support.
more	Configures whether CLI output should be displayed one screen at a time awaiting user input to continue.
reduced-prompt	Configures the maximum number of higher-level CLI context nodes to display by name in the CLI prompt for the current CLI session.

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Command	Description
saved-ind-prompt	Saves the indicator in the prompt.
shell	Enables **shell** commands for Nokia technical support.
terminal	Configures the terminal screen length for the current CLI session.
time-display	Specifies whether time should be displayed in local time or UTC.

2.2.4 CLI monitor commands

Monitor commands display specified statistical information related to the monitor subject (such as filter, port, QoS, router, service) at a configurable interval until a count is reached. The CLI **monitor** commands are found in the **root>monitor** context of the CLI tree.

The **monitor** command output displays a snapshot of the current statistics. The output display refreshes with subsequent statistical information at each configured interval and is displayed as a delta to the previous display.

The <Ctrl-c> keystroke interrupts a monitoring process. Monitor command configurations cannot be saved. You must enter the command for each monitoring session. Note that if the maximum limits are configured, you can monitor the statistical information for a maximum of 60 * 999 sec ~ 1000 minutes.

The CLI monitor command are described in the following table.

Table 8: CLI monitor command contexts

Command	Description
filter	Enables IP, IPv6 and MAC filter monitoring at a configurable interval until that count is reached.
lag	Enables Link Aggregation Group (LAG) monitoring to display statistics for individual port members and the LAG.
port	Enables port traffic monitoring. The specified ports statistical information displays at the configured interval until the configured count is reached.
router	Enables virtual router instance monitoring at a configurable interval until that count is reached.
service	Monitors commands for a particular service.

2.3 Getting help in the CLI

The **help** system commands and the ? key display different types of help in the CLI. The following table describes the different help commands.

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Table 9: Online help commands

Command	Description
help ?	List all commands in the current context.
string ?	List all commands available in the current context that start with *string*.
command ?	Displays the command's syntax and associated keywords.
command keyword ?	List the associated arguments for *keyword* in *command*.
string<Tab>	Complete a partial command name (auto-completion) or list available commands that match *string*.

The **tree** and **tree detail** system commands are help commands useful when searching for a command in a lower-level context.

Example

The following example shows a partial list of the **tree** and **tree detail** command output entered at the **config** level.

```
A:ALU-7210>config# tree
configure
+---card
| +---card-type
| +---mda
| | +---access
| | +---mda-type
| | +---network
| | +---shutdown
| +---shutdown
+---cron
| +---action
| | +---expire-time
| | +---lifetime
| | +---max-completed
| | +---results
| | +---script
| | +---shutdown
| +---schedule
| | +---action
| | +---count
| | +---day-of-month
| | +---description
| | +---end-time
| | +---hour
| | +---interval
| | +---minute
| | +---month
| | +---shutdown
| | +---type
| | +---weekday
| +---script
| | +---description
| | +---location
| | +---shutdown
```


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```
| +---time-range
| | +---absolute
| | +---daily
| | +---description
| | +---weekdays
| | +---weekend
| | +---weekly
| +---tod-suite
| | +---description
| | +---egress
| | | +---filter
| | | +---qos
| | | +---scheduler-policy
| | +---ingress
| | | +---filter
| | | +---qos
| | | +---scheduler-policy
+---dot1ag
| +---domain
| | +---association
|...

*A:ALA-12>config# tree detail
configure
+---card <slot-number>
| no card <slot-number>
| +---card-type <card-type>
| | no card-type
| +---mda <mda-slot>
| | no mda <mda-slot>
| | +---access
| | +---mda-type <mda-type>
| | | no mda-type
| | +---network
| | +---no shutdown
| | | shutdown
| +---no shutdown
| | shutdown
+---cron
| +---action <action-name> [owner <action-owner>]
| | no action <action-name> [owner <action-owner>]
| | +---expire-time {<seconds>|forever}
| | +---lifetime {<seconds>|forever}
| | +---max-completed <unsigned>
| | +---no results
| | | results <file-url>
| | +---no script
| | | script <script-name> [owner <script-owner>]
| | +---no shutdown
| | | shutdown
| +---no schedule <schedule-name> [owner <schedule-owner>]
| | schedule <schedule-name> [owner <schedule-owner>]
| | +---action <action-name> [owner <action-owner>]
| | | no action
| | +---count <number>
| | | no count
| | +---day-of-month {<day-number> [..<day-number>]|all}
| | | no day-of-month
| | +---description <description-string>
| | | no description
| | +---end-time [<date>|<day-name>] <time>
| | | no end-time
| | +---hour {<hour-number> [..<hour-number>]|all}
| | | no hour
```


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```
| | +---interval <seconds>
| | | no interval
| | +---minute {<minute-number> [..<minute-number>]|all}
| | | no minute
| | +---month {<month-number> [..<month-number>]|<month-name> [..<month-nam>]|all}
| | | no month
| | +---no shutdown
| | | shutdown
| | +---type <schedule-type>
| | +---weekday {<weekday-number> [..<weekday-number>]|<day-name> [..<day-nme>]|all}
|...
```

2.4 The CLI command prompt

By default, the CLI command prompt indicates the device being accessed and the current CLI context. For example, the prompt: `A:ALA-1>config>router>if#` indicates the active context, the user is on the device with hostname ALA-1 in the **configure>router>interface** context. In the prompt, the separator used between contexts is the ">"symbol.

At the end of the prompt, there is either a pound sign ("#") or a dollar sign ("$"). A "#" at the end of the prompt indicates the context is an existing context. A "$" at the end of the prompt indicates the context has been newly created. New contexts are newly created for logical entities when the user first navigates into the context.

Because there can be a large number of sublevels in the CLI, the **environment** command **reduced-prompt***no of nodes in prompt* allows the user to control the number of levels displayed in the prompt.

All special characters (#, $, and so on) must be enclosed within double quotes, otherwise it is seen as a comment character and all characters on the command line following the # are ignored.

Example

```
*A:ALU-7210>config>router# interface "primary#1"
```

When changes are made to the configuration file a "*" appears in the prompt string (`*A:ALU-7210`) indicating that the changes have not been saved. When an admin save command is executed the "*" disappears. This behavior is controlled in the **saved-ind-prompt** command in the **environment** context.

2.5 Displaying configuration contexts

The **info** and **info detail** commands display configuration for the current level. The **info** command displays non-default configurations. The **info detail** command displays the entire configuration for the current level, including defaults. The following example shows the output that displays using the **info** command and the output that displays using the **info detail** command.

2.6 EXEC files

The **exec** command allows the user to execute a text file of CLI commands as if it were typed at a console device.

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The **exec** command and the associated exec files can be used to conveniently execute a number of commands that are always executed together in the same order. For example, an exec command can be used by a user to define a set of commonly used standard command aliases.

The **echo** command can be used within an **exec** command file to display messages on screen while the file executes.

2.7 Entering CLI commands

This section provides information about entering CLI commands and parameters.

2.7.1 Command completion

The CLI supports both command abbreviation and command completion. If the keystrokes entered are enough to match a valid command, the CLI displays the remainder of the command syntax when the **Tab** key or space bar is pressed. When typing a command, the **Tab** key or space bar invokes auto-completion. If the keystrokes entered are definite, auto-completion will complete the command. If the letters are not sufficient to identify a specific command, pressing the **Tab** key or space bar will display commands matching the letters entered. System commands are available in all CLI context levels.

2.7.2 Unordered parameters

In a context, the CLI accepts command parameters in any order as long as the command is formatted in the correct command keyword and parameter syntax. Command completion will still work as long as enough recognizable characters of the command are entered.

The following output shows different **static-route** command syntax and an example of the command usage.

2.7.3 Editing keystrokes

When entering a command, special keystrokes allow for editing of the command. The following table describes the command editing keystrokes.

Table 10: Command editing keystrokes

Editing action	Keystrokes
Delete current character	**Ctrl-d**
Delete text up to cursor	**Ctrl-u**
Delete text after cursor	**Ctrl-k**
Move to beginning of line	**Ctrl-a**
Move to end of line	**Ctrl-e**

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Editing action	Keystrokes
Get prior command from history	**Ctrl-p**
Get next command from history	**Ctrl-n**
Move cursor left	**Ctrl-b**
Move cursor right	**Ctrl-f**
Move back one word	**Esc-b**
Move forward one word	**Esc-f**
Convert rest of word to uppercase	**Esc-c**
Convert rest of word to lowercase	**Esc-l**
Delete remainder of word	**Esc-d**
Delete word up to cursor	**Ctrl-w**
Transpose current and previous character	**Ctrl-t**
Enter command and return to root prompt	**Ctrl-z**
Refresh input line	**Ctrl-l**

2.7.4 Absolute paths

CLI commands can be executed in any context by specifying the full path from the CLI root. To execute an out-of-context command enter a forward slash "/" or backward slash "\" at the beginning of the command line. The forward slash "/" or backward slash "\" cannot be used with the **environment alias** command. The commands are interpreted as absolute path. Spaces between the slash and the first command will return an error. Commands that are already global (such as **ping**, **telnet**, **exit**, **back**, and so on) cannot be executed with a forward slash "/" or backward slash "\"at the beginning of the command line.

Example

```
*A:ALA-12# configure router
*A:ALA-12>config>router# interface system address 1.2.3.4
*A:ALA-12>config>router# /admin save
*A:ALA-12>config>router# \clear router interface
*A:ALA-12>config>router#
```

The command may or may not change the current context depending on whether or not it is a leaf command. This is the same behavior the CLI performs when CLI commands are entered individually.

Example

```
*A:ALA-12# admin
*A:ALA-12>admin# save
```

```
*A:ALA-12# admin save
```


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```
*A:ALA-12#
```

Note: An absolute path command behaves the same as manually entering a series of command line instructions and parameters.

In the following examples, the user begins in an IES context service ID 4 (IES 4).

Example: Absolute path command that returns to the original context

```
config>service>ies> /clear card 1
```

The preceding command behavior is the same as the following series of commands.

```
config>service>ies>exit all
 clear card 1
 configure service ies 4 (returns you to your starting point)
 config>service>ies
```

Example: Absolute path command that switches to a new context

The following command takes you to a different context.

```
config>service>ies>/configure service ies 5 create
```

This context becomes the following.

```
config>service>ies>exit all configure service vpls 5 create config>service>vpls
```

2.7.5 History

The CLI maintains a history of the most recently entered commands. The **history** command displays the most recently entered CLI commands.

Example

```
*A:ALA-1# history
   1 environment terminal length 48
   2 environment no create
   3 show version
   4 configure port 1/1/1
   5 info
   6 \configure router isis
   7 \port 1/1/1
   8 con port 1/1/1
   9 \con port 1/1/1
  10 \configure router bgp
  11 info
  12 \configure system login-control
  13 info
  14 history
  15 show version
  16 history
*A:ALA-1# !3
A:cses-E11#  show version
TiMOS-B-0.0.I2838 both/i386 NOKIA SR 7750 Copyright (c) 2016 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Mon Jan 10 18:33:16 PST 2016 by builder in /rel0.0/I2838/panos/main
```


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```
A:cses-E11#
TiMOS-B-0.0.I232 both/i386 NOKIA SAS-Sx 7210 Copyright (c) 2016 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Sat Oct 11 18:15:40 IST 2016 by panosbld in /panosbld/ws/panos/main
*A:ALU-7210#
```

2.7.6 Entering numerical ranges

The 7210 SAS CLI allows the use of a single numerical range as an argument in the command line. A range in a CLI command is limited to positive integers and is denoted with two numbers enclosed in square brackets with two periods ("..") between the numbers:

where *x* and *y* are positive integers and *y-x* is less than 1000.

For example, it is possible to shut down ports 1 through 10 in Slot 1 on MDA 1. A port is denoted with "*slot*/*mda*/*port*", where *slot* is the slot number, *mda* is the MDA number and *port* is the port number. To shut down ports 1 through 10 on Slot 1 and MDA 1, the command is entered as follows:

```
configure port 1/1/[1..10] shutdown
```

Ctrl-C can be used to abort the execution of a range command.

Specifying a range in the CLI does have limitations. These limitations are described in the following table.

Table 11: CLI range use limitations

Limitation	Description
Only a single range can be specified.	It is not possible to shut down ports 1 through 10 on MDA 1 and MDA 2, as the command would look like `configure port 1/[1..2]/[1..10]` and requires two ranges in the command, [1..2] for the MDA and [1..10] for the port number.
Ranges within quotation marks are interpreted literally.	In the CLI, enclosing a string in quotation marks (`"string"`) causes the string to be treated literally and as a single parameter. For example, several commands in the CLI allow the configuration of a descriptive string. If the string is more than one word and includes spaces, it must be enclosed in quotation marks. A range that is enclosed in quotes is also treated literally. For example, `configure router interface "A[1..10]" no shutdown` creates a single router interface with the name "A[1..10]". However, a command such as: `configure router interface A[1..10] no shutdown` creates 10 interfaces with names A1, A2 .. A10.
The range cannot cause a change in contexts.	Commands should be formed in such a way that there is no context change upon command completion. For example, `configure port 1/1/[1..10]` will attempt to change ten different contexts.

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Limitation	Description
	When a range is specified in the CLI, the commands are executed in a loop. On the first loop execution, the command changes contexts, but the new context is no longer valid for the second iteration of the range loop. A "Bad Command" error is reported and the command aborts.
Command completion may cease to work when entering a range.	After entering a range in a CLI command, command and key completion, which occurs by pressing the **Tab** or spacebar, may cease to work. If the command line entered is correct and unambiguous, the command works correctly; otherwise, an error is returned.

2.7.7 Pipe/match

The 7210 SAS devices support the pipe feature to search one or more files for a specific character string or pattern.

Note:
When using the pipe/match command the variables and attributes must be spelled correctly. The attributes following the command and must come before the expression/pattern. The following are examples of the pipe/match command to complete different tasks:

- Task - Capture all the lines that include "echo" and redirect the output to a file on the compact flash:

  ```
  admin display-config | match "echo" > cf3 cf1:\echo_list.txt
  ```

- Task - Display all the lines that do not include "echo":

  ```
  admin display-config | match invert-match "echo"
  ```

- Task - Display the first match of "vpls" in the configuration file:

  ```
  admin display-config | match max-count 1 "vpls"
  ```

- Task - Display everything in the configuration after finding the first instance of "interface":

  ```
  admin display-config | match post-lines 999999 interface
  ```

Command syntax:

```
match pattern context {parents | children | all} [ignore-case] [max-count lines-count]
 [expression]
    match pattern [ignore-case] [invert-match] [pre-lines pre-lines] [post-lines lines-count]
 [max-count lines-count] [expression]
```

where:

```
pattern      string or regular expression
context      keyword:  display context associated with the matching line
parents      keyword:  display parent context information
children     keyword:  display child context information
all          keyword:  display both parent and child context information
ignore-case  keyword
max-count    keyword:  display only a specific number of instances of matching lines
lines-count  1 — 2147483647
expression   keyword:  pattern is interpreted as a regular expression
invert-match keyword
pre-lines    keyword:  display some lines prior to the matching line
```


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```
pre-lines    0 — 100
post-lines   keyword:  display some lines after the matching line
lines-count  1 — 2147483647
```

Example

```
*A:Dut-G# show log log-id 99 | match ignore-case sap
"Processing of an access port state change event is finished and the status of all
 affected SAPs on port 1/1/21 has been updated."
"Service Id 4001, SAP Id 1/1/21:0.* configuration modified"


A:Dut-C# show log log-id 98 | match max-count 1 "service 1001"
"Status of service 1001 (customer 1) changed to administrative state: up, operationa
l state: up"

*A:Dut-G# admin display-config | match post-lines 4 max-count 2 expression "vpls"
#--------------------------------------------------
...
        vpls 1 customer 1 svc-sap-type null-star create
            description "Default tls description for service id 1"
            stp
                shutdown
            exit
        vpls 2 customer 1 svc-sap-type null-star create
            description "Default tls description for service id 2"
            stp
                shutdown
            exit
...
#--------------------------------------------------
```

The following table describes regular expression symbols and interpretation (similar to what is used for route policy regexp matching). Table 13: Special characters describes special characters.

Table 12: Regular expression symbols

String	Description
.	Matches any single character.
[ ]	Matches a single character that is contained within the brackets. [abc] matches "a", "b", or "c". [a-z] matches any lowercase letter. [A-Z] matches any uppercase letter. [0-9] matches any number.
[^]	Matches a single character that is not contained within the brackets. [^abc] matches any character other than "a", "b", or "c". [^a-z] matches any single character that is not a lowercase letter.
^	Matches the start of the line (or any line, when applied in multiline mode)
$	Matches the end of the line (or any line, when applied in multiline mode)
()	Define a "marked subexpression".

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String	Description
	Every matched instance will be available to the next command as a variable.
*	A single character expression followed by "*" matches zero or more copies of the expression.
{m,n}	Matches at least m and at most n repetitions of the term
{m}	Matches exactly m repetitions of the term
{m,}	Matches m or more repetitions of the term
?	The preceding item is optional and matched at most once.
+	The preceding item is matched one or more times.
-	Used between start and end of a range.
\	An escape character to indicate that the following character is a match criteria and not a grouping delimiter.
>	Redirect output

Table 13: Special characters

Options	Similar to	Description
[:upper:]	[A-Z]	uppercase letters
[:lower:]	[a-z]	lowercase letters
[:alpha:]	[A-Za-z]	upper- and lowercase letters
\w	[A-Za-z_]	word characters
[:alnum:]	[A-Za-z0-9]	digits, upper- and lowercase letters
[:digit:]	[0-9]	digits
\d	[0-9]	digits
[:xdigit:]	[0-9A-Fa-f]	hexadecimal digits
[:punct:]	[.,!?:...]	punctuation
[:blank:]	[\t]	space and TAB
[:space:]	[\t\n\r\f\v]	blank characters
\s	[\t\n\r\f\v]	blank characters

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2.7.8 Redirection

SR OS supports redirection (">"), which allows the operator to store the output of a CLI command as a local or remote file. Redirection of output can be used to automatically store results of commands in files (both local and remote).

Example

```
'ping <customer_ip> > cf3cf1:/ping/result.txt'
'ping <customer_ip> > ftp://test@ftp.nokia.com/ping/result.txt'
```

In some cases only part of the output might be applicable. The pipe/match and redirection commands can be combined:

Example

```
ping 10.0.0.1 | match expression "time.\d+" > cf3cf1:/ping/time.txt
This records only the RTT portion (including the word "time").
```

2.8 Configuration rollback

Note:
This feature is only supported on 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp.

The configuration rollback feature provides the ability to "undo" a configuration and return to previous router configuration states while minimizing impacts to services.

This feature gives the operator better control and visibility over router configurations and reduces operational risk while increasing flexibility and providing powerful recovery options.

Configuration rollback is useful in cases where configuration changes are made, but the operator later decides not to keep the changes (for example, when experimenting or when problems are identified in the configuration during actual network operation).

The advantages of this feature are as follows:

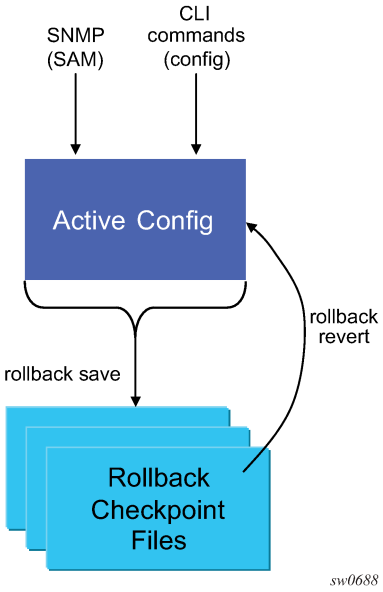
- By not having to reboot the router, changes made to a router configuration have minimal impact on services provided by the 7210 SAS.
- There is no impact to areas of configuration that did not change, but there are some exceptions.

Configuration parameters that changed (or items that a changed configuration has dependencies on) are first removed (return to default), and the previous values are then restored (can be briefly service impacting in changed areas).

A history of changes is preserved using checkpoint IDs that allow rollback to different points, as well as examination of changes made, as shown in the following figure.

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Figure 1: Rollback operation



2.8.1 Feature behavior

The following list describes detailed behavior and CLI usage of the rollback feature:

- The user can create a rollback checkpoint, and later, return to this checkpoint with minimal impacts to services by using the following command.

  admin>rollback# save [**comment** *comment-string*]

  comment-string: a 255 character comment associated with the checkpoint
- Rollback checkpoints include all current operationally active configurations:
  - changes from direct CLI commands in the configuration branch
  - SNMP sets
- Rollback checkpoints do not include BOF configuration information. The BOF file (and BOF configuration) is not part of a rollback save or rollback. A rollback does not change any of the BOF configuration. The BOF contains basic information for the node and does not change frequently (mostly during initial commissioning of the node).
- A rollback **save** command can be automatically executed (scheduled, for example, monthly) using the CRON facility.
- The latest rollback checkpoint file uses a suffix of ".rb". The next latest rollback checkpoint file has a suffix of ".rb.1", the next oldest has a suffix of "rb.2", and so on:

  `file-url.rb` <--- latest rollback file

  `file-url.rb.1`

  …

  `file-url.rb.9`<--- oldest rollback file

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- When a rollback save [no "-"] is executed, the system shifts the file suffix of all the previous checkpoints by 1 (new ID= old ID+1). If there are already as many checkpoint files as the maximum number supported, the last checkpoint file is deleted.
- The maximum number of rollback checkpoints is configurable and defaults to 10 (the latest files and files 1 through 9, where checkpoint file 9 is deleted during the next rollback-save).
- The location and name of the rollback checkpoint files are configurable to be local storage (for example, compact flash) or remote storage. The file URL must not contain a suffix (just a path/directory and filename). The suffix for rollback checkpoint files is .rb and is automatically appended to rollback checkpoint files.

  config>system>rollback# rollback-location *file-url*
- There is no default rollback location. If a location is not specified (or it is cleared using **no rollback-location**) and a **rollback save** is attempted, the rollback save will fail and return an error message.
- On the 7210 SAS-R6 and 7210 SAS-R12, the entire set of rollback checkpoint files can be copied from the active CPM CF to the inactive CPM CF. This synchronization is done through the following command:

  admin>redundancy# rollback-sync
- The operator can enable automatic synchronization of rollback checkpoint files between the active CPM and inactive CPM. When this automatic synchronization is enabled, a rollback save will cause the new checkpoint file to be saved to both the active and standby. The suffixes of the old checkpoint files on both active and standby CPMs are increased.

  Note:
  The automatic synchronize only causes the one new checkpoint file to be copied to both CFs (the other 9 checkpoints are not automatically copied from active to standby, but that can be done manually using the **admin>redundancy>rollback-sync** command).

  ```
  config>redundancy# [no] rollback-sync
  ```
- **config>redundancy>synchronize** {*boot-env*|*config*} and **admin>redundancy>synchronize** {*boot-env*|*config*}" do not apply to rollback checkpoint files. These commands do not manually or automatically synchronize rollback checkpoint files. The dedicated **rollback-sync** commands must be used to sync rollback checkpoint files.
- Rollback files can be deleted using a dedicated rollback checkpoint deletion command:

  admin>rollback# delete {**latest-rb** | *checkpoint-id*}

  – Deleting a rollback checkpoint causes the suffixes to be adjusted (decremented) for all checkpoints older than the one that was deleted (to close the "hole" in the list of checkpoint files and create room to create another checkpoint).

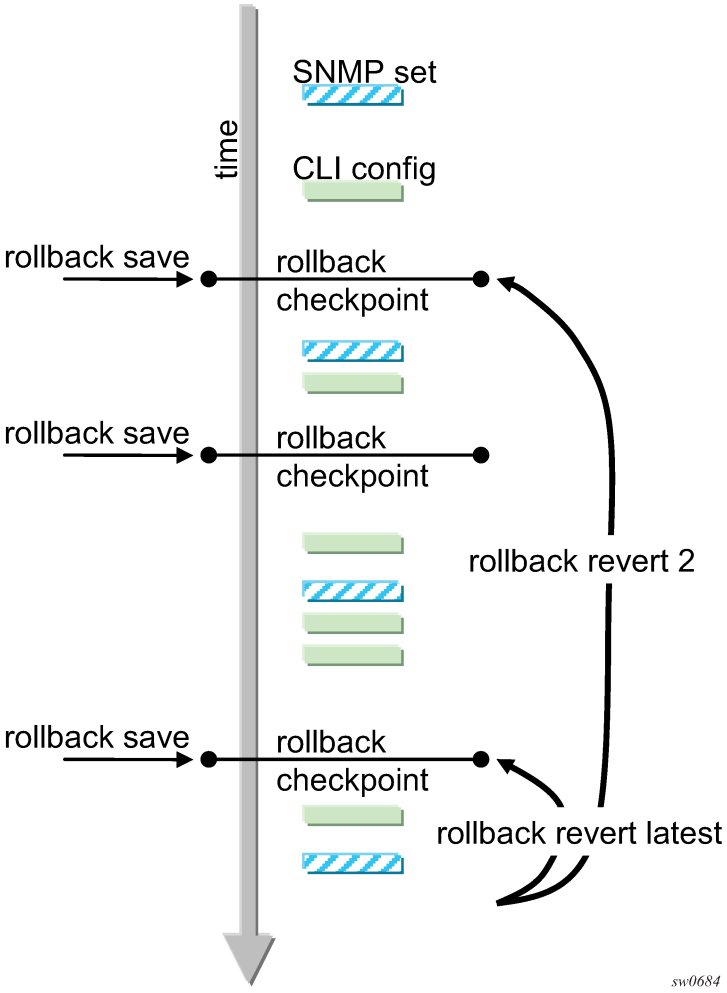
  – If **configure>redundancy>rollback-sync** is enabled, a **rollback delete** will also delete the equivalent checkpoint on the standby CF and shuffle the suffixes on the standby CF.

  – If an operator manually deletes a rollback checkpoint file using **file delete**, the suffixes of the checkpoint files are not shuffled, nor is the equivalent checkpoint file deleted from the standby CF. This manual deletion creates a "hole" in the checkpoint file list until enough new checkpoints have been created to roll the "hole" off the end of the list.
- As shown in the following figure, support for rolling back to a previous configuration (a saved rollback checkpoint) with minimal impact on services. The previous configuration will be loaded and take operational effect:

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admin>rollback# revert [**latest-rb** | *checkpoint-id*]

Figure 2: Configuration rollback



- A **rollback revert** does not affect the currently stored rollback checkpoint files (no deletions or renumbering). This means that if an operator issues a "rollback revert 3" and issues a "rollback-save", the resulting rollback checkpoint files "file-url.rb" and "file-url.rb.4" will contain the same rollback state/ configuration.
- The **boot-good-exec** or **boot-bad-exec** are not automatically executed after a rollback.
- Impacts to the running services are minimized during a rollback as follows:
  - There is no impact in areas of configuration that did not change, except for some exceptions.
  - Configuration parameters that changed (or items that a changed configuration has dependencies on) are first removed and the previous values are restored (can be briefly service impacting in changed areas). Some examples are as follows:
    - If the SAP ingress policy *num-qos-resources* value is different in the active configuration and in comparison to the value in the rollback checkpoint, all the SAPs are deleted and created

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again. This is done to guarantee that configuration of all the SAPs succeeds when moving to the previous configuration.

- Changing some of the parameters in the SAP egress policy requires the port to be shut down. Therefore, when moving to a previous configuration results in change of these values, the port is shut down, the old SAP egress policy is removed, and the new SAP egress policy is applied.

- A rollback will undo any SNMP sets or direct CLI configuration commands that occurred since the last checkpoint creation.
- During the period when a node is processing a **rollback revert** command, both CLI commands from other users and SNMP commands will continue to be processed. The only commands that are blocked during a **rollback revert** are other rollback commands including **revert**, **save**, and **compare** (only one rollback command can be executing at a time on one node).
- Commands are available to view and compare the various rollback checkpoints to current operating and candidate configurations:
  - Rollback checkpoint files are not guaranteed to be in any particular format. They are not interchangeable with normal configuration files or exec scripts. A normal configuration file (from an **admin save**) cannot be renamed as a rollback checkpoint and a rollback can be executed as long as the hardware change was an addition of hardware to the node (for example, added a new IOM into a previously empty slot).
  - A rollback is not guaranteed to work if hardware was removed or changed (for example, the IOM was removed or an MDA was swapped for a different MDA type).
- Rollback across a change to the following parameters is not supported:
  - system resource profile commands
  - PTP commands
- Rollback is supported even after an **admin reboot** is performed (or the primary configuration in the BOF is changed and an **admin reboot** is performed). **Admin reboot** does not "break the chain" for rollback.
- The Configuration Rollback feature is incompatible with the use of Time Of Day (ToD) policies and functionality. Rollback save and rollback revert operations are blocked if any ToD policies are active (for example, assigned to objects such as a SAP).
- Any configuration or state change performed under the debug branch of CLI is not saved in the rollback checkpoint file nor impacted by a rollback.
- Rollbacks to a checkpoint created in a more recent release is not supported.
- The following list captures some side effects and specific behaviors of a **rollback revert**. Some of these side effects are not related purely to configuration (that is, in the CLI configuration branch) and may have interactions with tools commands, RADIUS, and so on:
  - SAA jobs that are running when a **rollback revert** is initiated, and need configuration changes due to the rollback, will be stopped. If the SAA job is a continuous type, it will be restarted as part of the rollback revert after the configuration changes have been applied (just as if the operator had typed **no shutdown** for the continuous SAA job). Non-continuous SAA jobs that were modified by the rollback need to be manually restarted if they need to be run again.
  - If **max-nbr-mac-addr** is reduced as part of the **revert** but the number of MAC addresses in the forwarding database is greater than the maximum number of MAC addresses, the rollback is aborted before any actions are taken and an informative error message is provided. The operator must take actions to remove the MAC addresses to proceed with the rollback.

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- If a **force-switchover** command has been applied to a spoke SDP FEC of a dynamic multi-segment pseudowire, and a rollback revert needs to change the admin state of the spoke SDP FEC (for example, to modify spoke SDP FEC parameters that may be dependent on admin state), the rollback revert will automatically remove the force-switchover and the node will revert to whatever is the best spoke SDP in the redundant set.
- Rollback impacts the configuration state of the router, and as with normal operator CLI or SNMP configuration changes, additional actions or steps may need to occur before certain configuration changes take operational effect. The following are some examples:
  - Configuration changes that require a **shutdown** and **no shutdown** to be done by an operator to take operational effect also need a manual **shutdown** and **no shutdown** to be performed by the operator to take operational effect after a rollback if the rollback changes those configuration items. Some examples include:
  - Changes to autonomous system or confederation values require a BGP **shutdown** and **no shutdown**.
  - Changes to VPRN max-routes require a **shutdown** and **no shutdown** on the VPRN service.
  - Changes to an OSPF or ISIS export limit require a **shutdown** and **no shutdown** on OSPF or ISIS.
  - Configuration changes to an MSAP policy that requires a **tools>perform>subscriber-mgmt>eval-msap** command to take operational effect on subscribers that are already active. Rollback will change the MSAP policy configuration, but if it is required to have the configuration changes applied to the active subscribers, the operator will have to run the **eval-msap** tools command.
  - Changes to the SAP egress policy require a port **shutdown** and **no shutdown**. This is done automatically by the software when it detects a change.
  - Changes to the number of QoS resources in the SAP ingress policy results in deletion and creation of all the SAPs. This is done to ensure that the configuration can be successfully recreated using the SDX file.
- Any uncommitted changes (that is, the **begin** command was entered and some changes were made, but the **commit** command was never entered) in the following areas will be lost/cleared when a **rollback revert** is initiated:
  - **config>router>policy-options**
  - **config>system>sync-if-timing**

- Some card and MDA commands require a reboot, remove, or rebuild of an entire card or XMA/MDA. When these commands need to be executed as part of a rollback, the impacted cards/MDAs will be listed in a warning and the operator will be prompted with a single **y/n** prompt to decide whether to proceed or not. This prompting will not occur for a rollback initiated via SNMP, nor if the operator uses the **now** keyword with the **rollback revert** command. Some examples of card and MDA commands that may cause a prompt are the following:
  - **config>card>card-type**
  - **config>card>mda**
  - **config>card>mda>mda-type**
- Although the use of the **Ctrl-C** key combination is not recommended during a **rollback revert**, it is supported through CLI and SNMP. Interrupting a **rollback revert** may leave the router in a state that is not necessarily something between the old active configuration and the rollback checkpoint since the

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rollback processing may have been in the middle of tearing things down or rebuilding configurations. A strong warning is issued in this case to indicate that the operator must examine the configuration and potentially issue another **rollback revert** to return to a known (and coherent) configuration.

- A high availability CPM switchover during a **rollback revert** will cause the rollback operation to abort. The newly active CPM will have an indeterminate configuration. When an HA switchover occurs during a rollback (or within a few seconds of a rollback completing), the operator is advised to repeat the **rollback revert** operation to the same checkpoint.

2.8.2 Rescue configuration

A special rescue configuration checkpoint can be created that an operator can rollback revert to at any time. The rescue configuration has its own keyword (**rescue**) and does not use the same rolling suffix indexes as the normal rollback checkpoints. This allows the operator to easily return to the rescue configuration state without having to consider a checkpoint index, and ensures that the rescue checkpoint is always available (does not roll off the bottom of the list of checkpoints).

The operator should define a basic rescue configuration that is known to work and give correct management access to the node.

The location and filename of the rescue file are configurable. The 7210 SAS appends an .rc suffix to the specified rescue filename.

2.8.3 Operational guidelines

The following points provide some operational guidance on the usage of rollback:

- Both **admin save** and **rollback save** should be done periodically:
- Do an **admin save** to back up a complete configuration file that can be used during router reboot:
  - Used with a reboot as a last resort.
  - Do an **admin save** after any major hardware changes or major service changes.
  - Should be done after any software upgrade.
- Do a **rollback save** to create a rollback checkpoint:
  - used for intermediate checkpoints that can be recovered with minimal impacts to services
  - should be done each time that a moderate amount of configuration changes have been made
  - should be done after any hardware changes
  - should be done after any software upgrade
  - can also be scheduled with CRON (for example, once every 1 or 2 weeks)
- A new **rescue save** must be created when hardware is changed.
- Rollback checkpoint files are not editable nor compatible/interchangeable with configuration files (generated with **admin save**).
- Avoid repeatedly executing **rollback save** without also occasionally executing **admin save**. If you really get into a bad situation, you may have to use one of your admin save configurations as the primary configuration for an **admin reboot**.
- After a software upgrade has occurred and the system is operating as expected, it is recommended to create a rollback checkpoint file using the **admin>rollback>save** command and to save the

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configuration using **admin>save**. This ensures that a good checkpoint fully compatible with the new release is available shortly after the upgrade.

- A set of rollback checkpoints can be created to support busy/quiet days or weekend/weekdays and CRON can be used to shift between them.
- It is recommended to create a rollback checkpoint before a **rollback revert** is initiated (especially if there have been significant configuration changes since the last checkpoint was created). If the rollback is especially significant (a lot of major changes) it is also a good practice to do an **admin save** just in case a full reboot is required to recover from an issue.
- A rollback failure may occur in some limited cases where the node needs a long time to complete one of the resulting configuration changes. If a rollback fails during execution, it should be attempted again. The second attempt will typically complete the remaining configuration changes required to fully revert to the desired checkpoint.
- On the 7210 SAS-R6 and 7210 SAS-R12, when a new backup CPM is commissioned, the user should issue the **admin>redundancy>rollback-sync** to copy the entire set of rollback files from the active CPM checkpoint file (CF) to the new standby CPM CF. If the operator needs the system to automatically copy new rollback checkpoints to both CFs whenever a new checkpoint is created, the **config>redundancy>rollback-sync** should be configured.
- On the 7210 SAS-R6 and 7210 SAS-R12, a high availability CPM switchover during a **rollback revert** will cause the rollback operation to abort. The newly active CPM will have an indeterminate configuration. A log event is created and the operator is advised to repeat the rollback revert operation to the same checkpoint.
- A rollback checkpoint file stores the rollback location and the local and remote maximum checkpoint values, and as such a rollback revert operation can change those values. If an operator changes the local and remote maximum checkpoint values, it is recommended to delete all the existing checkpoints otherwise a subsequent rollback revert could change the max values back to a previous value.
- If a warning prompt (`y/n`) is displayed when a **rollback revert** is initiated, it is highly suggested to respond 'no' to the warning prompt the first time, save a rollback checkpoint before attempting this rollback revert, and execute the **rollback>revert** again and respond 'yes'. If the rollback encounters problems, a revert to the saved checkpoint can be used to return to the initial configuration state.

2.8.4 Configuration guidelines and restrictions

The following are the limitations of the configuration rollback feature for the 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp:

- Resource profile policy changes cannot be rolled back. That is, if there is a change in resource policy/ parameters between active configuration and checkpoint, rollback will not proceed.
- PTP is not supported.
- For SAP ingress QoS, due to the slice information available in the .sdx file, whenever there is a change in ingress QoS policy attached to a SAP, or if there are any additional SAPs in the checkpoint file, all SAPs are torn down and rebuilt. The user will be prompted before this occurs.
- A SAP that has a change in egress QoS policy will be shut down and will do a **no shutdown** after a delay.
- During rollback, all ports and SAPs are shut down and brought back up again. This brings down traffic and control protocols that have been initiated or are transitioning through the node during rollback.
- Rollback is not permitted when there is a change to **port-scheduler-mode**.

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- Back-to-back rollbacks, particularly scaled ones, are not recommended. Users must allow sufficient time for the system to process the current rollback before initiating a new one.
- On the 7210 SAS-R6 and 7210 SAS-R12, if there are additional differences in resource profile templates between two rollback points, the rollback procedure does not roll back any changes. An error message is displayed asking the user to undo these resource profile template changes manually.
- Rollback is not allowed between two rollback points if there are changes in the slice allocation in the same resource profile template. On the 7210 SAS-R6 and 7210 SAS-R12, the restriction also applies for a template that is not associated with any card.
- On the 7210 SAS-R6 and 7210 SAS-R12, if the resource profile templates are the same across two different rollback points but the attachment to the card is different, it may result in resource allocation failures in scaling scenarios.

2.9 Basic command reference

2.9.1 Command hierarchies

- Basic CLI commands
- Monitor commands
- Environment commands

2.9.1.1 Basic CLI commands

```
    - back
    - clear
    - echo [text-to-echo] [extra-text-to-echo] [more-text]
    - enable-admin
    - exec [-echo] [-syntax] filename | eof-marker-string
    - exit [all]
    - help
    - history
    - info [detail]
    - logout
    - password
    - ping {ip-address | dns-name} [rapid | detail] [ttl time-to-live] [tos type-of-service]
 [size bytes] [pattern pattern] [source ip-address] [interval seconds] [{next-hop ip-
address} | {interface interface-name} | bypass-routing] [count requests] [do-not-fragment]
 [router router-instance | service-name service-name] [timeout timeout]
    - pwc [previous]
    - sleep [seconds]
    - ssh [ip-addr | dns-name | username@ip-addr] [-l username] [-v SSH-version]
 [router router-instance]
    - telnet [ip-address | dns-name] [port] [router router-instance]
    - traceroute {ip-address | dns-name} [ttl value] [wait milliseconds] [no-dns] [source ip-
address] [tos type-of-service] [router router-instance]
    - tree [detail]
    - write {user | broadcast} message-string
```


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2.9.1.2 Show commands

```
show
    - alias
```

2.9.1.3 Monitor commands

```
monitor
    - filter
        - ip ip-filter-id entry entry-id [interval seconds] [repeat repeat] [absolute | rate]
        - ipv6 ipv6-filter-id entry entry-id [interval seconds] [repeat repeat] [absolute|rate]
        - mac  mac-filter-id entry entry-id [interval seconds] [repeat repeat]  [absolute |
 rate]
    - lag lag-id [lag-id...(up to 5 max)] [interval seconds] [repeat repeat] [absolute | rate]
    - port  port-id [port-id...(up to 5 max)] [interval seconds] [repeat repeat] [absolute |
 rate]
    - router
    - service
        - id service-id
            - sap sap-id [interval seconds] [repeat repeat] [absolute | rate]
            - sdp sdp-id [far-end] ip-address [interval seconds] [repeat repeat] [absolute |
 rate]
    - management-access-filter
```

2.9.1.4 Environment commands

```
root
    - environment
        - alias alias-name alias-command-name
        - no alias alias-name
        - [no] create
        - kernel [-password password] [-token token]
        - no kernel
        - [no] more
        - reduced-prompt [no of nodes in prompt]
        - no reduced-prompt
        - [no] saved-ind-prompt
        - shell[-password password] [-token token]
        - no shell
        - terminal
            - length lines
            - width width
        - time-display {local | utc}
        - [no] time-stamp
```

2.9.2 Command descriptions

- Global commands
- CLI environment commands
- Show commands

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- Monitor CLI commands

2.9.2.1 Global commands

enable-admin

Syntax

enable-admin

Context

<global>

Description

Note:
See the description for the **admin-password** command. If the **admin-password** is configured in the **config>system>security>password** context, any user can enter a special administrative mode by entering the **enable-admin** command.

The **enable-admin** command is in the default profile. By default, all users are given access to this command.

When the **enable-admin** command is entered, the user is prompted for a password. If the password is correct, the user is given unrestricted access to all commands.

The minimum length of the password is determined by the **minimum-length** command. The complexity requirements for the password is determined by the **complexity** command.

The following is an example of a password configuration.

```
A:ALA-1>config>system>security# info
----------------------------------------------
...
            password
                aging 365
                minimum-length 8
                attempts 5 time 5 lockout 20
                admin-password "rUYUz9XMo6I" hash
            exit
...
----------------------------------------------
A:ALA-1>config>system>security#
```

Use one of the following options to verify that a user is in the **enable-admin** mode.

- Administrators cab use the **show users** command to know which users are in this mode.
- Enter the **enable-admin** command again at the root prompt and an error message will be returned.

The following is an example output for the **show users** command.

```
A:ALA-1# show users
===============================================================================
User Type From Login time Idle time
```


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```
===============================================================================
admin Console -- 10AUG2006 13:55:24 0d 19:42:22
admin Telnet 10.20.30.93 09AUG2004 08:35:23 0d 00:00:00 A
-------------------------------------------------------------------------------
Number of users : 2
'A' indicates user is in admin mode
===============================================================================
A:ALA-1#
A:ALA-1# enable-admin
MINOR: CLI Already in admin mode.
A:ALA-1#
```

back

Syntax

back

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command moves the context back one level in the command hierarchy. For example, if the current level is the **config router ospf** context, the **back** command moves the cursor to the **config router** context level.

clear

Syntax

clear

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command clears statistics for a specified entity, or it clears and resets the entity.

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Parameters

cron

Clears CRON history.

filter

Clears IPv4, IPv6, MAC, and log filter counters.

lag

Clears LAG-related entities.

log

Closes and reinitializes the log specified by *log-id*.

port

Clears port statistics.

qos

Clears QoS statistics.

radius

Clears the RADIUS server state.

router

Clears router commands affecting the router instance in which they are entered.

Values arp, authentication, bfd, dhcp, forwarding-table, icmp-redirect-route, interface, isis, ldp, mpls, ospf, rip, rsvp

saa

Clears the SAA test results.

screen

Clears the console or telnet screen.

service

Clears service ID and statistical entities.

system

Clears or re-enables a previously failed reference.

tacplus

Clears the TACACS+ server state.

trace

Clears the trace log.

echo

Syntax

echo [*text-to-echo*] [*extra-text-to-echo*] [*more-text*]

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Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command echoes arguments on the command line. The primary use of this command is to allow messages to be displayed to the screen in files executed with the **exec** command.

Parameters

text-to-echo

Specifies a text string to be echoed up to 256 characters.

extra-text-to-echo

Specifies more text to be echoed up to 256 characters.

more-text

Specifies more text to be echoed up to 256 characters.

exec

Syntax

exec [**-echo**] [**-syntax**] {*filename* | [*eof_string*]}

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command executes the contents of a text file as if they were CLI commands entered at the console.

Exec commands do not have **no** versions.

The following commands are related to the **exec** command:

- boot-bad-exec

  Use this command to configure a URL for a CLI script to exec following a failed configuration boot.
- boot-good-exec

  Use this command to configure a URL for a CLI script to exec following a successful configuration boot.

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Parameters

-echo

Keyword to echo the contents of the **exec** file to the session screen as it executes.

Default Echo disabled.

-syntax

Keyword to perform a syntax check of the file without executing the commands. Syntax checking finds invalid commands and keywords, but it will not be able to validate erroneous user-configured parameters.

Default Execute file commands.

file-name

The text file with CLI commands to execute.

<<

Stdin can be used as the source of commands for the exec command. When stdin is used as the exec command input, the command list is terminated with **Ctrl-C**, "EOF<Return>" or "*eof_string*<Return>".

If an error occurs entering an exec file sourced from stdin, all commands after the command returning the error will be silently ignored. The exec command will indicate the command error line number when the stdin input is terminated with an end-of-file input.

eof_string

Specifies the ASCII printable string used to indicate the end of the exec file when stdin is used as the exec file source. **Ctrl-C** and "EOF" can always be used to terminate an exec file sourced from stdin.

Default **Ctrl-C**, EOF

exit

Syntax

exit [**all**]

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

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Description

This command returns to the context from which the current level was entered. For example, if you navigated to the current level on a context by context basis, then the **exit** command only moves the cursor back one level.

```
A:Dut-G# configure
A:Dut-G>config# service
A:Dut-G>config>service# vpls 1
A:Dut-G>config>service>vpls# exit
A:Dut-G>config>service# exit
A:Dut-G>config# exit
```

If you navigated to the current level by entering a command string, then the **exit** command returns the cursor to the context in which the command was initially entered.

The following is a sample configuration output.

```
A:Dut-G# configure service vpls 1
A:Dut-G>config>service>vpls# exit
A:Dut-G#
```

The **exit all** command moves the cursor all the way back to the root level.

```
A:Dut-G# configure
A:Dut-G>config# service
A:Dut-G>config>service# vpls 1
A:Dut-G>config>service>vpls# exit all
A:Dut-G#
```

Parameters

all

Keyword to exit back to the root CLI context.

help

Syntax

help

help edit

help global

help special-characters

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

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Description

This command provides a brief description of the help system. The following information is displayed:

```
Help may be requested at any point by hitting a question mark '?'.
In case of an executable node, the syntax for that node will be displayed with an
explanation of all parameters.
In case of sub-commands, a brief description is provided.
Global Commands:
Help on global commands can be observed by issuing "help globals" at any time.
Editing Commands:
Help on editing commands can be observed by issuing "help edit" at any time.
```

Parameters

edit

Keyword to display help on editing. The following output displays available editing keystrokes.

```
Delete current character.....................Ctrl-d
Delete text up to cursor.....................Ctrl-u
Delete text after cursor.....................Ctrl-k
Move to beginning of line....................Ctrl-a
Move to end of line..........................Ctrl-e
Get prior command from history...............Ctrl-p
Get next command from history................Ctrl-n
Move cursor left.............................Ctrl-b
Move cursor right............................Ctrl-f
Move back one word...........................Esc-b
Move forward one word........................Esc-f
Convert rest of word to uppercase............Esc-c
Convert rest of word to lowercase............Esc-l
Delete remainder of word.....................Esc-d
Delete word up to cursor.....................Ctrl-w
Transpose current and previous character.....Ctrl-t
Enter command and return to root prompt......Ctrl-z
Refresh input line...........................Ctrl-l
```

global

Keyword to display help on global commands.The following output displays the available global commands.

```
back            - Go back a level in the command tree
echo            - Echo the text that is typed in
exec            - Execute a file - use -echo to show the commands and
                  prompts on the screen
exit            - Exit to intermediate mode - use option all to exit to
                  root prompt
help            - Display help
history         - Show command history
info            - Display configuration for the present node
logout          - Log off this system
oam             + OAM Test Suite
ping            - Verify the reachability of a remote host
pwc             - Show the present working context
sleep           - Sleep for specified number of seconds
ssh             - SSH to a host
telnet          - Telnet to a host
traceroute      - Determine the route to a destination address
tree            - Display command tree structure from the context of
```


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```
                    execution
write           - Write text to another user
```

special-characters

Keyword to display help on special characters. Use the following CLI commands to display more information about commands and command syntax:

?

Lists all commands in the current context.

string?

Lists all commands available in the current context that start with the string.

command ?

Displays command syntax and associated keywords.

string<Tab> or string<Space>

Completes a partial command name (auto-completion) or list available commands that match the string.

history

Syntax

history

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command lists the last 30 commands entered in this session.

Re-execute a command in the history with the **!n** command, where **n** is the line number associated with the command in the history output.

For example:

```
A:ALA-1# history
  68 info
  69 exit
  70 info
  71 filter
  72 exit all
  73 configure
  74 router
  75 info
  76 interface "test"
  77 exit
  78 reduced-prompt
  79 info
```


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```
  80 interface "test"
  81 icmp unreachables exit all
  82 exit all
  83 reduced-prompt
  84 configure router
  85 interface
  86 info
  87 interface "test"
  88 info
  89 reduced-prompt
  90 exit all
  91 configure
  92 card 1
  93 card-type
  94 exit
  95 router
  96 exit
  97 history
A:ALA-1# !91
A:ALA-1# configure
A:ALA-1>config#
```

info

Syntax

info [**detail**]

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command displays the running configuration for the configuration context.

The output of this command is similar to the output of a **show config** command. This command, however, lists the configuration of the context where it is entered and all branches below that context level.

By default, the command only enters the configuration parameters that vary from the default values. The **detail** keyword causes all configuration parameters to be displayed.

Parameters

detail

Displays all configuration parameters, including parameters at their default values.

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logout

Syntax

logout

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command logs out of the router session.

When the **logout** command is issued from the console, the login prompt is displayed, and any log IDs directed to the console are discarded. When the console session resumes (regardless of the user), the log output to the console resumes.

When a Telnet session is terminated from a **logout** command, all log IDs directed to the session are removed. When a user logs back in, the log IDs must be recreated.

password

Syntax

password

Context

<ROOT>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command changes a user CLI login password.

When a user logs in after the administrator forces a **new-password-at-login,** or the password has expired (**aging**), then this command is automatically invoked.

When this command is invoked, the user is prompted to enter the old password, the new password, and the new password again to verify the correct input.

If a user fails to create a new password after the administrator forces a **new-password-at-login** or after the password has expired, the user is denied access to the CLI.

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ping

Syntax

ping {*ip-address* | *dns-name*} [**rapid** | **detail**] [**ttl** *time-to-live*] [**tos** *type-of-service*] [**size** *bytes*] [**pattern** *pattern*] [**source** *ip-address*] [**interval** *seconds*] [{**next-hop** *ip-address*} | {**interface** *interface-name*} | **bypass-routing**] [**count** *requests*] [**do-not-fragment**] [router *router-instance* | **service-name** *service-name*] [**timeout** *timeout*]

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command is the TCP/IP utility to verify IP reachability.

Parameters

ip-address* | *dns-name

Specifies the remote host to ping. The IP address or the DNS name (if DNS name resolution is configured) can be specified.

Values ipv4-address - a.b.c.d

ipv6-address - x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:x:x [-interface]

x:x:x:x:x:x:d.d.d.d

x: 0 — FFFF H

d: 0 — 255 D

rapid | detail

The **rapid** keyword specifies to send ping requests rapidly. The results are reported in a single message, not in individual messages for each ping request. By default, five ping requests are sent before the results are reported. To change the number of requests, include the **count** option.

The **detail** keyword includes in the output the interface on which the ping reply was received.

The following is a sample configuration.

```
*A:ALU-7210# ping 192.xxx.xxx.xxx
PING 192.xxx.xxx.xxx 56 data bytes
64 bytes from 192.xxx.xxx.xxx: icmp_seq=1 ttl=64 time<10ms.
64 bytes from 1192.xxx.xxx.xxx: icmp_seq=2 ttl=64 time<10ms.
64 bytes from 192.xxx.xxx.xxx: icmp_seq=3 ttl=64 time<10ms.
```


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```
64 bytes from 192.xxx.xxx.xxx: icmp_seq=4 ttl=64 time<10ms.
64 bytes from 192.xxx.xxx.xxx: icmp_seq=5 ttl=64 time<10ms.

---- 192.xxx.xxx.xxx PING Statistics ----
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min < 10ms, avg < 10ms, max < 10ms, stddev < 10ms
*A:ALU-7210#
```

ttl ***time-to-live***

Specifies the IP Time To Live (TTL) value to include in the ping request, expressed as a decimal integer.

Values 0 to128

tos ***type-of-service***

Specifies the type-of-service (TOS) bits in the IP header of the ping packets, expressed as a decimal integer.

Values 0 to 255

size ***bytes***

Specifies the size in bytes of the ping request packets.

Default 56 bytes (actually 64 bytes because 8 bytes of ICMP header data are added to the packet)

Values 0 to 65507

pattern ***pattern***

Specifies a 16-bit pattern string to include in the ping packet, expressed as a decimal integer.

Values 0 to 16384

source ***ip-address***

Specifies the source IP address to use in the ping requests in dotted-decimal notation.

Default The IP address of the egress IP interface.

Values ipv4-address - a.b.c.d

ipv6-address - x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:x:x [-interface]

x:x:x:x:x:x:d.d.d.d

x: 0 — FFFF H

d: 0 — 255 D

interval ***seconds***

Specifies the interval in seconds between consecutive ping requests, expressed as a decimal integer.

Default 1

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Values 1 to 10000

next-hop *ip-address*

This option disregards the routing table and will send this packet to the specified next hop address. This address must be on an adjacent router that is attached to a subnet that is common between this and the next-hop router.

Default per the routing table

Values ipv4-address - a.b.c.d

ipv6-address - x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x - [0..FFFF]H

d - [0..255]D

interface *interface-name*

Specifies the interface name.

bypass-routing

Keyword to send the ping request to a host on a directly attached network bypassing the routing table. The host must be on a directly attached network or an error is returned.

count *requests*

Specifies the number of ping requests to send to the remote host, expressed as a decimal integer.

Default 5

Values 1 to 10000

do-not-fragment

Specifies that the request frame should not be fragmented. This option is particularly useful in combination with the size parameter for maximum MTU determination.

router *router-instance*

Specifies the router name or service ID.

Default Base

Values *router-name*: Base, management

service-id: 1 to 2147483647

timeout *timeout*

Specifies the timeout in seconds.

Default 5

Values 1 to 10

service-name *service-name*

Specifies a unique service name, up to 64 characters to identify the service.

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Values [64 chars max]

pwc

Syntax

pwc [**previous**]

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command displays the present or previous working context of the CLI session. The **pwc** command provides a user who is in the process of dynamically configuring a chassis a way to display the current or previous working context of the CLI session. The **pwc** command displays a list of the CLI nodes that hierarchically define the current context of the CLI instance of the user.

The following is a sample configuration output.

```
A:Dut-G>config>service>vpls# pwc
------------------------------------------------------------------------------
Present Working Context :
------------------------------------------------------------------------------
 <root>
  configure
  service
  vpls 1
------------------------------------------------------------------------------
A:Dut-G>config>service>vpls#
```

When the **previous** keyword is specified, the previous context displays. This is the context entered by the CLI parser upon execution of the **exit** command. The current context of the CLI is not affected by the **pwc** command.

Parameters

previous

Keyword to display the previous present working context.

sleep

Syntax

sleep [*seconds*]

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Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command causes the console session to pause operation (sleep) for 1 second (default) or for the specified number of seconds.

Parameters

seconds

Specifies the number of seconds for the console session to sleep, expressed as a decimal integer.

Default 1

Values 1 to 100

ssh

Syntax

ssh [*ip-addr* | *dns-name* |*username@ip-addr*] [**-l** *username*] [**-v** *SSH-version*] [**router** *router-instance*| **service-name** *service-name*]

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command initiates a client Secure Shell (SSH) session with the remote host and is independent from the administrative or operational state of the SSH server. However, to be the target of an SSH session, the SSH server must be operational.

Quitting SSH while in the process of authentication is accomplished by either executing a **Ctrl-C** or "**~.**" (tilde and dot), assuming the "~" is the default escape character for SSH session.

Parameters

ip-address* | *host-name

Specifies the remote host for an SSH session. The IP address or the DNS name (if DNS name resolution is configured) can be specified.

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-l *user*

Specifies the username to use when opening the SSH session.

router *router-instance*

Specifies the router name or service ID.

Default Base

telnet

Syntax

telnet [*ip-address* | *dns-name*] [*port*] [**router** *router-instanc*e]

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command opens a Telnet session to a remote host. Telnet servers in 7210 SAS networks limit a Telnet clients to three login attempts. The Telnet server disconnects the Telnet client session after the third attempt has failed. The number of attempts for a Telnet client session is not user-configurable.

Parameters

ip-address

Specifies the IP address or the DNS name (if DNS name resolution is configured).

Values ipv4-address - a.b.c.d

ipv6-address - x:x:x:x:x:x:x:x (eight 16-bit pieces)

x:x:x:x:x:x:d.d.d.d

x: [0 .. FFFF]H

d: [0 .. 255]D

dns-name

Specifies the DNS name (if DNS name resolution is configured), up to 128 characters.

port

Specifies the TCP port number to use to Telnet to the remote host, expressed as a decimal integer.

Default 23

Values 1 to 65535

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router *router-instance*

Specifies the router name or service ID.

Values *router-name*: Base, management

service-id: 1 to 2147483647

Default Base

traceroute

Syntax

traceroute {*ip-address* | *dns-name*} [**ttl** *ttl*] [**wait** *milliseconds*] [**no-dns**] [**source** *ip-address*] [**tos** *type-of-service*] [**router** *router-instance*]

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

The TCP/IP traceroute utility determines the route to a destination address. Aborting a traceroute with the **Ctrl-C** could require issuing a second **Ctrl-C** before the prompt is returned.

The following is a sample configuration output.

```
A:ALA-1# traceroute 192.168.xx.xx4
traceroute to 192.168.xx.xx4, 30 hops max, 40 byte packets
 1  192.168.xx.xx4 0.000 ms  0.000 ms  0.000 ms
A:ALA-1#
```

Parameters

ip-address* | *dns-name

Specifies the remote address to traceroute. The IP address or the DNS name (if DNS name resolution is configured) can be specified.

Values ipv4-address - a.b.c.d

ipv6-address - x:x:x:x:x:x:x:x (eight 16-bit pieces)

x:x:x:x:x:x:d.d.d.d

x: [0 .. FFFF]H

d: [0 .. 255]D

ttl *ttl*

Specifies the maximum Time-To-Live (TTL) value to include in the traceroute request, expressed as a decimal integer.

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Values 1 to 255

wait *milliseconds*

Specifies the time in milliseconds to wait for a response to a probe, expressed as a decimal integer.

Default 5000

Values 1 to 60000

no-dns

Keyword to specify not to perform a DNS lookup for the specified host.

Default DNS lookups are performed

source *ip-address*

Specifies the source IP address to use as the source of the probe packets in dotted-decimal notation. If the IP address is not one of the device interfaces, an error is returned.

tos *type-of-service*

Specifies the type-of-service (TOS) bits in the IP header of the probe packets, expressed as a decimal integer.

Values 0 to 255

router *router-instance*

Specifies the router name or service ID.

Values *router-name*: Base, management

service-id: 1 to 2147483647

Default Base

tree

Syntax

tree [**detail**]

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command displays the command hierarchy structure from the present working context.

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Parameters

detail

Keyword to include parameter information for each command displayed in the tree output.

write

Syntax

write {*user* | **broadcast**} *message-string*

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command sends a console message to a specific user or to all users with active console sessions.

Parameters

user

Specifies the name of a user with an active console session to which to send a console message.

Values any valid CLI username

broadcast

Keyword to send the *message-string* to all users logged into the router.

message-string

Specifies the message string to send. Allowed values are any string up to 250 characters composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, and others), the entire string must be enclosed within double quotes.

2.9.2.2 CLI environment commands

alias

Syntax

alias *alias-name alias-command-line*

no alias *alias-name*

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Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command enables the substitution of a command line by an alias.

Use the **alias** command to create alternative names for an entity or command string that are r easier to remember and understand. If the string contains special characters (#, $, spaces, and others), the entire string must be enclosed within double quotes. Only a single command can be present in the command string.

The **alias** command can be entered in any context but must be created in the **environment** context.

For example, to create an alias named "soi" to display OSPF interfaces, enter:

```
alias soi "show router ospf interface"
```

Parameters

alias-name

Specifies the alias name. Do not use a valid command string for the alias. If the alias specified is an actual command, this causes the command to be replaced by the alias.

alias-command-line

Specifies the command line to be associated with the alias.

create

Syntax

[**no**] **create**

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command is required to create a new OS entity.

The **no** form of this command disables requiring the **create** keyword.

Default

create

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kernel

Syntax

kernel [**-password** *password*] [**-token** *token*]

no kernel

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command allows Nokia technical support to access the **kernel** commands. The **kernel** commands are reserved for Nokia technical support troubleshooting.

The **no** form of this command disables the **kernel** commands.

Default

no kernel

Parameters

password

The password option is not supported to access the **kernel** commands.

token

Specifies the token, up to 4096 characters, to access the **kernel** commands.

more

Syntax

[**no**] **more**

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

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Description

This command enables per-screen CLI output, meaning that the output is displayed on a screen-by-screen basis. The terminal screen length can be modified with the terminal command. The following prompt appears at the end of each screen of paginated output:

```
Press any key to continue (Q to quit)
```

The **no** form of this command displays the output all at once. If the output length is longer than one screen, the entire output will be displayed, which may scroll the screen.

Default

more

reduced-prompt

Syntax

reduced-prompt [*no of nodes in prompt*]

no reduced-prompt

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the maximum number of higher CLI context levels to display in the CLI prompt for the current CLI session. This command is useful when configuring features that are several node levels deep, causing the CLI prompt to become too long. By default, the CLI prompt displays the system name and the complete context in the CLI.

The number of nodes specified indicates the number of higher-level contexts that can be displayed in the prompt. For example, if **reduced-prompt** is set to 2, the two highest contexts from the present working context are displayed by name with the hidden (reduced) contexts compressed into a ellipsis ("…").

The following is a sample configuration output.

```
A:ALA-1>environment# reduced-prompt 2
A:ALA-1>vonfig>router# interface to-103
A:ALA-1>...router>if#
```

The setting is not saved in the configuration. It must be reset for each CLI session or stored in an **exec** script file.

The **no** form of this command reverts to the default.

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Default

no reduced-prompt

Parameters

no of nodes in prompt

Specifies the maximum number of higher-level nodes displayed by name in the prompt, expressed as a decimal integer.

Default 2

Values 0 to 15

saved-ind-prompt

Syntax

[**no**] **saved-ind-prompt**

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command enables saved indicator in the prompt. When changes are made to the configuration file a "*" appears in the prompt string indicating that the changes have not been saved. When an **admin save** command is executed, the "*" disappears.

The following is a sample configuration output.

```
*A:ALA-48# admin save
Writing file to ftp://xxx.xxx.xx.xx/./sim48/sim48-config.cfg
Saving configuration .... Completed.
A:ALA-48#
```

shell

Syntax

shell [**-password** *password*] [**-token** *token*]

no shell

Context

environment

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Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command allows Nokia technical support to access the **shell** commands. The **shell** commands are reserved for Nokia technical support troubleshooting.

The **no** form of this command disables the **shell** commands.

Default

no shell

Parameters

password

The password option is not supported to access the **shell** commands.

token

Specifies the token, up to 4096 characters, to access the **shell** commands.

terminal

Syntax

[**no**] **terminal**

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure the terminal screen length and width for the current CLI session.

length

Syntax

length *lines*

Context

environment>terminal

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command sets the terminal screen length (number of lines).

Default

24

Parameters

lines

Specifies the number of lines for the terminal screen length, expressed as a decimal integer.

Values 1 to 512

width

Syntax

width *width*

Context

environment>terminal

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command sets the terminal screen width (number of characters).

Default

80

Parameters

width

Specifies the number of characters for the terminal screen width, expressed as a decimal integer.

Values 1 to 512

time-display

Syntax

time-display {**local** | **utc**}

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Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command displays timestamps in the CLI session based on local time or Coordinated Universal Time (UTC).

The system keeps time internally in UTC and is capable of displaying the time in either UTC or local time based on the time zone configured.

This configuration command is only valid for times displayed in the current CLI session. This includes displays of event logs, traps and all other places where a timestamp is displayed.

In general all timestamps are shown in the time selected. This includes log entries destined for console/session, memory, or SNMP logs. Log files on compact flash are maintained and displayed in UTC format.

Default

time-display local — Displays time stamps based on the local time.

time-stamp

Syntax

time-stamp

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command displays timestamps in the CLI session.

2.9.2.3 Show commands

alias

Syntax

alias

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Context

<root>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command shows a list of existing aliases.

Output

The following output is an example of alias information, and Table 14: Output fields: alias describes the output fields.

Sample Output

```
A:ALA-103>config>system# show alias
===============================================================================
Alias-Name                    Alias-command-name
===============================================================================
sri                           show router interface
sse                           show service service-using epipe
ssvpls                        show service service-using vpls
ssi                           show service service-using ies
-------------------------------------------------------------------------------
Number of aliases : 5
===============================================================================
A:ALA-103>config>system#
```

Table 14: Output fields: alias

Label	Description
Alias-Name	Displays the name of the alias
Alias-command-name	The command and parameter syntax that define the alias
Number of aliases	The total number of aliases configured on the router

2.9.2.4 Monitor CLI commands

filter

Syntax

filter

Context

monitor

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Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

Commands in this context configure criteria to monitor IP and MAC filter statistics.

ip

Syntax

ip *ip-filter-id* **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context

monitor>filter

monitor>management-access-filter

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command enables IP filter monitoring. The statistical information for the specified IP filter entry is displayed at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the specified IP filter. The subsequent statistical information listed for each interval is displayed as a delta to the previous screen output.

When the keyword **rate** is specified, the rate per second for each statistic is displayed instead of the delta.

Monitor commands are similar to **show** commands, but only statistical information is displayed. Monitor commands display the selected statistics according to the configured number of times at the interval specified.

Parameters

ip-filter-id

Displays detailed information for the specified filter ID and its filter entries.

Values 1 to 65535

entry *entry-id*

Displays information on the specified filter entry ID for the specified filter ID only.

Values 1 to 65535

interval *seconds*

Specifies the interval for each display in seconds.

Default 5 seconds

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Values 3 to 60

repeat *repeat*

Specifies how many times the command is repeated.

Default 10

Values 1 to 999

absolute

Keyword to display raw statistics, without processing. No calculations are performed on the delta or rate statistics.

rate

Keyword to display the rate per second for each statistic instead of the delta.

Output

The following is output is an example of filter IP statistics.

Sample Output

```
A:ALA-1>monitor# filter ip 10 entry 1 interval 3 repeat 3 absolute
===============================================================================
Monitor statistics for IP filter 10 entry 1
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
===============================================================================
A:ALA-1>monitor#


A:ALA-1>monitor# filter ip 10 entry 1 interval 3 repeat 3 rate
===============================================================================
Monitor statistics for IP filter 10 entry 1
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Rate)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Rate)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
```


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```
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
===============================================================================
A:ALA-1>monitor#
```

ipv6

Syntax

ipv6 *ipv6-filter-id* **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context

monitor>filter

monitor>management-access-filter

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command enables IPv6 filter monitoring. The statistical information for the specified IPv6 filter entry displays at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the specified IPv6 filter. The subsequent statistical information listed for each interval is displayed as a delta to the previous display.

When the keyword **rate** is specified, the rate per second for each statistic is displayed instead of the delta.

Monitor commands are similar to **show** commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.

Parameters

iv6p-filter-id

Displays detailed information for the specified IPv6 filter ID and its filter entries.

Values 1 to 65535

entry *entry-id*

Displays information on the specified IPv6 filter entry ID for the specified filter ID only.

Values 1 to 65535

interval *seconds*

Specifies the interval for each display in seconds.

Default 10 seconds

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Values 3 to 60

repeat *repeat*

Specifies how many times the command is repeated.

Default 10

Values 1 to 999

absolute

Keyword to display the raw statistics, without processing. No calculations are performed on the delta or rate statistics.

rate

Keyword to display the rate per second for each statistic instead of the delta.

Output

The following output is an example of IPv6 filter statistics.

Sample Output

```
*A:7210SAS>monitor>filter# ipv6 10 entry 10 interval 3 repeat 3 absolute

===============================================================================
Monitor statistics for IPv6 filter 10 entry 10
===============================================================================
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Ing. Matches : 0 pkts
Egr. Matches : 0 pkts

-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches : 0 pkts
Egr. Matches : 0 pkts

-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches : 0 pkts
Egr. Matches : 0 pkts

-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches : 0 pkts
Egr. Matches : 0 pkts

===============================================================================
*A:7210SAS>monitor>filter#
```


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mac

Syntax

mac *mac-filter-id* **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context

monitor>filter

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command enables MAC filter monitoring. The statistical information for the specified MAC filter entry displays at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the specified MAC filter. The subsequent statistical information listed for each interval is displayed as a delta to the previous display.

When the keyword **rate** is specified, the rate per second for each statistic is displayed instead of the delta.

Monitor commands are similar to **show** commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.

Parameters

mac-filter-id

Specifies the MAC filter policy ID.

Values 1 to 65535

entry *entry-id*

Displays information on the specified filter entry ID for the specified filter ID only.

Values 1 to 65535

interval *seconds*

Specifies the interval for each display in seconds.

Default 5 seconds

Values 3 to 60

repeat *repeat*

Specifies how many times the command is repeated.

Default 10

Values 1 to 999

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absolute

Keyword to display the raw statistics, without processing. No calculations are performed on the delta or rate statistics.

rate

Keyword to display the rate-per-second for each statistic instead of the delta.

Output

The following output is an example of MAC filter statistics.

Sample Output

```
A:ALA-1>monitor>filter# mac 50 entry 10 interval 3 repeat 3 absolute
===============================================================================
Monitor statistics for Mac filter 50 entry 10
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
===============================================================================


A:ALA-1>monitor>filter# mac 50 entry 10 interval 3 repeat 3 rate
===============================================================================
Monitor statistics for Mac filter 50 entry 10
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Rate)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Rate)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
===============================================================================
A:ALA-1>monitor>filter#
```


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lag

Syntax

lag *lag-id* [*lag-id*...(up to 5 max)] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | *rate*]

Context

monitor

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command monitors traffic statistics for Link Aggregation Group (LAG) ports. Statistical information for the specified LAG IDs is displayed at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the specified LAG ID. The subsequent statistical information listed for each interval is displayed as a delta to the previous display.

When the keyword **rate** is specified, the rate per second for each statistic is displayed instead of the delta.

Monitor commands are similar to **rate** commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.

Parameters

lag-id

Specifies the number of the LAG.

Values 1 to 12

interval *seconds*

Specifies the interval for each display in seconds.

Default 5 seconds

Values 3 to 60

repeat *repeat*

Specifies how many times the command is repeated.

Default 10

Values 1 to 999

absolute

Keyword to display the raw statistics, without processing. No calculations are performed on the delta or rate statistics.

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rate

Keyword to display the rate per second for each statistic instead of the delta.

Output

The following output is an example of LAG statistics.

Sample Output

```
A:ALA-12# monitor lag 2
===============================================================================
Monitor statistics for LAG ID 2
===============================================================================
Port-id Input Input Output Output Input Output
Bytes Packets Bytes Packets Errors Errors
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
1/1/1 2168900 26450 64 1 0 0
1/1/2 10677318 125610 2273750 26439 0 0
1/1/3 2168490 26445 0 0 0 0
-------------------------------------------------------------------------------
Totals 15014708 178505 2273814 26440 0 0
-------------------------------------------------------------------------------
At time t = 5 sec (Mode: Delta)
-------------------------------------------------------------------------------
1/1/1 0 0 0 0 00
1/1/2 258 3 86 1 0 0
1/1/3 82 1 0 0 0 0
-------------------------------------------------------------------------------
Totals 340 4 86 1 0 0
===============================================================================
A:ALA-12#
```

management-access-filter

Syntax

management-access-filter

Context

monitor

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

Command in this context monitor management access filters. These filters are configured in the **config**>**system**>**security**>**mgmt-access-filter** context.

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port

Syntax

port *port-id* [*port-id*...(up to 5 max)] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context

monitor

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command enables port traffic monitoring. The specified ports statistical information is displayed at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the specified ports. The subsequent statistical information listed for each interval is displayed as a delta to the previous display.

When the keyword **rate** is specified, the rate per second for each statistic is displayed instead of the delta.

Monitor commands are similar to **rate** commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.

Parameters

port port-id

Specifies up to 5 port IDs.

interval *seconds*

Specifies the interval for each display in seconds.

Default 10 seconds

Values 3 to 60

repeat *repeat*

Specifies how many times the command is repeated.

Default 10

Values 1 to 999

absolute

Keyword to display the raw statistics, without processing. No calculations are performed on the delta or rate statistics.

rate

Keyword to display the rate per second for each statistic instead of the delta.

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Output

The following output is an example of port statistics.

Sample Output

```
A:ALA-12>monitor# port 1/1/4 interval 3 repeat 3 absolute
===============================================================================
Monitor statistics for Port 1/1/4
===============================================================================
                                            Input                      Output
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Octets                                          0                           0
Packets                                        39                         175
Errors                                          0                           0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Octets                                          0                           0
Packets                                        39                         175
Errors                                          0                           0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Octets                                          0                           0
Packets                                        39                         175
Errors                                          0                           0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Octets                                          0                           0
Packets                                        39                         175
Errors                                          0                           0
===============================================================================
A:ALA-12>monitor#


A:ALA-12>monitor# port 1/1/4 interval 3 repeat 3 rate
===============================================================================
Monitor statistics for Port 1/1/4
===============================================================================
                                            Input                      Output
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Octets                                          0                           0
Packets                                        39                         175
Errors                                          0                           0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Rate)
-------------------------------------------------------------------------------
Octets                                          0                           0
Packets                                         0                           0
Errors                                          0                           0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Rate)
-------------------------------------------------------------------------------
Octets                                          0                           0
Packets                                         0                           0
Errors                                          0                           0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
```


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```
-------------------------------------------------------------------------------
Octets                                          0                           0
Packets                                         0                           0
Errors                                          0                           0
===============================================================================
A:ALA-12>monitor#
```

router

Syntax

router *router-instance*

Context

monitor

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

Commands in this context configure criteria to monitor statistical information for BGP, LDP, MPLS, OSPF, and RSVP protocols.

Parameters

router-instance

Specifies the router name or service ID.

Values *router-name*: Base, management

service-id: 1 to 2147483647

Default Base

service

Syntax

service

Context

monitor

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

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Description

Commands in this context configure criteria to monitor specific service SAP criteria.

id

Syntax

id *service-id*

Context

monitor>service

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command displays statistics for a specific service, specified by the *service-id*, at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the *service-id*. The subsequent statistical information listed for each interval is displayed as a delta to the previous display.

When the keyword **rate** is specified, the "rate per second" for each statistic is displayed instead of the delta.

Monitor commands are similar to **rate** commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.

Parameters

service-id

Specifies the unique service identification number of the service in the service domain.

sap

Syntax

sap *sap-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context

monitor>service>id

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

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Description

This command monitors statistics for a SAP associated with this service.

This command displays statistics for a specific SAP, identified by the *port-id* and encapsulation value, at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the SAP. The subsequent statistical information listed for each interval is displayed as a delta to the previous display. When the keyword **rate** is specified, the rate per second for each statistic is displayed instead of the delta.

Monitor commands are similar to **rate** commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.

Parameters

sap-id

Specifies the physical port identifier portion of the SAP definition.

Values *sap-id*: null [port-id | lag-id]
dot1q [*port-id* | *lag-id*]:* | *qtag*
qinq [*port-id* | *lag-id*]:qtag1.qtag2
port-id *slot/mda/port*
lag-id *lag-id*
lag keyword
id 1 to 200
qtag1 0 to 4094
qtag2 *, 0 to 4094
dlci 16 to 022

port-id

Specifies the physical port ID in the *slot/mda/port* format.

If the card in the slot has Media Dependent Adapters (MDAs) installed, the *port-id* must be in the *slot_number/MDA_number/port_number* format. For example 1/2/3 specifies port 3 on MDA 2 in slot 1.

qtag1, qtag2

Specifies the encapsulation value used to identify the SAP on the port or sub-port. If this parameter is not specifically defined, the default value is 0.

The values depends on the encapsulation type configured for the interface. The following table describes the allowed values for the port and encapsulation types.

Table 15: Allowed values for port and encapsulation types

Port type	Encap-type	Allowed values	Comments
Ethernet	Null	0	The SAP is identified by the port.

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Port type	Encap-type	Allowed values	Comments
Ethernet	Dot1q	0 to 4094	The SAP is identified by the 802.1Q tag on the port. A 0 qtag1 value also accepts untagged packets on the dot1q port.
Ethernet	QinQ	qtag1: 0 to 4094 qtag2: 0 to 4094	The SAP is identified by two 802.1Q tags on the port. A 0 qtag1 value also accepts untagged packets on the dot1q port.

Values qtag1: 0 to 4094
qtag2 : * | 0 to 4094

interval ***seconds***

Specifies the interval for each display in seconds.

Default 11 seconds

Values 11 to 60

repeat ***repeat***

Specifies how many times the command is repeated.

Default 10

Values 1 to 999

absolute

Keyword to display the absolute rate-per-second value for each statistic.

rate

Keyword to display the rate per second for each statistic instead of the delta.

sdp

Syntax

sdp {*sdp-id* | **far-end** *ip-address*} [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context

monitor>service>id service-id

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command monitors statistics for a SDP binding associated with this service.

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Parameters

sdp-id

Specifies the SDP identifier.

Values 1 to 17407

absolute

Keyword to display the absolute rate per second value for each statistic.

far-end *ip-address*

Specifies the system address of the far-end 7210 SAS for the SDP in dotted-decimal notation.

interval *seconds*

Specifies the interval for each display, in seconds.

Default 11 seconds

Values 11 to 60

rate

Keyword to display the rate per second for each statistic instead of the delta.

repeat *repeat*

Specifies how many times the command is repeated.

Default 10

Values 1 to 999

Output

The following output is an example of SDP statistics.

Sample Output

```
A:ALA-12# monitor service id 100 sdp 10 repeat 3
===============================================================================
Monitor statistics for Service 100 SDP binding 10
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
I. Fwd. Pkts. : 0 I. Dro. Pkts. : 0
E. Fwd. Pkts. : 0 E. Fwd. Octets : 0
-------------------------------------------------------------------------------
At time t = 11 sec (Mode: Delta)
-------------------------------------------------------------------------------
I. Fwd. Pkts. : 0 I. Dro. Pkts. : 0
E. Fwd. Pkts. : 0 E. Fwd. Octets : 0
-------------------------------------------------------------------------------
At time t = 22 sec (Mode: Delta)
-------------------------------------------------------------------------------
I. Fwd. Pkts. : 0 I. Dro. Pkts. : 0
E. Fwd. Pkts. : 0 E. Fwd. Octets : 0
-------------------------------------------------------------------------------
At time t = 33 sec (Mode: Delta)
-------------------------------------------------------------------------
```


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```
I. Fwd. Pkts. : 0 I. Dro. Pkts. : 0
E. Fwd. Pkts. : 0 E. Fwd. Octets : 0
===============================================================================
```


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3 File system management

This chapter describes the file system management.

3.1 The file system

The 7210 SAS file system is used to store files used and generated by the system, for example, image files, configuration files, logging files, and accounting files.

The **file** commands allow you to copy, create, move, and delete files and directories, navigate to a different directory, display file or directory contents and the image version.

3.1.1 Compact flash devices

The file system is based on a DOS file system. The 7210 SAS devices provide several storage options, including internal flash and USB.

The following compact flash devices are supported:

- internal non-removable flash, `cf1:\`
- external removable compact flash or external removable SD card, `cf2:\`
- external USB slot, `uf1:\`

The device names are relative device names in that they refer to the devices local to the control processor running the current console session. As in the DOS file system, the colon (":") at the end of the name indicates it is a device.

The following table lists the storage locations available on specific 7210 SAS platforms.

Table 16: Storage locations on 7210 SAS platforms

7210 SAS platforms	Storage locations		
	cf1:\	cf2:\	uf1:\
7210 SAS-Mxp	✓	✓[9]	✓
7210 SAS-R6	✓	✓[9]	✓
7210 SAS-R12	✓	✓[9]	✓
7210 SAS-S 1/10GE	✓	✓[10]	

9 external removable compact flash

10 external removable SD card

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7210 SAS platforms	Storage locations		
	cf1:\	cf2:\	uf1:\
7210 SAS-Sx 1/10GE	✓	✓[10]	✓
7210 SAS-Sx 10/100GE	✓	✓[10]	✓
7210 SAS-T	✓	✓[9]	✓

In addition to user-added files and directories, the number of files in the root directory can also increment when the **admin save** or **bof save** commands are issued. The system enforces a threshold limit of 80 entries (files and directories) for contents of the root directory on `cf1:\`; there is no restriction on the number of files and directories that you can add in the subdirectories. A trap (tmnxRootDirFull) is generated if the threshold limit is exceeded, and a warning is generated for each new file or directory created in the root directory on `cf1:\` after the threshold limit is exceeded.

Note:
User intervention is required when the system displays the threshold exceeded event (tmnxRootDirFull). You are required to clean the root directory on `cf1:\` and ensure that the number of entries (files or directories) is below the enforced threshold limit of 80 entries. Remove unnecessary files and directories from the root directory or move them to a subdirectory that you have created under the root directory. The system does not generate a warning when the number of files and directories is reduced below the threshold limit.

Use the **file dir cf1:** command to determine the number of entries (files or directories) in the root directory. For example, in the following listing, the total number of entries in the root directory (file and directories) is 14 files + 2 directories = 16.

Example

```
*A:7210-SAS #

*A:7210-SAS #file dir

 Volume in drive cf1 on slot A is /flash.

 Volume in drive cf1 on slot A is formatted as FAT32.

Directory of cf1:\

10/12/2011  10:37p             4248394 boot.tim
10/17/2011  07:28a                 524 sasm.sdx
10/26/2011  10:06p                 828 bof.cfg
10/27/2011  09:04p      <DIR>          act-collect
10/27/2011  09:06p      <DIR>          act
10/17/2011  07:30a                   0 test1.txt
10/26/2011  10:43p                5360 sasm.cfg
10/11/2011  06:42a            28821599 both.tim
10/26/2011  10:42p               14597 bootlog.txt
10/19/2011  04:22a                 832 bof.cfg.1
10/17/2011  07:37a                 827 test1
10/17/2011  07:38a                 827 tes2
10/17/2011  07:38a                 827 tes3
10/17/2011  07:39a                 827 tes3567
10/17/2011  07:38a                 827 tes356
```


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```
10/18/2011  10:46p                5481 sasm.cfg.1

              14 File(s)              33117369 bytes.
               2 Dir(s)               80470016 bytes free.

*A:7210-SAS #
```

3.1.2 USB storage device

The 7210 SAS platform supports the use of the USB interface as an alternate storage location that provides a larger storage capacity than the internal flash. You can use a USB storage device to store TiMOS images, configuration files, accounting records, and log files. The BOF can point to images on the USB and you can use the USB to load TiMOS images and configuration files.

The following guidelines and caveats apply to the use of USB storage devices:

- The option to load the boot loader (`boot.tim`) from a USB storage device is supported on all platforms as described in this document.
- USB ports are supported on all 7210 SAS platforms as described in this document, except 7210 SAS-S 1/10GE.
- See the *7210 SAS Software Release Notes 26.x.Rx* for a list of USB devices and capacities that are supported on the 7210 SAS.
- When a USB device is unplugged or removed from the system, a major alarm is raised. The alarm can be cleared using the **shutdown** command.
- The 7210 SAS auto detects the device type when any supported device is connected to the USB interface. Only approved USB mass storage device and optical clip-on devices plugged in to the USB port are recognized as valid devices. The use of unsupported devices generates error logs.
- Nokia recommends that the user should run the **shutdown** command before removing the USB storage device.

3.1.3 Storage locations for accounting, logs, index file, and images

The default location for accounting records, logs, and others is set to point to `cf1:\`.

Note:
Nokia recommends you should not store frequently written objects such as accounting records, system logs, and others on the internal flash (`cf1:\`), as it is non-replaceable. to store only systems images, configuration files, persistence database, `nvsys.info`, and QoS SAP resource map (the sdx file). Use the external flash (`cf2:\`) or use `uf1:\` to store frequently written objects (as applicable).

The following applies to storage locations on 7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-R6, and 7210 SAS-R12 platforms:

- On the 7210 SAS-T, 7210 SAS-R6, and 7210 SAS-R12, the default location for accounting records and logs is set to `cf1:\`. The user can change it to either `cf2:\` or `uf1:\`.
- If the license is purchased for the 7210 SAS-T and 7210 SAS-Mxp, these platforms are factory-shipped with the `boot.tim` and the BOF on `cf1:\`. Nokia recommends that you should not move these files from `cf1:\` on these platforms.

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- If the license is purchased for the 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-R6, and 7210 SAS-R12, these platforms are factory-shipped with the `boot.tim` and starter BOF on `cf2:\`. The user can choose to copy these files to the internal flash `cf1:\`, if need be.
- The `boot.tim` and BOF can be stored on one of these locations: `cf1:\` or `cf2:\` or `uf1:\`. The `bof.cfg` is stored in the same location as the boot loader (`boot.tim`) used to boot the system. For example, if the boot loader (boot.tim) on `cf2:\` is used to boot the system, the BOF created during auto-init or manual intervention during first-time boot will be created on `cf2:\` and used subsequently.
- TiMOS images (`both.tim`) can be stored in one of these locations: `cf1:\` or `cf2:\` or `uf1:\`, with appropriate configuration of the BOF (that is, primary, secondary, and tertiary locations pointing to the appropriate place).
- The ndx and sdx files are generated at the location specified in the BOF parameter of the configuration file. If the user does not specify the location in the BOF, the ndx and sdx files are in the same location as the default configuration file. The default configuration file is created in the same location as the TiMOS image used to boot the system. For example, if no configuration file location is specified in the BOF and the TiMOS image (`both.tim`) located in `uf1:\` is used to boot the system, the default configuration file, the index file, the sdx file, and `nvsys.info` file created on `uf1:\` and used subsequently. If the user specifies `cf2:\` as the location of the configuration file in the BOF, the configuration file, the index file, the sdx file, and `nvsys.info` file are created on `cf2:\` and used subsequently.

For more information about the use of storage locations on 7210 SAS-R6 and 7210 SAS-R12 when using redundant CPM configuration, see Configuration guidelines for synchronization of active and standby CPM on 7210 SAS-R6 and 7210 SAS-R12.

3.1.4 Configuration guidelines for storing the TiMOS, boot.tim, bof.cfg, ndx, sdx, and nvsys.info file

The following are configuration guidelines for storing files:

- Store the `boot.tim` and `bof.cfg` on `cf1:\`. Create a backup of the `boot.tim` and `bof.cfg` on `cf2:\` or `uf1:\`.
- Store the `both.tim`, configuration file (and as a result, the ndx, sdx, and `nvsys.info`) on `cf2:\` . Create regular backups of these files in one of the following locations: `cf2:\` or `uf1:\` or create a backup on SAM (Service Access Manager) or the network management station.

3.1.5 URLs

The arguments for the 7210 SAS file commands are modeled after standard universal resource locator (URL). A URL refers to a file (a *file-url*) or a directory (a *directory-url*).

7210 SAS OS supports operations on both the local file system and on remote files. For the purposes of categorizing the applicability of commands to local and remote file operations, URLs are divided into three types: **local**, **ftp**, **sftp**, and **tftp**. The syntax for each of the URL types is listed in the following table.

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Table 17: URL types and syntax

URL type	Syntax	Notes
local-url	[*cflash-id*:\]*path* [*usb-flash-id*:\] *path*	*cflash-id* is the compact flash device name. Values: cf1: *usb-flash-id* is the USB device name. Values: uf1:
ftp-url	**ftp://**[*username*[:*password*]@]*host*/*path*	An absolute FTP path from the root of the remote file system. Where: *username* is the FTP username *password* is the FTP user password *host* is the remote host *path* is the path to the directory or file
	ftp://[*username*[:*password*]@]*host*/./*path*	A relative FTP path from the user's home directory. Note the period and slash ("./") in this syntax compared to the absolute path.
sftp-url	**sftp://**[*username*[:*password*]@]*host*/*path*	An absolute SFTP path from the root of the remote file system. Where: *username* is the SFTP username *password* is the SFTP user password *host* is the SFTP server *path* is the path to the directory or file
	sftp://[*username*[:*password*]@]*host*/./*path*	A relative SFTP path from the user's home directory. Note the period and slash ("./") in this syntax compared to the absolute path.
tftp-url	**tftp://***host*[/*path*]/*filename*	TFTP is only supported for operations on file URLs.

All the commands can operate on the local file system. The following table describes which commands also support remote file operations.

Table 18: File command local and remote file system support

Command	local-url	ftp-url	sftp-url	tftp-url
attrib	✓			
cd	✓	✓	✓	
copy	✓	✓	✓	✓

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Command	local-url	ftp-url	sftp-url	tftp-url
checksum	✓	✓	✓	✓
delete	✓	✓	✓	
dir	✓	✓	✓	
md		✓	✓	
move	✓	✓	✓	
rd		✓	✓	
type	✓	✓	✓	✓
version	✓	✓	✓	✓

The system accepts either forward slash ("/") or backslash ("\") characters to delimit directories and filenames in URLs. Similarly, the SFTP client application on the 7210 SAS can use either slash or backslash characters, but not all SFTP clients treat backslash characters as equivalent to slash characters. In particular, UNIX systems will often times interpret the backslash character as an "escape" character. This can cause problems when using an external SFTP client application to send files to the SFTP server. If the external system treats the backslash like an escape character, the backslash delimiter will get stripped by the parser and will not be transmitted to the SFTP server.

For example, a destination directory specified as "cf1:\dir1\file1" will be transmitted to the SFTP server as "cf1:dir1file1" where the backslash escape characters are stripped by the SFTP client system before transmission. On systems where the client treats the backslash like an "escape" character, a double backslash "\\" or the forward slash "/" can typically be used to correctly delimit directories and the filename.

3.1.6 Wildcards

7210 SAS supports the standard DOS wildcard characters. The asterisk (*) can represent zero or more characters in a string of characters, and the question mark (?) can represent any one character.

Example

```
A:ALA-1>file cf1:\ # copy test*.cfg siliconvalley
 cf1:\testfile.cfg
 1 file(s) copied.
 A:ALA-1>file cf1:\ # cd siliconvalley
 A:ALA-1>file cf1:\siliconvalley\ # dir
  Volume in drive cf1 on slot A has no label.
 Directory of cf1:\siliconvalley\
 05/10/2006 11:32p      <DIR>          .
 05/10/2006 11:14p      <DIR>          ..
 05/10/2006 11:32p                7597 testfile.cfg
   1 File(s)                 7597 bytes.
   2 Dir(s)                1082368 bytes free.
 A:ALA-1>file cf1:\siliconvalley\ #
```


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3.2 File management tasks

This section describes system file management tasks including copying, moving, displaying and deleting files; modifying file attributes; and creating, displaying, and deleting directories.

Note:
When a file system operation is performed with a command that can potentially delete or overwrite a file system entry (such as the **copy**, **delete**, **move**, **rd**, or **scp** command), a prompt appears to confirm the action. The **force** keyword performs these file management operations without displaying the confirmation prompt.

3.2.1 Modifying file attributes

The system administrator can change the read-only attribute in the local file. Enter the **attrib** command with no options to display the contents of the directory and the file attributes.

Use the following CLI syntax to modify file attributes:

```
file>
    attrib [+r | -r] file-url
```

Example: Command syntax usage

```
# file
 file cf1:\ # attrib
 file cf1:\ # attrib +r BOF.SAV
 file cf1:\ # attrib
```

Note:
In the preceding example, instead of `cf1:\` user can specify `uf1:\` to manage the file attributes of the file located on the USB drive.

Example: File configuration

```
A:ALA-1>file cf1:\ # attrib
cf1:\bootlog.txt
cf1:\bof.cfg
cf1:\boot.ldr
cf1:\bootlog_prev.txt
cf1:\BOF.SAV
A:ALA-1>file cf1:\ # attrib +r BOF.SAV

A:ALA-1>file cf1:\ # attrib
cf1:\bootlog.txt
cf1:\bof.cfg
cf1:\boot.ldr
cf1:\bootlog_prev.txt
R cf1:\BOF.SAV
```


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3.2.2 Creating directories

Use the **md** command to create a new directory in the local file system, one level at a time.

Enter the **cd** command to navigate to different directories.

Use the following CLI syntax to create a new directory:

```
file>
    md file-url
```

Example: Command syntax usage

```
file cf1:\ # md test1
 file cf1:\ # cd test1
 file cf1:\test1\ # md test2
 file cf1:\test1\ # cd test2
 file cf1:\test1\test2\ # md test3
 file cf1:\test1\test2\ # cd test3
 file cf1:\test1\test2\test3 #
```

3.2.3 Copying files

Use the **copy** command to upload or download an image file, configuration file, or other file types to or from a flash card or a TFTP server.

The **scp** command copies files between hosts on a network. It uses SSH for data transfer, and uses the same authentication and provides the same security as SSH.

The source file for the **scp** command must be local. The file must reside on the router. The destination file has to be of the format: user@host:file-name. The destination does not need to be local.

Use the following CLI syntax to copy files:

```
file>
    copy source-file-url dest-file-url [force]
    scp local-file-url destination-file-url [router router name | service-id] [force]
```

Example: Command syntax usage

```
Example: A:ALA-1>file cf1:\ # copy 104.cfg cf1:\test1\test2\test3\test.cfg
A:ALA-1>file cf1:\ # scp file1 admin@192.168.x.x:cf1:\file1
A:ALA-1>file cf1:\ # scp file2 user2@192.168.x.x:/user2/file2
A:ALA-1>file cf1:\ # scp cf1:/file3 admin@192.168.x.x:cf1:\file3
```

3.2.4 Moving files

Use the **move** command to move a file or directory from one location to another.

Use the following CLI syntax to move files:

```
file>
    move old-file-url new-file-url [force]
```


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Example: Command syntax usage

```
Example: A:ALA-1>file cf1:\test1\test2\test3\ # move test.cfg cf1:\test1
cf1:\test1\test2\test3\test.cfg
A:ALA-1>file cf1:\test1\test2\test3\ # cd ..
A:ALA-1>file cf1:\test1\test2\ # cd ..
A:ALA-1>file cf1:\test1\ # dir

Directory of cf1:\test1\
05/04/2006 07:58a      <DIR>          .
05/04/2006 07:06a      <DIR>          ..
05/04/2006 07:06a      <DIR>          test2
05/04/2006 07:58a                25278 test.cfg
 1 File(s)                 25278 bytes.
 3 Dir(s)                1056256 bytes free.
A:ALA-1>file cf1:\test1\ #
```

3.2.5 Removing files and deleting directories

Use the **delete** and **rd** commands to delete files and remove directories. Directories must be empty before they can be removed. When file or directories are deleted they cannot be recovered.

Use the following CLI syntax to delete files and remove directories:

```
file>
    delete file-url [force]
    rd file-url [force]
```

Example: Command syntax usage

```
A:ALA-1>file cf1:\test1\ # delete test.cfg
A:ALA-1>file cf1:\test1\ # delete abc.cfg
A:ALA-1>file cf1:\test1\test2\ # cd test3
A:ALA-1>file cf1:\test1\test2\test3\ # cd ..
A:ALA-1>file cf1:\test1\test2\ # rd test3
A:ALA-1>file cf1:\test1\test2\ # cd ..
A:ALA-1>file cf1:\test1\ # rd test2
A:ALA-1>file cf1:\test1\ # cd ..
A:ALA-1>file cf1:\ # rd test1
A:ALA-1>file cf1:\ #
```

3.2.6 Displaying directory and file information

Use the **dir** command to display a list of files on a file system. Use the **type** command to display the contents of a file. Use the **version** command to display the version of a `cpm.tim` or `iom.tim` file.

Use the following CLI syntax to display directory and file information:

```
file>
    dir [file-url]
    type file-url
    version file-url
```


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Example: Command syntax usage

```
*A:card-1>file cf1:\ # dir
  Volume in drive cf1 on slot A is /flash.

  Volume in drive cf1 on slot A is formatted as FAT32.

Directory of cf1:\

10/22/2008  10:30a               8849 bootlog.txt
10/22/2008  10:30a                733 bof.cfg
10/22/2008  10:29a               5531 bootlog_prev.txt
02/01/2001  09:25a            3528373 boot.tim
02/01/2001  09:21a               4860 config.cfg
10/22/2008  11:07a      <DIR>         test1
10/17/2008  07:32p                724 env.cfg
10/15/2008  03:38p               9499 snake.cfg
```

3.3 File command reference

- Command hierarchy
- Command descriptions

3.3.1 Command hierarchy

3.3.1.1 Configuration commands

```
file
    - attrib [+r | -r] file-url
    - attrib
    - cd [file-url]
    - checksum {md5 | sha256} file-url [router router-instance]
    - copy source-file-url dest-file-url [force]
    - delete file-url [force]
    - dir [file-url] [sort-order {d | n | s}] [reverse]
    - format cflash cflash-id
    - md file-url
    - move old-file-url new-file-url [force]
    - rd file-url rf [force]
    - repair [cflash-id]
    - scp local-file-url destination-file-url [router router-instance] [force]
    - [no] shutdown [active] [standby]
    - [no] shutdown cflash-id
    - type file-url
    - version file-url [check]
```


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3.3.2 Command descriptions

3.3.2.1 Configuration commands

- File system commands
- File commands

3.3.2.1.1 File system commands

shutdown

Syntax

[**no**] **shutdown** [*cflash-id*]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command disables the drive. This command is available for use only with removable storage drives. The removable storage drives differ among the 7210 SAS platforms. It cannot be used with the internal non-removable compact flash.

The **no** form of this command enables the drive.

Default

no shutdown

Parameters

cflash-id

Specifies the device identifier.

Values cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

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3.3.2.1.2 File commands

attrib

Syntax

attrib [**+r** | **-r**] *file-url*

attrib

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command sets or resets the read-only attribute for a file in the local file system. To list all files and their current attributes enter `attrib` or `attrib x` where x is either the filename or a wild-card (*).

When an **attrib** command is entered to list a specific file or all files in a directory, the file's attributes are displayed with or without an "R" preceding the filename. The "R" implies that the **+r** is set and that the file is read-only. Files without the "R" designation implies that the **-r** is set and that the file is read-write-all.

Parameters

file-url

Specifies the URL for the local file.

+r Sets the read-only attribute on the specified file.

-r Clears/resets the read-only attribute on the specified file.

Values

file-url — *local-url* | *remote-url*

local-url — [*cflash-id*/ | *usb-flash-id*] [*file-path*]

remote-url — [{ftp:// | tftp://} *login:pswd@remote-locn*/] [*file- path*]

remote-locn — [hostname | ipv4-address | ipv6-address]

ipv4-address — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — a string up to 32, for link local addresses

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cflash-id or usb-flash-id — cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

+r

Keyword to set the read-only attribute on the specified file.

-r

Keyword to reset the read-only attribute on the specified file.

cd

Syntax

cd [*file-url*]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command displays or changes the current working directory in the local file system.

Parameters

file-url

Specifies the URL or filename.

Values

file-url — *local-url* | *remote-url*

local-url — [*cflash-id*/ | *usb-flash-id*] [*file-path*]

remote-url — [{ftp | tftp | sftp}://} *login:pswd@remote-locn*/] [*file- path*]

remote-locn — [hostname | ipv4-address | ipv6-address]

ipv4-address — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x — 0 to FFFF (hexadecimal)

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d — 0 to 255 (decimal)

interface — a string up to 32, for link local addresses

cflash-id or usb-flash-id — cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

none

Displays the current working directory.

..

Specifies the parent directory. This can be used in place of an actual directory name in a *directory-url*.

directory-url

Specifies the destination directory.

checksum

Syntax

checksum {**md5** | **sha256**} *file-url* [**router** *router-instance*]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command computes and displays a checksum for a file.

Parameters

md5

Keyword to specify the use of the MD5 algorithm to produce the file checksum.

sha256

Keyword to specify the use of the SHA-256 algorithm to produce the file checksum.

file-url

Specifies the location of the file.

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Values

local-url	[*cflash-id/*][*file-path*] up to 200 characters, including cflash-id directory length 99 chars max each
remote-url	[{ftp | tftp | sftp}://*login*:*pswd@remote-locn*/][*file-path*]
	up to 247 characters
	directory length up to 199 characters
remote-locn	[*hostname* | *ipv4-address* | [*ipv6-address*]]
ipv4-address	*a.b.c.d*
ipv6-address	*x:x:x:x:x:x:x:x*[*-interface*]
	x:x:x:x:x:x:d.d.d.d[*-interface*]
	x - [0 to FFFF]H
	d - [0 to 255]D
	interface - up to 32 characters, for link local addresses
cflash-id	cf1: | cf2:

router-instance

Specifies the router name or the service ID.

Values

router-instance:	*router-name* | *service-id*
router-name:	"Base" | "management" | "vpls-management"
vprn-svc-id:	1 to 2147483647

copy

Syntax

copy *source-file-url dest-file-url* [**force**]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command copies a file or all files in a directory from a source URL to a destination URL. At least one of the specified URLs should be a local URL. The optional wild-card (*) can be used to copy multiple

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files that share a common (partial) prefix and/or (partial) suffix. When a file is copied to a destination with the same file name, the original file is overwritten by the new file specified in the operation. The following prompt appears if the destination file already exists:

"Overwrite destination file (y/n)?"

For example:

To copy a file named `srcfile` in a directory called `test` on `cf1` to a file called `destfile` in a directory called `production` on `cf1`, the syntax is:

```
sr1>file cf1:\ # copy cf2-/test/srcfile/production/destfile
```

To FTP a file named `121201.cfg` in directory `mydir` stored on `cf1` to a network FTP server with IP address 192.0.2.79 in a directory called `backup` with a destination file name of `121201.cfg,` the FTP syntax is:

```
copy /mydir/121201.cfg 192.0.2.79/backup/121201.cfg
```

Parameters

source-file-url

Specifies the location of the source file or directory to be copied.

dest-file-url

Specifies the destination of the copied file or directory.

Values

file-url — *local-url* | *remote-url*

local-url — [*cflash-id*/ | *usb-flash-id*] [*file-path*]

remote-url — [{ftp | tftp | sftp}://} *login:pswd@remote-locn*/] [*file- path*]

remote-locn — [hostname | ipv4-address | ipv6-address]

ipv4-address — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — a string up to 32, for link local addresses

cflash-id or usb-flash-id — cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

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force

Keyword to force an immediate copy of the specified file(s).

file copy force

Keyword to execute the command without displaying a user prompt message.

delete

Syntax

delete *file-url* [**force**]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command deletes the specified file.

The optional wild-card "*" can be used to delete multiple files that share a common (partial) prefix and/or (partial) suffix. When the wild-card is entered, the following prompt displays for each file that matches the wild-card:

"Delete file <filename> (y/n)?"

Parameters

file-url

Specifies the URL or filename.

Values

file-url — *local-url* | *remote-url*

local-url — [*cflash-id*/ | *usb-flash-id*] [*file-path*]

remote-url — [{ftp | sftp}:// *login:pswd@remote-locn*/] [*file- path*]

remote-locn — [hostname | ipv4-address | ipv6-address]

ipv4-address — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — a string up to 32, for link local addresses

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cflash-id or usb-flash-id — cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

force

Keyword to force an immediate deletion of the specified file.

The **file delete * force** command deletes all the wildcard matching files without displaying a user prompt message.

dir

Syntax

dir [*file-url*] [**sort-order** {**d** | **n** | **s**}] [**reverse**]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command displays a list of files and subdirectories in a directory.

Parameters

file-url

Specifies the URL or filename. Use the *file-url* with the optional wildcard (*) to reduce the number of files to list.

Values

file-url — *local-url* | *remote-url*

local-url — [*cflash-id*/ | *usb-flash-id*] [*file-path*]

remote-url — [{ftp | sftp}:// *login:pswd@remote-locn*/] [*file- path*]

remote-locn — [hostname | ipv4-address | ipv6-address]

ipv4-address — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x — 0 to FFFF (hexadecimal)

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d — 0 to 255 (decimal)

interface — a string up to 32, for link local addresses

cflash-id or usb-flash-id — cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

sort-order {d | n | s}

Specifies the sort order.

Values d — date

n — name

s — size

reverse

Specifies to reverse the sort order.

Default lists all files in the present working directory

file

Syntax

file

Context

<root>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command enables access to the context to enter and perform file system operations. When entering the **file** context, the prompt changes to reflect the present working directory. Navigating the file system with the **cd** command results in a changed prompt.

The **exit all** command leaves the file system/file operation context and returns to the <root> CLI context. The state of the present working directory is maintained for the CLI session. Entering the **file** command returns the cursor to the working directory where the **exit** command was issued.

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format

Syntax

format cflash *cflash-id*

Context

root>file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command formats the compact flash. The compact flash must be shutdown before starting the format.

Parameters

cflash-id

Specifies the compact flash type.

Values	cflash-id	cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)
		cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)
		cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

md

Syntax

md *file-url*

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

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Description

This command creates a new directory in a file system.

Directories can only be created one level at a time.

Parameters

file-url

Specifies the URL or filename.

Values

file-url — *local-url* | *remote-url*

local-url — [*cflash-id/* | *usb-flash-id*] [*file-path*]

remote-url — [{ftp | sftp}:// *login:pswd@remote-locn/*] [*file- path*]

remote-locn — [hostname | ipv4-address | ipv6-address]

ipv4-address — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — a string up to 32, for link local addresses

cflash-id or usb-flash-id — cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

move

Syntax

move *old-file-url new-file-url* [**force**]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

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Description

This command moves a local file, system file, or a directory. If the target already exists, the command fails and an error message displays.

Parameters

old-file-url new-file url

Specifies the file or directory to be moved and the new destination to place the old file URL.

Values

file-url — *local-url* | *remote-url*

local-url — [*cflash-id*/ | *usb-flash-id*] [*file-path*]

remote-url — [{ftp | sftp}:// *login:pswd@remote-locn*/] [*file- path*]

remote-locn — [hostname | ipv4-address | ipv6-address]

ipv4-address — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — a string up to 32, for link local addresses

cflash-id or usb-flash-id — cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

force

Keyword to force an immediate move of the specified file. The **file move force** command is executed without displaying a user prompt message.

rd

Syntax

rd *file-url* rf [**force**]

Context

file

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Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

The rd command is used to delete a directory.

If a directory has files and no sub-directories, the force option must be used to force delete the directory and files it contains.

Parameters

file-url

Specifies the directory to be removed.

Values

file-url — *local-url* | *remote-url*

local-url — [*cflash-id*/ | *usb-flash-id*] [*file-path*]

remote-url — [{ftp | sftp}:// *login:pswd@remote-locn*/] [*file- path*]

remote-locn — [hostname | ipv4-address | ipv6-address]

ipv4-address — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — a string up to 32, for link local addresses

cflash-id or usb-flash-id — cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

rf

Keyword to force a recursive delete.

force

Keyword to force an immediate deletion of the specified directory.

The **rd** *file-url* **force** command is executed without displaying a user prompt message.

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repair

Syntax

repair [*cflash-id*]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command checks a compact flash device for errors and repairs any errors found.

Parameters

cflash-id

Specifies the compact flash slot ID to be shutdown or enabled. If no *cflash-id* is specified, the drive referred to by the current working directory is assumed.

Values cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

scp

Syntax

scp *local-file-url destination-file-url* [**router** *router-instance*] [**force**]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command copies a local file to a remote host file system. It uses `ssh` for data transfer, and uses the same authentication and provides the same security as `ssh`. The following prompt appears:

"Are you sure (y/n)?" The destination must specify a user and a host.

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Parameters

local-file-url

Specifies the local source file or directory.

Values *local-file-url* **—** **[***cflash-id/***]** **[***file-path***]**

cflash-id or *usb-flash-id* — cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

destination-file-url

Specifies the destination file.

user

Specifies the SSH user.

host

Specifies the remote host IP address of DNS name.

file-path

Specifies the destination path.

router-instance

Specifies the router name or service ID.

Values *router-instance* — *user@hostname*:*file-path*] | *router-name*

user — up to 32 characters

hostname — [*dns-name* | *ipv4-address* | *ipv6-address*]

ipv4-address — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — up to 32 characters max, for link local addresses

dns-name — up to 128 characters

file-path — up to 200 characters

directory length, up to 99 characters each

router-name: Base, Management

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Default - Base

force

Keyword to force an immediate copy of the specified file.The **file scp** *local-file-url destination-file-url* [**router**] **force** command executes without displaying a user prompt message.

type

Syntax

type *file-url*

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command displays the contents of a text file.

Parameters

file-url

Specifies the file name of the target file.

Values

file-url — *local-url* | *remote-url*

local-url — [*cflash-id/* | *usb-flash-id*] [*file-path*]

remote-url —[{ftp | tftp | sftp}:// *login:pswd@remote-locn/*] [*file- path*]

remote-locn — [hostname | ipv4-address | ipv6-address]

ipv4-address — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — a string up to 32, for link local addresses

cflash-id or usb-flash-id — cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

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cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

version

Syntax

version *file-url* [**check**]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command displays the version of a -TiMOS file.

Note:
This command is not supported when **sftp** is used in the URL string to specify a remote location.

Parameters

file-url

Specifies the file name of the target file.

Values

file-url — *local-url* | *remote-url*

local-url — [*cflash-id/* | *usb-flash-id*] [*file-path*]

remote-url —[{ftp | tftp | sftp}://*login:pswd@remote-locn/*] [*file- path*]

remote-locn — [hostname | ipv4-address | ipv6-address]

ipv4-address — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x[-interface]

x:x:x:x:x:x:d.d.d.d[-interface]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — a string up to 32, for link local addresses

cflash-id or usb-flash-id — cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

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cf1:, cf2: (7210 SAS-Sx 1/10GE: standalone and standalone-VC)

check

Keyword to validates the `.tim` file.

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4 Boot options

This chapter provides information about configuring boot option parameters.

4.1 System initialization

When the 7210 SAS device is powered on, the system executes the `boot.tim` file (also known as the boot loader or the bootstrap image) from the file system located on one of the storage media available on the 7210 SAS platform. The `boot.tim` file is the image that reads and executes the system initialization commands configured in the Boot Option File (BOF).

Note:
Some 7210 SAS platforms (including 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-T, 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and 7210 SAS-Sx 10/100GE) do not ship with the bootstrap image. For these platforms, you must use one of the following devices to access the `boot.tim` file to boot the system. Insert the device containing the bootstrap image in the specified storage media location before powering on the system, as follows:

- **external flash**

  Insert the compact flash into the external compact flash slot.

- **SD card**

  Insert the SD card into the SD card slot.

- **USB device**

  Insert the USB storage device into the USB port.

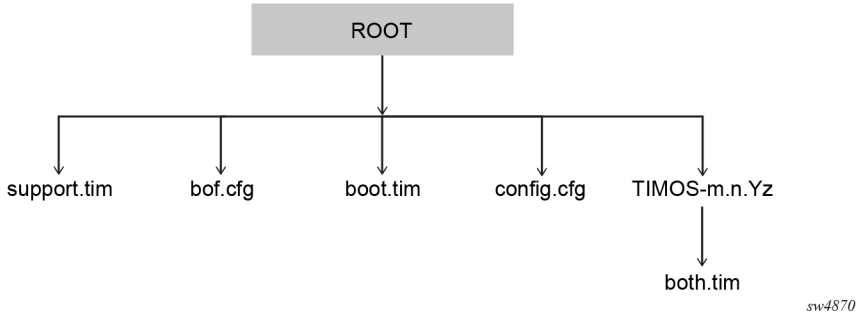
See the appropriate chassis installation guide for more information about the prerequisites for the specific 7210 SAS platform. See Contents of factory-shipped 7210 SAS systems for a list of contents shipped with the system on each 7210 SAS platform.

If the system cannot find the bootstrap image (`boot.tim`) in the default location (`cf:\boot.tim`), the system searches other storage locations (such as `uf1:\`) for the file and uses the `boot.tim` file in these locations to boot the system.

The following figure shows the typical flash directory structure and file names for a node shipped from the factory.

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Figure 3: Flash drive directory structure



Note:
The `support.tim` file is only used for platforms that support Secure Boot.

Files on the compact flash are:

- `bof.cfg` - boot option file
- `boot.tim` - bootstrap image
- `config.cfg` - default configuration file
- TIMOS-m.n.Yz:
  - m - major release number
  - n - minor release number
  - Y - type of release
    - A - alpha release
    - B - beta release
    - M - maintenance release
    - R - released software
  - z - version number
  - `both.tim` - CPM and IOM image file

4.1.1 Contents of factory-shipped 7210 SAS systems

The following table lists the contents that are shipped with the system on each 7210 SAS platform.

Table 19: Contents shipped with the system on 7210 SAS

7210 SAS platforms	System contents					
	boot.tim File	Golden bootstrap image	BOF	TiMOS Image		support.tim file
				cf1:\	cf2:\	
7210 SAS-Mxp[11]	✓		✓		✓	

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7210 SAS platforms	System contents					
	boot.tim File	Golden bootstrap image	BOF	TiMOS Image		support.tim file
				cf1:\	cf2:\	
7210 SAS-R6[11]	✓		✓		✓	
7210 SAS-R12[11]	✓		✓		✓	
7210 SAS-S 1/10GE[12]	✓		✓		✓	✓[13]
7210 SAS-Sx 1/10GE[12]	✓		✓		✓	✓[13]
7210 SAS-Sx 10/100GE[12]	✓		✓		✓	
7210 SAS-T[11]	✓		✓		✓	

4.1.2 System boot option modes

When the system executes the `boot.tim` file, the bootstrap image searches for and processes the BOF. The user has the option to modify the BOF manually and save it (see Manual mode for more information), or to retrieve the BOF from the network (see Auto-init mode for more information).

Depending on whether the node is factory-shipped with the BOF, the user can obtain and use the BOF as follows. See Table 19: Contents shipped with the system on 7210 SAS for information about which platforms are factory-shipped with the BOF:

- On 7210 SAS nodes that are factory-shipped with the BOF, use one of the following manual mode options:
  - boot the system in manual mode by using the starter BOF; the system uses the default `both.tim`, as configured in the default BOF
  - boot the system by interrupting the default boot process and manually edit the contents of the BOF to create a new BOF

  See the appropriate 7210 SAS chassis installation guide for more information about editing and creating a new BOF for the specific 7210 SAS platform.
- On 7210 SAS nodes that are factory-shipped without a BOF, the file is not present when the system is powered on for the first time. Use one of the following options to obtain a BOF for the system:
  - boot the system by manually creating a BOF (manual mode)

[11] No images are shipped on cf1:\. The user can purchase the software that is shipped with the boot.tim, starter BOF, and TiMOS image on cf2:\.

[13] The support.tim file is only supported in standalone mode.

[12] No images are shipped on cf1:\. The user must purchase a software license to obtain an image on the SD card. The SD card can be inserted into the SD card slot on the chassis to boot up the node. The software is shipped with the boot.tim, starter BOF, and TiMOS image.

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– boot the system by retrieving the BOF from the network, using DHCP to retrieve the network location of the BOF (auto-init mode); auto-init mode is the default boot procedure if there is no manual intervention during the first boot of the node

See the appropriate chassis installation guide for more information about using the available system boot options for the specific 7210 SAS platform.

Note:

- If the operator executes the **reset** command in the boot loader prompt or the **admin>reboot auto-init** command in the TiMOS CLI, 7210 SAS resets the current BOF, reboots, and initiates auto-init mode after the reboot.
- The operator can manage a 7210 SAS node through an external physical network. Managing a node through an external physical network secures the management network by restricting access to service customers and service data.

4.1.2.1 Auto-init mode

Note:
Auto-init is supported on all 7210 SAS platforms as described in this document, except the 7210 SAS-R6, 7210 SAS-R12, and platforms operating in standalone-VC mode.

During the first boot or a reboot after the execution of the **admin>reboot auto-init** command, if the user does not intervene to create the BOF in the manual mode, the system, by default, runs the auto-init procedure after a wait time. The default wait time is 3 seconds. Auto-init uses designated front-panel ports. See Configuration guidelines for auto-init and manual mode for more information about the front-panel ports used for each 7210 SAS platform. Auto-init requires a DHCP server to be configured in the network and reachable by the system. DHCP requests are directed out of one uplink port at a time because all other ports in the system are down.

Note:

- Only IPv4 address assignments and parameters are supported with DHCP. DHCPv6 is not supported with auto-init.
- Some systems use other ports in addition to front panel port 1 and 2. See Configuration notes for 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp for information about specific ports used to send DHCP request for 7210 SAS platforms.

If a DHCP server is present in the network, the system expects to receive an IP address, default gateway information, and a BOF location in the response returned by the DHCP server. Upon receiving these parameters from the DHCP server, the system applies the IP configuration and downloads the BOF from the location specified by the DHCP server. The BOF is saved in the flash drive and used for subsequent reboots. The bootstrap image processes the BOF parameters to boot the system. See Configuration file and TiMOS image loading for information about the BOF processing.

Before the node attempts to use DHCP to obtain the BOF and image files, you can configure the following link parameters in the BOF to suit your deployment needs:

- the uplink ports to use
- VLAN ID used
- link speed

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- duplex setting for the link
- auto-negotiation capability for the link

Note:
DHCP uses the values specified in the partial BOF to retrieve the complete BOF from the network. If you configure the preceding parameters in the partial BOF, Nokia recommends using the same values for the locally modified BOF as in the BOF downloaded from the network.

To update the preceding BOF parameters, use console access and break the boot sequence. Then, enter the **auto** keyword and follow the prompts to update the BOF parameters. Enter **exit** when you are done. The boot loader software uses these parameters to configure the link appropriately and sends out the DHCP requests to obtain the BOF. The BOF obtained through DHCP must contain the location of the image file and configuration file (and values for other BOF parameters). If the DHCP process is successful, the BOF obtained from the network is copied to the local flash.

Caution:
The parameter values in the BOF downloaded from the network must match those configured in the partial BOF. If there is a mismatch between the values retrieved from the network (that is, the network BOF is not configured to match the new values) and the user-configured values in the partial BOF, the next reboot of the system will fail. For example, specifying different auto-negotiate values in the two BOFs may cause the system to fail to bring up the link, which will cause the auto-init procedure and subsequent reboots to fail.

A mismatch may also cause the system to require twice the number of network resources. For example, the use of different VLAN ID values causes the system to require twice the number of resources for two services (one for each VLAN ID).

See Figure 5: System initialization: bootstrap process overview for more information about the bootstrap process and system initialization.

The system first attempts to use uplinkA and then uplinkB parameters to receive a successful response from the DHCP server. If there is no response on both uplink ports, the boot procedure is restarted, during which the user can choose to enter the manual mode or allow the system to default to the auto-init procedure again.

If the image fails to download through the auto-init process, the system loads the TiMOS image by using the both.tim file located on the local flash (that is, `cf1:\both.tim` and `cf1:\*TIMOS*\both.tim`). After the TiMOS image is loaded and bootup is successful, the user can choose to continue using the same image by entering the **admin**>**auto-init stop** command within a fixed amount of time, as prompted. Running the **admin**>**auto-init** stop command creates a BOF and saves it on the local flash, with the image location pointing to the image on the flash. If the user does not run this command when prompted, the system reboots again and attempts to find an image through the auto-init process (that is, by sending DHCP requests).

4.1.2.1.1 Ping check in auto-init mode

After successful bootup using the Auto-init mode procedure, the software initiates a ping check to ensure that the system has IP connectivity. The software loads the configuration file and attempts to ping the destination node three times using the IP address specified in the **ping-address** BOF parameter. If the ping check does not succeed, the system is rebooted with the BOF reset after 1 minute and the boot process is repeated. If the address in the BOF is zero or the ping address is not specified, the ping check is not performed.

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4.1.2.2 Secure download of files during auto-init

Note:
This feature is only supported on the 7210 SAS-Sx/S 1/10GE (standalone mode).

The 7210 SAS supports auto-init with secure download of the BOF file, TiMOS image file (`both.tim`), and configuration file using SFTP. Users must provision the system appropriately before the installation of the node in the production network and powering it up to use auto-init. For more information about using SFTP for secure download of file during auto-init, see Secure download of image and configuration files using SFTP.

4.1.2.3 Manual mode

Manual mode has two options:

- Either use the starter BOF or configure the BOF to point to a local image to use the image files on the flash that are shipped with the node.
- Configure the BOF to retrieve the image files from the network.

If the user opts for the manual mode boot procedure using the network to retrieve the images and configuration for the first-time boot, the required parameters must be specified for a successful system boot. Manual mode configurations require authentication. The default password is "password". BOF parameters that should be configured include the following:

- image path
- configuration file path
- uplinkA parameters (port number, VLAN ID, IP/mask, static route)
- uplinkB parameters (port number, VLAN ID, IP/mask, static route)
- **eth-mgmt-disable**

Note:
The following caveats apply for manual mode on 7210 SAS platforms.

- UplinkA and uplinkB parameters are only supported on the 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE operating in standalone mode, 7210 SAS-Sx 10/100GE, and 7210 SAS-T.
- On the 7210 SAS-R6 and 7210 SAS-R12, the out-of-band (OOB) Ethernet management port can be used to retrieve the image and configuration file from the network.
- The auto-init mode is not supported on the 7210 SAS-Sx/S 1/10GE (standalone-VC), 7210 SAS-R6, and 7210 SAS-R12.

Provisions to configure two uplinks is supported in the BOF for port redundancy. If the image path and configuration file path are local, the IP address and routing information for uplinkA and uplinkB is not required.

Optionally, the user can obtain IP parameters through DHCP by configuring 0 (zero) for the IP address of the uplink port. In this case, the DHCP server should be configured to grant the IP address and the default gateway information used to reach the server where the image and configuration files are located.

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After the BOF configuration is complete, a BOF with configured parameters is created in the flash that can be used for subsequent reboots. The bootstrap image then processes the BOF parameters to boot the system. See Configuration file and TiMOS image loading for information about BOF processing.

The **eth-mgmt-disable** parameter indicates whether the out-of-band Ethernet management port is enabled during the boot process. On a 7210 SAS node where a previous version of the BOF exists, the boot process uses the existing parameter values for uplinkA and uplinkB ports to boot the TIMOS image. The OOB port is disabled by default. The user has the option to enable the Ethernet management port and use it to boot the system.

4.1.2.4 Configuration guidelines for auto-init and manual mode

This section describes the configuration guidelines for the auto-init and manual modes:

- The Ethernet management port does not support auto-init mode. The use of DHCP to obtain the BOF from the network and other system parameters is currently not supported on Ethernet management ports.
- In auto-init mode, DHCP requests sent out by the node are in two formats. The system attempts to communicate with the DHCP server in these two formats, one after another (if necessary).
  - Initially, the DHCP requests are sent out with a priority VLAN tag (VLAN ID = 0, dot1p PCP bits set to 7).
  - If no response is received from the DHCP server after the DHCP request is sent, DHCP requests are sent without VLAN tags (that is, null-tagged packets).
- In auto-init mode, the BOF can be downloaded through SFTP, FTP, or TFTP based on the information a client receives from the DHCP server. The DHCP client tries the following options to obtain the BOF name and the server IP address:
  - **using the vendor-specific option**

    The client searches for option 43 in the DHCP reply. This provides the URL, which has to be accessed through SFTP or FTP. For example: "ftp://abcd:xyz@10.0.0.2/test/bof.cfg". If this file is found the client retrieves this file.
  - **collating server-name and file-name**

    If option 43 is not found in the DHCP reply, a URL is formed by using the tftp-server name and the boot-file retrieved via TFTP. The IP address of the TFTP server is obtained from DHCP option 66 or the "sname" field of a DHCP message, and the filename on the TFTP server is obtained from DHCP option 67 or the "file" field of a DHCP message.
- In manual mode, if the OOB port is enabled (that is, if **no eth-mgmt-disable** is configured), the OOB port is used to download the TIMOS image file and configuration file specified in the BOF, and the system boot is successfully completed. If a system boot fails, the uplinkA and uplinkB parameters are used to retrieve the TIMOS image and configuration files.
- On a factory-shipped 7210 SAS-T device, the system attempts the auto-init process (that is, sends DHCP requests) using the first two 1GE ports (1/1/1 and 1/1/2 on 7210 SAS-T) and the last two 10GE ports (1/1/25 and 1/1/26 on 7210 SAS-T). See System boot options for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE in satellite mode and System boot options for 7210 SAS-Mxp, 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and 7210 SAS-Sx 10/100GE in standalone mode for information about ports used for bootup on these platforms.
- The system sends out the DHCP request on a single port at a time and waits for the DHCP server to respond. If a successful server response is received, the auto-init process uses the information to boot

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up the system. If no response is received from the server within a stipulated time, the system sends out DHCP requests on the next port in the list based on a specific order, looping through all the ports until a successful response is received from the server, or the user interrupts the boot process.

- When using auto-init with partial BOF configuration, the user has the option to either stop auto-init by logging in to the node and using the console to run the **admin**>**auto-init stop** command or let auto-init continue.
- The user can intervene to stop auto-init at any time when auto-init is in progress. The system logs the progress of auto-init. The system emits the LED light until auto-init is complete or when the user stops the auto-init process.

4.1.2.5 Secure download of image and configuration files using SFTP

Note:
This feature is only supported on the 7210 SAS-Sx/S 1/10GE (standalone mode).

Auto-init is used for retrieving IP configuration information using DHCP, and subsequently the BOF file, image file, and configuration file to allow the node to be provisioned with the minimal configuration and enable subsequent management of the node.

During auto-init, initially the BOF file is downloaded using FTP (when using DHCP Option 43) or using TFTP (when using sname and file field in the DHCP message), followed by parsing the BOF file to obtain the location to download the image file and the configuration file. The files are downloaded using FTP. The existing protocols do not provide secure transmission mechanisms. This feature allows the use of SFTP for secure download of files (in other words, the BOF file, TiMOS image file (named `both.tim`), `support.tim`, and the configuration file) downloaded during auto-init.

SFTP requires mutual authentication of the SFTP client on the 7210 SAS and the SFTP server (in other words, the SFTP server deployed by the operator from where the images and configuration files are downloaded). To enable mutual authentication, the SFTP server presents the host key to the client for proving its' identity so the client can establish connections with only trusted servers. The SFTP client uses PKI mechanisms (using the private-public key pair) to prove that it is a valid user allowed to download the files from the SFTP server.

When SFTP is not used for a secure download, auto-init requires only the boot loader image (`boot.tim`) on the storage media (SD card, and so on) to start the auto-init process and boot the node with correct images and initial configuration file. Introducing SFTP to download the files securely requires the user to provide more information along with the boot loader so that the SFTP client and SFTP server can mutually authenticate each other. The following information must be available on the storage media used for auto-init for successful mutual authentication:

- **SFTP server public key**

  The SFTP server public key is used by the client to authenticate the server when the server presents its host key during the session establishment. The client continues to establish the session only if the available server public key can be used to validate the authenticity of the server successfully. It assures the client is talking to the operator’s trusted SFTP server.

- **SFTP client user private key and public key pair**

  The SFTP client user public key is used by the server to authenticate the user and allow access to the files stored on the server. It is expected that the client public key is available on the server so that when the client (7210 SAS node) presents it during the authentication phase, the server uses the client’s

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public key to validate the authenticity of the user and provides access to resources (BOF, TiMOS image, and configuration files in this context) on the server on successful authentication.

4.1.2.5.1 Preparing the storage media for secure download during auto-init

About this task

Perform the following steps to use SFTP and PKI for the secure download of files during auto-init for the following scenarios:

- using auto-init for the first-time bootup of a unit shipped from the factory
- using the **admin>reboot>auto-init** command to explicitly trigger auto-init manually (for subsequent use of auto-init if needed)

For first-time bootup before powering on the 7210 SAS, or before initiating auto-init using the **admin>reboot>auto-init** command, the storage media with the required artefacts must be prepared for secure download of the files during auto-init.

If necessary, copy the `boot.tim` from Release 26.9.R1 or later to replace the existing `boot.tim`, if any. Also, if needed, copy the `both.tim` from Release 26.9.R1 or later (and `support.tim`) to replace the existing `both.tim` (and `support.tim`), if any. The storage media is prepared for secure download using a 7210 SAS-Sx/S 1/10GE (standalone mode) running Release 26.9.R1 or later.

Note:
A storage media shipped with a software license from Release 26.9.R1 or later can be used. It already contains the bootloader (`boot.tim`) and the TiMOS image (`both.tim`), while the remaining files described in this section must be added to it using the following procedure.

To prepare the SD card with the required artefacts for secure download of the auto-init files, perform the following steps using a 7210 SAS-Sx/S 1/10GE (standalone mode) running Release 26.9.R1 or later.

Procedure

Step 1. Execute the **tools>perform>system>ssh>gen-keypair** command with the following options.

Example

The following command syntax and options are displayed for reference:

```
-----------------------------------------------------------------------
 tools perform system ssh gen-keypair
 - gen-keypair <url-string> curve {secp256r1|secp384r1|secp521r1}
   [secure-download-type]
- gen-keypair <url-string> ed25519 [secure-download-type]
- gen-keypair <url-string> rsa <key-size> [secure-download-type]

<url-string>           : <local-url> - [99 chars max]
                         local-url      - <cflash-id>/<file-path>
                         cflash-id      - cf1:
<key-size>             : [2048..4096] - Default: 3072
<secure-download-type> : autoinit-secure-download|boot-secure-download
-----------------------------------------------------------------------
```

In this example, the **tools perform system ssh gen-keypair cf1:\autoinit\sftp\client_key rsa 2048 autoinit-secure-download** command is executed.

a. Execute the **gen-keypair** command with the **autoinit-secure-download** option as displayed in the preceding example.

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The value specified with the *url-string* parameter is the location used to store the generated key files. Users should specify a temporary location to store the key files as these key files are generated on this node but copied over to a new SD card used to boot the 7210 SAS that are deployed in field.

In this example, RSA is the cryptographic algorithm with a *key-size* of 2048.

b. The preceding command prompts for a passphrase. Enter the passphrase of choice.

Note:

- A passphrase is not mandatory. Without a passphrase, the client private key file is not encrypted. It is highly recommended to use a passphrase to securely encrypt the client private key file.
- Any Linux machine can be used to generate the client private-public key when not using a passphrase. In this case, the client private-public key pair can be copied over manually to the SD card in the correct directory (directory and filenames to use must match the ones specified in the next step).

Step 2. After the passphrase is entered, the following files are created.

- `cf1:\autoinit\sftp\client_key`: this file contains the client private key and is encrypted using the passphrase (if provided).
- `cf1:\autoinit\sftp\client_key.pub`: this file contains the client public key; this file is stored in cleartext.
- `cf1:\autoinit\sftp\passphrase.enc`: this file contain the encrypted passphrase used to decrypt the client_key. This file is not created if user enters a blank passphrase.

Step 3. Copy the SFTP server public key into the same folder as above (for example, `cf1:\autoinit\sftp\server_key.pub`).

Note:
If more than one server is used, (for example, a different server for each of the primary, secondary, tertiary BOF image and configuration parameters) the public key for each of the server is copied into the `server_key.pub` file.

Example

The following example of the `server_pub.key` is displayed for reference:

```
===============================================================================
*A:Router-1# file type cf1:\autoinit\sftp\server_key.pub
File: server_key.pub
-------------------------------------------------------------------------------
ssh-rsa AAAAB3NzaC1yc2EAAAABIwAAAQEAv5fUo5YwUFc/ZuZ8sC8v1/O5EhnJufefaqf55sCxetbxTLo
VebUayxPBDuNmFSk3qINzqq/3m4aIoPmSLYzbf21OIjdeZBC+VvnwYXFfI02vgcSXxVLxIFBROonw6LdZYd
QynQ79KWjoIDL5tgBGAm8DLBsqj8hX/C/XhGvbTCRf+lGiA7ZmjQ/xn7kJ4+gDxh+jLP41AG9KOgSDt
NghODsgXMiEdcCJLZduzyPcbvSMiJvOpcWf4gvhKB5DtGj/b9ydjxl7+B5ARmqW/D3peL5UKnu834TmYgh
Kyw5WYjcr8QPNs7NksHc/wM5cV9GNKFmQ41fXdNvIwuonxoyoTw==
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIN3q2e0PIpa9X5V7gWQlDHa6DoZjzx1IdKeg6fKQPQ0+
 user@host1
ecdsa-sha2-nistp521 AAAAE2VjZHNhLXNoYTItbmlzdHA1MjEAAAAIbmlzdHA1MjEAAACFBAC8gfxZ2w9Kk
LrxdQ0Pvirx+iJXBDSIAyFAtxAZXaOz8+2IrwCPOQj2JAjYllfhd6cXZGNwlzJMRWLGdugG3JBxTQGm6M0f
BgTfdEorM4gLmXhwlnZQSK3A9eGbsegxSqllsijicKCJUXL7H6qtUJFT5AqzuWvHuV81HXnpQj1hwTZe9A==
 user@host2

===============================================================================
```


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```
*A:Router-1#
```

Step 4. Copy all the files from `cf1:\autoinit\sftp\` to the storage media used to boot up the factory-shipped 7210 SAS-Sx/S 1/10GE (standalone mode) unit using auto-init.

- Files can be first transferred to a server and then used to create copies of storage media (multiple copies) to be used for auto-init.
- Files must be copied under the following directory hierarchy <booted-drive:>\autoinit\sftp\.

Note:
During bootup, the 7210 SAS searches for the bootloader (for example, `boot.tim` image file) on all drives available in the system in a predefined order and uses the first instance when it locates a `boot.tim` image. This drive is termed as <booted-drive> and must contain the `\autoinit\sftp\` directory with the corresponding files to use the secure download option with auto-init.

Step 5. Ensure the `boot.tim`, `both.tim`, and `support.tim` files are also copied over, if needed.

Step 6. At the end of the preceding steps, the new storage media to be used for booting a factory-shipped 7210 SAS should have the following content.

Example

```
cf1:\autoinit\sftp\client_key
cf1:\autoinit\sftp\passphrase.enc
cf1:\autoinit\sftp\server_key.pub
cf1:\autoinit\sftp\client_key.pub
cf1:\boot.tim
cf1:\both.tim
cf1:\support.tim
```

Note:

- If the storage shipped with a software license is used, `both.tim` and `support.tim` are shipped from the factory under a root-directory (for example, `cf1:\`) or under <root-directory>:\TIMOS\both.tim (for example, `cf1:\TIMOS\both.tim`).
- `support.tim` must be located in the same location as the `both.tim`. `support.tim` is required only on nodes that support Secure Boot.

Step 7. The storage media is ready for use.

Step 8. Before starting auto-init, copy the contents of the `client_key.pub` file to the server under the correct location as required by the SFTP server configuration. For example, on a standard Linux server, the client public key is copied into the <user-home-directory-on-server>/.ssh/authorized_keys file.

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4.1.2.5.2 Auto-init with secure download on a factory-shipped 7210 SAS

About this task

After the storage media is ready using the Preparing the storage media for secure download during auto-init procedure, the following steps describe how auto-init with secure download works on a factory-shipped 7210 SAS unit.

Note:
The following steps are also applicable for initiation of auto-init explicitly using the **admin>reboot>auto-init** command, with the exception that the user must ensure the new storage media with the required artefacts are inserted into the unit before issuing the **admin>reboot>auto-init** command.

Procedure

Step 1. Install the factory-shipped 7210 SAS in the network.

Step 2. Use the newly created storage media (for example, an SD card) and insert it into the storage slot (for example, an SD card slot).

Step 3. Power on the 7210 SAS. The 7210 SAS shipped from factory is configured to use auto-init by default.

Step 4. During power on, the bootrom loads up and searches all the available drives in a predefined order for the `boot.tim` file (for example, `cf1:\boot.tim`). If it locates one successfully, it loads `boot.tim`.

Step 5. The `boot.tim` checks for the autoboot flag and initiates auto-init process if the autoboot flag is set (which is set by default on all units shipped from the factory). The autoboot flag is also set when the **admin>reboot>auto-init** command is executed.

4.1.2.5.2.1 Boot.tim running the auto-init process

This section describes the sequence of events when the `boot.tim` is running the auto-init process, with specifics of the secure download of files called out explicitly.

The first step is to download the BOF file. After using the BOF file, the image and configuration file is downloaded. The following list describes how the BOF file is downloaded.

1. The bootloader sends out DHCP packets to retrieve IP information and BOF file location URL (in DHCP Option 43).

   The DHCP server side must be configured to send Option 43. For example, on a Linux machine using the DHCP server, the `/etc/dhcp/dhcpd.conf` file has an entry as follows:

   ```
   option vendor-encapsulated-options "sftp://host-abc@192.168.10.1/home/abc/7210-images/
   SASDxp/bof.cfg";
   ```

2. The bootloader configures the IP address and static routes using the information provided by the DHCP server.
3. If the BOF file location URL specifies an SFTP URL (with a username and without a password), use SFTP to download the BOF file using the PKI keys stored in `<boot-drive>:\autoinit\sftp\` (for example, `cf1:\autoinit\sftp\`), as described below:

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a. The `cf1:\autoinit\sftp\server_key.pub` file is used to retrieve the server public key and authenticate the SFTP server.

b. Using the passphrase, the `cf1:\autoinit\sftp\client_key` file is decrypted to retrieve the private key. The client key is used to authenticate the 7210 SAS SFTP client to the SFTP server successfully. Users are not prompted for the passphrase or password.

c. Alternatively, if the BOF file location URL specifies the SFTP URL (with a username and a password), use SFTP to download the BOF file using the username and password provided.

i. In this case, only the server public key from the `<booted-drive>:\autoinit\sftp\` file is used to avoid the prompt to know if the server can be trusted or not. No other files are required in this location.

ii. **Note:**

- The username and password are cleartext in the SFTP URL and typically not recommended.
- If an SFTP URL with a username and password configured in BOF is used to download images or configuration files, copy the SFTP server public key into the booted drive in the folder path configured at `/bof sftp-key-directory`. If `/bof sftp-key-directory` is not configured, the SFTP server public key must be copied in `:\autoinit\sftp\server_key.pub`. If a server key is missing, the node goes into a boot loop.

d. The BOF file is downloaded.

4.1.2.5.2.2 Processing of downloaded BOF file and use of SFTP

The downloaded BOF file contains the location of the primary, secondary, and tertiary image files and the configuration files. The BOF file is parsed by bootloader auto-init process to obtain these image and configuration file locations. SFTP is used to download these files as described in the following sequence of events.

1. If the configuration specifies the SFTP URL (with a username and without a password) for the primary, secondary, and tertiary image files and the configuration files, SFTP is used to download the image and configuration files.
   a. The passphrase is used to decrypt the `cf1:\autoinit\sftp\client_key` file and retrieve the client private key.
   b. The client key is used to authenticate to the SFTP server successfully as described above. The user is not prompted for a passphrase or a password.
2. Alternatively, if the BOF configuration specifies an SFTP URL with a username and password for the primary, secondary, and tertiary image files and the configuration files, SFTP is used to download the image and configuration files. This is similar to step c in Boot.tim running the auto-init process and requires only a server public key.

After the TiMOS image and configuration files are downloaded, the bootloader loads the TiMOS image (`both.tim`) and the TiMOS image executes the configuration file. After successful boot up of the node the following occurs:

- The node is booted successfully in TiMOS context and CLI access should be available through console (if not blocked), management access is available using OOB management port (if not blocked and

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if OOB port is configured appropriately using BOF parameters), or management access is available using in-band management port (if in-band management port is configured appropriately using the configuration file).

- The autoboot or auto-init flag is reset so that the node does not attempt auto-init on the next reboot.

Note:
A sample BOF file (downloaded from the server as part of auto-init) is displayed as follows (only relevant parameters appears below):

```
Primary-image  sftp:\\username@<ip-address or servername>\both.tim
Primary-config  sftp:\\ username@<ip-address or servername>\config
```

- The node can be manged locally or remotely (as long as the configuration file provided to the node from the server has the minimal management configuration information required for remote management of the node).

Note:
The software does not restrict the use of client keys under `<booted-drive>:\autoinit\sftp\` for use only with auto-init. It is used if the BOF is absent (not present) or when the BOF file **sftp-key-directory** command is not configured explicitly. In other words, the keys under `<booted-drive>:\autoinit\sftp\` are always used when auto-init is initiated (either through the **admin>reboot>auto-init** command or when the 7210 SAS is powered up from the factory for the first time), because in both these cases the BOF file is absent.

4.1.2.6 Using SFTP and PKI on a subsequent reboot

On a subsequent reboot of the node, the following options are present for a download of the TiMOS image and configuration file. Users must change the BOF configuration after a successful auto-init to use one of the supported options listed below. In all the options below, the BOF file must be present.

Note:
If the BOF file is not present, the 7210 SAS attempts auto-init by default.

- Using local storage media as the primary, secondary, and tertiary image and configuration file location. Files can be copied to the local storage media using FTP, SFTP, or another media (if available).
- Using an FTP URL to specify a remote location for the primary, secondary, and tertiary image and configuration file location.
- Using an SFTP URL (with user/password option) to specify a remote location for the primary, secondary, and tertiary image and configuration file location.
  - The server public key must be known by users beforehand. The server public key is obtained from the BOF **sftp-key-directory** command, if configured. If the **sftp-key-directory** command is not configured, the keys are obtained from the `<booted-drive>:\autoinit\sftp` location, the server public key must be copied to either one of these locations beforehand.
  - **Note:**
    With SFTP used in 7210 SAS bootloader context, if the server public key is not available, an error message is displayed and the node attempts auto-init indefinitely until auto-init is stopped by the user or the server public key is made available.

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- Using an SFTP URL with the PKI option (without a passphrase prompt) to specify the remote location for the primary, secondary, and tertiary image and configuration file location.
  - Uses SFTP client key files available in the location specified with the BOF **sftp-key-directory** command for authentication. If the **sftp-key-directory** command is not configured, the keys are obtained from the `<booted-drive>:\autoinit\sftp` location.
  - The server public key must be known by users beforehand. The server public key is obtained from the BOF **sftp-key-directory** command, if configured. If the **sftp-key-directory** command is not configured, the keys are obtained from the `<booted-drive>:\autoinit\sftp` location, the SFTP client key files must be copied to either one of these locations beforehand.
  - **Note:**
    With SFTP used in 7210 SAS bootloader context, if the server public key is not available, an error message is displayed and the node attempts auto-init indefinitely until auto-init is stopped by the user or the server public key is made available.

Note:
It is recommended to use an SFTP username and password for normal operations when auto-init is complete or to use SFTP PKI with per node keys as described in BOF parameter for key files during bootup.

4.1.2.7 BOF parameter for key files during bootup

To allow an SFTP client to use a per node private-public key pair with the better protection for passphrase, an option is provided **tools>perform>system>ssh>gen-keypair boot-secure-download** command.

Using the **boot-secure-download** option, users can generate a private-public key pair that is unique for the node and can only be used with the SFTP client on the node. Executing the **tools>perform** command prompts for a passphrase. allowing users to protect the private key file using a passphrase of their choice.

The generated keys and the passphrase files are stored in the directory specified with the **tools** command. This directory must match the BOF **sftp-key-directory** command, or else the software displays an error.

If the user does not specify the directory name while using the **gen-key-pair** command with the **boot-secure-download** option, the software displays an error.

The **sftp-key-directory** command is introduced in the BOF configuration to allow users to specify the directory where the key files are located so that on bootup the bootloader can determine the location for retrieving the key files. This command is also made available in **bof>sftp-key-directory** *directory-name* command.

4.1.2.8 Using SFTP and PKI for the BOF configuration in the TiMOS context

When the BOF parameters such as the primary, secondary, and tertiary image and configuration file location are changed in the TiMOS context (using the commands available under the **bof** context) to specify a remote location, TiMOS checks the specified remote location to determine if the file exists and is in the correct format.

If the check succeeds, the configuration is allowed to proceed. If the check fails, TiMOS displays an informational message (“Valid timos image should be present in the mentioned path”) and allows the configuration to proceed. When the SFTP URL is used to specify the remote location, TiMOS uses the SFTP client to make this check and uses the required keys from the following location:

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If the **sftp-key-directory** command is configured, the SFTP client uses the keys from the specified location. If not, it uses the `<bootdrive>:\autotinit\sftp` location.

4.1.2.9 Using SFTP and PKI with the admin>save command

When the **admin>save** command is executed in the TiMOS context without the URL argument specified, the command uses the URL specified in the BOF file for **bof>primary-config** command to determine the location where the file needs to be saved. If SFTP is configured as the URL, the following options are available:

- SFTP with a username and password
- SFTP with PKI

For each of the preceding options provided for use with the SFTP client with the **admin>save** command, the behavior is the same as using the SFTP client to download the image or configuration file. In other words, all options provided with those scenarios should work when the SFTP client is used with the **admin>save** command. See Using SFTP and PKI on a subsequent reboot for more information.

4.1.2.10 Configuration guidelines for SFTP with auto-init with the bof>save and admin>save commands

The following configuration guidelines apply for use of SFTP with auto-init with the **bof>save** and **admin>save** commands:

- During auto-init, with SFTP used in 7210 SAS bootloader context to securely download the files, if the server public key is not available, an error message is displayed and the node attempts auto-init indefinitely until auto-init is stopped by the user or the server public key is made available.
- If an SFTP URL using either PKI or username/password authentication credentials configured in BOF is used to download images or configuration files, copy the SFTP server public key into the booted drive in the folder path configured at **/bof sftp-key-directory**. If `/bof sftp-key-directory` is not configured, the SFTP server public key must be copied in `:\autoinit\sftp\server_key.pub`. If a server key is missing, the system reboots and attempts to boot gain. This process continues indefinitely until the server public key required to download the image and configuration files is successfully made available.
- To assure the unattended node is brought up or other operations when using SFTP, ensure that the SSH/SFTP server is configured to not request more information during the SFTP client/user authentication (for example, disable use of the keyboard-interactive method on the SSH/SFTP server side). It is recommend users validate the SFTP client authentication process in their labs with the SSH/SFTP server of their choice, before deployment, to ensure that the SFTP server does not request additional information from SFTP client during the authentication phase. Requests for additional information from the server results in user prompts and waiting for user inputs indefinitely. This breaks the unattended operation, such as auto-init.

4.1.3 BOF and configuration file encryption

In cases where the 7210 SAS platform is not installed in a physically secure location, the user can encrypt the BOF and the configuration file to halt or hinder interpretation of the contents of the file.

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By default, the BOF and configuration file are not encrypted. When encryption is enabled for either file and a change is saved (using the **bof save** command), the original file is moved to `filename.1` and the encrypted file becomes the new `filename.cfg`.

Caution:
When the original file is moved to `filename.1`, this file is unencrypted. To maintain node security, delete the unencrypted `filename.1` file.

When the BOF is encrypted on the compact flash, the BOF parameters can be modified using the BOF interactive menu during node startup, and fields can be modified using this menu.

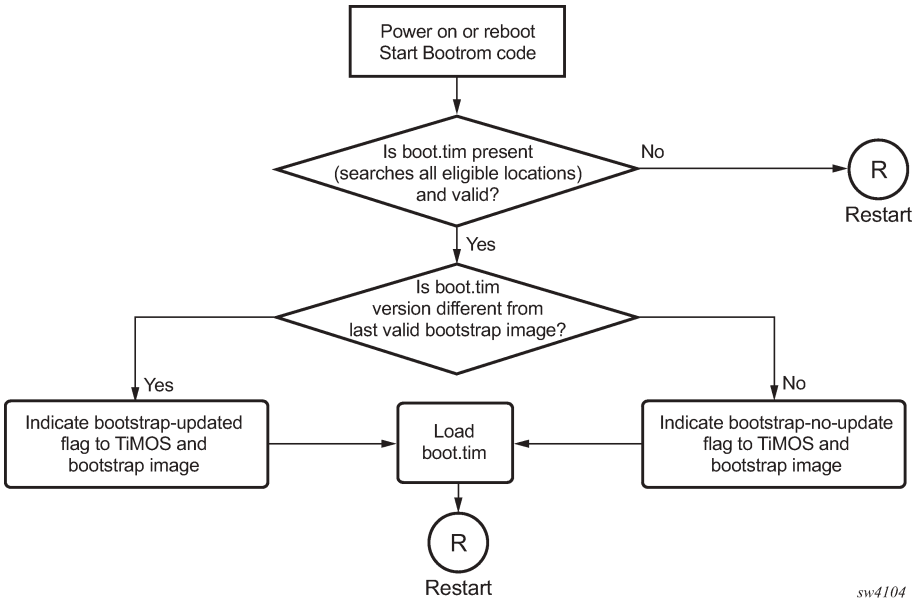
See Configuring BOF encryption for information about configuring BOF encryption. See Configuring the BOF interactive menu password for information about configuring the BOF interactive menu password. See Configuring the configuration file encryption for information about configuring configuration file encryption.

4.1.4 Bootstrap load process

The following figure shows the bootstrap load process.

See 7210 SAS boot options and procedures for more information about platform-specific supported boot options, and how the specific system processes these options and loads the bootstrap image file (`boot.tim`), the TiMOS image (`both.tim`) and the configuration file to make the system operational and ready for use.

Figure 4: System initialization: bootstrap load process



Example

The following is a sample of console display when the `boot.tim` file is located on `cf1:/` and the system boots successfully.

```
Nokia 7210 Boot ROM. Copyright 2016 Nokia.
```


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```
All rights reserved. All use is subject to applicable license agreements.
Running POST tests from ROM
Testing ROM load area...done

Relocating code...Jumping to RAM

Performing second stage RAM test....passed

Board Serial Number is 'SN123456789'
Bootlog started for Version V-0.0.I317
Build V-0.0.I317 bootrom/mpc 7xxx
Built on Tue Jan 6 02:23:14 IST 2009 by panosbld in /panosbld/ws/panos/main

?Attempting to load from file cf1:/boot.tim
Version L-0.0.I312, Fri Jan  2 04:26:32 IST 2009 by panosbld in /panosbld/ws/panos/
main
text:(3002475-->12623392) + data:(550940-->2414128)
Starting at 0xb000000...


Total Memory: 512MB  Chassis Type: sas  Card Type: badami_7210
TiMOS-L-0.0.I312 boot/mpc NOKIA SAS-Sx 7210 Copyright (c) 2016 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Fri Jan 2 04:26:32 IST 2016 by panosbld in /panosbld/ws/panos/main

TiMOS BOOT LOADER

...
```

4.1.5 7210 SAS boot options and procedures

The location of the `boot.tim` bootstrap image varies per 7210 SAS platform and depends on the storage locations supported by the platform. The boot option modes to find and load the `boot.tim` bootstrap image file also vary per 7210 SAS platform.

This section provides information about the supported boot option modes and storage locations for 7210 SAS platforms.

4.1.5.1 System boot options for 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-T

These 7210 SAS platforms support the following options to retrieve the boot.tim and TiMOS/SROS images (both.tim) required to boot the system:

- internal flash (`cf1:\`)
- external flash (`cf2:\`)
- external USB flash (`uf1:\`)
- network (with auto-init)

  This option is supported only on the 7210 SAS-T.
- network (without auto-init)

Because multiple storage locations are available for the bootstrap image `boot.tim` file on the 7210 SAS-T, 7210 SAS-R6, and 7210 SAS-R12, these platforms do not support the golden bootstrap image.

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During bootup, the bootrom searches for the `boot.tim` in the following locations in the specified order and uses the image obtained from the first location where `boot.tim` is found to load the bootstrap image:

- `cf1:\` (internal USB)
- `cf2:\` (external flash)
- `uf1:\` (external USB)

If the `boot.tim` is not found in any of these locations, the boot procedure fails. If the `boot.tim` image is found, the system searches for `bof.cfg` (the boot options file) on the same storage device in the root directory. For example, if `boot.tim` is found on `cf2:\`, the system also looks for `bof.cfg` in `cf2:\bof.cfg`.

If `bof.cfg` is found, the system uses the BOF to locate the TiMOS software (`both.tim` file), configuration file, and other boot parameters, and processes them to boot the system. If the BOF is not found, the system attempts to retrieve the BOF from the network using the auto-init mode and create a new BOF as part of the auto-init process.

In some cases, the BOF may specify different storage device locations for the TiMOS image (`both.tim`) and the configuration file. For example, the bootstrap image `boot.tim` file may be located on `cf1:\`, but `both.tim` and the configuration file may not be located on this device. You can use the **show**>**system**>**information** command to identify the location of the BOF and the `boot.tim` image used to boot the system.

The following is a sample output of system information for the 7210 SAS-T.

```
*...........
Boot-loader Source     : cf1:
BOF Source             : cf1:
Image Source           : primary
Config Source          : N/A
Last Booted Config File: N/A
Last Boot Cfg Version  : N/A
Last Boot Config Header: N/A
Last Boot Index Version: N/A
Last Boot Index Header : N/A
Last Saved Config      : N/A
Time Last Saved        : N/A
Changes Since Last Save: Yes
User Last Modified     : admin
Time Last Modified     : 2000/06/01 20:03:28
Max Cfg/BOF Backup Rev : 5
Cfg-OK Script          : N/A
Cfg-OK Script Status   : not used
Cfg-Fail Script        : N/A
Cfg-Fail Script Status : not used
*A:SAST>show>system#
```

See System boot option modes for more information about the auto-init and manual boot option modes, and how the system processes these options and loads the boot loader (`boot.tim`), the TiMOS image (`both.tim`), and the configuration file to make the system operational and ready for use.

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4.1.5.2 System boot options for 7210 SAS-Mxp, 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and 7210 SAS-Sx 10/100GE

Note:
See the Virtual chassis chapter for information about boot up and configuration of the 7210 SAS-Sx/S 1/10GE operating in standalone-VC mode.

These platforms can operate in the satellite mode or standalone mode, according to the following considerations:

- In the satellite mode of operation, these 7210 SAS platforms do not need an assigned IP address because they are managed by the 7750 SR host. The user must connect the correct ports to the 7750 SR host and power on the node. The node automatically fetches the BOF, the image, and the configuration required to operate in satellite mode.

  See System boot options for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE in satellite mode for a detailed procedure used to boot these 7210 SAS platforms.
- In the standalone mode of operation, these 7210 SAS platforms provide IP/MPLS functionality. The platforms need an assigned IP address and can be managed independently. See System boot options for 7210 SAS-Mxp, 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and 7210 SAS-Sx 10/100GE in standalone mode for procedures to boot these 7210 SAS platforms.

The operating mode that the 7210 SAS platform or node uses to boot up is determined by the **chassis-role** and **host-type** BOF parameters. Nokia recommends configuring similar values for both parameters to ensure that the node boots up in the correct mode. Failure to do so will result in an error and the node will not boot up. See BOF chassis-role and host-type parameters for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE for more information about BOF parameter settings to boot up the nodes in standalone mode and satellite mode.

Note:

- Nokia recommends using the external SD card slot (`cf2:\`) on the 7210 SAS-Sx/S 1/10GE and 7210 SAS-Sx 10/100GE or the external compact flash (`cf2:\`) on the 7210 SAS-Mxp to boot up the node the first time.
- To change the chassis role and the mode in which the platform will boot up, manually interrupt the boot process and use the BOF menu option to configure the **chassis-role** parameter value. You can also revert the parameter value to the factory default setting of **factory-default**.
- To boot up in standalone mode, it is not required to update the BOF to include the **host-type** parameter. To maintain backward compatibility, the node boots up in standalone mode if the **chassis-role** parameter is set to **factory-default** (the value set when it is shipped from the factory), and the **host-type** parameter is set to **none**.

The following sections describe the system initialization process for 7210 SAS-Mxp, 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and 7210 SAS-Sx 10/100GE in both standalone mode and satellite mode, and the role of the **chassis-role** and **host-type** BOF parameters:

- System boot options for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE in satellite mode
- System boot options for 7210 SAS-Mxp, 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and 7210 SAS-Sx 10/100GE in standalone mode

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- Configuration notes for 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp

4.1.5.3 System boot options for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE in satellite mode

These platforms support the use of the external SD card slot or external compact flash (`cf2:\`) to boot the system. Use the storage media supplied with the purchase of a valid satellite mode license. After you insert the storage media in the external storage media slot, ensure that the satellite is connected to the host before you power on the system.

Table 20: Uplink ports used for 7210 SAS platforms and variants in satellite mode lists the uplink ports used for 7210 SAS platforms and their variants. To boot up in satellite mode, the uplinks must be connected to the host ports, as described in Table 20: Uplink ports used for 7210 SAS platforms and variants in satellite mode.

Note:
The following notes apply to the host port information listed in Table 20: Uplink ports used for 7210 SAS platforms and variants in satellite mode:

- In satellite mode, you cannot configure the BOF parameters uplinkA and uplinkB ports for use with auto-init. To successfully boot up the 7210 SAS node connected as a satellite to the host in satellite mode, use the ports specified in Table 20: Uplink ports used for 7210 SAS platforms and variants in satellite mode as uplinks to the 7750 SR host. The 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 platform allows the use of other ports; see the port information that follows in this bulleted list.

  See Configuration notes for 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp for information about ports used for first-time boot up with the **chassis-role** set to **factory-default**.
- On the 7210 SAS-Sx 10/100GE operating in satellite mode, you can establish a connection to the host with one 100 GE or 10 GE uplink. However, Nokia recommends that you use more than one uplink based on capacity requirements and to provide redundancy.
- On the 7210 SAS-Sx 10/100GE, by default, the DHCP requests are sent through ports 1/1/65 and 1/1/66, followed by 10GE ports 1/1/1 and 1/1/2. However, to use ports 1/1/1 and 1/1/2 as uplink ports in satellite mode, you must first appropriately configure the ports in the 7750 SR host machine.
- On the 7750 SR host, the 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 variant 100GE uplink ports are referred to as u1, u2, u3, and u4:
  - u1 - maps to 1/1/c65
  - u2 - maps to 1/1/c66
  - u3 - maps to 1/1/c67
  - u4 - maps to 1/1/c68

  On the 7750 SR host, the 1/1/c1 to 1/1/c4 front panel ports of the 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 variant operating in satellite mode are referred to as 1/1/c65 to 1/1/c68.
- See the *7210 SAS Software Release Notes 26.x.Rx*, part number 3HE 27852 000*x* TQZZA, for information about the 7750 SR platforms and releases that support Ethernet satellites, and

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the version of 7210 SAS satellite mode software that is compatible with a specific version of SR OS software.

Table 20: Uplink ports used for 7210 SAS platforms and variants in satellite mode

Uplink ports used to connect to the host	7210 SAS platforms and variants								
	7210 SAS-Mxp		7210 SAS-Sx/S 1/10GE						7210 SAS-Sx 10/100GE
	ETR	Non-ETR	22F 2C 4SFP+	24T 4SFP+	24Tp 4SFP+ PoE	46F 2C 4SFP+	48T 4SFP+	48Tp 4SFP+ PoE	64SFP+ 4QSFP28
1/1/25 [14]	✓	✓	✓	✓	✓				
1/1/26 [14]	✓	✓	✓	✓	✓				
1/1/49 [14]						✓	✓	✓	
1/1/50 [14]						✓	✓	✓	
1/1/c1/1 [15]									✓[16]
1/1/c2/1 [15]									✓[16]

After the uplinks are connected and the node is powered up, the satellite node sends out DHCP packets. The host matches the MAC address in the DHCP packet against the host configuration to identify the satellite and provides the correct BOF to the satellite node for booting up. The BOF sets the **host-type** command to **satellites** and also provides the location of the TiMOS (SR OS) image and configuration file. The boot loader fetches the TiMOS image and configuration file and boots up in satellite mode.

Note:
When operating the 7210 SAS platform in satellite mode, Nokia recommends to use only the auto-init procedure to retrieve the BOF and other boot parameters from the host. Other procedures, such as the manual configuration of the BOF, are not allowed. See Auto-init mode for more information.

[14] 10GE uplink port

[15] 100GE uplink port

[16] 10GE ports can also be used

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4.1.5.4 System boot options for 7210 SAS-Mxp, 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and 7210 SAS-Sx 10/100GE in standalone mode

Note:
See the Virtual chassis chapter for information about boot up and configuration of the 7210 SAS-Sx/S 1/10GE operating in standalone-VC mode.

When operating in standalone mode, these 7210 SAS platforms support the following options to boot the system:

- internal flash (`cf1:\`)
- external SD card slot (`cf2:\`)
- external USB flash (`uf1:\`) (not available for 7210 SAS-S 1/10GE)
- network (with auto-init; auto-init is not supported on platforms operating in standalone-VC mode)
- network (without auto-init)

Because multiple storage locations are available for the boot loader (`boot.tim`) on the 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE, these platforms do not support the golden bootstrap image.

During bootup, the bootrom searches for the `boot.tim` in the following locations in the specified order and uses the image obtained from the first location where `boot.tim` is found to load the bootstrap image:

- `cf1:\` (internal USB)
- `cf2:\` (external SD card slot)
- `uf1:\` (external USB) (if available)

If the `boot.tim` is not found in any of the locations, the boot procedure fails. If the `boot.tim` is found in one of these locations, the system searches for `bof.cfg` (the boot option file) on the same storage device in the root directory. For example, if `boot.tim` is found on `cf2:\`, the system also looks for `bof.cfg` in `cf2:\bof.cfg`.

If the BOF is found, the system uses the BOF to locate the TiMOS software (`both.tim` file), configuration file and other boot parameters and processes them to boot the system. If the BOF is not found, the system attempts auto-init to retrieve the BOF from the network and create a new BOF as part of the auto-init process.

Note:
The following notes apply to 7210 SAS platforms configured in standalone mode:

- To perform a first-time bootup on a factory-shipped node, you are required to buy the software license and use the storage media (for example, SD card of compact flash) obtained to boot up the system. To boot up in standalone mode, it is not required to modify the BOF received during auto-init mode process to include the **host-type** parameter. To maintain backward compatibility, the node will boot up in standalone mode if the **chassis-role** parameter is set to **factory-default** (the value set when it is shipped from factory) and the **host-type** parameter is not set to any value (none).
- The auto-init procedure for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-1/10GE, and 7210 SAS-Sx 10/100GE remains unchanged and is the same as the other 7210 SAS platforms. Operators can continue to use the auto-init procedure that was used in previous releases. The ports used for first-time boot up when **chassis-role** is set to **factory-default**

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is described in section Configuration notes for 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp.

- When operating in standalone mode, 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE support the option of either configuring the BOF manually (see section Manual mode for more information about the procedure used) or retrieving the BOF using autoinit (see section Auto-init mode for more information about the procedure used).

In some cases, the BOF may specify different storage device locations for the TiMOS image (`both.tim`) and the configuration file. For example, the `boot.tim` file may be located on `cf1:\`, but `both.tim` and the configuration file may be located on `cf2:\`. Use the **show>system>information** command to identify the location of the BOF and the `boot.tim` image used to boot the system.

Example: System information output for the 7210 SAS-Sx/S 1/10GE

```
A:7210SAS>show>system# information

===============================================================================
System Information
===============================================================================
System Name            : hw_sass_duth
System Type            : 7210 SAS-Sx/S 1/10GE 48Tp4SFP+ (PoE)-1
System Version         : B-8.0.B1-238
System Contact         :
System Location        :
System Coordinates     :
System Up Time         : 0 days, 00:03:52.99 (hr:min:sec)

SNMP Port              : 161
SNMP Engine ID         : 0000197f0000a47b2cc669d3
SNMP Engine Boots      : 42
SNMP Max Message Size  : 1500
SNMP Admin State       : Enabled
SNMP Oper State        : Enabled
SNMP Index Boot Status : Not Persistent
SNMP Sync State        : N/A

Tel/Tel6/SSH/FTP Admin : Enabled/Disabled/Enabled/Disabled
Tel/Tel6/SSH/FTP Oper  : Up/Down/Up/Down

Boot-loader Source     : cf1:
BOF Source             : cf1:
Image Source           : primary
Config Source          : primary
Last Booted Config File: cf1:\bala_default_config.cfg
Last Boot Cfg Version  : THU JAN 13 01:53:35 2000 UTC
Last Boot Config Header: # TiMOS-B-8.0.B1-225 both/hops NOKIA SAS-Sx
                         48T4SFP+ 7210 Copyright (c) 2016 Nokia.
                          # All rights reserved. All use subject to
                         applicable license agreements. # Built on Thu Apr 14
                         21:25:57 IST 2016 by builder in /home/builder/8.0B1/
                         panos/main # Generated THU JAN 13 01:53:35 2016 UTC
Last Boot Index Version: N/A
Last Boot Index Header : # TiMOS-B-8.0.B1-225 both/hops NOKIA SAS-Sx
                         48T4SFP+ 7210 Copyright (c) 2016 Nokia.
                          # All rights reserved. All use subject to
                         applicable license agreements. # Built on Thu Apr 14
                         21:25:57 IST 2016 by builder in /home/builder/8.0B1/
                         panos/main # Generated THU JAN 13 01:53:35 2016 UTC
Last Saved Config      : N/A
```


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```
Time Last Saved        : N/A
Changes Since Last Save: No
Max Cfg/BOF Backup Rev : 5
Cfg-OK Script          : N/A
Cfg-OK Script Status   : not used
Cfg-Fail Script        : N/A
Cfg-Fail Script Status : not used

Management IP Addr     : xx.xxx.xx.xx/24
Primary DNS Server     : N/A
Secondary DNS Server   : N/A
Tertiary DNS Server    : N/A
DNS Domain             : (Not Specified)
DNS Resolve Preference : ipv4-only
BOF Static Routes      :
  To                   Next Hop
  xx.xxx.x.x/16        xx.xxx.xx.x

  xxx.x.x.x/8          xx.xxx.xx.x


ICMP Vendor Enhancement: Disabled
===============================================================================

===============================================================================
System Oper Group Information
===============================================================================
Name                           Oper   Creation Hold   Hold   Members Monitor
                               Status Origin   UpTime DnTime
                                              (secs) (secs)
-------------------------------------------------------------------------------
No Matching Entries
===============================================================================
A:7210SAS-Sx>show>system#
```

Example: System information output for the 7210 SAS-Sx 10/100GE

```
*A:7210SAS>show>system# information

===============================================================================
System Information
===============================================================================
System Name               : NS1633T0067
System Type               : 7210 SAS-Sx 64SFP+4QSFP28
Chassis-role Config value : standalone
Host-type Config value    : standalone
Chassis Operating Mode    : standalone
System Version            : B-9.0.B1-246
System Contact         :
System Location        :
System Coordinates     :
System Up Time            : 16 days, 19:05:26.61 (hr:min:sec)

SNMP Port                 : 161
SNMP Engine ID            : 0000197f0000d099d58f5e41
SNMP Engine Boots         : 44
SNMP Max Message Size     : 1500
SNMP Admin State          : Disabled
SNMP Oper State           : Disabled
SNMP Index Boot Status    : Not Persistent
SNMP Sync State           : N/A

Tel/Tel6/SSH/FTP Admin    : Disabled/Disabled/Enabled/Disabled
```


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```
Tel/Tel6/SSH/FTP Oper     : Down/Down/Up/Down

Boot-loader Source        : cf2:
BOF Source                : cf2:
Image Source              : primary
Config Source             : N/A
Last Booted Config File   : N/A
Last Boot Cfg Version     : N/A
Last Boot Config Header: N/A
Last Boot Index Version   : N/A
Last Boot Index Header : N/A
Last Saved Config         : N/A
Time Last Saved           : N/A
Changes Since Last Save   : Yes
User Last Modified        : admin
Time Last Modified        : 2000/01/13 22:19:03
Max Cfg/BOF Backup Rev    : 5
Cfg-OK Script             : N/A
Cfg-OK Script Status      : not used
Cfg-Fail Script           : N/A
Cfg-Fail Script Status    : not used

Management IP Addr        : xx.xxx.xx.xx/24
Primary DNS Server        : N/A
Secondary DNS Server      : N/A
Tertiary DNS Server       : N/A
DNS Domain                : (Not Specified)
DNS Resolve Preference    : ipv4-only
DNSSEC AD Validation      : False
DNSSEC Response Control   : drop
BOF Static Routes         :
  To                   Next Hop
  xx.xxx.x.x/16        xx.xxx.xx.x

  xxx.x.x.x/8          xx.xxx.xx.x


ICMP Vendor Enhancement   : Disabled
EFM OAM Grace Tx Enable   : False
===============================================================================

===============================================================================
System Oper Group Information
===============================================================================
Name                            Oper   Creation Hold   Hold   Members Monitor
                                Status Origin   UpTime DnTime
                                                (secs) (secs)
-------------------------------------------------------------------------------
No Matching Entries
===============================================================================
*A:7210SAS>show>system#
```

Example: System information output for the 7210 SAS-Mxp

```
*A:7210SAS>show>system# information

===============================================================================
System Information
===============================================================================
System Name            : SAS-M2
System Type            : 7210 SAS-Mxp 22F2C 4SFP+ ETR-1
System Version         : B-8.0.F40(16)
System Contact         :
```


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```
System Location        :
System Coordinates     :
System Up Time         : 3 days, 13:26:45.91 (hr:min:sec)

SNMP Port              : 161
SNMP Engine ID         : 0000197f0000c4084a7ab86d
SNMP Engine Boots      : 11
SNMP Max Message Size  : 1500
SNMP Admin State       : Enabled
SNMP Oper State        : Enabled
SNMP Index Boot Status : Not Persistent
SNMP Sync State        : N/A

Tel/Tel6/SSH/FTP Admin : Enabled/Disabled/Enabled/Enabled
Tel/Tel6/SSH/FTP Oper  : Up/Down/Up/Up

BOF Source             : cf1:
Image Source           : primary
Config Source          : primary
Last Booted Config File: cf1:/default.cfg
Last Boot Cfg Version  : THU SEP 10 08:12:31 2015 UTC
Last Boot Config Header: N/A
Last Boot Index Version: N/A
Last Boot Index Header : N/A
Last Saved Config      : N/A
Time Last Saved        : N/A
Changes Since Last Save: Yes
User Last Modified     : admin
Time Last Modified     : 2015/09/19 01:37:49
Max Cfg/BOF Backup Rev : 5
Cfg-OK Script          : cf1:/env.cfg
Cfg-OK Script Status   : success
Cfg-Fail Script        : N/A
Cfg-Fail Script Status : not used

Management IP Addr     : 10.135.5.168/24
Primary DNS Server     : N/A
Secondary DNS Server   : N/A
Tertiary DNS Server    : N/A
DNS Domain             : (Not Specified)
DNS Resolve Preference : ipv4-only
BOF Static Routes      :
  To                   Next Hop
  135.0.0.0/8          10.135.5.1


ICMP Vendor Enhancement: Disabled
===============================================================================

===============================================================================
System Oper Group Information
===============================================================================
Name                            Oper   Creation Hold   Hold   Members Monitor
                                Status Origin   UpTime DnTime
                                                (secs) (secs)
-------------------------------------------------------------------------------
No Matching Entries
===============================================================================
*A:7210SAS>show>system#
```


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4.2 Configuration file and TiMOS image loading

The bootstrap image processes the initialization parameters from the BOF and attempts to locate the configuration file configured in the BOF. Up to three locations can be configured for the system to search for the configuration file. The locations can be local or remote. The first location searched is the primary configuration location. If not found, the secondary configuration location is searched, and lastly, the tertiary configuration location is searched.

If the configuration file is in a remote location, the bootstrap process saves it on the flash as `cf1:/default.cfg`. Users must not delete this file or create a file with this name. The configuration file includes chassis, IOM, MDA, and port configurations, as well as system, routing, and service configurations.

Like the configuration file, three locations can be configured for the system to search for the files that contain the `both.tim` (SR OS/TiMOS) image. The locations can be local or remote. The first location searched is the primary image location. If not found, the secondary image location is searched, and lastly, the tertiary image location is searched.

Note:
The configuration and image loading information described in this section applies to all the 7210 SAS platforms with the following exceptions:

- On 7210 SAS-R6 and 7210 SAS-R12, the following caveats apply:
  - only manual mode using OOB port or Ethernet management port is supported
  - obtaining an IP address and other parameters using DHCP with the OOB port is not supported
  - auto-init is not supported
- On 7210 SAS-Mxp and 7210 SAS-T, both manual mode and auto-init mode are supported.
- On 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE, the manual mode is used only to boot the platform in standalone mode.

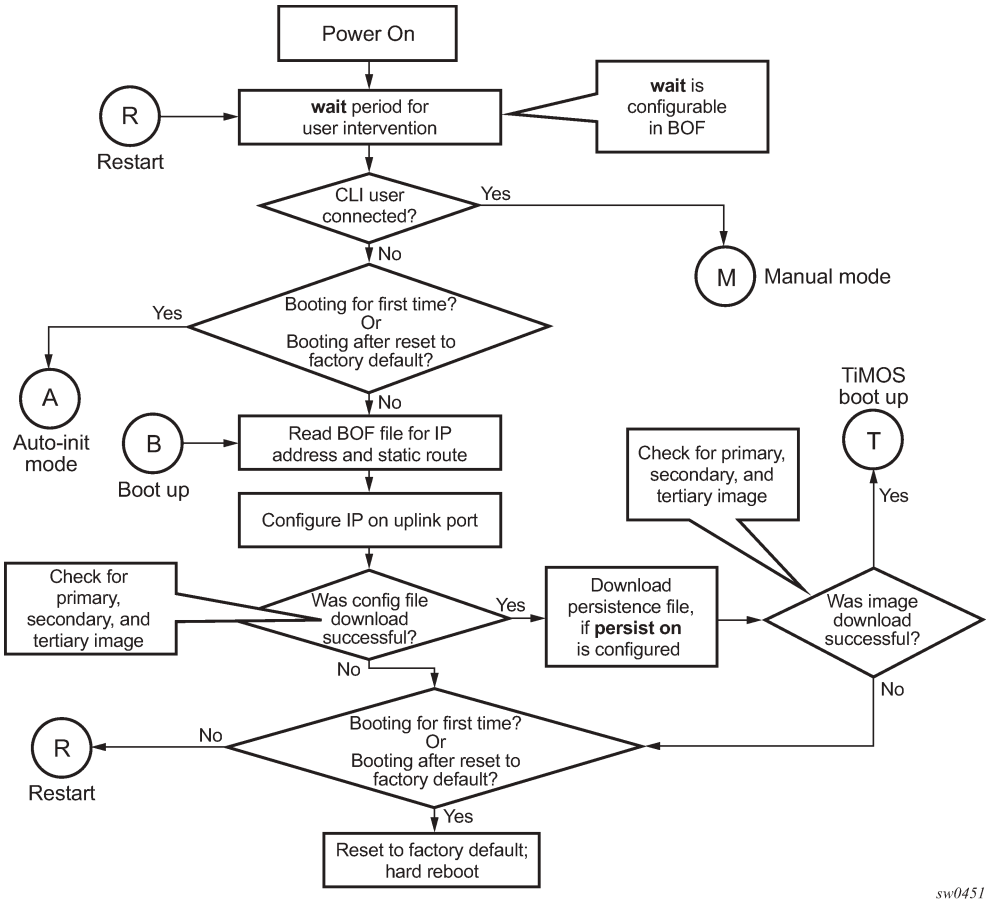
4.2.1 Boot sequence and image loading

This section describes the booting sequence of the 7210 SAS platforms when they are powered on, and how they obtain the TiMOS image file, the BOF, the configuration file loads, the image, and the configuration file to bring up the platform.

- Figure 4: System initialization: bootstrap load process shows the bootstrap load process.
- Figure 5: System initialization: bootstrap process overview shows an overview of the system initialization process and the multiple options available to initialize the system.
- Figure 6: System initialization: bootstrap process for manual mode shows the system initialization process in manual mode to create a new BOF or edit an existing BOF.
- Figure 7: System initialization: bootstrap process for auto-init mode with partial BOF shows the system initialization process in auto-init mode using partially configured BOF parameters.
- Figure 8: System initialization: bootstrap process for auto-init mode shows the system initialization process using auto-init mode to retrieve the BOF from the network.
- Figure 9: System initialization: TiMOS boot shows the process for booting up the TiMOS (both.tim) image.

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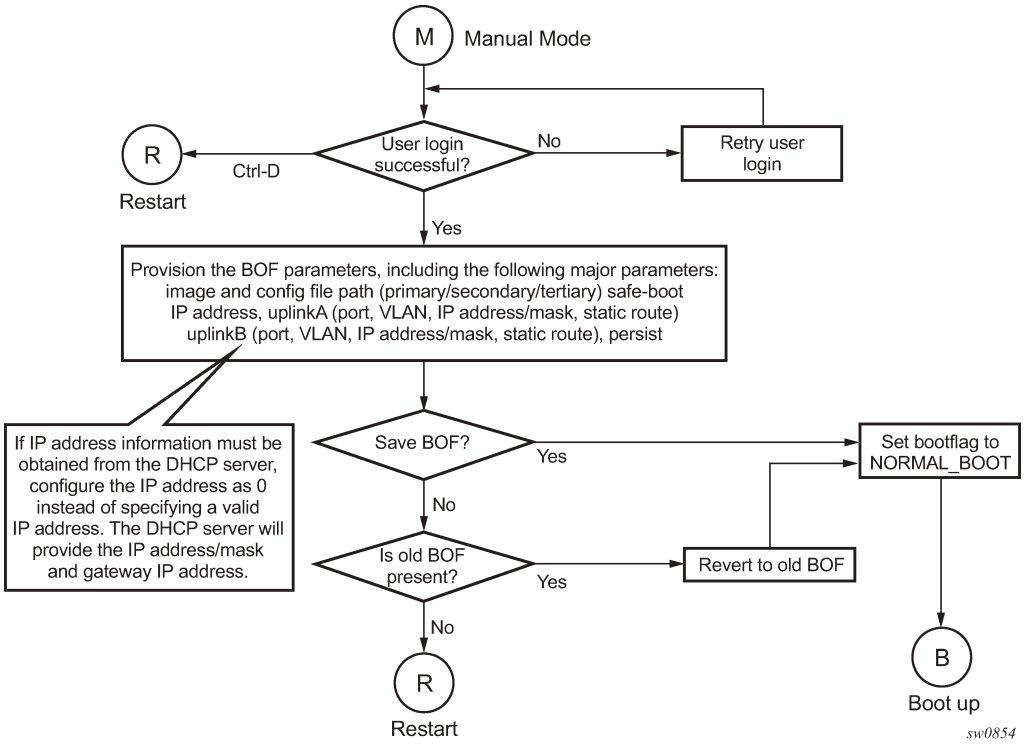
Figure 5: System initialization: bootstrap process overview



See Persistence for more information about persistence of the index files.

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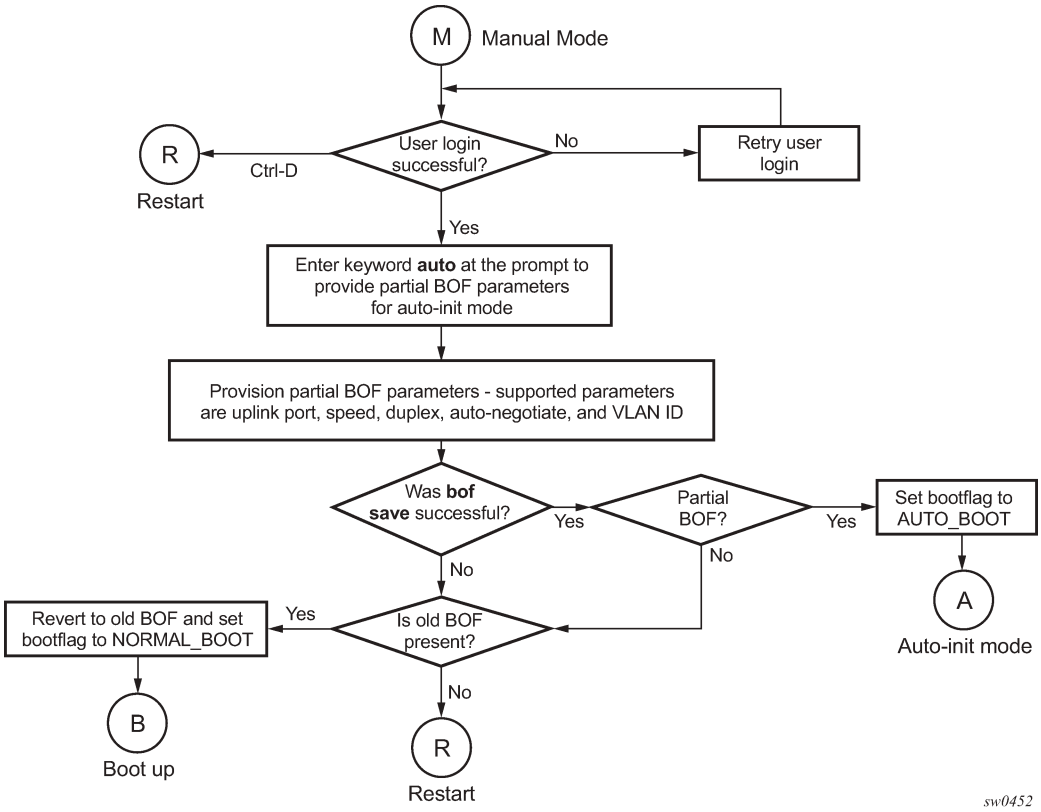
Figure 6: System initialization: bootstrap process for manual mode



See Manual mode for more information about the manual mode process.

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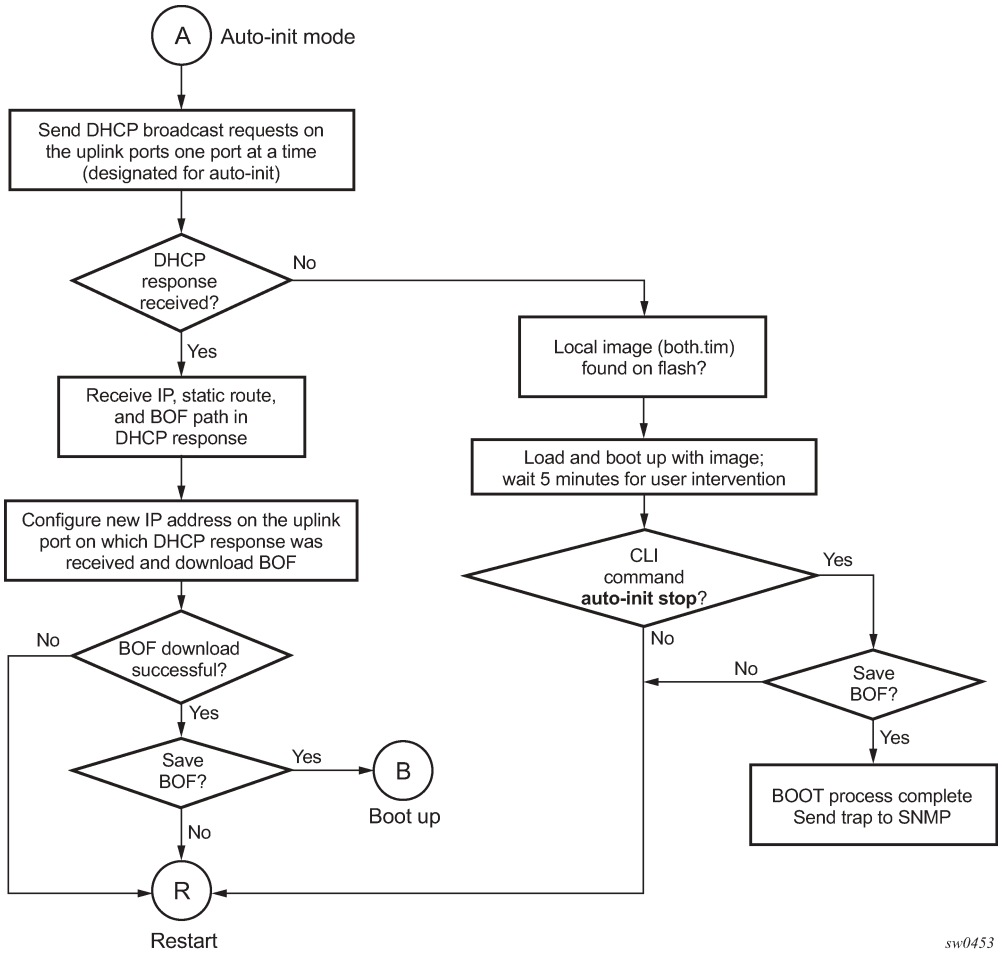
Figure 7: System initialization: bootstrap process for auto-init mode with partial BOF



See Auto-init mode for more information about operating in the auto-init mode with a partial BOF.

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Figure 8: System initialization: bootstrap process for auto-init mode



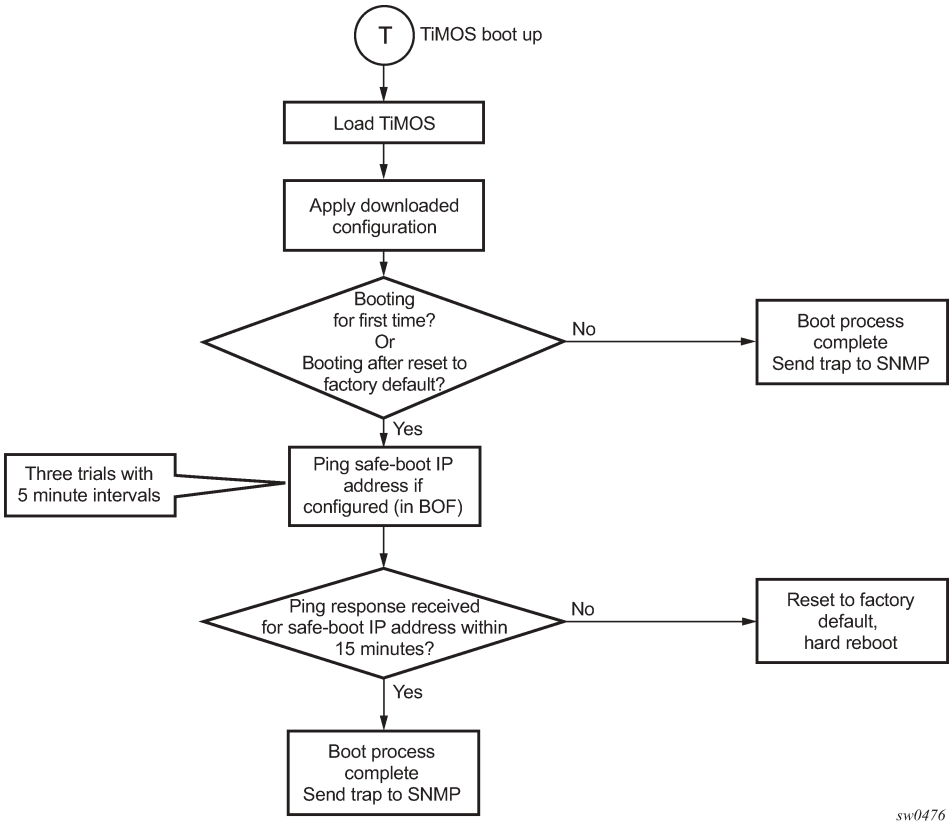
When the `both.tim` file is successfully downloaded, control is passed from the bootstrap image to the TiMOS image. The TiMOS image attempts to load the configurations from the downloaded configuration file. If no configuration file location is present in the BOF, the system is loaded with the default configuration.

Note:
During the auto-init procedure, if the configuration file or image file download fails from the network, the system reinitiates the auto-init process.

See Auto-init mode for more information about the auto-init mode process.

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Figure 9: System initialization: TiMOS boot



4.2.2 BOF chassis-role and host-type parameters for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE

On the 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE, the operator can configure the **chassis-role** and **host-type** boot parameters to operate the 7210 SAS node in standalone mode or satellite mode. The values configured for these parameters must be consistent for boot up to proceed correctly. Table 21: 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE boot loader actions for chassis-role and host-type parameters describes the boot loader action when the **chassis-role** and **host-type** parameters are set to one of the allowed values.

The **bof**>**host-type** command can be set to one of the following values:

- **none** (factory default setting)
- **standalone**
- **satellites**

The **chassis-role** boot parameter (not available in the BOF) can be set to one of the following values:

- **factory-default**

  By default, the **chassis-role** boot parameter value is set to **factory-default** when the 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, 7210 SAS-Sx 10/100GE and 7210 SAS-Mxp are shipped from the

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factory. In the **factory-default** setting, the user can use auto-init to retrieve the BOF and boot the node in either standalone or satellite mode by setting the **host-type** parameter in the BOF.

By default, the boot loader assigns a value of **none** to the **host-type** parameter and uses this value if the **host-type** parameter is not explicitly received in the BOF. As a result, in the **factory-default** setting, the user can boot the node in standalone mode without setting the **host-type** parameter to an explicit value (which maintains backward compatibility).

- **standalone**

  This parameter setting forces the node to operate in standalone mode. In the **standalone** setting, the **host-type** parameter value in the BOF (retrieved through auto-init, present locally, or configured manually) must be set to either **standalone** or **none**. If **host-type** is set to **satellites**, the boot loader detects a mismatch and does not boot up.

- **satellite**

  This parameter setting forces the node to operate only in satellite mode. In the **satellite** setting, the **host-type** parameter value in the BOF (retrieved through autoinit, present locally, or configured manually) must be set to **satellites**. If **host-type** is set to **standalone**, the boot loader detects a mismatch and does not boot up.

The following table describes the boot loader action when the **chassis-role** and **host-type** parameters are set to one of the allowed values.

Table 21: 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE boot loader actions for chassis-role and host-type parameters

Boot parameter: chassis-role	BOF parameter: host-type	Boot loader action
factory-default	**satellites**	• The user sets **chassis-role** to **satellite**. • The system boots up successfully in satellite mode. • On subsequent reboots, the system will continue to boot up in satellite mode.
	standalone	• The user sets **chassis-role** to **standalone**. • The system boots up successfully in standalone mode. • On subsequent reboots, the system will continue to boot up in standalone mode.
	none (**host-type** is not set to any value explicitly)	• The **chassis-role** value is unchanged from **factory-default**. • The system boots up successfully in standalone mode. • On subsequent reboots, the system will continue to boot up in standalone mode, if the value of **host-type** is not set explicitly (that is, it is set to **none**).
standalone	**standalone**	• The **chassis-role** value is unchanged from **standalone**. • The system boots up successfully in standalone mode. • On subsequent reboots, the system will continue to boot up in standalone mode.

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Boot parameter: chassis-role	BOF parameter: host-type	Boot loader action
	satellites	The boot loader detects a mismatch and returns an error. Depending on the context of the boot loader, it will take one of the following actions: • If the boot loader is in auto-init, it will retry auto-init to fetch a new BOF with the correct value for **host-type**. • If the boot loader was interrupted to configure the BOF parameters manually, it will go back to provide an option for the user to change the value of **host-type** to the correct value.
	none	• The value of **chassis-role** is unchanged from **standalone**. • The system boots up successfully in standalone mode. • On subsequent reboots, the system will continue to boot up in standalone mode if the **host-type** value is not set explicitly (that is, the value is set to **none**).
satellite	**satellites**	• The **chassis-role** value is unchanged from **satellite**. • The system boots up successfully in satellite mode. • On subsequent reboots, the system will continue to boot up in satellite mode.
	standalone	The boot loader detects a mismatch and returns an error. Depending on the context of the boot loader, it will take one of the following actions: • If the boot loader is in auto-init, it will retry auto-init to fetch a new BOF with the correct value for **host-type**. • If the boot loader was interrupted to configure the BOF parameters manually, it will go back to provide an option for the user to change **host-type** to the correct value.
	none (**host-type** is not set to any value explicitly)	Not recommended

4.2.3 Configuration notes for 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp

The following BOF configuration guidelines apply to these platforms:

- When the **chassis-role** parameter for the node is set to **satellite**, DHCP requests are sent out of the following ports:
  - ports 1/1/25, 1/1/26 (10GE ports) on the 24-port 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Mxp variants

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  - ports 1/1/49, 1/1/50 (10GE ports) on the 48-port 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE variants
  - ports 1/1/c1/1 and 1/1/c2/1 (100GE ports), and 10 GE ports 1/1/1 and 1/1/2 on the 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 variant

  The boot loader continuously iterates over the previously mentioned ports, sending out DHCP requests until the boot loader receives a response from the host.

- When the **chassis-role** parameter for the node is set to **standalone**, DHCP requests are sent out of the following ports:
  - ports 1/1/27, 1/1/28 (10GE ports) and ports 1/1/1, 1/1/2 (1GE ports) on the 24-port 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Mxp variants
  - ports 1/1/51, 1/1/52 (10GE ports) and ports 1/1/1, 1/1/2 (1GE ports) on the 48-port 7210 SAS-Sx/S 1/10GE, and 7210 SAS-S 1/10GE variants
  - ports 1/1/c3/1 and 1/1/c4/1 (100GE ports), and 10 GE ports 1/1/1 and 1/1/2 on the 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 variant

  In addition, the boot loader will attempt to load the TiMOS image (`both.tim`) from the local flash if auto-init fails (that is, no responses were received from the DHCP server).
- When the node is shipped from the factory (with the **chassis-role** set to **factory-default**) and powered up for the first time, the node sends out DHCP requests on the following ports:
  - 10GE ports 1/1/25, 1/1/26, 1/1/27, and 1/1/28 on the 24-port 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Mxp
  - 10GE ports 1/1/49, 1/1/50, 1/1/51 and 1/1/52 on the 48-port 7210 SAS-Sx 1/10GE and 7210 SAS-S 1/10GE
  - the first two 1GE ports, 1/1/1 and 1/1/2, on all 7210 SAS-Sx/S 1/10GE and 7210 SAS-Mxp variants
  - on a 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 variant, the DHCP requests are sent out of ports 1/1/c1/1, 1/1/c2/1, 1/1/c3/1, and 1/1/c4/1, and the first two 10 GE ports (1/1/1 and 1/1/2)

  To change this, connect to the console and modify the **chassis-role** parameter value to either **satellite** or **standalone**, as required. After the **chassis-role** parameter is updated, the node attempts autoinit to retrieve the BOF.

4.3 Persistence

Optionally, the BOF **persist** parameter can specify whether the system should preserve system indexes when a **save** command is executed. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index. If persistence is not required and the configuration file is successfully processed, the system becomes operational. If persistence is required, a matching x.ndx file must be located and successfully processed before the system can become operational. Matching files (configuration and index files) must have the same filename prefix such as `test123.cfg` and `test123.ndx`, and are created at the same time when a **save** command is executed. The persistence option must be enabled to deploy the Network Management System (NMS). The default is off.

Traps, logs, and console messages are generated if problems occur and SNMP shuts down for all SNMP gets and sets; however, traps are issued.

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4.4 Resetting the node to the factory default setting

From Release 4.0 onward, you can use the **bof>bof-password** command to modify the factory default BOF password **password**.

The user must enter the correct BOF password to edit the BOF parameters. If the incorrect password is entered three times consecutively, the system prompts the user, after the third attempt, to reset the BOF password to the factory default.

If the user chooses not to reset the BOF password, the system prompts the user to enter the password again. If the user chooses to reset the password to factory default, the system also resets the flash to factory defaults (removes all files from the flash drive, except the boot image file (`cf1:\boot.tim`) and TiMOS image file (`cf1:\both.tim`)) as a security measure to prevent malicious access to the configuration file.

After password reset, the node is rebooted with the factory default settings; the BOF parameters are also set to default values. The user must now setup the box using the same steps that were used during first-time boot up of the factory-shipped box. After the system boots up with this setup, use the factory default password "password" to edit the BOF parameters, and use the **bof>bof-password** command to change the password again.

Note:

- The BOF password can be changed from the default value to any other user-defined value only at the TiMOS level.
- Nokia strongly recommends that the user should not rename `cf1:\boot.tim` and `cf1:\both.tim` if the system needs to retain them during the password recovery procedure.
- Nokia strongly recommends that the user should retain a backup copy of all the image files, configuration files, and other data.

Example

The following sample logs show the system console prompts that are displayed when the user forgets the password and chooses to reset the password to the factory default setting. The BOF contents before and after the reset are also displayed.

Note:
The BOF parameters are set to default values after a password reset.

```
TiMOS BOOT LOADER

CPLD Version: 2.1
Time from clock is FRI AUG 19 09:22:46 2016 UTC
USB:   USB EHCI 1.00
scanning bus for devices...
1 USB Device(s) found
Number of blocks in device 0 is 0
Number of bytes per block in device 0 is 0
Switching serial output to sync mode...   done

Looking for cf1:/bof.cfg ... OK, reading

Contents of Boot Options File on cf1:
    primary-image      ftp://*:*@xxx.xxx.xx.xx/xxx/xx/xxx/xx/xxx/both.tim
```


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```
    primary-config     cf1:\sasm.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.xx.xxx/24 active
    eth-mgmt-route     x.x.x.x/0 next-hop xx.xxx.xx.x
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#uplinkA Port Settings:
uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
uplinkB-port       1/1/2
    uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      1000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        network
    acl-mode           IPv6-None
    use-expansion-card-type   m4-ds1-ces
    no  console-disabled

Hit a key within 3 seconds to change boot parameters...

Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Password:
Incorrect password

Password:
Incorrect password

Password:
Incorrect password

 Authentication failed, Do you want to reset password?(yes/no)

*********************************************************************
  On reset,the node's flash contents will be set to factory defaults.
  All files on the flash will be removed. If present, files
  cf1:/boot.tim and cf1:/both.tim are not removed.
  Please ensure that you have a backup of the required
  files before you proceed.
*********************************************************************

'yes' or 'no' ?
'yes' or 'no' ? yes

*****************************************
*** Chassis must not be powered off nor  ***
*** cards removed while password reset   ***
*** is in progress                       ***
*****************************************
Password reset complete. Restarting...
```


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At this point, the password reset is complete and the node restarts to boot up with factory default settings.

```
Resetting...OK
ø
Nokia 7210 Boot ROM. Copyright 2016 Nokia.

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Running POST tests from ROM
Testing ROM load area...done

Relocating code...Jumping to RAM

Performing second stage RAM test....passed

Board Serial Number is 'NS1023C1436'
Bootlog started for Version 9-V-0.0.I1111
Build V-0.0.I1111 bootrom/mpc 7xxx
Built on Wed Jun 29 21:55:30 IST 2016 by builder in /builder/0.0/panos/main

?Attempting to load from file cf1:/boot.tim
Version L-4.0.beta-private, Sat Aug 20 12:59:26 IST 2016 by abc /abc/ws-40b/panos/
main
text:(3706043-->13139264) + data:(528557-->2068192)
Starting at 0xb000000...


Total Memory: 1GB  Chassis Type: sas  Card Type: badami_7210
TiMOS-L-4.0.beta-private boot/mpc NOKIA SAS 7210 Copyright (c) 2016 Nokia.
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Built on Sat Aug 20 12:59:26 IST 2016 by abc in /abc/ws-40b/panos/main

TiMOS BOOT LOADER

CPLD Version: 2.1
Time from clock is FRI AUG 19 09:24:05 2016 UTC
USB:   USB EHCI 1.00
scanning bus for devices...
1 USB Device(s) found
Number of blocks in device 0 is 0
Number of bytes per block in device 0 is 0
Switching serial output to sync mode...   done

Looking for cf1:/bof.cfg ... not found
Could not find bof.cfg on any of the local drives.

Default Settings
----------------
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
uplinkB-port       1/1/2
    uplinkB-autoneg
    uplinkB-duplex     full
```


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```
    uplinkB-speed      1000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        network
    acl-mode           IPv6-None
    use-expansion-card-type   m4-ds1-ces
    no  console-disabled
Hit a key within 1 second to change boot parameters...
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt
Password:
```

Note:
At this password prompt, you are required to enter the default password "password".

4.5 BOF password

7210 SAS devices require a BOF password for the user to change the contents of the BOF using the BOF interactive menu. Additionally, the 7210 SAS supports an option to securely store the BOF password using the **bof secure-bof-password** command, as shown in the following sample logs.

Example

```
------------
primary-image ftp://*:*@135.254.173.17//usr/global/images/21.9/B1-8/7xxx/
bcmiproc-both.tim
primary-config ftp://*:*@135.254.173.3/tmp/dxp/dxp2537.cfg
secondary-config ftp://*:*@135.254.173.3/tmp/dxp/dxp2537bkup.cfg
password *
ping-address 1.1.1.1
#uplinkA Port Settings:
uplinkA-port 1/1/1
uplinkA-autoneg
uplinkA-duplex full
uplinkA-speed 1000
uplinkA-address 10.135.25.37/24
uplinkA-vlan null
uplinkA-route 135.0.0.0/8 next-hop 10.135.25.1
#uplinkB Port Settings:
uplinkB-port 1/1/11
no uplinkB-autoneg
uplinkB-duplex full
uplinkB-speed 10000
uplinkB-address 0
uplinkB-vlan 0
#System Settings:
wait 3
persist off
console-speed 115200
uplink-mode access-uplink
no console-disabled
secure-bof-password enable
Do you want to overwrite cf1:/bof.cfg with the new settings? (yes/no): y
Successfully saved the new settings in cf1:/bof.cfg
```


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```
----------------------------
```

4.6 OOB Ethernet management port

The 7210 SAS platforms support the OOB Ethernet management port for management of the node. An OOB Ethernet port can be used to download the TiMOS image file and the configuration file by creating a BOF manually. The OOB management port allows for use of both IPv4 and IPv6. See IPv6 configuration guidelines in OOB node management for information about platforms that support IPv6 for the OOB management port.

See the *7210 SAS OS Software Release Notes 11.0Rx* for information about the specific software release that supports OOB management port and IPv6.

4.6.1 IPv6 configuration guidelines in OOB node management

The following are the configuration guidelines for IPv6 on an OOB management port of the node:

- The management port on the management router instance only supports host functionality.
- It is required that an IPv4 address is configured in the BOF. A BOF that contains only IPv6 addresses is not supported.
- IPv6 duplicate address detection is not supported.
- IPv6 auto-configuration is not supported.
- IPv6 over IPv4 tunneling is not supported.
- IPv6 path MTU discovery is not supported.
- The router discovery option is not supported on the management port.

4.7 Security for console port and Ethernet management port

The 7210 SAS OS supports disabling the console port and OOB Ethernet management port. In remote deployments, operators can choose to disable user access to the node through the console and through the Ethernet management port to prevent unauthorized and malicious access. Use the **bof>console-disabled** command to disable the console and the **bof>eth-mgmt-disabled** command to disable the use of the Ethernet management port.

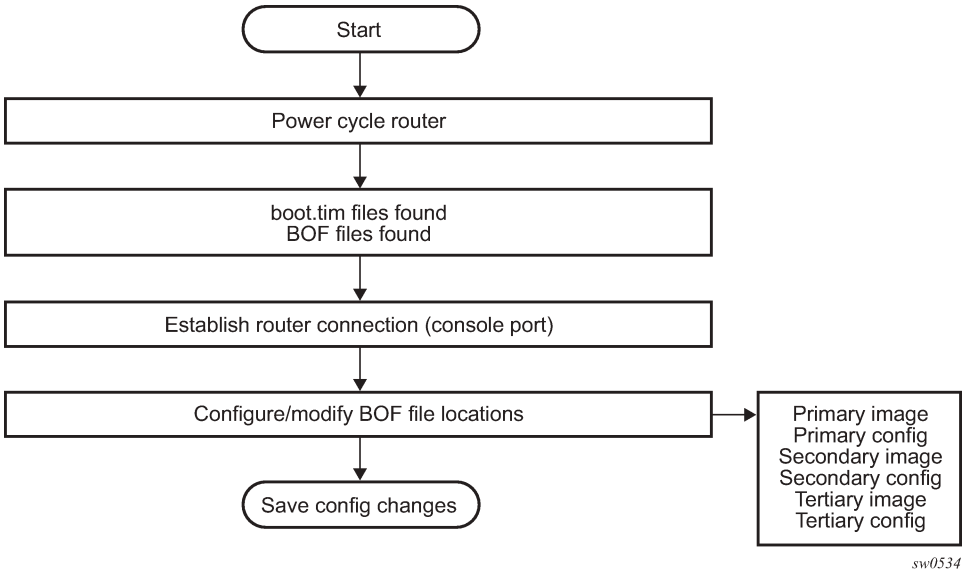
Note:
Access to a console is only disabled when the TiMOS image is loaded. Console access remains unchanged during the boot loader stage of the boot up process. That is, the **bof** command takes effect only when the node is booted with the TiMOS image.

4.8 Initial system startup process flow

The following figure shows the process to start your system. This example assumes that the boot loader and BOF image and configuration files are successfully located.

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Figure 10: System startup process flow



4.9 Configuration notes

This section describes BOF configuration guidelines:

- The loading sequence is based on the order in which the sequence is placed in the configuration file. It is loaded as it is read during bootup.

4.10 Configuring boot file options with CLI

This section provides information to configure BOF parameters with CLI.

4.10.1 BOF configuration overview

Nokia routers do not contain a boot EEPROM. The bootstrap image is loaded from the `boot.tim` file. The BOF performs the following tasks:

1. sets up the uplink ports or the Ethernet management port (speed, duplex, auto) (only on platforms that support the Ethernet management port)
2. assigns the IP address (either statically or using DHCP) for the uplink/Ethernet management port
3. assigns the VLAN to the uplink port
4. creates static routes to provide network connectivity
5. sets the console port speed
6. configures the Domain Name System (DNS) name and DNS servers
7. configures the primary, secondary, tertiary configuration source

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8. configures the primary, secondary, and tertiary image source
9. configures operational parameters

4.10.2 Basic BOF configuration

The parameters that specify the location of the image filename that the router will try to boot from and the configuration file are in the BOF.

The most basic BOF configuration should have the following:

- uplink port or Ethernet management port parameters
- primary image location
- primary configuration location

Output example: Basic BOF configuration

```
A:7210>show# bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xxx.xxx.xx.xx//import/panos_builds/nightly/
2.0                                              /S80/MTU-sultan/
    primary-config     tftp://xx.xxx.xx.xxx/MTU/mtu3DGP.cfg
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
uplinkB-port       1/1/2
    uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      1000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no console-disabled
===============================================================================
A:7210>show#
```

Output example: Configuration for the 7210 SAS-Sx/S 1/10GE

The following output is an example of configuration to enable satellite mode in the BOF for the 7210 SAS-Sx/S 1/10GE.

```
===============================================================================
A:7210SAS-Sx# shell satclicmd 1 "show bof"
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xx.x.x.x/esat-1/primary/
```


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```
    secondary-image    ftp://*:*@xx.x.x.x/esat-1/secondary/
    tertiary-image     ftp://*:*@xx.x.x.x/esat-1/tertiary/
    primary-config     ftp://*:*@xx.x.x.x/esat-1/config.cfg
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port 1/1/49
    uplinkA-autoneg
    uplinkA-duplex full
    uplinkA-speed 1000
    uplinkA-address xx.xxx.x.x/19
    uplinkA-vlan 0
    uplinkA-route xx.x.x.x/32 next-hop xx.xxx.x.x
#uplinkB Port Settings:
    uplinkB-port 1/1/50
    uplinkB-autoneg
    uplinkB-duplex full
    uplinkB-speed 1000
    uplinkB-address xx.xxx.x.x/19
    uplinkB-vlan 0
    uplinkB-route xx.x.x.x/32 next-hop xx.xxx.x.x
#System Settings:
    wait 3
    persist off
    console-speed 115200
    no console-disabled
    host-type satellites
===============================================================================
Result of 'satclicmd' = 0 = 0x0
A:7210SAS-Sx#
```

Output example: Configuration for the 7210 SAS-R6

The following output is an example of a basic BOF configuration for the 7210 SAS-R6.

```
*A:dut-b>show# bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xx.xxx.x.xxx/./images/sasr/cpm.tim
    primary-config     cf2:\MasterScaling_18_Aug_B.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.x.xxx/24 active
    eth-mgmt-address   xxxx::xxxx/64 active
    eth-mgmt-address   xx.xxx.x.xxx/24 standby
    eth-mgmt-route     xx.xxx.x.x/16 next-hop xx.xxx.x.x
    eth-mgmt-route     xxx.xxx.x.x/16 next-hop xx.xxx.x.x
    eth-mgmt-route     xxx.xxx.x.x/16 next-hop xx.xxx.x.x
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
===============================================================================
*A:dut-b>show#
```


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4.10.3 Common configuration tasks

This section describes basic system configuration tasks that must be performed to configure the BOF.

For details about hardware installation and initial router connections, see the specific hardware installation guide.

4.10.3.1 Searching for the BOF

The BOF should be on the same drive as the bootstrap image file. If the system cannot load or cannot find the BOF, the system checks whether the boot sequence was manually interrupted or else continues with the auto-init mode. The system prompts for a different image and configuration location.

Note:
Auto-init is not supported on the 7210 SAS-R6 and 7210 SAS-R12; use the starter BOF or create a BOF manually to boot the system.

4.10.3.2 Sample output of BOF configuration on bootup for 7210 SAS platforms

This section provides sample output of a BOF configuration boot sequence for 7210 SAS platforms.

4.10.3.2.1 Sample output: BOF configuration on bootup for 7210 SAS-Mxp and 7210 SAS-T

Example

The following is a sample output of a manually interrupted boot sequence on the 7210 SAS-Mxp and 7210 SAS-T.

```
Hit a key within 3 seconds to change boot parameters...

Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt


You must supply some required Boot Options. At any prompt, you can type:
   "restart" - restart the query mode.
   "reboot"  - reboot.
   "exit"    - boot with with existing values.
   "reset"   - reset the bof and reboot.

Press ENTER to begin, or 'flash' to enter firmware update, or the shell password...

Software Location
-----------------
   You must enter the URL of the TiMOS software.
   The location can be on a Compact Flash device,
   or on the network.

   Here are some examples
      cf1:/timos1.0R1
      ftp://user:passwd@xxx.xxx.x.xxx/./timos1.0R1
      ftp://user:passwd@[xxxx::x]/./timos1.0R1
      tftp://xxx.xxx.x.xxx/./timos1.0R1
      tftp://xxxx::x/./timos1.0R1
```


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```
The existing Image URL is 'ftp://*:*@xx.xx.xxx.xx//home/***/images/both.tim'
Press ENTER to keep it.
Software Image URL:
Using: 'ftp://*:*@xx.xx.xxx.xx//home/****/images/both.tim'


Configuration File Location
---------------------------
   You must enter the location of configuration
   file to be used by TiMOS.  The file can be on
   a Compact Flash device, or on the network.

   Here are some examples
      cf1:/config.cfg
      ftp://user:passwd@xxx.xxx.x.xxx/./config.cfg
      ftp://user:passwd@[xxxx::x]/./config.cfg
      tftp://xxx.xxx.x.xxx/./config.cfg
      tftp://xxxx::x/./config.cfg

The existing Config URL is 'ftp://*:*@xx.xxx.xx.xxx/tftpboot/STU/config.cfg
Press ENTER to keep it, or the word 'none' for no Config URL.
Config File URL: none


Network Configuration
---------------------

Boot Interface Management
-------------------------
   You specified a network location for either the
   software or the configuration file. You need to
   configure either eth-mgmt or uplinkA or uplinkB ports.
   You will be asked to configure the port number, IP address,
   static routes, and VLAN Id in case of uplink ports.

   eth-mgmt Port Setting
   --------------------
Existing eth-mgmt port settings are:

   eth-mgmt-port
   eth-mgmt-address    xx.xxx.xx.xx/24
   eth-mgmt-route      xx.xxx.x.x/16 next-hop xx.xxx.xx.x
   eth-mgmt-route      xxx.xxx.x.x/16 next-hop xx.xxx.xx.x

   eth-mgmt port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:

   uplinkA Port Setting
   --------------------
Existing uplinkA port settings are:
#uplinkA Port Settings:
uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
#uplinkB Port Settings:
uplinkB-port       1/1/2
    uplinkB-autoneg
```


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```
    uplinkB-duplex     full
    uplinkB-speed      1000
    uplinkB-address    0
    uplinkB-vlan       0

   uplinkA port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:

   uplinkB Port Setting
   --------------------
Existing uplinkB port settings are:

   uplinkB-port       1/1/2
   uplinkB-address    0
   uplinkB-vlan     0

   uplinkB port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:


New Settings
------------
    primary-image      ftp://*:*@xxx.xxx.xxx.xx//home/****/images/both.tim
    secondary-config   tftp://xx.xxx.xx.xxx/STU/config.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.xx.xx/24
    eth-mgmt-route     xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    eth-mgmt-route     xxx.xxx.x.x/16 next-hop xx.xxx.xx.x
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#uplinkA Port Settings:
uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
uplinkB-port       1/1/2
    uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      1000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    console-disabled
```


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4.10.3.2.2 Sample output: BOF configuration on bootup for 7210 SAS-R6 and 7210 SAS-R12

Example

The following is a sample output of a manually interrupted boot sequence on the 7210 SAS-R6 and 7210 SAS-R12.

```
Hit a key within 3 seconds to change boot parameters...
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt
Password:
Incorrect password
Password:
You must supply some required Boot Options. At any prompt, you can type:
   "restart" - restart the query mode.
   "reboot"  - reboot.
   "exit"    - boot with with existing values.
   "reset"   - reset the bof and reboot.
Press ENTER to begin, or 'flash' to enter firmware update...
Software Location
-----------------
   You must enter the URL of the TiMOS software.
   The location can be on a Compact Flash device,
   a USB flash drive, or on the network.
   Here are some examples
      cf1:/timos1.0R1
      uf1:/timos1.0R1
      ftp://user:passwd@xxx.xxx.x.xxx/./timos1.0R1
      ftp://user:passwd@[xxxx::x]/./timos1.0R1
      tftp://xxx.xxx.x.xxx/./timos1.0R1
      tftp://[xxxx::x]/./timos1.0R1
The existing Image URL is 'ftp://*:*@xxx.xxx.xx.xxx/tmp/sasr/b/'
Press ENTER to keep it.
Software Image URL:
Using: 'ftp://*:*@xxx.xxx.xx.xxx/tmp/sasr/b/'
Configuration File Location
---------------------------
   You must enter the location of configuration
   file to be used by TiMOS.  The file can be on
   a Compact Flash device, a USB flash drive, or
   on the network.
   Here are some examples
      uf1:/config.cfg
      cf1:/config.cfg
      ftp://user:passwd@xxx.xxx.x.xxx/./config.cfg
      ftp://user:passwd@[xxxx::x]/./config.cfg
      tftp://xxx.xxx.x.xxx/./config.cfg
      tftp://[xxxx::x]/./config.cfg
The existing Config URL is 'uf1:\SASR2553.cfg'
Press ENTER to keep it, or the word 'none' for no Config URL.
Config File URL:
Using: 'uf1:\SASR2553.cfg'
Network Configuration
---------------------
   You specified a network location for either the
   software or the configuration file.  You need to
   assign an IP(v6) address for this system.
   The IP address should be entered in standard
   dotted-decimal form with a network length.
       example:   192.168.1.169/24
Existing eth-mgmt port settings are:
   eth-mgmt-port
```


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```
   eth-mgmt-address    xx.xxx.xx.xx/24 active
   eth-mgmt-address    xx.xxx.xx.xx/24 standby
   eth-mgmt-address    0 active
   eth-mgmt-address    0 standby
   eth-mgmt-route      x.x.x.x/24 next-hop xx.xxx.xx.x
   eth-mgmt-route      x.x.x.x/24 next-hop xx.xxx.xx.x
   eth-mgmt-route      xx.xxx.x.x/16 next-hop xx.xxx.xx.x
   eth-mgmt-route      xxx.x.x.x/8 next-hop xx.xxx.xx.x
   eth-mgmt port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings: edit
   You need to assign an IP address for this port.
   The IP address should be entered in standard
   dotted-decimal form with a network length.
   example:   192.168.1.169/24
The existing eth-mgmt Active IP address is xx.xxx.xx.xx/24. Press ENTER to keep it.
Enter eth-mgmt Active IP Address : xx.xxx.xx.xx/24
   In case of an IPv6, the IPv6 address should be
   entered in standard colon hexadecimal notation
   with a prefix length.
       example:   3FFE::1/112
Enter eth-mgmt Active IPv6 Address (Type 0 if none desired): 0
The existing eth-mgmt Standby IP address is xx.xxx.xx.xx/24. Press ENTER to keep it.
Enter eth-mgmt Standby IP Address : xx.xxx.xx.xx/24
   In case of an IPv6, the IPv6 address should be
   entered in standard colon hexadecimal notation
   with a prefix length.
       example:   3FFE::1/112
Enter eth-mgmt Standby IPv6 Address (Type 0 if none desired): 0
   You specified network locations which might require
   static routes to reach. You will be asked to
   enter static routes until all the locations become
   reachable.
   Static routes should be entered in the following format:
   prefix/mask next-hop ip-address
   example:     192.168.0.0/16 next-hop 192.168.1.254
A static route to the Primary Image exists: xxx.x.x.x/8 next-hop xx.xxx.xx.x
Do you want to keep it? (yes/no) y
Would you like to add a static route? (yes/no) yes
Enter ip route: xx.xxx.x.x/16 next-hop xx.xxx.xx.x
A route to that subnet already exists.
Would you like to add a static route? (yes/no) n
Would you like to add a static IPv6 route? (yes/no) n
Current configuration enables use of console (setting is "no console-disabled")
Press ENTER to proceed with existing setting or 'disable' to disable console access:
New Settings
------------
    primary-image      ftp://*:*@xxx.xxx.xx.xxx/tmp/sasr/b/
    secondary-image    cf1:\
    tertiary-image     uf1:\
    primary-config     uf1:\SASR2553.cfg
    secondary-config   uf1:\SASR2553.cfg
    tertiary-config    cf2:\SASR2553.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.xx.xx/24 active
    eth-mgmt-address   xx.xxx.xx.xx/24 standby
    eth-mgmt-route     x.x.x.x/24 next-hop xx.xxx.xx.x
    eth-mgmt-route     x.x.x.x/24 next-hop xx.xxx.xx.x
    eth-mgmt-route     xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    eth-mgmt-route     xxx.x.x.x/8 next-hop xx.xxx.xx.x
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
```


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```
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
Do you want to overwrite cf1:/bof.cfg with the new settings? (yes/no): y
Successfully saved the new settings in cf1:/bof.cfg
Configuring Network with eth-mgmt Port Setting.....
Primary config file present at: uf1:\SASR2553.cfg
Sap Index file present at: uf1:\SASR2553.sdx
Primary image location: ftp://*:*@xxx.xxx.xx.xxx/tmp/sasr/b/
Initial DNS resolving preference is ipv4-only
Loading image ftp://*:*@xxx.xxx.xx.xxx/tmp/sasr/b/cpm.tim
Version C-6.1.R3, Wed Jun  4 10:32:00 IST 2014 by builder in /home/builder/6.1B1/R3/
panos/main
text:(35757600-->121586864)
telnet>
```

4.10.3.2.3 Sample output: BOF configuration on bootup for 7210 SAS-Sx/S 1/10GE

Example

The following is a sample output of a manually interrupted boot sequence on the 7210 SAS-Sx/S 1/10GE.

```
primary-image      cf2:both.tim
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/25
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/26
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
    primary-image      ftp://*:*@xxx.xxx.xx.x/./images/SASS-hops-both.tim
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    xxx.xxx.xx.xxx/24
    uplinkA-vlan       0
    uplinkA-route      xxx.xxx.x.x/16 next-hop xxx.xxx.xx.x
#System Settings:
    wait               3
```


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```
    persist            off
    console-speed      115200
    no  console-disabled
   primary-image      ftp://*:*@xx.xxx.xx.xxx/./images/SASS-hops-both.tim
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.xx.xxx/24 active
    eth-mgmt-route     xx.xxx.x.x/16 next-hop xx.xxx.xx.xxx
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
  primary-image      uf1:both.tim
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/25
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/26
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
```

4.10.3.3 Accessing the CLI

About this task

To access the CLI to configure the software for the first time, perform the following steps.

Procedure

Step 1. Turn on the power to the chassis.

The 7210 SAS software automatically begins the boot sequence.

Step 2. When the boot loader, BOF image, and configuration files are successfully located, establish a router connection (console session).

See the applicable chassis and installation guide for these 7210 SAS platforms for more information about establishing a console connection.

4.10.3.4 Configuring BOF encryption

The BOF contents can be encrypted using AES256 and integrity information maintained using SHA256.

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Use the following CLI syntax to configure BOF encryption.

```
bof
        encrypt {on | off}
```

4.10.3.5 Configuring the BOF interactive menu password

The 7210 SAS supports the configuration of a BOF password to provide specific users with access to the BOF interactive menu. To securely store the BOF password, use the **bof secure-bof-password** command.

Use the following CLI syntax to configure and securely store a password for the BOF interactive menu.

```
bof
        bof-password password
        no bof-password
        secure-bof-password {enable | disable}
```

The password must be a plaintext string, between 8 and 32 characters, and cannot contain embedded nulls.



Caution:
When entering the password in plaintext, ensure that the password is not visible to bystanders.

4.10.3.6 Configuring the configuration file encryption

The configuration file contents can be encrypted using AES256 and integrity information maintained using SHA256.

Use the following CLI syntax to configure an encryption key for the configuration file.

```
bof
        encryption-key key
        no encryption-key
```

The configured encryption key must be a plaintext string, between 8 to 32 characters, and cannot contain embedded nulls.



Caution:
When entering the encryption key in plaintext, ensure that the key is not visible to bystanders.

4.10.3.7 7210 SAS console port support

Console ports are supported on all 7210 SAS platforms described in this guide.

4.10.3.8 Configuring BOF parameters

This section provides sample output of a BOF configurations on 7210 SAS platforms.

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4.10.3.8.1 Sample output: BOF configuration for 7210 SAS-Mxp and 7210 SAS-T

Output example

The following is a sample output of a BOF configuration for the 7210 SAS-Mxp and 7210 SAS-T.

```
A:7210>show# bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xxx.xxx.xxx.xx//import/panos_builds/nightly/
2.0                                                /S80/MTU-sultan/
    primary-config     tftp://xx.xxx.xx.xxx/MTU/mtu3DGP.cfg
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/24
    uplinkA-address    xx.xxx.xx.xx/24
uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/2
    uplinkB-address    0
uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      1000
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no console-disabled
===============================================================================
A:7210>show#
```

4.10.3.8.2 Sample output: BOF configuration for 7210 SAS-R6

Output example

The following is a sample output of a BOF configuration for 7210 SAS-R6.

```
--------
*7210SAS# show bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xx.xxx.xx.xx/./images/SASR6-KT2/
    primary-config     cf1:\config.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.xx.xx/24 active
    eth-mgmt-address   xx.xxx.xx.xx/24 standby
    eth-mgmt-route     xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    eth-mgmt-route     xxx.x.x.x/8 next-hop xx.xxx.xx.x
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
```


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```
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
===============================================================================
7210 SAS#
```

4.10.3.8.3 Sample output: BOF configuration for 7210 SAS-R12

Output example

The following is a sample output of a BOF configuration for 7210 SAS-R12.

```
--------------
A:7210SAS# show bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xx.xxx.xx.xx/./images/SASR12-KT2
    primary-config     cf1:\sreekak.cfg
    secondary-config   cf2:\sreekak.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.xx.xx/24 active
    eth-mgmt-address   xx.xxx.xx.xx/24 standby
    eth-mgmt-route     xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    eth-mgmt-route     xxx.x.x.x/8 next-hop xx.xxx.xx.x
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
===============================================================================
A:7210SAS#
```

4.10.3.8.4 Sample output: BOF configuration for 7210 SAS-Sx/S 1/10GE

Output example

The following is a sample output of a BOF configuration for 7210 SAS-Sx/S 1/10GE.

```
*A:SAS7210>show# bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xx.xxx.x.xx/./images/SASS/hops-both.tim
    primary-config     cf1:\default_config.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.xx.xx/24 active
    eth-mgmt-route     xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
```


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```
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
    host-type standalone
===============================================================================
*A:SAS7210>show#
```

4.11 Service management tasks

This section describes the service management tasks and system administration commands.

4.11.1 System administration commands

Use the following administrative commands to perform management tasks.

```
A:ALA-1# admin
        auto-init stop
        check-golden-bootstrap
        debug-save [<file-url>]
        disconnect [address <ip-address> | username <user-name> | {console|telnet|ftp|ssh}]
        display-config
        [no] enable-tech
        reboot [upgrade][auto-init][now]
        save [file-url] [detail] [index]
        set-time <date> <time>
        tech-support <file-url>
        update-golden-bootstrap [file-url]
```

4.11.1.1 Viewing the current configuration

Use one of the following CLI commands to display the current configuration. The **detail** option displays all default values. The **index** option displays only the persistent indexes. The **info** command displays context-level information.

```
admin# display-config [detail|index]
    info detail
```

Example: Configuration file

```
*A:sim169# admin display-config
# TiMOS-B-0.0.I218 both/i386 NOKIA SAS-Sx 7210 Copyright (c) 2016.
# All rights reserved. All use subject to applicable license agreements.
# Built on Fri Sep 26 20:46:58 IST 2016 by panosbld in /panosbld/ws/panos/main

# Generated THU JUN 23 19:19:22 2016 UTC

exit all
configure
#--------------------------------------------------
echo "System Configuration"
```


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```
#------------------------------------------------
    system
        name "7210-3"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
        ccm 1
        exit
        snmp
        exit
        login-control
            idle-timeout 1440
            motd text "7210-3"
        exit
        time
            sntp
                shutdown
            exit
            zone UTC
        exit
        thresholds
            rmon
            exit
        exit
    exit...
...
#------------------------------------------------

# Finished FRI Nov 21 15:06:16 2008 UTC
A:*A:sim169##
```

4.11.1.2 Modifying and saving a configuration

If you modify a configuration file, the changes remain in effect only during the current power cycle unless a **save** command is executed. Changes are lost if the system is powered down or the router is rebooted without saving:

- Specify the file URL location to save the running configuration. If a destination is not specified, the files are saved to the location where the files were found for that boot sequence. The same configuration can be saved with different filenames to the same location or to different locations.
- The **detail** option adds the default parameters to the saved configuration.
- The **index** option forces a save of the index file.
- Changing the active and standby addresses without reboot standby CPM may cause a **boot-env** synchronization to fail.

Use the following command syntax to save a configuration.

```
bof# save [cflash-id]
```

Example: Saving a configuration

```
A:ALA-1# bof
A:ALA-1>bof# save cf1:
A:ALA-1>bof#
```


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Use the following command syntax to save the system configuration.

```
admin# save[file-url][detail][index]
```

Example: Saving the system configuration

```
A:ALA-1# admin save cf1:\test123.cfg
Saving config.# Saved to cf1:\test123.cfg
... complete
A:ALA-1#
```

Note:
If the **persist** option is enabled and the **admin save** *file-url* command is executed with an FTP path used as the *file-url* parameter, two FTP sessions simultaneously open to the FTP server. The FTP server must be configured to allow multiple sessions from the same login; otherwise, the configuration and index files will not be saved correctly.

4.11.1.3 Deleting BOF parameters

You can delete specific BOF parameters. The no form of these commands removes the parameter from configuration. The changes remain in effect only during the current power cycle unless a **save** command is executed. Changes are lost if the system is powered down or the router is rebooted without saving.

Deleting the BOF and rebooting causes the system to enter the auto mode.

Use the following CLI syntax to save and remove BOF configuration parameters.

```
bof# save [cflash-id]
```

Example: Saving a BOF configuration

```
A:ALA-1# bof
A:ALA-1>bof# save cf1:
A:ALA-1>bof#
```

Example: Removing BOF parameters

```
*A:7210>bof#
      no   console-speed
      no   dns-domain
      no   eth-mgmt-address
      no   eth-mgmt-autoneg
      no   eth-mgmt-disable
           eth-mgmt-duplex
      no   eth-mgmt-route
           eth-mgmt-speed
           persist
      no   ping-address
      no   primary-config
      no   primary-dns
      no   primary-image
           save
      no   secondary-config
      no   secondary-dns
      no   secondary-image
      no   tertiary-config
```


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```
      no   tertiary-dns
      no   tertiary-image
      no   uplinkA-address
      no   uplinkA-autoneg
      no   uplinkA-duplex
      no   uplinkA-speed
      no   uplinkA-port
      no   uplinkA-route
      no   uplinkA-vlan
      no   uplinkB-address
      no   uplinkB-autoneg
      no   uplinkB-duplex
      no   uplinkB-speed
      no   uplinkB-port
      no   uplinkB-route
      no   uplinkB-vlan
          wait
```

4.11.1.4 Saving a configuration to a different filename

Save the current configuration with a unique filename to have additional backup copies and to edit parameters with a text editor. You can save your current configuration to an ASCII file.

Use one of the following CLI syntax to save a configuration to a different location.

```
bof# save [cflash-id]
```

Example: Saving a BOF configuration

```
 A:ALA-1# bof
A:ALA-1>bof# save cf1:
A:ALA-1>bof#
```

or

```
admin# save [file-url][detail][index]
```

Example: Saving to a different filename

```
 A:ALA-1>admin# save cf1:\testABC.cfg
Saving config.# Saved to cf1:\testABC.cfg
... complete
A:ALA-1#
```

4.11.1.5 Rebooting

When an **admin**>**reboot** command is issued, the system reboots. Changes are lost unless the configuration is saved. Use the**admin**>**save** *file-url*command to save the current configuration. If no command line options are specified with the **reboot** command, the user is prompted to confirm the reboot operation. However, if the **now** option is specified, the user is not prompted to confirm the reboot operation. The **reboot upgrade** command forces an upgrade of the device firmware (CPLD and ROM) and reboots the system.

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Note:
The **auto-init** option is supported on the 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE (standalone), 7210 SAS-Sx 10/100GE (standalone), and 7210 SAS-T. It is not supported on 7210 SAS-R6, 7210 SAS-R12, and platforms operating in standalone-VC mode.

Use the following CLI syntax to reboot.

```
admin# reboot [upgrade] [auto-init] [now]
```

Example: Rebooting the system

```
A:DutA>admin# reboot
Are you sure you want to reboot (y/n)? y
Resetting...OK

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Running POST tests from ROM
Testing ROM load area...done

Relocating code...Jumping to RAM
...
```

When an **admin reboot auto-init** command is issued, the system resets the existing BOF and reboots. The system startup process after the **admin reboot auto-init** command is executed is the same as the first time system boot as described in System initialization.

Note:
After the BOF is reset, the system may not boot up with the last saved system configuration unless the new BOF also uses the same configuration file. If booting the system with the last saved system configuration is required, it is recommended to run the **admin**>**save** *file-url* command to save the current system configuration and modify the BOF to use this configuration file.

Use the following syntax to reset the BOF and reboot.

```
admin# reboot auto-init [now]
```

Example: Resetting the BOF and rebooting

```
Example: *A:ALA-1# admin reboot auto-init
WARNING: Configuration and/or Boot options may have changed since the last save.
Are you sure you want to reset the bof and reboot (y/n)? Y
Resetting...OK

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```


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4.12 BOF command reference

4.12.1 Command hierarchies

4.12.1.1 Configuration commands

```
bof
    - bof-password password
    - no bof-password
    - [no] console-disabled
    - console-speed baud-rate
    - no console-speed
    - dns-domain dns-name
    - no dns-domain
    - encrypt  {on | off}
    - encryption-key  key
    - no encryption-key
    - [no] eth-mgmt-address ip-prefix/ip-prefix-length [active | standby]
    - [no] eth-mgmt-autoneg
    - [no] eth-mgmt-disabled
    - eth-mgmt-duplex {full | half}
    - [no] eth-mgmt-route ip-prefix/ip-prefix-length next-hop ip-address
    - eth-mgmt-speed speed
    - host-type host-type
    -  no host-type
    - persist {on | off}
    - ping-address ip-address
    - no ping-address
    - primary-config file-url
    - no primary-config
    - primary-dns ip-address
    - no primary-dns [ip-address]
    - primary-image file-url
    - no primary-image
    - save [cflash-id ]
    - secondary-config file-url
    - no secondary-config
    - secondary-dns ip-address
    - no secondary-dns [ip-address]
    - secondary-image file-url
    - no secondary-image
    - secure-bof-password  {enable | disable}
    - sftp-key-directory file-url
    - no sftp-key-directory
    - tertiary-config file-url
    - no tertiary-config
    - tertiary-dns ip-address
    - no tertiary-dns [ip-address]
    - tertiary-image file-url
    - no tertiary-image
    - uplink-mode {access-uplink | network}
    - uplinkA-address ip-address/mask
    - no uplinkA-address
    - uplinkA-autoneg
    - no uplinkA-autoneg
    - uplinkA-duplex {full | half}
    - uplinkA-port port-id
```


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```
    - no uplinkA-port
    - [no] uplinkA-route ip-address/mask next-hop ip-address
    - uplinkA-speed speed
    - uplinkA-vlan 0..4094
    - no uplinkA-vlan
    - uplinkB-address ip-address/mask
    - no uplinkB-address
    - uplinkB-autoneg
    - no uplinkB-autoneg
    - uplinkB-duplex {full | half}
    - uplinkB-port port-id
    - no uplinkB-port
    - [no] uplinkB-route ip-address/mask next-hop ip-address
    - uplinkB-speed speed
    - uplinkB-vlan 0..4094
    - no uplinkB-vlan
    - vc-stack-node {cpmA | cpmB} slot-num slot-num mac-addr mac-address
    - no vc-stack-node {cpmA | cpmB}
    - wait seconds
```

4.12.1.2 Show commands

```
show
    - bof [cflash-id | booted]
    - boot-messages
```

4.12.2 Command descriptions

- Configuration commands
- Show commands

4.12.2.1 Configuration commands

- File management commands
- BOF processing control
- Console port configuration
- Image and configuration management
- DNS configuration commands

4.12.2.1.1 File management commands

bof

Syntax

bof

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Context

<ROOT>

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the boot options file (BOF) for the specified local storage device.

A BOF file specifies where the system searches for runtime images, configuration files, and other operational parameters during system initialization.

BOF parameters can be modified, and changes can be saved to a specified compact flash. The BOF must be located in the root directory of either an internal or external compact flash local to the system and have the mandatory filename of `bof.cfg`.

When modifications are made to in-memory parameters that are currently in use or operating, the changes are effective immediately. For example, if the console speed is changed, the change takes place immediately.

Only one entry of the BOF configuration command statement can be saved after the statement has been found to be syntactically correct.

No default BOF exists.

encrypt

Syntax

encrypt {**on** | **off**}

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command enables and disables encryption of the BOF using AES256 and SHA256.

When the BOF is encrypted on the compact flash, it is still reachable using the BOF interactive menu during node startup, and fields can be modified using this menu.

Default

encrypt off

Parameters

on

Keyword to enable BOF encryption.

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off

Keyword to disable BOF encryption.

encryption-key

Syntax

encryption-key *key*

no encryption-key

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command creates a key used by AES256 and SHA256 algorithms for configuration file encryption and hashing. This key is used for all configuration files (primary, secondary, and tertiary).

After creating or deleting a key, use the **admin save** command to save the configuration file with the current encryption key state.

The **no** form of this command deletes the encryption key.

Default

no encryption-key

Parameters

key

Specifies the encryption key in plaintext format between 8 and 32 characters.

save

Syntax

save [*cflash-id*]

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

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Description

This command uses the boot option parameters currently in memory and writes them from the BOF to the compact flash.

The BOF is located in the root directory of the internal compact flash drive local to the system and has the mandatory filename bof.cfg.

Command usage:

- **bof save**

  This configuration saves the BOF to the flash drive.

- **bof save cf1:**

  This configuration saves the BOF to cf1:\.

Default

Saves must be explicitly executed. BOF is saved at the same location as the location of boot.tim used for booting the system.

Parameters

cflash-id

The compact flash ID where the bof.cfg is to be saved.

Values cf1: | cf2: | uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2: | cf2-A: | cf2-B: | uf1: | uf1-A: | uf1-B: (7210 SAS-R6 and 7210 SAS-R12) cf1: | cf2: (7210 SAS-S 1/10GE)

Default cf1:

secure-bof-password

Syntax

secure-bof-password {**enable** | **disable**}

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command securely stores BOF passwords in the bof.cfg file in an encrypted format.

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Note:
When this command is enabled or disabled, the system resets the BOF password to the default password. Nokia recommends that after enabling or disabling this command, the user should change the password using the **bof**>**bof-password** command.

Parameters

enable

Keyword to enable securing the BOF password.

disable

Keyword to disable securing the BOF password.

sftp-key-directory

Syntax

sftp-key-directory *file-url*

no sftp-key-directory

Context

bof

Platforms

7210 SAS-Sx/S 1/10GE (standalone mode)

Description

This command configures the location where the SFTP PKI files are available.

The **no** form of this command clears the SFTP key directory location and disables the use of SFTP client key files available in this location.

Default

no sftp-key-directory

Parameters

file-url

Specifies the primary configuration file location, expressed as a file URL.

Values url-string: <local-url> [up to 180 characters]

local-url: <cflash-id>/<file-path>

cflash-id: cf1: | uf1:

usb-flash-id: cf1: | uf1:

Note:
The *usb-flash-id* parameter is applicable only to platforms that support USB port and USB storage devices.

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4.12.2.1.2 BOF processing control

wait

Syntax

wait *seconds*

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures a pause, in seconds, at the start of the boot process that allows the user to interrupt system initialization at the console.

When the user interrupts system initialization, the user is allowed to manually override the parameters defined in the BOF.

Only one **wait** command can be defined in the BOF.

Default

3

Parameters

seconds

Specifies the length of the pause at the start of the boot process, in seconds

Values 1 to 10

4.12.2.1.3 Console port configuration

bof-password

Syntax

bof-password *password*

no bof-password

Context

bof

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Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures a BOF password. The user must provide the password to edit the BOF parameters in the boot loader.

This command also implements a mechanism for password recovery. If the user forgets the password, it can be reset to factory default. When a password is reset, as a security measure to prevent a malicious access to the configuration files, the system also resets the flash to factory defaults (that is, it removes all files from the flash, except the boot image file (`cf1:\boot.tim`) and TiMOS image file (`cf1:\both.tim`)), and reboots the node with the factory default settings. After boot up, the user must set up the box using the same steps used to boot the box the first time after it was received from the factory. During bootup after a reboot, the user can use the factory default password "password" to edit the BOF parameters. After the factory default password is used, Nokia recommends that the user should change the password.

Note:

- Nokia strongly recommends that you should not rename the cf1:\boot.tim and cf1:\both.tim files. These files should be retained in case the system needs them during the password recovery procedure. Nokia also recommends making a backup of all the image files, configuration files, and other data.
- Enabling or disabling the **secure-bof-password** command resets the BOF password to the default password. See secure-bof-password for more information.

The **no** form of this command deletes the configured password and resets to the default password. The **no** form is supported only when **secure-bof-password enable** is configured.

Default

bof password password

Parameters

password

Specifies the BOF password in plaintext string format, between 8 and 32 characters.

console-disabled

Syntax

[**no**] **console-disabled**

Context

bof

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Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command allows the user to enable or disable the serial port console for use.

In remote deployments, this command provides additional security mechanism for the user. The console can be disabled to prevent unauthorized system access.

Note:
The console is always available for use when the device is booting up. This command is applicable only after the TiMOS image (`both.tim`) is up and running successfully. If the user executes this command in the BOF CLI context, the command takes effect only during the next boot. A BOF **save** operation must be performed after executing the **console-disabled** command.

The **no** form of this command enables the console.

Default

no console-disabled

console-speed

Syntax

console-speed *baud-rate*

no console-speed

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the console port baud rate.

When this command is issued to edit the BOF used for the most recent boot, the BOF and the active configuration are changed immediately.

The **no** form of this command reverts to the default value.

Default

115200

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Parameters

baud-rate

The console port baud rate, expressed as a decimal integer.

Values 9600, 19200, 38400, 57600, 115200

4.12.2.1.4 Image and configuration management

persist

Syntax

persist {**on** | **off**}

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures whether the system will preserve system indexes when a **save** command is executed. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index and others. This reduces resynchronizations of the Network Management System (NMS) with the affected network element.

In the event that **persist** is **on** and the reboot with the appropriate index file fails, SNMP is operationally shut down to prevent the management system from accessing and possibly synchronizing with a partially booted or incomplete network element. Use the **config**>**system**>**snmp**>**no shutdown** command to enable SNMP access.

If **persist** is enabled and the **admin**>**save** *file-url* command is executed with an FTP path used as the *file-url* parameter, two FTP sessions simultaneously open to the FTP server. The FTP server must be configured to allow multiple sessions from the same login; otherwise, the configuration and index files will not be saved correctly.

Note:

- Persistency files (`.ndx`) are saved on the same disk as the configuration files and the image files.
- When an operator sets the location for the persistency file, the system will checks to ensure that the disk has enough free space. If this there is not enough free space, persistency does not become active and a trap is generated. In this case, the operator must free adequate disk space. Until disk space is freed, the system performs a space availability check every 30 seconds. As soon as the space is available, persistency will become active on the next (30 second) check.

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Default

off

Parameters

on

Keyword to preserve the system index when saving the configuration.

off

Keyword to disable system index saves between reboots.

primary-config

Syntax

primary-config *file-url*

no primary-config

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the name and location of the primary configuration file.

The system attempts to use the configuration specified in **primary-config**. If the specified file cannot be located, the system automatically attempts to obtain the configuration from the location specified in **secondary-config** and then the **tertiary-config**.

If an error in the configuration file is encountered, the boot process aborts.

The **no** form of this command removes the **primary-config** configuration.

Parameters

file-url

Specifies the primary configuration file location, expressed as a file URL.

Values file-url [local-url | remote-url] (up to 180 characters) local-url [<cflash-id/> | <usb-flash-id>][file-path] remote-url [{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*] cflash-id cf1:, cf2 usb-flash-id uf1:

cf1:|cf2:|uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2: | cf2-A: | cf2-B: | uf1: | uf1-A: | uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1: | cf2: (7210 SAS-S 1/10GE)

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primary-image

Syntax

primary-image *file-url*

no primary image

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the primary directory location for runtime image file loading.

The system attempts to load all runtime image files configured in the **primary-image** first. If this fails, the system attempts to load the runtime images from the location configured in the **secondary-image**. If the secondary image load fails, the tertiary image specified in **tertiary-image** is used.

The **no** form of this command removes the **primary-image** configuration.

Parameters

file-url

Specifies the *location-url* can be either local (this flash) or a remote FTP server.

Values file-url [local-url | remote-url] (up to 180 characters) local-url [<cflash-id/> | <usb-flash-id>][file-path] remote-url [{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*] cflash-id cf1:, cf2 usb-flash-id uf1:

cf1:|cf2:|uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2: | cf2-A: | cf2-B: | uf1: | uf1-A: | uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1: | cf2: (7210 SAS-S 1/10GE)

secondary-config

Syntax

secondary-config *file-url*

no secondary-config

Context

bof

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Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the name and location of the secondary configuration file.

The system attempts to use the configuration as specified in **secondary-config** if the primary **config** cannot be located. If the **secondary-config** file cannot be located, the system attempts to obtain the configuration from the location specified in the **tertiary-config**.

If an error in the configuration file is encountered, the boot process aborts.

The **no** form of this command removes the **secondary-config** configuration.

Parameters

file-url

The secondary configuration file location, expressed as a file URL.

Values file-url [local-url | remote-url] (up to 180 characters) local-url [<cflash-id/> | <usb-flash-id>][file-path] remote-url [{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*] cflash-id cf1:, cf2 usb-flash-id uf1:

cf1:|cf2:|uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2: | cf2-A: | cf2-B: | uf1: | uf1-A: | uf1-B: (7210 SAS-R6 and 7210 SAS-R12) cf1: | cf2: (7210 SAS-S 1/10GE)

secondary-image

Syntax

secondary-image *file-url*

no secondary-image

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the secondary directory location for runtime image file loading.

The system attempts to load all runtime image files configured in the **primary-image** first. If this fails, the system attempts to load the runtime images from the location configured in the **secondary-image**. If the secondary image load fails, the tertiary image specified in **tertiary-image** is used.

The **no** form of this command removes the **secondary-image**configuration.

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Parameters

file-url

The *file-url* can be either local (this local flash) or a remote FTP server.

Values file-url [local-url | remote-url] (up to 180 characters) local-url [<cflash-id/> | <usb-flash-id>][file-path] remote-url [{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*] cflash-id cf1:, cf2 usb-flash-id uf1:

cf1: | cf2: | uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2: | cf2-A: | cf2-B: | uf1: | uf1-A: | uf1-B: (7210 SAS-R6 and 7210 SAS-R12) cf1: | cf2: (7210 SAS-S 1/10GE)

tertiary-config

Syntax

tertiary-config *file-url*

no tertiary-config

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the name and location of the tertiary configuration file.

The system attempts to use the configuration specified in **tertiary-config** if both the primary and secondary config files cannot be located. If this file cannot be located, the system boots with the factory default configuration.

If an error in the configuration file is encountered, the boot process aborts.

The **no** form of this command removes the **tertiary-config** configuration.

Parameters

file-url

The tertiary configuration file location, expressed as a file URL.

Values local-url [<cflash-id/> | <usb-flash-id>][file-path] cflash-id cf1:, cf2 usb-flash-id uf1: remote-url [{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*]local-url

cf1: | cf2: | uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

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cf2: | cf2-A: | cf2-B: | uf1: | uf1-A: | uf1-B: (7210 SAS-R6 and 7210 SAS-R12) cf1: | cf2: (7210 SAS-S 1/10GE)

tertiary-image

Syntax

tertiary-image *file-url*

no tertiary-image

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the tertiary directory location for runtime image file loading.

The system attempts to load all runtime image files configured in the **primary-image** first. If this fails, the system attempts to load the runtime images from the location configured in the **secondary-image**. If the secondary image load fails, the tertiary image specified in **tertiary-image** is used.

The **no** form of this command removes the **tertiary-image** configuration.

Parameters

file-url

The *location-url* can be either local (this flash) or a remote FTP server.

Values file-url [local-url | remote-url] (up to 180 characters) local-url [<cflash-id/> | <usb-flash-id>][file-path] remote-url [{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*] cflash-id cf1:, cf2 usb-flash-id uf1:

cf1: | cf2: | uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2: | cf2-A: | cf2-B: | uf1: | uf1-A: | uf1-B: (7210 SAS-R6 and 7210 SAS-R12) cf1: | cf2: (7210 SAS-S 1/10GE)

uplink-mode

Syntax

uplink-mode {**access-uplink**| **network**}

Context

bof

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Platforms

7210 SAS-T (network mode and access-uplink mode)

Description

This command configures the system in either access-uplink mode or network mode.

In access-uplink mode, the device allows for configuration of the port in access-uplink mode and allows for use of access-uplink SAPs for service configuration. In this mode, the system boots up with all ports configured in access mode. The user can modify the port mode to access-uplink after system boot up, but the software does not allow the mode to be set to network. The software allows the user to configure services to use only either access SAPs or access-uplink SAPs, but not MPLS-based SDPs. This mode is supported on the 7210 SAS-T.

In network mode, the device allows for configuration of the port in network mode and allows the use of network IP interfaces and MPLS-based SDPs for service configuration. In this mode, the system boots up with all ports configured in network mode. The user can modify the port mode to access after system boot up, but the software does not allow the mode to be set to access-uplink. The software allows the user to configure services to use only either access SAPs or MPLS-based SDPs, but not access uplink SAPs. This mode is supported on the 7210 SAS-T.

Note:
Ensure that service entities related to MPLS mode are not enabled when the device is configured in access-uplink mode and vice-versa. The system does not enforce this.

Default

network

Parameters

access-uplink

Keyword to allow for configuration of the port in access-uplink mode and usage of access-uplink SAPs for service configuration

network

Keyword to allow for configuration of the port in network mode and usage of network IP interfaces and MPLS based SDPs for service configuration.

ping-address

Syntax

ping-address *ip-address*

no ping-address

Context

bof

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Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures the IP address used for a ping-test after the system boots.

The **no** form of this command removes the **ping-address** configuration. Setting a value of 0 also removes the **ping-address** configuration.

Parameters

ip-address

Specifies an IPv4 IP address in the form a.b.c.d, for example, 10.1.2.10.

uplinkA-address

Syntax

uplinkA-address *ip-address/mask*

no uplinkA-address

Context

bof

Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures the uplinkA address.

The **no** form of this command sets the uplinkA to use DHCP to get the IP address and the **show bof** value reflects 0 for this parameter.

Parameters

ip-address

Specifies the IP address of the BOF. This address must be unique within the subnet and specified in dotted-decimal notation.

Values a.b.c.d

mask

Specifies the subnet mask length when the IP prefix is specified in CIDR notation. When the IP prefix is specified in CIDR notation, a forward slash (/) separates the *ip-addr* from the *mask-length* parameter. The mask length parameter indicates the number of bits used for the network portion of the IP address; the remainder of the IP address is used to determine the host portion of the IP address.

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Values 1 to 30

uplinkB-address

Syntax

uplinkB-address *ip-address/mask*

no uplinkB-address

Context

bof

Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures the uplink-B address.

The **no** form of this command sets the uplinkB to use DHCP to get the IP address and the **show bof** value reflects 0 for this parameter.

Parameters

ip-address

Specifies the IP address of the BOF. This address must be unique within the subnet and specified in dotted-decimal notation.

Values a.b.c.d

mask

Specifies the subnet mask length when the IP prefix is specified in CIDR notation. When the IP prefix is specified in CIDR notation, a forward slash (/) separates the *ip-address* from the *mask* parameter. The *mask* parameter indicates the number of bits used for the network portion of the IP address; the remainder of the IP address is used to determine the host portion of the IP address.

Values 1 to 30

uplinkA-autoneg

Syntax

[**no**] **uplinkA-autoneg**

Context

bof

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Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command enables speed and duplex auto-negotiation on the uplinkA port in the running configuration and the boot option file (BOF).

The **no** form of this command disables the auto-negotiate feature on this port.

Note:
The **uplinkA-autoneg** command is not valid for 10gig ports. Therefore, whenever the user selects 10gig ports as uplinkA port, the **uplinkA-autoneg** command is defaulted to **no uplinkA-autoneg**, speed as **uplinkA-speed 10000**, duplex as **uplinkA-duplex full**, as shown in the following output example.

```
#uplinkA Port Settings:
    uplinkA-port       1/1/26
    no uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
```

Default

uplinkA-autoneg

uplinkB-autoneg

Syntax

[**no**] **uplinkB-autoneg**

Context

bof

Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command enables speed and duplex auto-negotiation on the uplinkB port in the running configuration and the BOF.

The **no** form of this command disables the auto-negotiate feature on this port.

Note:
The **uplinkB-autoneg** command is not valid for 10gig ports. Therefore, whenever the user selects 10gig ports as uplinkB-port, the **uplinkB-autoneg** command defaults to **no uplinkB-**

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autoneg, speed as uplinkB-speed 10000, duplex as uplinkB-duplex full, as shown in the following output example.

```
#uplinkB Port Settings:
    uplinkB-port       1/1/26
    no uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
```

Default

uplinkB-autoneg

uplinkA-duplex

Syntax

uplinkA-duplex {**full** | **half**}

Context

bof

Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures the duplex mode of the uplinkA port when auto-negotiation is disabled in the running configuration and the BOF.

It also allows for the configuration of the duplex mode of the Ethernet port. If the port is configured to auto-negotiate, this parameter will be ignored.

Note:
The **uplinkA-autoneg** command is not valid for 10gig ports, therefore, whenever the user selects 10gig ports as **uplinkA-port**, the **uplinkA-autoneg** command is defaulted to **no uplinkA-autoneg**, speed as **uplinkA-speed** 10000, duplex as **uplinkA-duplex full**, as shown in the following output sample.

```
#uplinkA Port Settings:
    uplinkA-port       1/1/26
    no uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
```


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Default

uplinkA-duplex full

Parameters

full

Keyword to set the link to full duplex mode.

half

Keyword to set the link to half duplex mode.

uplinkB-duplex

Syntax

uplinkB-duplex {**full** | **half**}

Context

bof

Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures the duplex mode of the uplinkB port when auto-negotiation is disabled in the running configuration and the BOF.

This configuration command allows for the configuration of the duplex mode of the Ethernet port. If the port is configured to auto-negotiate, this parameter will be ignored.

Note:
The **uplinkB-autoneg** command is not valid for 10gig ports. Therefore, whenever the user selects 10gig ports as **uplinkB-port**, the **uplinkB-autoneg** command defaults to **no uplinkB-autoneg**, speed as **uplinkB-speed 10000**, duplex as **uplinkB-duplex full**, as shown in the following output sample.

```
#uplinkB Port Settings:
    uplinkB-port       1/1/26
    no uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
```

Default

uplinkB-duplex full

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Parameters

full

Keyword to set the link to full duplex mode.

half

Keyword to set the link to half duplex mode.

uplinkA-port

Syntax

uplinkA-port *port-id*

no uplinkA-port

Context

bof

Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures the primary port to be used for boot up.

The **no** form of this command removes all the uplinkA parameters from the BOF.

Parameters

port-id

Specifies the primary port to be used for boot up in the slot/mda/port format.

uplinkB-port

Syntax

uplinkB-port *port-id*

no uplinkB-port

Context

bof

Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

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Description

This command configures the secondary port to be used for boot up.

The **no** form of this command removes all the uplinkB parameters from the BOF.

Parameters

port-id

Specifies the secondary port to be used for boot up in the slot/mda/port format.

uplinkA-route

Syntax

[**no**] **uplinkA-route** *ip-address/mask* **next-hop** *ip-address*

Context

bof

Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures an uplinkA static route.

Parameters

ip-address

Specifies the IP address of the BOF. This address must be unique within the subnet and specified in dotted-decimal notation.

Values a.b.c.d

mask

Specifies the subnet mask length when the IP prefix is specified in CIDR notation. When the IP prefix is specified in CIDR notation, a forward slash (/) separates the *ip-address* from the *mask* parameter. The *mask* parameter indicates the number of bits used for the network portion of the IP address; the remainder of the IP address is used to determine the host portion of the IP address.

Values 0 to 32

next-hop *ip-address*

Specifies the next hop IP address used to reach the destination.

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uplinkB-route

Syntax

[**no**] **uplinkB-route** *ip-address/mask* **next-hop** *ip-address*

Context

bof

Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures an uplinkB static route.

Parameters

ip-address

Specifies the IP address of the BOF. This address must be unique within the subnet and specified in dotted-decimal notation.

Values a.b.c.d

mask

Specifies the subnet mask length when the IP prefix is specified in CIDR notation. When the IP prefix is specified in CIDR notation, a forward slash (/) separates the *ip-address* from the *mask* parameter. The *mask* parameter indicates the number of bits used for the network portion of the IP address. The remainder of the IP address is used to determine the host portion of the IP address.

Values 0 to 32

next-hop *ip-address*

Specifies the next-hop IP address used to reach the destination.

uplinkA-speed

Syntax

uplinkA-speed *speed*

Context

bof

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Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures the speed for the uplinkA port when auto-negotiation is disabled in the running configuration and the BOF.

If the port is configured to auto-negotiate, this parameter is ignored.

Note:
The **uplinkA-autoneg** command is not valid for 10gig ports. Therefore, whenever the user selects 10gig ports as **uplinkA-port**, the **uplinkA-autoneg** command is defaulted to **no uplinkA-autoneg**, speed as **uplinkA-speed 10000**, duplex as **uplinkA-duplex full**, as shown in the following output example.

```
#uplinkA Port Settings:
    uplinkA-port       1/1/26
    no uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
```

Default

uplinkA-speed 1000

Parameters

10

Keyword to set the link to 10 M/bps speed.

100

Keyword to set the link to 100 M/bps speed.

1000

Keyword to set the link to 1000Mbps speed.

10000

Keyword to set the link to 10000Mbps speed.

uplinkB-speed

Syntax

uplinkB-speed *speed*

Context

bof

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Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures the speed for the uplinkB port when auto-negotiation is disabled in the running configuration and the BOF.

If the port is configured to Auto-negotiate, this parameter is ignored.

Note:
The **uplinkB-autoneg** command is not valid for 10gig ports. Therefore, whenever the user selects 10gig ports as **uplinkB-port**, the **uplinkB-autoneg** command defaults to **no uplinkB-autoneg**, speed as **uplinkB-speed 10000**, and duplex as **uplinkB-duplex full**, as shown in the following output example.

```
#uplinkB Port Settings:
    uplinkB-port       1/1/26
    no uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
```

Default

uplinkB-speed 1000

Parameters

10

Keyword to set the link to 10 m/bps speed.

100

Keyword to set the link to 100 m/bps speed.

1000

Keyword to set the link to 1000 m/bps speed.

10000

Keyword to set the link to 10000 m/bps speed.

uplinkA-vlan

Syntax

uplinkA-vlan *0..4094*

no uplinkA-vlan

Context

bof

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Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures a VLAN ID to be used on uplinkA.

The **no** form of this command is used to send untagged packets on uplinkA.

Parameters

0...4094

Specifies the VLAN ID.

Values 0 to 4049

uplinkB-vlan

Syntax

uplinkB-vlan *0..4094*

no uplinkB-vlan

Context

bof

Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network mode and access-uplink mode)

Description

This command configures a VLAN ID to be used on uplinkB.

The **no** form of this command is used to send untagged packets on uplinkB.

Parameters

0...4094

Specifies the VLAN ID.

Values 0 to 4049

eth-mgmt-address

Syntax

[**no**] **eth-mgmt-address** *ip-prefix/ip-prefix-length* [**active** | **standby**]

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Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command assigns an IP address to the management Ethernet port in the running configuration and the BOF. Deleting a BOF address entry is not allowed from a telnet session.

Note:
The following caveats apply for the **eth-mgmt-address** command:

- The **active** and **standby** options are only available on the 7210 SAS-R6 and 7210 SAS-R12, and on the 7210 SAS-Sx 1/10GE and 7210 SAS-S 1/10GE when the **chassis-role** parameter is set to **standalone-vc**.
- On the 7210 SAS-Sx 1/10GE and 7210 SAS-S 1/10GE, choosing the **active** option configures the IP address on the active CPM node, and is used by the network manager to operate the virtual chassis (VC). Choosing the **standby** option configures the IP address on the standby CPM node.

The **no** form of this command deletes the IP address assigned to the Ethernet port.

Default

no eth-mgmt-address

Parameters

ip-prefix/ip-prefix-length

Specifies the IP address in dotted-decimal notation.

Values ipv4-prefix a.b.c.d (host bits must be 0)

ipv6-prefix - x:x:x:x:x:x:x:x (eight 16-bit pieces)

x:x:x:x:x:x:d.d.d.d

x - [0..FFFF]H

d - [0..255]D

ipv4-prefix-length: 0 to 32

ipv6-prefix-length: 0 to 128

active

Specifies that the specified IP address applies to the active CPM (supported only on 7210 SAS-R6 and 7210 SAS-R12, and to 7210 SAS-Sx 1/10GE and 7210 SAS-S 1/10GE in standalone-VC)

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standby

Specifies that the specified IP address applies to the standby CPM (supported only on 7210 SAS-R6 and 7210 SAS-R12, and to 7210 SAS-Sx 1/10GE and 7210 SAS-S 1/10GE in standalone-VC)

eth-mgmt-autoneg

Syntax

[**no**] **eth-mgmt-autoneg**

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command enables speed and duplex auto-negotiation on the management Ethernet port in the running configuration and the BOF.

The **no** form of this command disables the auto-negotiate feature on this port.

Default

eth-mgmt-autoneg

eth-mgmt-disabled

Syntax

[**no**] **eth-mgmt-disabled**

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command allows the user to enable or disable the out-of-band management Ethernet port for use during boot up.

The **no** form of this command enables the port.

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Default

eth-mgmt-disabled

eth-mgmt-duplex

Syntax

eth-mgmt-duplex {**full** | **half**}

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the duplex mode of the management Ethernet port when auto-negotiation is disabled in the running configuration and the BOF.

This configuration command allows for the configuration of the duplex mode of the Ethernet port. If the port is configured to auto-negotiate, this parameter will be ignored.

Default

eth-mgmt-duplex full

Parameters

full

Keyword to set the link to full duplex mode.

half

Keyword to set the link to half duplex mode.

eth-mgmt-route

Syntax

[**no**] **eth-mgmt-route** *ip-prefix/ip-prefix-length* **next-hop** *ip-address*

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

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Description

This command configures a static route entry for the management Ethernet port in the running configuration and the BOF.

This command allows manual configuration of static routing table entries. These static routes are only used by traffic generated by the Ethernet port. To reduce configuration, manual address aggregation should be applied where possible.

A static default (0.0.0.0 or 0) route cannot be configured on the management Ethernet port. A maximum of ten static routes can be configured on the management Ethernet port.

The **no** form of this command deletes the static route.

Parameters

ip-prefix\ip-prefix-length

Specifies the destination address of the static route in dotted-decimal notation.

Values ip-prefix|ip-prefix-length: ipv4-prefix a.b.c.d (host bits must be zero)
ipv4-prefix-le 0 to 32
ipv6-prefix - x:x:x:x:x:x:x:x (eight 16-bit pieces)
x:x:x:x:x:d.d.d.d
x - [0..FFFF]H
d - [0..255]D
ipv6-prefix-le - 0 to 128

next-hop ***ip-address***

Specifies the next hop IP address used to reach the destination.

Values ipv4-address - a.b.c.d
ipv6-address - x:x:x:x:x:x:x:x (eight 16-bit pieces)
x:x:x:x:x:x:d.d.d.d
x - [0..FFFF]H
d - [0..255]D

eth-mgmt-speed

Syntax

eth-mgmt-speed *speed*

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

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Description

This command configures the speed for the management Ethernet port when auto-negotiation is disabled in the running configuration and the BOF.

If the port is configured to Auto-negotiate, this parameter is ignored.

Default

speed 100

speed 1000 (applicable only to 7210 SAS-R6 and 7210 SAS-R12)

Parameters

10

Keyword to set the link to 10 M/bps speed.

100

Keyword to set the link to 100 M/bps speed.

1000

Keyword to set the link to 1000 M/bps speed (applicable only to 7210 SAS-R6 and 7210 SAS-R12).

host-type

Syntax

host-type *host-type*

no host-type

Context

bof

Platforms

7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE (standalone and standalone-VC), and 7210 SAS-Sx 10/100GE

Description

This command configures the host system.

When operating in satellite mode, the setting for the **host-type** BOF parameter must be consistent with the value of the **chassis-role** parameter; otherwise, on reboot the node will not boot up correctly. See BOF chassis-role and host-type parameters for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE for more information.

It is not necessary to configure the **host-type** value when the chassis role is set to **standalone**.

For nodes that are destined to operate in a virtual chassis (VC) set up, it is not necessary to configure the **host-type** value when the bootloader **chassis-role** parameter is set to **standalone-vc**.

The **no** form of this command removes the **host-type** setting.

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Default

no host-type

Parameters

host-type

Specifies the value of the host type for the system.

Values satellites | standalone | standalone-vc

satellites

The node boots up in satellite mode when the **host-type** parameter is set to **satellites** and the **chassis-role** is set to **satellite** or **factory-default**.

standalone

The node boots up in standalone mode when the **host-type** parameter is set to **standalone**.

standalone-vc

The node boots up in standalone VC mode when the **host-type** parameter is set to **standalone-vc**.

4.12.2.1.5 DNS configuration commands

dns-domain

Syntax

dns-domain *dns-name*

no dns-domain

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the domain name used when performing DNS address resolution. This is a required parameter if DNS address resolution is required. Only a single domain name can be configured. If multiple domain statements are configured, the last one encountered is used.

The **no** form of this command removes the domain name from the configuration.

Default

no dns-domain

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Parameters

dns-name

Specifies the DNS domain name up to 32 characters.

primary-dns

Syntax

primary-dns *ip-address*

no primary-dns [*ip-address*]

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the primary DNS server used for DNS name resolution. DNS name resolution can be used when executing ping, traceroute, and service-ping, and also when defining file URLs. DNS name resolution is not supported when DNS names are embedded in configuration files.

The **no** form of this command removes the primary DNS server from the configuration.

Default

no primary-dns

Parameters

ip-address

The IP address of the primary DNS server.

Values ipv4-address - a.b.c.d

ipv6-address - x:x:x:x:x:x:x:x (eight 16-bit pieces)

x:x:x:x:x:x:d.d.d.d

x - [0..FFFF]H

d - [0..255]D

secondary-dns

Syntax

secondary-dns *ip-address*

no secondary-dns [*ip-address*]

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Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command configures the secondary DNS server for DNS name resolution. The secondary DNS server is used only if the primary DNS server does not respond.

DNS name resolution can be used when executing ping, traceroute, and service-ping, and also when defining file URLs. DNS name resolution is not supported when DNS names are embedded in configuration files.

The **no** form of this command removes the secondary DNS server from the configuration.

Default

no secondary-dns

Parameters

ip-address

Specifies the IP address of the secondary DNS server.

Values ipv4-address - a.b.c.d

ipv6-address - x:x:x:x:x:x:x:x (eight 16-bit pieces)

x:x:x:x:x:x:d.d.d.d

x - [0..FFFF]H

d - [0..255]D

tertiary-dns

Syntax

tertiary-dns *ip-address*

no tertiary-dns [*ip-address*]

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

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Description

This command configures the tertiary DNS server for DNS name resolution. The tertiary DNS server is used only if the primary DNS server and the secondary DNS server do not respond.

DNS name resolution can be used when executing ping, traceroute, and service-ping, and also when defining file URLs. DNS name resolution is not supported when DNS names are embedded in configuration files.

The **no** form of this command removes the tertiary DNS server from the configuration.

Default

no tertiary-dns

Parameters

ip-address

Specifies the IP address of the tertiary DNS server.

Values ipv4-address - a.b.c.d

ipv6-address - x:x:x:x:x:x:x:x (eight 16-bit pieces)

x:x:x:x:x:x:d.d.d.d

x - [0..FFFF]H

d - [0..255]D

4.12.2.2 Show commands

bof

Syntax

bof [*cflash-id* | **booted**]

Context

show

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command shows the BOF executed on last system boot or on the specified device.

If no device is specified, the BOF used in the last system boot displays. If the BOF has been modified since the system boot, a message displays.

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Parameters

cflash-id

Specifies the cflash directory name.

Values cf1: | cf2: | uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE (standalone and standalone-VC), 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2: | cf2-A: | cf2-B: | uf1: | uf1-A: | uf1-B: (7210 SAS-R6 and 7210 SAS-R12) cf1: | cf2: (7210 SAS-S 1/10GE (standalone and standalone-VC))

booted

Keyword to display the boot option file used to boot the system.

Output

The following output samples are examples of BOF information, and Table 22: Output fields: BOF describes the output fields.

- Sample output for 7210 SAS-T (network mode)
- Sample output for 7210 SAS-T (access-uplink mode)
- Sample output for 7210 SAS-Mxp
- Sample output for 7210 SAS-R6
- Sample output for 7210 SAS-Sx/S 1/10GE
- Sample output for 7210 SAS-Sx 10/100GE
- Sample output for SFTP client

Sample output for 7210 SAS-T (network mode)

```
*A:ALA# show bof cf1:
===============================================================================
BOF on cf1:
===============================================================================
    primary-image      ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/bothx.tim
    secondary-image    ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/bothx.tim
    tertiary-image     ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/both.tim
    primary-dns        xxx.xxx.xxx.xxx
    dns-domain         in.example.com
    ping xx.xxx.xx.xx
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-address    xxx.xxx.x.xx/24
uplinkA-autoneg
uplinkA-duplexfull
uplinkA-speed1000
    uplinkA-vlan       0
    uplinkA-route      xx.xxx.x.x/16 next-hop xxx.xxx.x.x
#uplinkB Port Settings:
    uplinkB-port       1/1/2
    uplinkB-address    0
uplinkB-autoneg
uplinkB-duplexfull
uplinkB-speed1000
    uplinkB-vlan       0
#System Settings:
    wait               3
```


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```
    persist            on
    console-speed      115200
    no console-disabled
===============================================================================
*A:ALA#
*A:ALA# show bof booted
===============================================================================
System booted with BOF
===============================================================================
    primary-image      ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/bothx.tim
    secondary-image    ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/bothx.tim
    tertiary-image     ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/both.tim
    primary-dns        xxx.xxx.xxx.xxx
    dns-domain         in.example.com
    ping-address   xx.xxx.xx.xx
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-address    xxx.xxx.x.xx/24
uplinkA-autoneg
uplinkA-duplexfull
uplinkA-speed1000
    uplinkA-vlan       0
    uplinkA-route      xx.xxx.x.x/16 next-hop xxx.xxx.x.x
#uplinkB Port Settings:
    uplinkB-port       1/1/2
    uplinkB-address    0
uplinkA-autoneg
uplinkA-duplexfull
uplinkA-speed1000
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            on
    console-speed      115200
    no console-disabled
===============================================================================
*A:ALA#
A:7210-SAS>show# bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xxx.xxx.xxx.xx//import/panos_builds/nightly/0.0/
I943/MTU-sultan/
    primary-config     tftp://xx.xxx.xx.xxx/MTU/mtu4-Ver2-0-SFPgash.cfg
    secondary-config   tftp://xx.xxx.xx.xxx/MTU/mtu4-ver-5-SAP.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.xx.xx/24
    eth-mgmt-route     xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    eth-mgmt-route     xxx.x.x.x/8 next-hop xx.xxx.xx.x
    eth-mgmt-route     xxx.xxx.x.x/16 next-hop xx.xxx.xx.x
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#uplinkA Port Settings:
    uplinkA-port       1/1/24
    uplinkA-address    xx.xxx.xx.xx/24
uplinkA-autoneg
uplinkA-duplexfull
uplinkA-speed1000
    uplinkA-vlan       null
    uplinkA-route      xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    uplinkA-route      xxx.xxx.x.x/16 next-hop xx.xxx.xx.x
#uplinkB Port Settings:
```


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```
    uplinkB-port       1/1/24
    uplinkB-address    0
uplinkB-autoneg
uplinkB-duplexfull
uplinkB-speed1000
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no-service-ports   1/1/24 1/1/2
    use-expansion-card-type   m2-xfp
    no console-disabled
===============================================================================
A:7210-SAS>show#
```

Sample output for 7210 SAS-T (access-uplink mode)

```
*A:7210-SAS-T>bof# show bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xxx.xxx.xxx.xx//tftpboot/apai/both.tim
    primary-config     ftp://*:*@xx.xxx.x.xxx/./images/mtuUplink.cfg
    primary-dns        xxx.xxx.xxx.xxx
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/24
    uplinkA-address    xx.xxx.x.xxx/24
uplinkA-autoneg
uplinkA-duplexfull
uplinkA-speed1000
    uplinkA-vlan       null
    uplinkA-route      xx.x.x.x/8 next-hop xx.xxx.x.x
    uplinkA-route      xx.xxx.x.x/16 next-hop xx.xxx.x.x
    uplinkA-route      xxx.xxx.x.x/16 next-hop xx.xxx.x.x
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no console-disabled
===============================================================================
*A:7210-SAS-T>bof#
```

Sample output for 7210 SAS-Mxp

```
*A:7210SAS>show# bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xxx.xxx.xxx.xx/./pkhosla/SASM2/both.tim
    primary-config     ftp://*:*@xxx.xxx.xxx.xx/./pkhosla/SASM2/config2.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.x.xxx/24 active
    eth-mgmt-route     xxx.x.x.x/8 next-hop xx.xxx.x.x
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#uplinkA Port Settings:
```


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```
    uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/2
    uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      1000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        network
    no  console-disabled
===============================================================================
*A:7210SAS>show#
```

Sample output for 7210 SAS-R6

```
A:dut-a>show# bof
===============================================================================
BOF (Memory)
===============================================================================
primary-image      ftp://*:*@10.135.23.81/./images/dut-r/
primary-config     ftp://*:*@10.135.23.81/./images/dut-r/dut-r.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   10.135.23.163/24 active
    eth-mgmt-address   10.135.23.164/24 standby
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     1000
#System Settings:
    wait               3
    persist            on
    console-speed      115200
    no  console-disabled
===============================================================================
A:dut-a>show#
```

Sample output for 7210 SAS-Sx/S 1/10GE

```
*A7210SAS>show# bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xx.xxx.x.xx/./images/SASS/hops-both.tim
    primary-config     cf1:\bala_default_config.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.xx.xx/24 active
    eth-mgmt-route     xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
```


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```
    console-speed      115200
    no  console-disabled
    host-type standalone
===============================================================================
*A7210SAS>show#
```

Sample output for 7210 SAS-Sx 10/100GE

```
*A:7210SAS>show# bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xxx.xxx.xxx.xx/./images/SASS/hops-both.tim
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   xx.xxx.xx.xx/24 active
    eth-mgmt-route     xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    eth-mgmt-route     xxx.x.x.x/8 next-hop xx.xxx.xx.x
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     1000
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
    host-type        standalone
===============================================================================
*A:7210SAS>show#
```

Sample output for the SFTP client

```
A:Router-1# show bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      sftp://*@xxx.xxx.xx.a/./images/bcmiproc-both.tim
    secondary-image    sftp://*@xxx.xxx.xx.b:10001/./images/bcmiproc-both.tim
    primary-config     sftp://*@xxx.xxx.xx.c:10002/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    secondary-config   sftp://*@xx.xxx.xxx.a/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    tertiary-config    sftp://*@xxx.xxx.xx.b:10001/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    xxx.xxx.xx.yyy/24
    uplinkA-vlan       null
    uplinkA-route      xxx.xx.x.x/16 next-hop xxx.xxx.xx.x
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled
    sftp-key-directory cf1:/bootSecure
===============================================================================
A:Router-1# show bof cf1:
===============================================================================
BOF on cf1:
===============================================================================
    primary-image      sftp://*@xxx.xxx.xx.a/./images/bcmiproc-both.tim
    secondary-image    sftp://*@xxx.xxx.xx.b:10001/./images/bcmiproc-both.tim
```


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```
    primary-config     sftp://*@xxx.xxx.xx.c:10002/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    secondary-config   sftp://*@xx.xxx.xxx.a/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    tertiary-config    sftp://*@xxx.xxx.xx.b:10001/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    xxx.xxx.xx.yyy/24
    uplinkA-vlan       null
    uplinkA-route      xxx.xx.x.x/16 next-hop xxx.xxx.xx.x
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled
    sftp-key-directory cf1:/bootSecure
===============================================================================
A:Router-1# show bof booted
===============================================================================
System booted with BOF
===============================================================================
    primary-image      sftp://*@xxx.xxx.xx.a/./images/bcmiproc-both.tim
    secondary-image    sftp://*@xxx.xxx.xx.b:10001/./images/bcmiproc-both.tim
    primary-config     sftp://*@xxx.xxx.xx.c:10002/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    secondary-config   sftp://*@xx.xxx.xxx.a/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    tertiary-config    sftp://*@xxx.xxx.xx.b:10001/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    xxx.xxx.xx.yyy/24
    uplinkA-vlan       null
    uplinkA-route      xxx.xx.x.x/16 next-hop xxx.xxx.xx.x
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled
    sftp-key-directory cf1:/bootSecure
===============================================================================
A:Dut-C#
```

Table 22: Output fields: BOF

Label	Description
primary-image	The primary location of the directory that contains the runtime images of both CPM and IOM
primary-config	The primary location of the file that contains the configuration
primary-dns	The primary DNS server for resolution of host names to IP addresses
secondary-image	The secondary location of the directory that contains the runtime images of both CPM and IOM

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Label	Description
secondary-config	The secondary location of the file that contains the configuration
secondary-dns	The secondary DNS server for resolution of host names to IP addresses
tertiary-image	The tertiary location of the directory that contains the runtime images of both CPM and IOM
tertiary-config	The tertiary location of the file that contains the configuration
tertiary-dns	The tertiary DNS server for resolution of host names to IP addresses
persist	On — persistent indexes between system reboots is enabled Off — persistent indexes between system reboots is disabled
wait	The time configured for the boot to pause while waiting for console input
autonegotiate	No autonegotiate — autonegotiate not enabled Autonegotiate — autonegotiate is enabled
console speed	The console port baud rate
ping-address	The IPv4 IP address to be used for ping-test after auto-init
dns domain	The domain name used when performing DNS address resolution
uplinkA-address	Displays the uplinkA IP address
uplinkA-autoneg	Displays the auto-negotiation of the management Ethernet port
uplinkA-duplex	Displays full duplex operation
uplinkA-speed	Displays the 1000 M/bps operation
uplinkA-port	Displays the primary port to be used for auto-init
uplinkA-route	Displays the static route associated with uplinkA
uplinkA-vlan	Displays the VLAN ID to be used on uplinkA
uplinkB-address	Displays the uplinkB IP address
uplinkB-autoneg	Displays the auto-negotiation of the management Ethernet port
uplinkB-duplex	Displays full duplex operation
uplinkB-speed	Displays the 1000 M/bps operation
uplinkB-port	Displays the secondary port to be used for auto-init

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Label	Description
uplinkB-route	Displays the static route associated with uplinkB
uplinkB-vlan	Displays the VLAN ID to be used on uplinkB
uplink-mode	This parameter displays the uplink mode of the device 7210 SAS-T devices can be configured in either network mode or access-uplink mode
no-service-ports	Displays the ports on which service traffic is not processed
use-expansion-card-type	Displays the expansion card type
console-disabled	Displays the status of serial port console
eth-mgmt-disabled	Displays if Ethernet management is disabled
eth-mgmt-address	Displays the Ethernet management address
eth-mgmt-route	Displays the Ethernet Management route
eth-mgmt-autoneg	Displays if auto-negotiate is enabled
eth-mgmt-duplex	Displays the mode of the Ethernet management port
eth-mgmt-speed	Displays the Ethernet management speed
sftp-key-directory	Displays the location of the directory containing the PKI files used by SFTP client during bootup (including auto-init)

boot-messages

Syntax

boot-messages

Context

show

Platforms

Supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode

Description

This command shows boot messages generated during the last system boot.

Output

The following output is an example of boot message information.

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Sample Output

```
===============================================================================
cf1:/bootlog.txt
===============================================================================
Bootlog started for Version V-0.0.I317
Build V-0.0.I317 bootrom/mpc 7xxx
Built on Tue Jan 6 02:23:14 IST 2016 by panosbld in /panosbld/ws/panos/main

?Attempting to load from file cf1:/boot.tim
Version L-0.0.I312, Fri Jan  2 04:26:32 IST 2009 by panosbld in /panosbld/ws/panos/
main
text:(3002475-->12623392) + data:(550940-->2414128)
Starting at 0xb000000...

Total Memory: 512MB  Chassis Type: sas  Card Type: badami_7210
TiMOS-L-0.0.I312 boot/mpc NOKIA SAS-Sx 7210 Copyright (c) 2016 Nokia.
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Built on Fri Jan 2 04:26:32 IST 2016 by panosbld in /panosbld/ws/panos/main

TiMOS BOOT LOADER
Extended checks enabled with overhead of 36B
Time from clock is THU JAN 08 16:04:05 2016 UTC
Switching serial output to sync mode...   done

Looking for cf1:/bof.cfg ... OK, reading

Contents of Boot Options File on cf1:
    primary-image      ftp://*:*@xxx.xxx.xxx.xx/import/panos_nightly_builds/1.0/B1-
12/STU-sultan/both.tim
    primary-config     cf1:\config.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/13
uplinkA-autoneg
uplinkA-duplexfull
uplinkA-speed1000
    uplinkA-address    xx.xxx.xx.xxx/24
    uplinkA-vlan       null
    uplinkA-route      xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    uplinkA-route      xxx.xxx.x.x/16 next-hop xx.xxx.xx.x
#uplinkB Port Settings:
    uplinkB-port       1/1/2
    uplinkB-address    0
uplinkB-autoneg
uplinkB-duplexfull
uplinkB-speed1000
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200

Hit a key within 1 second to change boot parms...
Configuring Network with uplinkA Port Setting.....
Primary config file present at: cf1:\config.cfg

Primary image location: ftp://*:*@xxx.xxx.xxx.xx/import/panos_nightly_builds/1.0/
B1-12/STU-sultan/both.tim
Initializing uplinkA port using IP addr xx.xxx.xx.xxx.
Loading image ftp://*:*@xxx.xxx.xxx.xx/import/panos_nightly_builds/1.0/B1-12/STU-
sultan/both.tim
Version B-1.0.B1-12, Wed Jan  7 00:58:35 IST 2016 by builder in /builder/ws/panos/
main
text:(27022791-->84574868) + data:(1921023-->10720420)
```


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```
Executing TiMOS image at 0x100000

Total Memory: 512MB  Chassis Type: sas  Card Type: badami_7210
TiMOS-B-1.0.B1-12 both/mpc NOKIA 7210 Copyright (c) 2016 Nokia.
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Built on Wed Jan 7 00:58:35 IST 2016 by builder in /builder/ws/panos/main

   ___                  ___          ___          ___
  /\  \                /\__\         /\  \        /\  \
  \:\  \        ___    /::|  |       /::\  \       /::\  \
   \:\  \      /\__\   /:|:|  |      /:/\:\  \     /:/\ \  \
   /::\  \    _\/__/  /:/|:|__|__   /:/  \:\  \   _\:\~\ \  \
  /:/\:\__\  /\__\   /:/ |::::\__\ /:/__/ \:\__\ /\ \:\ \ \__\
 /:/  \/__/ /:/  /   \/__/~~/:/  / \:\  \ /:/  / \:\ \:\ \/__/
/:/  /     /:/  /          /:/  /   \:\  /:/  /   \:\ \:\__\
\/__/      \/__/          /:/  /     \:\/:/  /     \:\/:/  /
                        /:/  /       \::/  /       \::/  /
                        \/__/         \/__/         \/__/
Time from clock is THU JAN 08 16:05:20 2016 UTC

Attempting to exec primary configuration file:
   'cf1:\config.cfg' ...
System Configuration
System Security Configuration
Log Configuration
System Security Cpm Hw Filters Configuration
QoS Slope and Queue Policies Configuration
Port Scheduler Policies Configuration
Card Configuration
Port Configuration
Management Router Configuration
Router (Network Side) Configuration
Static Route Configuration
Service Configuration
Router (Service Side) Configuration
Executed 234 lines in 0.1 seconds from file cf1:\config.cfg

INFO: CLI #1008 The SNMP daemon is disabled.  To enable SNMP, execute the command
'config>system>snmp no shutdown'.
TiMOS-B-1.0.B1-12 both/mpc NOKIA SAS-Sx 7210 Copyright (c) 2016 Nokia.
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Built on Wed Jan 7 00:58:35 IST 2016 by builder in /builder/ws/panos/main

Login:
```


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5 Secure Boot

Note: The Secure Boot feature is only supported on the 7210 SAS-Sx/S 1/10GE (standalone).

The 7210 SAS SR OS Secure Boot ensures that the software executed by the system is trusted and originated from Nokia IP Networks.

At every boot of the control card, each step in the boot process verifies the digital signature of the next software element to ensure its integrity and authenticity, up to and including the 7210 SAS SR OS images. This boot sequence forms the chain of trust for Secure Boot.

Software image signatures use RSA-4096 keys and SHA-384 hashes.

The Secure Boot chain is rooted in the platform CPM firmware, based on UEFI specifications. As such, the Nokia Platform Key, Key Exchange Key, and allowed and disallowed databases are provisioned when Secure Boot is activated to perform the required signature verification.

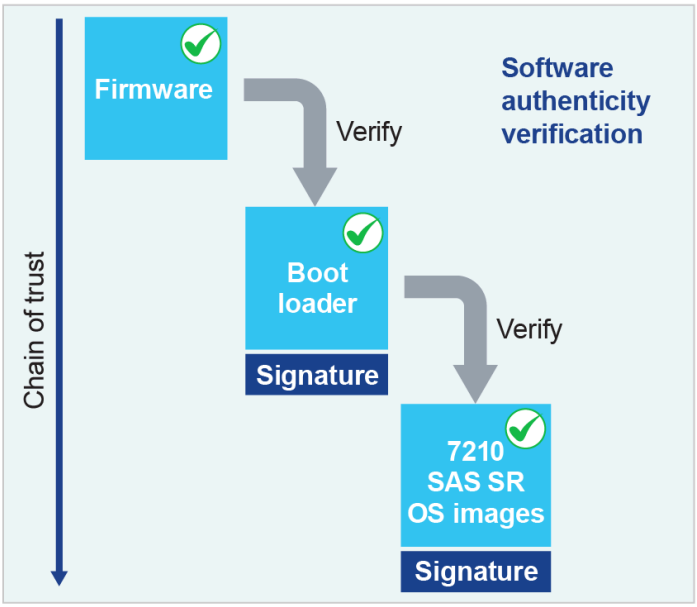
Firmware updates are also digitally signed and verified using the same principle. The signature verification of a firmware update is performed at boot time by the existing firmware before the firmware update can proceed.

5.1 Secure Boot chain

The following figure shows the Secure Boot chain of trust for 7210 SAS SR OS platforms.

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Figure 11: Secure boot chain of trust



sw4500

The software images part of the Secure Boot chain varies among SR OS platforms. This list of software images per platform is described in System initialization, and includes the Boot Loader, `boot.tim`, and the 7210 SAS SR OS `*.tim` software images.

5.2 Activate Secure Boot

Secure Boot is enabled, per node, by providing the card slot, card serial number, and confirmation code command options.

Use the following command to activate Secure Boot.

```
admin system security secure-boot activate card "A" serial-number NS123456789 confirmation-code
 secure-boot-permanent
```

The following example shows the warning messages and a prompt for proceeding with Secure Boot activation.

Example

```
This operation will permanently activate secure boot on card A and cannot be reversed.
After activation, the system will only accept digitally signed software and will not boot
 using un-signed software.
This operation will immediately reset card A.
Are you sure you want to continue (y/n)?
```

The card serial number and Secure Boot confirmation code are required to avoid accidental activation of Secure Boot in the network. The confirmation code is *secure-boot-permanent*.

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The Secure Boot **activate** command verifies that the BOF primary image uses the same software release as the currently running software, and automatically reboots the node if the software release matches. Otherwise, an error is generated in the CLI.

Note:

- The system also verifies the boot.tim version against the running software version on applicable platforms. These verifications ensure that the entire boot chain up to the primary image supports Secure Boot, before activating Secure Boot and rebooting the node.
- The node must use the latest bootrom that is recommended for use with Secure Boot before activating Secure Boot. Check the 7210 SAS 26.9.R1 release notes to view the bootrom version that support Secure Boot.

WARNING: After Secure Boot is activated on a node, the capability is permanently enabled and cannot be disabled. The node permanently refuses to execute unsigned software for security reasons. As a result, it is not possible to downgrade to a software release published before the release that introduced Secure Boot for a specific platform. For example, 7210 SAS-Sx/S 1/10GE (standalone) Secure Boot support is introduced in software Release 26.9.R1. After activating Secure Boot on this platform the system cannot be downgraded to software releases before 26.9.R1.

5.3 Operational commands and logs

This section describes the following:

- Secure Boot state
- Software update
- Update Secure Boot variables

5.3.1 Secure Boot state

Secure Boot and UEFI variables Secure Boot keys status is available for each node.

Use the following command to display Secure Boot state information.

```
show card A detail
```

Output example

```
Hardware Data
    Secure boot status            : enabled
    UEFI variables status         : ok
```

where

- Secure Boot status — indicates if Secure Boot is enabled or disabled
- UEFI variables status — indicates if Secure Boot variables need updating

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At every boot in the security log, the system records if Secure Boot is enabled or disabled for each node. The following is an example of such a log message.

```
24 2023/05/17 06:09:03.140 EDT MAJOR: SECURITY #2241 Base Card A
"CPM A has booted with a secure-boot status of enabled"
```

Secure Boot UEFI variables can be obtained for each node using the following command.

```
tools dump system security secure-boot uefi-var card
```

The command displays the following x509 certificates and SHA-256 hash UEFI variables:

- Platform Key (PK)
- Key Exchange Key (KEK)
- Allowed Database (DB)
- Disallowed Database (DBx)

5.3.2 Software update

After Secure Boot is enabled on the system, and before upgrading to a new software release, the user must validate that the new software image is properly signed. This additional verification is required because the system only boots Nokia-signed software images; unsigned or improperly signed images are not booted.

Use the following command to validate the signature of the TiMOS *.tim images contained in the **software-image** *url* location referenced in the command. This verification includes `boot.tim`, `support.tim`, and `both.tim` if the files are present in the cf1 or uf1 directory.

```
admin system security secure-boot validate software-image url
```

5.3.3 Update Secure Boot variables

The system supports Secure Boot UEFI key updates and revocation using the following commands.

```
admin system security secure-boot update-key
admin system security secure-boot revoke-key
```

5.4 Secure Boot command reference

5.4.1 Command hierarchies

- Secure Boot administration commands
- Secure Boot tools commands

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5.4.1.1 Secure Boot administration commands

```
root
    - admin
        - system
            - security
                - secure-boot
                    - activate card cpm-slot serial-number cpm-serial-number confirmation-
code code
                    - revoke-key card cpm-slot serial-number cpm-serial-number confirmation-
code code
                    - update-key card cpm-slot serial-number cpm-serial-number confirmation-
code code software-image file-url
                    - validate software-image url [override-default-boot-image]
```

5.4.1.2 Secure Boot tools commands

```
tools
    - dump
        - system
            - security
                - secure-boot
                    - uefi-vars card cpm-slot
```

5.4.2 Command descriptions

- Secure Boot administration commands
- Secure Boot tools commands

5.4.2.1 Secure Boot administration commands

secure-boot

Syntax

secure-boot

Context

admin>system>security

Platforms

7210 SAS-Sx/S 1/10GE (standalone)

Description

Commands in this context administratively provision Secure Boot.

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activate

Syntax

activate card *cpm-slot* **serial-number** *cpm-serial-number* **confirmation-code** *code*

Context

admin>system>security>secure-boot

Platforms

7210 SAS-Sx/S 1/10GE (standalone)

Description

This command activates Secure Boot to enforce digital signature verification of the software on every boot.

When Secure Boot is activated on a node, the capability is permanently enabled and cannot be disabled.

Parameters

cpm-slot

Specifies the logical CPM slot.

Values A

cpm-serial-number

Specifies the node serial number, up to 256 characters.

code

Specifies the Secure Boot confirmation code, up to 32 characters.

revoke-key

Syntax

revoke-key card *cpm-slot* **serial-number** *cpm-serial-number* **confirmation-code** *code*

Context

admin>system>security>secure-boot

Platforms

7210 SAS-Sx/S 1/10GE (standalone)

Description

This command revokes Secure Boot keys.

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Parameters

cpm-slot

Specifies the logical CPM slot.

Values A

cpm-serial-number

Specifies the node serial number, up to 256 characters.

code

Specifies the Secure Boot confirmation code, up to 32 characters.

update-key

Syntax

update-key card *cpm-slot* **serial-number** *cpm-serial-number* **confirmation-code** *code* **software-image** *file-url*

Context

admin>system>security>secure-boot

Platforms

7210 SAS-Sx/S 1/10GE (standalone)

Description

This command updates Secure Boot keys.

Parameters

cpm-slot

Specifies the logical CPM slot.

Values A

cpm-serial-number

Specifies the node serial number, up to 256 characters.

code

Specifies the Secure Boot confirmation code, up to 32 characters.

file-url

Specifies the URL for the software image.

Values [*local-url* | *remote-url*] (up to 180 characters)

where:

- *local-url* — [*cflash-id/*] [*file-path*]
  180 characters maximum, including *cflash-id*
  directory length 99 characters maximum each

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- *remote-url* — [{ftp://| tftp://} *login*:*pswd@remote-locn*/][*file-path*]
  180 characters maximum
  directory length 99 characters maximum each
  where: *remote-locn* — [*hostname* | *ipv4-address* | *ipv6-address*]
- *cflash-id* — cf1: | uf1:

validate

Syntax

validate software-image *url* [**override-default-boot-image**]

Context

admin>system>security>secure-boot

Platforms

7210 SAS-Sx/S 1/10GE (standalone)

Description

This command validates the specified software image.

Parameters

file-url

Specifies the URL for the file.

Values [*local-url* | *remote-url*] (up to 180 characters)
where:

- *local-url* — [*cflash-id*/] [*file-path*]
  180 characters maximum, including *cflash-id*
  directory length 99 characters maximum each
- *remote-url* — [{ftp://| tftp://} *login*:*pswd@remote-locn*/][*file-path*]
  180 characters maximum
  directory length 99 characters maximum each
  where: *remote-locn* — [*hostname* | *ipv4-address* | *ipv6-address*]
- *cflash-id* — cf1: | uf1:

override-default-boot-image

Keyword to override the default boot image.

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5.4.2.2 Secure Boot tools commands

secure-boot

Syntax

secure-boot

Context

tools>dump>system>security

Platforms

7210 SAS-Sx/S 1/10GE (standalone)

Description

This command displays Secure Boot settings.

uefi-vars

Syntax

uefi-vars card *cpm-slot*

Context

tools>dump>system>security>secure-boot

Platforms

7210 SAS-Sx/S 1/10GE (standalone)

Description

This command displays the Secure Boot Unified Extensible Firmware Interface (UEFI) variables.

Parameters

cpm-slot

Specifies the logical CPM slot.

Values A

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6 Virtual chassis

This chapter provides information about the parameters required to create a virtual chassis and how to configure them. A virtual chassis is also known as a stack of nodes.

Topics in this chapter include provisioning, booting, and preprovisioning the virtual chassis; provisioning service entities; replacing and upgrading nodes; and virtual chassis boot scenarios and split scenarios.

6.1 Overview

The 7210 SAS supports the grouping together, or stacking, of a set of nodes to create a virtual chassis (VC). The following nodes can be stacked to form a VC:

- the 7210 SAS-Sx 1/10GE and its variants
- the 7210 SAS-S 1/10GE and its variants

A VC provides operational simplicity because it uses a single IP address and MAC address for a set of stacked nodes. This set of nodes can be provisioned and monitored as a single platform rather than as individual nodes. For example, users can provision services for all ports in the VC without having to log in and access each node individually. As well, the NSP NFM-P management system can manage and monitor the VC as a single platform rather than the individual nodes that comprise it.

In addition to operational simplicity, a VC increases service reliability by providing redundancy in the following ways:

- If the node running control plane protocols in the VC fails, a standby node takes over the master node function, minimizing service loss.
- Access devices can be connected using a mechanism such as LAG or G.8032 so that the impact of a node failure in a VC is minimized for services on the access device.

Nodes can be added to or removed from a VC to increase the total available ports or to replace a failed unit.

The nodes of the VC are connected through their stacking ports. The total capacity provided by the stacking ports is equivalent to the sum of the bandwidth provided by the individual port. The stacking ports are used for forwarding service traffic and for exchanging management and control messages between the nodes in the VC. The VC control traffic is prioritized over other traffic on the stacking ports.

The 7210 SAS supports VC in standalone mode.

Nodes in the VC can take on the role of active CPM, standby CPM, or line card (also known as an IMM). In a VC, two of the nodes can be designated as CPM nodes (along with a built in IMM) and the other node is designated as an IMM-only node. See Node roles in the VC for more information. Each of the nodes in the VC is provisioned as a card, similar to the cards in a chassis.

A VC can support uplink over-subscription, where only a few uplinks from the end nodes of the stack are connected to the network, and all customer services are delivered through these uplink ports.

A VC can also support a configuration where the uplinks are not over-subscribed and operators can connect any number of ports from each node in the stack to the network core. In Release 11.0, the VC

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software module keeps track of the shortest path from a specific source IMM to a destination IMM and uses it to forward packets through the stack using the stacking ports.

A VC can operate as a Layer 2 device, where only VLANs are used for uplink connectivity, or as a full-fledged IP/MPLS platform with support for IP/MPLS-based Layer 2 and Layer 3 VPNs.

Note:
The following functionality is currently not supported on VCs:

- Synchronous Ethernet network synchronization
- 1588v2 PTP network synchronization

6.1.1 Node roles in the VC

Note:
Contact a Nokia technical support representative for scaling information about the minimum and maximum number of nodes supported in the VC.

The nodes in a VC are modeled in software as either CPM nodes or IMM nodes. The CPMs and the IMMs are interconnected through stacking ports.

In a VC, CPMs perform a dual role and will also act as IMMs. Consequently, a CPM is referred to as a CPM-IMM node and the IMM is referred to as an IMM-only node. Nodes in a VC are IMM-only nodes by default, but an IMM-only node is not mandatory in a VC.

If only one node is configured in the VC (minimum requirement), it must be a CPM-IMM node. A maximum of two CPM-IMM nodes can be configured on the VC to provide control plane redundancy. In this case, the remaining nodes must be IMM nodes. If more than two CPM-IMM nodes are configured, the software logs an error. The user can also configure a VC with one CPM-IMM and one IMM-only node; however, this configuration does not provide control-plane redundancy.

During the boot process, the system designates one of the configured CPM-IMM nodes as the active and the other as the standby CPM-IMM. If the active CPM-IMM fails, the standby CPM-IMM takes over the active role. It is possible to upgrade an existing IMM-only node to be a CPM-IMM node so that if an existing CPM-IMM node fails, another node can take on its role. See Configuration guidelines for upgrading, adding, or removing a VC node for more information about upgrading an IMM-only node to a CPM-IMM node. It is also possible to add a new node to the VC as a CPM-IMM node in the event that an existing CPM-IMM node must be replaced; however, there are restrictions. See Permitted platform combinations in a VC for more information. For information about adding and removing nodes in different scenarios, see VC boot scenarios.

6.1.2 Permitted platform combinations in a VC

Not all combinations of 7210 SAS-Sx 1/10GE and 7210 SAS-S 1/10GE platform variants can be configured as CPM-IMM nodes and assume the role of the active and standby CPM in a VC. Only platforms with similar capabilities can be configured as CPM-IMM nodes.

This restriction does not apply to nodes acting as IMM-only nodes. Any 7210 SAS-Sx 1/10GE variant or 7210 SAS-S 1/10GE variant (PoE and non-PoE, fiber and copper) can be configured as an IMM-only node to operate with any of the supported combinations of CPM-IMM nodes.

The following table lists the supported combinations of 7210 SAS-Sx 1/10GE and 7210 SAS-S 1/10GE variants that can be configured as CPM-IMM nodes.

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Table 23: Supported node combinations for CPM-IMM configuration

CPM-A	CPM-B	CPM-IMM
7210 SAS-Sx 1/10GE (any variant)	7210 SAS-S 1/10GE (any variant)	No
7210 SAS-S 1/10GE (any variant)	7210 SAS-S 1/10GE (any variant)	Yes
7210 SAS-Sx 1/10GE (any variant)	7210 SAS-Sx 1/10GE (any variant)	Yes

6.2 Provisioning and booting up the VC in standalone mode

The 7210 SAS supports manual bootup for a VC.

To provision a node to belong to a VC, it must be configured with the **chassis-role** parameter set to **standalone-vc**. The **chassis-role** parameter is a BOF parameter in the boot loader context.

Of the two nodes configured as CPM-IMM, one becomes the active CPM and the other becomes the standby CPM, ready to move to the active role should the current active CPM fail.The node designated as the active CPM uses the configuration file available locally or remotely at boot up. It distributes the configuration to all members of the VC. Setting the **chassis-role** parameter to **standalone-vc** ensures that the member nodes of the VC do not use any local configuration at boot up.

The IMM-only node configuration and the service configuration is always done on the active CPM. The active CPM-IMM node distributes the configuration information to other VC members when the user has saved the TiMOS configuration.The IMM-only nodes receive the service configuration from the active CPM through VC management messages, while the standby CPM receives the service configuration through the high availability (HA) reconcile mechanism.

The active CPM-IMM also sends out VC management packets with VC configuration information to IMM-only member nodes. The IMM-only nodes use the management packets to obtain the VC configuration and join the VC.

The VC requires a single IP address and MAC address to be managed as a single entity. The current active CPM owns the IP address and responds to all the messages sent to this IP address and uses the MAC address as required (for example, for ARP).

The **show>chassis** command displays power, fan, and alarm statuses of the VC by consolidating the statuses of all cards provisioned in the VC. The **show>card** command displays power, fan, and alarm statuses for individual cards.

The following mechanisms are used to boot the nodes in standalone-VC mode. Both mechanisms require the configuration of appropriate BOF parameters for the node to boot up in standalone-VC mode.

- The first mechanism requires console access to configure BOF parameters. Use this method either for nodes with the **chassis-role** set to **factory-default** (factory-shipped nodes) or any other value.
- The second mechanism involves the use of a preconfigured BOF file on an SD card to boot the system. Console access is not required. Independent SD cards with the appropriate BOF file are used for CPM-IMM nodes and IMM only nodes. Use this mechanism only for first-time boot up of a node when the **chassis-role** is set to **factory-default**, and not for nodes when **chassis-role** is set to any other value.

See Procedure to boot in the standalone-VC mode and Procedure to boot in standalone-VC mode for factory-default units using an SD card for information about booting the 7210 SAS-Sx/S 1/10GE in standalone-VC mode, including the booting sequenced, BOF prompts, and sample logs.

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6.2.1 Required BOF parameters

When the node is shipped from the factory, the **chassis-role** parameter in the boot loader file is set to **factory-default**. For the node to be part of a VC, the user must explicitly set the **chassis-role** parameter in the boot loader to **standalone-vc**.

The user must also configure the following boot loader parameters to operate the VC:

Note:
Before these boot loader parameters are configured, verity that the **chassis-role** must be set to **standalone-vc**.

- **vc-stack-name**

  Configure the boot loader parameter **vc-stack-name** on the active CPM-IMM node to identify the VC of which the nodes are members. A node configured with a **vc-stack-name** of "my-stack" is a member node of the VC "my-stack". The *system-name* variable in the **configure system name** command can be reused as the boot loader **vc-stack-name** value. A node cannot be added to a VC if its **vc-stack-name** value does not match that of the current active CPM-IMM.

- **vc-stack-node-type**

  Specify the node role as either **cpm-imm** or **imm-only** using the boot loader BOF parameter **vc-stack-node-type**. The default setting is **imm-only**. Users need to modify the default only for nodes that can take on the role of CPM by changing the setting to **cpm-imm**. The BOF parameter does not need to be modified for nodes whose role is IMM. Users can configure two nodes in the stack to be **cpm-imm** nodes.

In addition, to operate the VC users must also configure the following commands in the TiMOS BOF context:

- **vc-stack-node**

  Use the command **bof>vc-stack-node** {**cpmA** | **cpmB**} **slot-num** *slot-num* **mac-addr** *mac-address* to configure the slot number and the MAC address of the CPM nodes. The VC stack node **cpmA** and **cpmB** parameters can also be configured through the boot loader BOF menu prompts.

  The slot number identifies a specific node in the VC (similar to the slot ID of a card in a chassis-based system) and is used in addressing service objects created during provisioning. The slot number also is used to light up the correct LED on the front-panel of the node, enabling operators to see which slot is configured with the VC node (the stack LED also denotes that the node is part of a VC and is fully functional). The slot number of the active and standby CPM-IMMs can be set to any number from 1 to 8, as long as it is not in use by another VC member node. An arbitration process during the boot phase ensures that one of the CPM nodes is the active CPM and the other is the standby CPM.

  The MAC address must match the base MAC address printed on the label of the chassis.

- **eth-mgt-address**

  Configure the management IP address for the two CPM nodes using the command **bof>eth-mgmt-address** *ip-prefix*/*ip-prefix-length* [**active** | **standby**]. The Ethernet management IP address configured as **active** provides the IP address of the active node, which a management station can use to operate the stack. The management IP address configured as **standby** provides connectivity to the standby node.

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6.2.2 Manually configuring nodes to boot as CPM-IMM in a VC with console access

About this task

The CPM-IMM nodes are configured through the BOF and do not require further configuration to be part of the VC. Perform the following steps to manually boot and configure CPM-IMM nodes in a VC:

Procedure

Step 1. Identify the two nodes that will take on the CPM role.

Step 2. Ensure there is console access to the CPM nodes to complete the boot process.

If console access is not available, use the SD card with appropriate BOF file values to boot the system. See Procedure to boot in standalone-VC mode for factory-default units using an SD card .

See the applicable chassis and installation guide for these 7210 SAS platforms for more information about establishing a console connection.

Step 3. Ensure the CPM nodes are powered on.

Step 4. Ensure that the SD card delivered with the software license containing the boot loader (`boot.tim`) and TiMOS software is installed in the SD card slot.

Step 5. Manually interrupt the boot process at the boot loader BOF prompt and configure the following:

a. Specify **standalone-vc** for the **chassis-role** parameter.

b. Specify a name for the **vc-stack-name** parameter.

c. Specify **cpm-imm** for the **vc-stack-node-type** parameter.

d. Specify the slot number and MAC address for CPM A and CPM B in the **vc-stack-node** parameter.

e. Specify the IP prefix information for the active and standby options in the **eth-mgmt-address** parameter.

Step 6. Configure other BOF parameters such as image location, configuration file location, and route information, similar to a 7210 SAS node operating in the standalone mode.

See System boot options for 7210 SAS-Mxp, 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and 7210 SAS-Sx 10/100GE in standalone mode for information.

You can get the TiMOS image (`both.tim`) for the CPM-IMM nodes from the local SD card or through the network by specifying the primary/secondary/tertiary image locations appropriately.

Example

The following output is an example of a CPM-IMM node configuration.

```
A:Dut-A# show bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@135.250.127.36/./images/7xxx-hops/
    primary-config     cf1:\default.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   10.135.17.166/24 active
    eth-mgmt-address   10.135.17.167/24 standby
    eth-mgmt-route     10.250.0.0/16 next-hop 10.135.17.1
```


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```
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
    vc-stack-name      VC-3
    vc-stack-node-type cpm-imm
    vc-stack-node cpmA slot-num 1 mac-addr d0:99:d5:91:1c:41
    vc-stack-node cpmB slot-num 2 mac-addr d0:99:d5:90:1e:41
===============================================================================
```

6.2.3 Manually booting a VC IMM-only node with console access

About this task

The IMM-only node can be booted independently of the CPM-IMM nodes. Perform the following steps to manually configure IMM-only nodes in a VC:

Procedure

Step 1. To boot the IMM-only node, use the SD card provided with the software license that contains the appropriate `boot.tim` image. Ensure console access is available to boot the IMM-only node.

Step 2. Upon power up, manually interrupt the boot process at the BOF prompt and configure the following:

- **a.** Specify **standalone-vc** for the boot loader parameter **chassis-role**.
- **b.** Specify **imm-only** for the boot loader parameter **vc-stack-node-type**.
- **c.** Note the MAC address of the IMM-only node. The MAC address used for VC configuration is the chassis MAC address printed on the label of the node.

  You will need this information to configure the node in the TiMOS context using the **config**>**system**>**vc-stack**>**vc-node** *slot-number* **mac-address** *ieee-address* command on the active CPM, when the CPM is up.

The slot number, image location, configuration location, IP addresses, and route information do not need to be configured on the IMM-only node.

Step 3. Save the file and allow the boot loader to proceed with the boot process.

Step 4. After the CPM has booted up, on the active CPM, follow the prompts in the TiMOS context to configure the IMM-only slot number and MAC address.

Expected outcome

During bootup, the IMM uses the configured MAC address to identify whether the IMM is part of the stack and to determine its VC stack name and slot number before loading the TiMOS images.

The IMM-only node communicates with the active CPM node in the boot loader context. If the user has configured it to be part of the stack, the IMM-only node obtains its slot number and the TiMOS images required to boot up from the active CPM.

When the IMM-only node receives a VC discovery message containing the MAC address and slot number, the IMM-only node obtains the location of the TiMOS image (`both.tim`) and downloads it using the information received in the discovery message. If an IMM-only node does not receive the VC discovery

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message with its MAC address and slot number, it does not load the TiMOS image. Instead, the IMM-only node will wait for a specific amount of time defined by the system, reboot, and wait again to receive a VC discovery message with its MAC address. The IMM-only node repeats this process indefinitely or until the operator removes the node from the VC by disconnecting its stacking ports.

Example

The following output is an example of a BOF configuration for an IMM-only node.

```
===============================================================================
BOF (Memory)
===============================================================================
#System Settings:
    wait              3
    persist           off
    console-speed     115200
    no console-disabled
    vc-stack-node-type imm-only
===============================================================================
```

What to do next

Users cannot use the console or Telnet to view the BOF or execute the BOF commands on an IMM-only node. To update the VC parameters associated with the IMM-only node, users should reboot the node, interrupt the boot process, and use the menu prompts displayed in the boot loader context.

6.2.4 Configuring an IMM-only node in a VC

To configure an IMM-only node in the VC, use the command **config**>**system**>**vc-stack**>**vc-node** *slot-number* **mac-address** *ieee-address* [**create**].

An IMM-only node in a VC is identified by its *slot-number* and its MAC address. The slot number assigned to the node can be an arbitrary number from 1 to 8. It is used in service provisioning to identify ports on a VC member node, and on service objects on those ports. The port on a VC member node is identified using the format *slot-id*/1/*port-id*;*sap-id*. For example, port 20 on the front panel of a VC member node in slot 4 with a SAP ID of 300 is identified as 4/1/20:300.

Slot numbers are unique to each VC, which are identified by their **vc-stack-name**, and can be reused across different VCs. Software ensures the uniqueness of the slot number in each VC by raising an error if two nodes in the same VC are assigned the same slot number.

When an IMM-only node boots up, it uses the MAC address and slot number received in the VC discovery messages sent by the CPM node to discover VC configuration information. The MAC address used for VC configuration is the chassis MAC address printed on the label of the node. If it does not match the MAC address retrieved from the EEPROM, the node will not be able use the VC configuration information. For CPM-IMM nodes, this will result in boot failure. The IMM-only nodes will wait indefinitely for a VC discovery message with the correct MAC address from the CPM-IMM node, or until the operator removes the node from the VC by disconnecting its stacking ports.

6.2.5 Provisioning the card type for all nodes in a VC

When the TiMOS image boots up on the CPM-IMM nodes and the IMM-only node, users must provision the card type on each node so that the software knows which hardware platforms are members of the VC. The software can then determine the logical IMM types, which are the slots of the VC. Provisioning the

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card type is a mandatory step in the bootup process for all nodes of the VC in order for the nodes/cards to be fully functional. Use the following CLI command:

```
A:Dut-A# configure card 1 card-type
  - card-type <card-type>
  - no card-type
 <card-type>          : sas-sx-24sfp-4sfpp | sas-sx-48sfp-4sfpp | sas-sx-24t-
4sfpp | sas-sx-48t-4sfpp | sas-s-24sfp-4sfpp|sas-s-48sfp-4sfpp|sas-s-24t-4sfpp|sas-
s-48t-4sfpp
```

The card type can be preprovisioned and allows for preprovisioning of services. If the software-determined card type does not match the configured card type for the slot number, a provisioning mismatch error is logged. The software determines the card type by reading the information on the EEPROM of the platform.

The following table lists the supported card types associated with the 7210 SAS-Sx 1/10GE platform.

Table 24: Card types for 7210 SAS-Sx 1/10GE platform

Card type	7210 SAS-Sx 1/10GE platform
sas-sx-24sfp-4sfpp	7210 SAS-Sx 1/10GE 22F 2C 4SFP+
sas-sx-48sfp-4sfpp	7210 SAS-Sx 1/10GE 46F 2C 4SFP+
sas-sx-24t-4sfpp	7210 SAS-Sx 1/10GE 24T 4SFP+
sas-sx-48t-4sfpp	7210 SAS-Sx 1/10GE 48T 4SFP+
sas-sx-24tp-4sfpp	7210 SAS-Sx 1/10GE 24Tp 4SFP+ PoE
sas-sx-48tp-4sfpp	7210 SAS-Sx 1/10GE 48Tp 4SFP+ PoE

The following table lists the supported card types associated with the 7210 SAS-S 1/10GE platform.

Table 25: Card types for 7210 SAS-S 1/10GE platform

Card type	7210 SAS-S 1/10GE platform
sas-s-24sfp-4sfpp	7210 SAS-S 1/10GE 24F 4SFP+
sas-s-48sfp-4sfpp	7210 SAS-S 1/10GE 48F 4SFP+
sas-s-24t-4sfpp	7210 SAS-S 1/10GE 24T 4SFP+
sas-s-48t-4sfpp	7210 SAS-S 1/10GE 48T 4SFP+
sas-s-24tp-4sfpp	7210 SAS-S 1/10GE 24Tp 4SFP+ PoE
sas-s-48tp-4sfpp	7210 SAS-S 1/10GE 48Tp 4SFP+ PoE

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6.3 Provisioning service entities

The nodes in a VC are represented as the cards of a chassis. Each card is assigned a slot number. Using the slot number, services are provisioned on the card using the format *slot-number*/*mda-number*/*port-number*:*sap-id*, where the *slot-number* is configured for every node/card, the *mda-number* is always set to 1 for all 7210 SAS-Sx/S 1/10GE platforms supporting VC, and the *port-number* corresponds to the front-panel Ethernet port number and ranges from 1 to 28 or from 1 to 52 for 7210 SAS-Sx/S 1/10GE platforms.

6.4 Preprovisioning a VC

To preprovision a VC, users must configure the **card-type** for the slot they want to preprovision. When the card type is configured, the ports are automatically created for that slot, allowing configuration of the services using the ports of the slot.

The **vc-node** command can be configured later and is independent of the **card-type** configuration. The **vc-node** configuration identifies the slot and the MAC address of the node and is used only by the IMM-only node to become part of the VC. If the software detects a mismatch between the hardware type of the IMM-only node and the configured/provisioned card type, it logs an error and reboots the card, allowing the user to correct the value and fix the problem.

6.5 Configuring a system resource profile for a VC

A node system resource profile is divided into two parts:

- a global resource profile to manage the VC-wide resources for certain features
- a resource profile per card/slot to manage the resources on a specific slot

The per card/slot resource profile is useful for allocating resources to different features on each card to suit the application or service being delivered on those access ports.

Example: Global resource profile

The following output is an example of the per-node global system resource profile for a VC.

```
A:Dut-A# configure system global-res-profile
A:Dut-A>config>system>glob-res# info detail
----------------------------------------------
            router
                no ecmp
                no ldp-ecmp
                no max-ip-subnets
                no max-ipv6-routes
            exit
----------------------------------------------
A:Dut-A>config>system>glob-res#
```

Example: Per-card/slot resource profile

The following output shows an example of the per-card/slot resource profile for a VC.

```
*A:Dut-A# configure system resource-profile 1
```


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```
*A:Dut-A>config>system>res-prof# info detail
----------------------------------------------
            description "Default System Resource Profile Policy"
            no g8032-control-sap-tags
            ingress-internal-tcam
                sap-aggregate-meter 2
                qos-sap-ingress-resource 4
                    mac-match-enable 6
                    ipv4-match-enable 6
                    ipv6-ipv4-match-enable 6
                    ipv4-mac-match-enable 6
                exit
                acl-sap-ingress 2
                    ipv4-match-enable 5
                    ipv6-64-only-match-enable 5
                    ipv4-ipv6-128-match-enable 5
                    mac-match-enable 5
                exit
                eth-cfm 2
                    no up-mep
                    sap-down-mep 1
                    sdp-down-mep-ing-mip 1
                exit
            exit
            egress-internal-tcam
                acl-sap-egress 2
                    mac-ipv4-match-enable 2
                    no ipv6-128bit-match-enable
                    no mac-ipv6-64bit-match-enable
                    no mac-match-enable
                exit
                no egress-sap-aggregate-meter
            exit
----------------------------------------------
*A:Dut-A# show card 1 active-resource-profile
===============================================================================
Active System Resource Profile Information
===============================================================================
-------------------------------------------------------------------------------
IPv6 FIB
-------------------------------------------------------------------------------
max-ipv6-routes            : disable
-------------------------------------------------------------------------------
Router
-------------------------------------------------------------------------------
max-ip-subnets             : 2000
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Router
-------------------------------------------------------------------------------
system-max-ecmp            : 1
L3-max-ecmp-groups         : 1024
Ldp-max-ecmp-groups        : disable
Ldp-ecmp-percent-value     : disable
-------------------------------------------------------------------------------
Ingress Internal CAM       : 8
-------------------------------------------------------------------------------
Sap Ingress Qos resource   : 4          Sap  Aggregate Meter (#)   : 2
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 Resource         : disable    IPv4-Mac Resource          : max
-------------------------------------------------------------------------------
Net Ingress Qos resource   : disable
-------------------------------------------------------------------------------
```


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```
-------------------------------------------------------------------------------
Sap Ingress ACL resource   : 2
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 128 bit Resource : disable    IPv6 64 bit Resource       : disable
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Eth CFM                    : 2
-------------------------------------------------------------------------------
sap-down-mep                  : 1     up-mep                    : disable
sdp-down-mep-ing-mip          : 1
-------------------------------------------------------------------------------
Egress Internal CAM        : 2
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Sap Egress ACL resource    : 2
-------------------------------------------------------------------------------
Mac and IPv4 Resource      : 2          Mac-only Resource          : disable
IPv6 128 bit Resource      : disable    Mac and IPv6 64 bit Resour*: disable
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Egr sap agg-meter          : disable
-------------------------------------------------------------------------------
MBS pool                   : Node
-------------------------------------------------------------------------------
Decommissioned Ports       : Not Applicable
-------------------------------------------------------------------------------
===============================================================================
* indicates that the corresponding row element may have been truncated.
# indicates that the value will take effect only after reboot or clear card.
```

6.6 VC boot scenarios

This section describes the required configurations and the expected behaviors of different boot up scenarios.

6.6.1 First time manual boot of nodes in the stack

About this task

The following steps describe how to manually bring up a VC using nodes shipped from the factory that are being booted up for the first time.

Users can boot up a single node or a set of nodes that are to be part of a VC. As well, users can power on one node, all the nodes, or a set of nodes; there is no restriction on the power sequence. The following steps describe the sequence when all nodes are booted up together; however, the steps here do not dictate the order of service provisioning and do not preclude preprovisioning of services on the active CPM. Service preprovisioning is allowed after the VC configuration, including the VC node member configuration, is complete.

Note:
The CPM-IMM nodes are configured through the BOF and do not require further configuration to be part of the VC.

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Procedure

Step 1. Identify the two nodes that will take on the CPM role.

Step 2. Ensure there is console access to each CPM node to drive the boot process.

See the applicable chassis and installation guide for these 7210 SAS platforms for more information about establishing a console connection.

Step 3. Ensure the CPM nodes are powered on.

Step 4. Ensure that the SD card containing the boot loader (boot.tim) and TiMOS (both.tim) software is installed in the SD card slot for each CPM node.

In Release 11.0, the TiMOS image (`both.tim`) for the CPM-IMM nodes can be obtained from the local SD card or obtained through the network by specifying the primary/secondary/tertiary image locations appropriately.

Step 5. On the node that will be the active CPM for the first time boot, log in through the console port and manually interrupt the boot process.

The boot prompt appears.

Step 6. Configure BOF parameters as follows:

- Specify **standalone-vc** for the boot loader parameter **chassis-role**.
- Specify a name for the boot loader parameter **vc-stack-name**.
- Specify **cpm-imm** for the boot loader parameter **vc-stack-node-type**.
- Specify the slot number and MAC address of each CPM-IMM node in the **bof>vc-stack-node** command.
- Specify the management IP address for the active and standby CPM-IMM nodes in the **bof>eth-mgmt-address** command.
- Configure the TiMOS image location.
- Configure the configuration file location.

See System boot options for 7210 SAS-Mxp, 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and 7210 SAS-Sx 10/100GE in standalone mode for information about configuring BOF parameters.

Example

The following output shows an example of a BOF configuration for a CPM-IMM node.

```
A:Dut-A# show bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@135.250.127.36/./images/7xxx-hops/
    primary-config     cf1:\default.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   10.135.17.166/24 active
    eth-mgmt-address   10.135.17.167/24 standby
    eth-mgmt-route     10.250.0.0/16 next-hop 10.135.17.1
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
```


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```
    vc-stack-name      VC-3
    vc-stack-node-type cpm-imm
    vc-stack-node cpmA slot-num 1 mac-addr d0:99:d5:91:1c:41
    vc-stack-node cpmB slot-num 2 mac-addr d0:99:d5:90:1e:41
===============================================================================
```

Step 7. On the node that will be the standby CPM for the first time boot, log in through the console port and manually interrupt the boot process.

Expected outcome

The boot prompt appears.

Step 8. Configure BOF parameters as follows:

- Specify **standalone-vc** for the boot loader parameter **chassis-role**.
- Specify a name for or the boot loader parameter **vc-stack-name**.
- Specify **cpm-imm** for the boot loader parameter **vc-stack-node-type**.
- Specify the slot number and MAC address of each CPM-IMM node in the **bof>vc-stack-node** command.
- Configure the TiMOS image location.

The CPM-IMM nodes undergo an arbitration process where the node assigned the lower slot number gets chosen as the active CPM node.

The node chosen as the active CPM node loads the TiMOS image and boots up as the active CPM-IMM node. The standby CPM also proceeds with boot up. However, it does not have the VC configuration on first-time boot and needs to wait for the active CPM to provide the VC configuration through VC management messages.

Step 9. Identify the node that will take on the IMM role.

Step 10. Ensure there is console access to the IMM node to drive the boot process.

Step 11. Ensure that the SD card containing the appropriate boot loader (`boot.tim`) software is installed in the SD card slot.

Step 12. Power on the node that will be the IMM node, log in through the console port and manually interrupt the boot process.

Expected outcome

The boot prompt appears.

Step 13. Configure the boot loader BOF parameter **chassis-role** as **standalone-vc**.

The boot loader parameter **vc-stack-node-type** retains its default value of **imm-only**.



Note:
The **vc-stack-node-type** parameter is stored in the boot flash (and not in the boot option file) and must be modified using the BOF menu prompts.

The VC stack name, slot number, image location, configuration location, IP addresses, and route information do not need to be configured on the IMM-only node.

Example

The following output shows an example of a BOF configuration for a IMM-only node.

```
===============================================================================
BOF (Memory)
===============================================================================
```


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```
#System Settings:
    wait              3
    persist           off
    console-speed     115200
    no console-disabled
    vc-stack-node-type imm-only
===============================================================================
```

Step 14. After the IMM-only BOF parameters are configured, save the BOF by typing `Yes` when prompted to save the BOF. Allow the boot loader proceed with the boot process.

The IMM-only node waits to receive VC configuration information from the active CPM-IMM node.

Step 15. Take note of the MAC address of the node chosen as the IMM-only node. The MAC address is the chassis MAC address printed on the label of the node.

Step 16. At the TiMOS prompt on the active CPM node, proceed with the VC configuration by using the **config>system>vc-stack>vc-stack-node** command to configure the IMM-only node slot number and MAC address.

Expected outcome

When the VC configuration information has been committed in the CLI, the active CPM node sends the VC configuration to all other nodes in the VC through VC management messages over the stacking ports.

When the IMM-only nodes receive the VC management messages from the active CPM, they confirm the VC configuration by matching their chassis address to the MAC address contained in the VC message.They then retrieve the TiMOS image from the active CPM and use it to boot up.

While booting up with the TiMOS image, the standby CPM node undergoes another CPM election arbitration process, which results in the node detecting itself as standby. The node then executes the HA reconcile process and synchronizes its management and control plane state with the active CPM. It receives the current running configuration with the VC configuration and the current BOF configuration present on the active CPM.

The VC is now ready for use.

6.6.2 Subsequent reboot of the stack (with correct BOF present)

This scenario assumes that the BOF configured on each node during the first time boot up is saved locally and contains the VC configuration required for the node to boot up. It also assumes that the **chassis-role** parameter in the bootflash is set to **standalone-vc** for each node.

The following sequence occurs in the boot loader context and in the TiMOS context. There is no user intervention required:

- In the boot loader context, all the nodes in the VC read their bootflash and the BOFs that are present locally, and receive their VC configuration.
- In the boot loader context, the nodes configured as **cpm-imm** go through a CPM election process and the node with the lower slot number is chosen as the active CPM. Both nodes proceed to boot up using the TiMOS image (`both.tim`).
- In the TiMOS context, both the **cpm-imm** nodes again read the BOFs that are present locally and receive their VC configuration.
- In the boot loader context, the **imm-only** nodes wait to receive VC management messages from the active CPM, when the active CPM has booted up. When the **imm-only** nodes receive VC management messages that contain their MAC address and slot number, they proceed to boot up using the TiMOS

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image (`both.tim`). A local copy of the TiMOS image is used if it matches the version available on the active CPM; otherwise, the **imm-only** nodes retrieve the newer version from the active CPM. The **imm-only** nodes do not participate in the CPM election process.

- In the TiMOS context, the **cpm-imm** nodes go through the CPM election arbitration process to elect the active CPM node. The active CPM node then initializes the chassis manager and initiates a HA reconcile process with the standby CPM node.

If both the **cpm-imm** nodes come up as active, which is detected by both nodes receiving each other's VC management messages claiming themselves to be active, the node with the higher slot number reboots itself.

6.7 Replacing and upgrading a node in a VC

This section describes how to:

- replace a CPM-IMM node or IMM-only node
- upgrade an existing IMM-only node to a CPM-IMM node
- downgrade a CPM-IMM node to an IMM-only node

6.7.1 Replacing a standby/active CPM-IMM node with another CPM-IMM node

About this task

When replacing a node, the SD card used to boot the replacement node must contain a version of the boot.tim and both.tim images that match that of the active CPM. If the versions do not match, the bootup will not be successful.

If a VC is configured with only a single CPM-IMM node and that node fails, the entire VC is down, including the IMM-only nodes. The IMM-only nodes reboot if they do not hear from the active CPM node after some time.

If the stacking ports are not connected together to form a ring connecting all the nodes of the VC, any failure in the VC (whether a link or a node failure) will isolate some nodes off of the VC, affecting all the services on those nodes. In addition, if the uplink is through one of the nodes that has been isolated or has failed, services using the uplink for the entire VC are affected. The procedure here assumes a ring of stacking ports is configured.

In the following scenario, it is assumed that a CPM-IMM node has failed and needs to be replaced. It is assumed that a redundant CPM node is configured and another CPM-IMM node is currently active. The replacement node might be a new node from the factory or a node that has been previously used as an IMM node:

Procedure

Step 1. Use the MAC address or slot number to determine whether the failed node is CPM-A or CPM-B. The node to be added as a CPM-IMM node must be configured based on which one failed. For the purposes of this example, it is assumed that CPM-B (the standby CPM) has failed.

Step 2. Disconnect the stacking port on the failed node and complete the stacking ring.

Step 3. On the active CPM, remove the configuration of the failed CPM-IMM node (CPM-B) from the BOF using the **bof no vc-stack-node** command.

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Step 4. On the active CPM, add the configuration of the new CPM-IMM node as CPM-B to the BOF using the **bof vc-stack-node** command.

Step 5. Save the BOF for the configuration to take effect immediately.

Step 6. If the replacement node is an existing IMM-only node, follow these steps:

a. Remove the IMM-only node configuration from the configuration file of the active CPM using the **config system vc-stack no vc-node** command.

b. Connect to the console of the IMM-only node.

c. Reboot the node by toggling the power button.

d. On boot up, interrupt the boot process and configure the node as CPM-IMM (CPM-B) by configuring the following BOF parameters:

- specify **cpm-imm** for **vc-stack-node-type**
- specify the slot number and MAC address of each CPM-IMM node in the **bof**>**vc-stack-node** command

Step 7. If the replacement node is a new node, follow these steps:

a. Physically connect the new node into the VC ring (the stacking ports are connected to form a ring so that an alternate path always exists).

b. Reboot the node.

c. Connect to the console of the new node.

d. Power on the node.

e. On boot up, interrupt the boot process and configure the node as CPM-IMM node by configuring the following boot loader parameters:

- specify **cpm-imm** for **vc-stack-node-type**
- specify the slot number and MAC address of each CPM-IMM node in the **bof vc-stack-node** command

Step 8. Save the BOF and allow the boot to proceed.

The node comes up as a standby CPM node and talks to the active CPM to start the HA synchronization process. The master LED on the standby CPM will be blinking. The master LED on the active CPM will glow steady.

Expected outcome

Services are not interrupted during the preceding process because the active CPM (CPM-A) is present and has not been rebooted (assuming the active CPM has an uplink to the network). If one of the IMM-only nodes was converted to a CPM-IMM node, the services on that IMM are affected as the node is rebooted to effect the change to a CPM-IMM node.

6.7.2 Replacing an IMM-only node with another node

About this task

In this scenario, it is assumed that the IMM-only node has failed and needs to be replaced. The replacement node can be a new node from the factory or a node that has been previously used as an IMM node in another VC. In the former case, the procedure is similar to adding a node received from factory; see First time manual boot of nodes in the stack starting at step 9.

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The SD card used to boot the node must contain a version of the TiMOS image (`boot.tim`) that matches that of the active CPM. If the version do not match, the boot will not be successful.

If a ring of stacking ports is not configured, any failure in the stack (either a link or node failure) will isolate some nodes off of the stack, affecting all the services on those nodes. In addition, if the uplink is available through one of the nodes that is now isolated or failed, services using the uplink for the entire VC are affected.

The following procedure assumes a ring is configured and that the replacement node had been previously used as an IMM node in another VC:

Procedure

Step 1. Disconnect the stacking port of the failed IMM-only node.

Step 2. Connect to the console of the active CPM node.

Step 3. On the active CPM node, use the **no vc-node** command to remove the failed IMM-only node configuration from the configuration file of the active CPM.

Step 4. On the active CPM node, add the configuration for the new IMM-only node using the **config**>**system**>**vc-stack**>**vc-node** command, specifying the MAC address of the new IMM-only node and reusing the same slot number as the failed IMM-only node.

Step 5. Connect to the console of the replacement IMM node.

Step 6. Connect the new IMM node to the stacking ring.

Step 7. Reboot the IMM node by toggling the power to it

Step 8. On boot up, interrupt the boot process and specify **imm-only** for the **vc-stack-node-type** boot loader.

Step 9. Save the BOF configuration and let the boot proceed.

Expected outcome

The node will boot up as an IMM-only node. The appropriate stack LED on the front panel of the node will glow steady.

Expected outcome

Services are not interrupted, as the active CPM (CPM-A) is present and has not been rebooted (assuming the active CPM has an uplink to the network). If one of the IMM-only nodes is converted to a CPM-IMM node, the services on that IMM node are affected as the node is rebooted to effect the change to a CPM-IMM node.

6.7.3 Replacing the current active CPM node with another node

If the active CPM node needs to be replaced and has not failed, switchover to the standby CPM can be forced before using the procedure outlined in Replacing a standby/active CPM-IMM node with another CPM-IMM node.

6.7.4 Expanding a VC by adding a new IMM-only node

This scenario is similar to Replacing an IMM-only node with another node except that instead of replacing an existing IMM-only node, a new node is being added. This requires the configuration file on the active CPM to be updated by adding the new IMM-only node VC configuration parameters using the

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config>system>vc-stack>vc-node command, without deleting or modifying any existing VC configuration parameters.

6.7.5 Removing a node from a VC (standby CPM or IMM)

If the node to be removed is the standby CPM-IMM node, see Replacing a standby/active CPM-IMM node with another CPM-IMM node and update the BOF on the active CPM node by removing the VC configuration parameters for the node being removed.

If the node to be removed is an IMM-only node, see Replacing an IMM-only node with another node and update the configuration file on the active CPM node by removing the VC configuration parameters for the node being removed.

6.7.6 Adding a new standby CPM node into an existing VC

This scenario is similar to Replacing a standby/active CPM-IMM node with another CPM-IMM node, with the VC configuration information of the new CPM-IMM node being added to the BOF of the active CPM node.

6.7.7 Configuration guidelines for upgrading, adding, or removing a VC node

The following configuration guidelines apply for upgrading, adding, or removing a VC node:

- When upgrading an IMM-only node to a CPM-IMM node, ensure connectivity is available between the IMM and the current active CPM-IMM node over the stacking links.
- A power cycle may be required if the role is changed from a CPM-IMM node to an IMM-only node.
- See the latest scaling guide for information about the maximum number of nodes that can be stacked together in a VC.

6.8 VC split scenarios

A VC split can occur as a result of the following failures in a VC:

- a single stacking link failure
- a single node failure
- a double failure consisting of two failed links, two failed nodes fail, or a failed link and a failed node

In the event of single stacking link failure in a VC, all nodes including the active and standby CPM-IMM nodes can continue to communicate with each other. There is no impact on the control plane and no services are lost because an alternate path exists around the point of failure. Services on all the IMM-only nodes continue to forward traffic; however, there might be an impact to the switching throughput as the stacking port bandwidth reduces by half.

Similarly, in the event of a single node failure in a VC, the VC can continue to operate with the active CPM-IMM node (or the standby CPM-IMM node if the active failed). There is no impact to the control plane or services and services on all the IMM continue to forward traffic. However, services provisioned on the failed node are lost and there might be an impact to the switching throughput as the stacking port bandwidth reduces by half.

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If a double failure occurs, because two links fail, or two nodes fail, or a link and a node fail, the VC will have two islands of nodes/cards. One of these islands needs to own the VC. To decide which island of nodes will own the VC and continue normal functions, the following occurs:

- If an island has only IMM-only nodes, they all reboot.
- If one of the islands has both active and standby CPM-IMM nodes, nothing happens to the nodes in that island. They continue to work as normal and services configured on these nodes continue to operate in the VC without impact. The nodes on the second island reboot.
- If one of the islands has the active CPM-IMM node and the other has the standby CPM-IMM node, the island with the greater number of nodes continues to be functional in the VC and all the nodes in the other island reboot. If software determines that the island with the active CPM-IMM is also the island with the greater number of nodes, that island continues normal operation while the nodes in island with the standby CPM-IMM all reboot (including the standby node). If software determines that the island with the standby CPM-IMM is the island with the greater number of nodes, the standby node takes the role of active CPM-IMM and that island continues operations. The nodes in the other island all reboot.
- If both islands have the same number of nodes, the node that was the standby CPM-IMM node before the failure occurred becomes the active CPM-IMM. All the nodes in the island with the previously active CPM-IMM node (that is, active before the failure) will reboot. While rebooting, if the CPM-IMM node is unable to contact the current active node in boot.tim, they will reboot again. The IMM-only node will reboot and wait to hear from the active CPM (basically, it will wait for the operator to fix the problem and join the islands).

CPM-IMM nodes store information to detect whether a reboot is occurring due to a VC split. If a split has occurred, the node attempts to connect to the current active CPM-IMM. When it talks to the active CPM-IMM and boots up successfully, it clears the stored VC split information. If the CPM-IMM node is unable to talk to the current active CPM node, it will reboot and start the process all over again until it can successfully talk to an active CPM.

Users can clear the VC split information stored in the database and stop the reboot process by interrupting the boot process and providing a Yes response at the boot loader prompt to clear the VC split information.

6.9 VC network synchronization

See Network synchronization for more information.

6.10 VC configuration guidelines

- Starting in Release 25.9.R1, the **vc-node** context for nodes configured to take the role of CPMA and CPMB is created automatically in the TiMOS configuration file to allow users to configure the **internal-synce-ports** for CPMA and CPMB. The **vc-node** configuration for CPMA and CPMB is taken from the BOF configuration.

  If the BOF is configured as follows:

```
A:Dut-A# show bof
===============================================================================
BOF (Memory)
===============================================================================
vc-stack-name VC-3
vc-stack-node-type cpm-imm
```


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```
vc-stack-node cpmA slot-num 1 mac-addr d0:99:d5:91:1c:41
vc-stack-node cpmB slot-num 2 mac-addr d0:99:d5:90:1e:41
===============================================================================
```

In the TiMOS context, the following configuration lines are added by the software on bootup for CPMA and CPMB:

```
A:Dut-A# info detail
===============================================================================
configure system vc-stack

  vc-node 1 mac-addr d0:99:d5:91:1c:41 create
    no internal-synce-ports
  exit
  vc-node 2 mac-addr d0:99:d5:90:1e:41 create
    no internal-synce-ports
  exit
exit
===============================================================================
```

- The **vc-node** context for CPMA and CPMB can be used only for configuring the **internal-synce-ports**. It cannot be used to modify the MAC address of CPMA and CPMB, and the slot number for CPMA and CPMB.
- The **vc-node** context cannot be used to remove the CPMA and CPMB node (for example, the **config>system>vc-stack>no vc-node** command is not available for nodes configured as CPMA and CPMB).
- Before using the **bof>no vc-stack-node cpmA** or **bof>no vc-stack-node cpmB** commands to remove either CPMA or CPMB for replacing the node in case of failures, the **internal-synce-ports** configuration must be removed.
- The **vc-stack-name** must be configured using only alphanumeric characters. Special characters (&, *, and so on) are not advised.

6.11 Virtual chassis command reference

6.11.1 Command hierarchies

6.11.1.1 Configuration commands

Note:
See BOF command reference for more information about BOF commands.

```
bof
    - vc-stack-node {cpmA | cpmB} slot-num slot-num mac-addr mac-address
    - no vc-stack-node {cpmA | cpmB}
    - [no] vc-stack-name
    - vc-stack-node-type [cpm-imm | imm-only]
    - no vc-stack-node-type
```


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6.11.2 Command descriptions

6.11.2.1 Configuration commands

6.11.2.1.1 Standalone virtual chassis (VC) commands

vc-stack-node

Syntax

vc-stack-node {**cpmA** | **cpmB**} **slot-num** *slot-num* **mac-addr** *mac-address*

no vc-stack-node {**cpmA** | **cpmB**}

Context

bof

Platforms

7210 SAS-S 1/10GE and 7210 SAS-Sx 1/10GE: standalone-vc mode

Description

This command configures the nodes that will be CPM-IMM nodes in a virtual chassis (VC).

The slot number can be set to any number from 1 to 8 as long as it is not in use by another VC member node. The slot number identifies a specific node or card in the VC similar to the slot ID of a card in a chassis-based system, and is used in addressing service objects created during provisioning.

An arbitration process in the boot phase ensures that one of the CPM-capable nodes is the active CPM and the other is the standby CPM. Internally software will always assign CPM A as the active CPM-IMM node and CPM B as the standby CPM-IMM node. Ports on the logical IMM which is part of the CPM are referred to using the same format as IMM-only nodes (*slot-id*/1/*port-id*).

The MAC address must match the chassis MAC address of the node.

The **no** form of this command removes the node from the VC.

Parameters

cpmA

Specifies the active CPM-IMM.

cpmB

Specifies the standby CPM-IMM.

slot-num

Specifies the slot number of the node.

Values 1 to 8

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mac-address

Specifies the chassis MAC address of the node.

Values xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx

vc-stack-name

Syntax

[no] vc-stack-name

Context

bof

Platforms

7210 SAS-S 1/10GE and 7210 SAS-Sx 1/10GE: standalone-vc mode

Description

This command configures the boot loader **vc-stack-name** on the active CPM-IMM node to identify the VC of which the nodes are members. A node configured with a **vc-stack-name** of "my-stack" is a member node of the VC "my-stack". The *system-name* variable in the **configure system name** command can be reused as the boot loader **vc-stack-name** value. A node cannot be added to a VC if its **vc-stack-name** value does not match that of the current active CPM-IMM.

The **no** form of this command removes the **vc-stack-name**.

Note:
The **vc-stack-name** command can only be set during the boot loader steps and cannot be set during TIMOS.

Default

no vc-stack-name

vc-stack-node-type

Syntax

vc-stack-node-type [cpm-imm | imm-only]

no vc-stack-node-type

Context

bof

Platforms

7210 SAS-S 1/10GE and 7210 SAS-Sx 1/10GE: standalone-vc mode

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Description

This command configures the node role as either **cpm-imm** or **imm-only**. The default setting is **imm-only**. Users need to modify the default only for nodes that can take on the role of CPM by changing the setting to **cpm-imm**. This command does not need to be modified for nodes whose role is IMM. Users can configure two nodes in the stack to be **cpm-imm** nodes.

The **no** form of this command reverts the command to the default value.

Default

vc-stack-node-type imm-only

Parameters

cpm-imm

Keyword to specify the node role as CPM-IMM.

imm-only

Keyword to specify the node role as IMM only.

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7 System management

This chapter provides information about configuring basic system management parameters.

7.1 System management parameters

System management commands allow you to configure basic system management functions such as the system name, the router's location and coordinates, and Common Language Location Identifier (CLLI) code, as well as time zones, Network Time Protocol (NTP), Simple Network Time Protocol (SNTP) properties, CRON and synchronization properties.

7.1.1 System information

This section describes the system information components.

7.1.1.1 System name

The system name is the MIB II (RFC 1907, *Management Information Base for Version 2 of the Simple Network Management Protocol (SNMPv2))* sysName object. By convention, this text string is the fully-qualified domain name of the node. The system name can be any ASCII printable text string up to 32 characters.

7.1.1.2 System contact

The system contact is the MIB II sysContact object. By convention, this text string is a textual identification of the contact person for this managed node, together with information about how to contact this person. The system contact can be any ASCII printable text string up to 80 characters.

7.1.1.3 System location

The system location is the MIB II sysLocation object, which is a text string conventionally used to describe the physical location of the node; for example, "Bldg MV-11, 1st Floor, Room 101". The system location can be any ASCII printable text string up to 80 characters.

7.1.1.4 System coordinates

The Nokia Chassis MIB tmnxChassisCoordinates object defines the system coordinates. This text string indicates the Global Positioning System (GPS) coordinates of the location of the chassis.

Two-dimensional GPS positioning offers latitude and longitude information as a four dimensional vector:

<direction, hours, minutes, seconds>

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where:

- direction is one of the four basic values: N, S, W, E
- hours ranges from 0 to 180 (for latitude) and 0 to 90 for longitude
- minutes and seconds range from 0 to 60.

<W, 122, 56, 89> is an example of longitude and <N, 85, 66, 43> is an example of latitude.

System coordinates can be expressed in different notations; for example:

- N 45 58 23, W 34 56 12
- N37 37' 00 latitude, W122 22' 00 longitude
- N36*39.246' W121*40.121

The system coordinates can be any ASCII printable text string up to 80 characters.

7.1.1.5 Naming objects

It is discouraged to configure named objects with a name that starts with "tmnx" and with the "_" symbol.

7.1.1.6 CLLI

A CLLI code string for the device is an 11-character standardized geographic identifier that uniquely identifies the geographic location of places and certain functional categories of equipment unique to the telecommunications industry. The CLLI code is stored in the Nokia Chassis MIB tmnxChassisCLLICode object.

The CLLI code can be any ASCII printable text string of up to 11 characters.

7.1.2 System time

The 7210 SAS routers are equipped with a real-time system clock for time-keeping purposes. When set, the system clock always operates on Coordinated Universal Time (UTC), but the software has options for local time translation and system clock synchronization. System time parameters include Time zones, Network Time Protocol, SNTP time synchronization, and CRON.

7.1.2.1 Time zones

Setting a time zone allows times to be displayed in the local time rather than in UTC. The supports both user-defined and system-defined time zones.

A user-defined time zone has a user-assigned name of up to four printable ASCII characters that is different from the system-defined time zones. For user-defined time zones, the offset from UTC is configured, as well as any summer time adjustment for the time zone.

The system-defined time zones are listed in the following table, which includes both time zones with and without summer time correction.

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Table 26: System-defined time zones

Acronym	Time zone name	UTC offset
Europe		
GMT	Greenwich Mean Time	UTC
BST	British Summer Time	UTC +1
IST	Irish Summer Time	UTC +1*
WET	Western Europe Time	UTC
WEST	Western Europe Summer Time	UTC +1
CET	Central Europe Time	UTC +1
CEST	Central Europe Summer Time	UTC +2
EET	Eastern Europe Time	UTC +2
EEST	Eastern Europe Summer Time	UTC +3
MSK	Moscow Time	UTC +3
MSD	Moscow Summer Time	UTC +4
US and Canada		
AST	Atlantic Standard Time	UTC -4
ADT	Atlantic Daylight Time	UTC -3
EST	Eastern Standard Time	UTC -5
EDT	Eastern Daylight Saving Time	UTC -4
ET	Eastern Time	Either as EST or EDT, depending on place and time of year
CST	Central Standard Time	UTC -6
CDT	Central Daylight Saving Time	UTC -5
CT	Central Time	Either as CST or CDT, depending on place and time of year
MST	Mountain Standard Time	UTC -7

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Acronym	Time zone name	UTC offset
MDT	Mountain Daylight Saving Time	UTC -6
MT	Mountain Time	Either as MST or MDT, depending on place and time of year
PST	Pacific Standard Time	UTC -8
PDT	Pacific Daylight Saving Time	UTC -7
PT	Pacific Time	Either as PST or PDT, depending on place and time of year
HST	Hawaiian Standard Time	UTC -10
AKST	Alaska Standard Time	UTC -9
AKDT	Alaska Standard Daylight Saving Time	UTC -8
Australia		
AWST	Western Standard Time (for example, Perth)	UTC +8
ACST	Central Standard Time (for example, Darwin)	UTC +9.5
AEST	Eastern Standard/Summer Time (for example, Canberra)	UTC +10

7.1.2.2 Network Time Protocol

The Network Time Protocol (NTP) is defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis*. It allows participating network nodes to keep time more accurately and maintain time in a more synchronized manner between the participating network nodes.

NTP uses stratum levels to define the number of hops from a reference clock. The reference clock is treated as a stratum-0 device that is assumed to be accurate with little or no delay. Stratum-0 servers cannot be used in a network. However, they can be directly connected to devices that operate as stratum-1 servers. A stratum-1 server is an NTP server with a directly-connected device that provides Coordinated Universal Time (UTC), such as a GPS or atomic clock.

The 7210 SAS devices cannot act as stratum-1 servers but can act as stratum-2 devices because a network connection to an NTP server is required.

The higher stratum levels are separated from the stratum-1 server over a network path, therefore a stratum-2 server receives its time over a network link from a stratum-1 server. A stratum-3 server receives its time over a network link from a stratum-2 server.

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If the internal PTP process is used as a time source for System Time and OAM, it must be specified as a server for NTP. If PTP is specified, the **prefer** parameter must also be specified. After PTP has established a UTC traceable time from an external grandmaster source, that clock will always be the time source into NTP, even if PTP goes into time holdover.

Note:
Use of the internal PTP time source for NTP promotes the internal NTP server to stratum 1 level. This may impact the NTP network topology.

The following NTP elements are supported:

- **server mode**

  In this mode, the node advertises the ability to act as a clock source for other network elements. By default, the node will, by default, transmits NTP packets in NTP version 4 mode.

- **authentication keys**

  These keys implement increased security support in carrier and other networks. Both DES and MD5 authentication are supported, as well as multiple keys.

- **symmetric active mode**

  In this mode, the NTP is synchronized with a specific node that is considered more trustworthy or accurate than other nodes carrying NTP in the system. This mode requires that a specific peer is set.

- **broadcast**

  In this mode, the node receives or sends using a broadcast address.

- **alert when NTP server is not available**

  When none of the configured servers are reachable on the node, the system reverts to manual timekeeping and issues a critical alarm. When a server becomes available, a trap is issued indicating that standard operation has resumed.

- **NTP and SNTP**

  If both NTP and SNTP are enabled on the node, SNTP transitions to an operationally down state. If NTP is removed from the configuration or shut down, SNTP resumes an operationally up state.

- **gradual clock adjustment**

  Because several applications (such as Service Assurance Agent (SAA)) can use the clock, if a major adjustment (128 ms or more) is needed, it is performed by programmatically stepping the clock. If a minor (less than 128 ms) adjustment is needed, it is performed by either speeding up or slowing down the clock.

- **rate limit events and traps**

  To avoid the generation of excessive events and traps the NTP module rate limits the generation of events and traps to three per second. At that point, a single trap is generated to indicate that event and trap squashing is taking place.

7.1.2.3 SNTP time synchronization

To synchronize the system clock with outside time sources, the 7210 SAS devices include a Simple Network Time Protocol (SNTP) client. As defined in RFC 2030, SNTP Version 4 is an adaptation of NTP. SNTP typically provides time accuracy within 100 ms of the time source. SNTP can only receive the time

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from NTP servers; it cannot be used to provide time services to other systems. SNTP is a compact, client-only version of NTP. SNTP does not authenticate traffic.

In the 7210 SAS software, the SNTP client can be configured in both unicast client modes (point-to-point) and broadcast client modes (point-to-multipoint). SNTP should be used only at the extremities of the synchronization subnet. SNTP clients should operate only at the highest stratum (leaves) of the subnet and in configurations where no NTP or SNTP client is dependent on another SNTP client for synchronization. SNTP time servers should operate only at the root (stratum 1) of the subnet and then only in configurations where no other source of synchronization other than a reliable radio clock is available.

7.1.2.4 CRON

The CRON feature supports the SAA functions and time-based policy scheduling to meet time of day requirements. CRON functionality includes the ability to specify the commands to be run, their scheduling, including one-time only functionality (oneshot), interval and calendar functions, and the storage location for the script output. CRON can also specify the relationship between input, output, and schedule. Scheduled reboots, peer turn ups, service assurance agent tests, and OAM events, such as connectivity checks or troubleshooting runs, can also be scheduled.

CRON features are saved to the configuration file.

CRON features run serially with at least 255 separate schedules and scripts. Each instance can support a schedule where the event is repeatedly executed.

The following CRON elements are supported:

- **action**

  This configures parameters for a script including the maximum amount of time to keep the results from a script run, the maximum amount of time a script may run, the maximum number of script runs to store and the location to store the results.

- **schedule**

  The **schedule** function configures the type of schedule to run, including one-time only (oneshot), periodic, or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds).

- **script**

  The **script** command opens a new nodal context that contains information about a script.

- **time range**

  ACLs and QoS policy configurations may be enhanced to support time-based matching. CRON configuration includes time-matching with the **schedule** sub-command. Schedules are based on events; **time-range** defines an end-time used as a match criteria.

- **time of day**

  Time of Day (TOD) suites are useful when configuring many types of time-based policies or when a large number of SAPs require the same type of TOD changes. The TOD suite may be configured while using specific ingress or egress ACLs or QoS policies, and is an enhancement of the ingress and egress CLI trees.

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7.2 High availability

This section describes the high availability (HA) routing options and features that service providers can use to reduce vulnerability at the network or service provider edge and alleviate the effect of a lengthy outage on IP networks.

Note:
HA with control plane redundancy is only supported on the 7210 SAS-R6 and 7210 SAS-R12. Control plane redundancy is not supported on the 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-T.

HA is an important feature in service provider routing systems. The unprecedented growth of IP services and applications in service provider networks is driven by the demand from the enterprise and residential communities. Downtime can be very costly, and, in addition to lost revenue, customer information and business-critical communications can be lost. HA is the combination of continuous uptime over long periods (Mean Time Between Failures (MTBF)) and the speed at which failover or recovery occurs (Mean Time To Repair (MTTR)).

The advantage of HA routing is evident at the network or service provider edge, where thousands of connections are hosted. Rerouting options around a failed piece of equipment are often limited, or, a single access link exists to a customer because of the additional cost of redundant links. As service providers converge business-critical services, such as real-time voice (VoIP), video, and VPN applications over their IP networks, the requirements for HA become more stringent compared to the requirements for best-effort data.

Network and service availability become critical aspects in advanced IP service offerings, which dictate that the IP routers used to build the foundations of these networks must be resilient to component and software outages.

7.2.1 HA features

As more and more critical commercial applications move to IP networks, providing HA services becomes increasingly important. This section describes HA features for 7210 SAS devices.

7.2.1.1 Redundancy

Redundancy features enable duplication of data elements to maintain service continuation in case of outages or component failure.

7.2.1.1.1 Software redundancy on 7210 SAS-R6 and 7210 SAS-R12

Software outages are challenging even when baseline hardware redundancy is in place. A balance should be maintained when providing HA routing, otherwise router problems typically propagate not only throughout the service provider network, but also externally to other connected networks that potentially belong to other service providers. This could affect customers on a broad scale. The 7210 SAS-R6 and 7210 SAS-R12 devices support several software availability features that contribute to the percentage of time that a router is available to process and forward traffic.

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All routing protocols specify minimum time intervals in which the peer device must receive an acknowledgment before it disconnects the session:

- OSPF default session timeout is approximately 40 seconds. The timeout intervals are configurable.
- BGP default session timeout is approximately 120 seconds. The timeout intervals are configurable.

Therefore, router software must recover faster than the specified time interval to maintain up time.

7.2.1.1.2 Configuration redundancy on 7210 SAS-R6 and 7210 SAS-R12

Features configured on the active device CFM or CPM are also saved on the standby CFM or CPM. If the active device CFM or CPM fails, these features are brought up on the standby device that takes over the mastership and becomes the active CFM or CPM.

Even with modern modular and stable software, the failure of route processor hardware or software can cause the router to reboot or cause other service impacting events. In the best circumstances, failure leads to the initialization of a redundant route processor, which hosts the standby software configuration, to become the active processor. The following options are available:

- **warm standby**

  The router image and configuration is already loaded on the standby route processor. However, the standby could still take a few minutes to become effective because it must first reinitialize connections by bringing up Layer 2 connections and Layer 3 routing protocols, and then rebuild the routing tables.

- **hot standby**

  The router image, configuration, and network state are already loaded on the standby; it receives continual updates from the active route processor and the swap-over is immediate. Newer generation routers, like the 7210 SAS routers have extra processing built into the system so that router performance is not affected by frequent synchronization, which consumes increased system resources.

7.2.1.1.3 Component redundancy

7210 SAS component redundancy is critical to reducing MTTR for the routing system.

Note:
This feature is supported on all 7210 SAS platforms as described in this document, including those operating in access-uplink mode.

Component redundancy consists of the following:

- **redundant power supply**

  The use of 2 power supplies is supported for redundant power supplies. A power module can be removed without impact on traffic when redundant power supplies are in use. The power supply is hot swappable. The 7210 SAS-S 1/10GE platform supports a single fixed non-removable integrated power supply and a hot-swappable power supply.

  Note:

  – On the 7210 SAS-S 1/10GE platform, if the device is booted with a power entry module and there is a power supply, the system detects the power supply. If the device is booted with a power entry module but there is no power supply, the system does not detect the "power-supply type". This occurrence is reported as none and the PS LED is OFF.

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– On the 7210 SAS-S 1/10GE platform, there is no DC input failure detection that is classified separately. In the case of a failure, the system reports the DC power value as "failed."

- **fan module**

  Failure of one or more fans does not impact traffic. Failure of a single fan is detected and notified. The fan tray and fan module is hot-swappable:

  – On the 7210 SAS-R6 and 7210 SAS-R12, the fan module/tray contains 6 fans.

  – On the 7210 SAS-Mxp and 7210 SAS-T, the fan module/tray contains 3 fans.

  – On the 7210 SAS-Sx 1/10GE and 7210 SAS-Sx 10/100GE, the fan module is not supported. The devices contain a fixed set of one or more fans with filters on both sides of the chassis.

  – On the 7210 SAS-S 1/10GE, the fan module is not supported. The devices contain a fixed set of one or more fans without filters.

  – On the 7210 SAS-R6 and 7210 SAS-R12, 2 x Switch Fabric/Control Processor Module (SF/CPM) can be used to provide control plane redundancy with non-stop routing and non-stop services. The SF/CPM is hot-swappable.

7.2.1.1.4 Service redundancy on 7210 SAS-R6 and 7210 SAS-R12

All service-related statistics are kept during a switchover. Services, SDPs, and SAPs will remain up with a minimum loss of forwarded traffic during a CFM/CPM switchover.

7.2.1.1.5 Accounting configuration redundancy on 7210 SAS-R6 and 7210 SAS-R12

When there is a switchover and the standby CFM/CPM becomes active, the accounting servers are checked and if they are administratively up and capable of coming online (media present, and others), the standby is brought online; new accounting files are created at this point. Users must manually copy the accounting records from the failed CFM/CPM.

7.2.1.2 Nonstop forwarding and routing on 7210 SAS-R6 and 7210 SAS-R12

In a control plane failure or a forced switchover event, the router continues to forward packets using the existing stale forwarding information. Nonstop forwarding requires clean control plane and data plane separation. Usually the forwarding information is distributed to the IMMs.

7.2.1.2.1 Nonstop forwarding on 7210 SAS-R6 and 7210 SAS-R12

In a control plane failure or a forced switchover event, the router continues to forward packets using the existing stale forwarding information.

Nonstop forwarding is used to notify peer routers to continue forwarding and receiving packets, even if the route processor (control plane) is not working or is in a switch-over state. Nonstop forwarding requires clean control plane and data plane separation and usually the forwarding information is distributed to the line cards.

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This method of availability has both advantages and disadvantages. Nonstop forwarding continues to forward packets using the existing stale forwarding information during a failure. This may cause routing loops and black holes; surrounding routers must adhere to separate extension standards for each protocol. Each vendor must support protocol extensions for router interoperability.

7.2.1.2.2 Nonstop routing on 7210 SAS-R6 and 7210 SAS-R12

The Nonstop Routing (NSR) feature on 7210 SAS devices ensures that routing neighbors are unaware of a routing process fault. If a fault occurs, a reliable and deterministic activity switch to the inactive control complex occurs; the routing topology and reachability are not affected, even during routing updates. NSR achieves HA through parallelization by maintaining up-to-date routing state information, at all times, on the standby route processor. This is achieved independent of protocols or protocol extensions and provides a more robust solution than graceful restart protocols between network routers.

The NSR implementation on the 7210 SAS routers supports all routing protocols. It allows existing sessions (BGP, LDP, OSPF, and others) to be retained during a CFM or CPM switchover, including the support for MPLS signaling protocols. No change is visible to the peers.

Protocol extensions are not required. There are no interoperability issues and defining protocol extensions for each protocol is not required. Unlike nonstop forwarding and graceful restart, the forwarding information in NSR is always up to date, which eliminates possible black holes or forwarding loops.

Traditionally, addressing HA issues has been patched through nonstop forwarding solutions. The NSR implementation overcomes these limitations by delivering an intelligent, hitless failover solution. This enables a carrier-class foundation for transparent networks that is required to support business IP services backed by stringent SLAs. This level of HA support poses a major issue for conventional routers whose architectural design limits or prevents them from implementing NSR.

7.2.1.3 CPM switchover on 7210 SAS-R6 and 7210 SAS-R12

During a switchover, system control and routing protocol execution are transferred from the active to the standby CPM.

An automatic switchover may occur under the following conditions:

- a fault condition that causes the active CPM to crash or reboot
- the active CPM is declared down (not responding)
- online removal of the active CPM

A manual switchover may occur under the following conditions:

- To force a switchover from an active CPM to a standby, use the **admin redundancy force-switchover** command. You can also use the **config system switchover-exec** and **admin redundancy force-switchover now** CLI commands to configure a batch file that runs after a failover.

7.3 Temperature threshold alarm and fan speed

The following table lists the over-temperature thresholds for 7210 SAS devices.

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Table 27: Over-temperature threshold for 7210 SAS devices

Device variants	Minimum temperature (in degrees centigrade)	Maximum temperature (in degrees centigrade)
7210 SAS-Mxp	0	76
7210 SAS-Mxp ETR	-10	80
7210 SAS-R6	-1	74
7210 SAS-R12	0	96
7210 SAS-Sx/S 1/10GE and 7210 SAS-Sx 10/100GE	0	85
7210 SAS-T	0	58
7210 SAS-T ETR	-21	68

The 7210 SAS system software controls the fans by monitoring the internal temperature of the chassis. The software manages the fan speed to maintain the internal temperature within operational limits.

The 7210 SAS-R6 supports overheat protection reboot. This feature protects the IMM and CPM cards when the temperature exceeds system-defined temperature thresholds; these thresholds are not user-configurable. The software monitors the temperature of each card and if the temperature exceeds the threshold, the system raises an over-temperature critical event. The system reboots all overheated CPM cards and powers off all overheated IMM cards to reduce the heat generated, which consequently cools down the chassis. The system powers back on the IMM cards after the temperature is reduced. Operators are still required to take immediate action for an over-temperature critical event. See the *7210 SAS-R6 Chassis Installation Guide* for more information about maintaining the operating temperature.

Note:
Nokia recommends that when planning their availability design, operators must consider CPM card reboot handling that is caused when the system temperature exceeds system-defined thresholds. Failure to build in network redundancy may result in network and service downtime.

7.3.1 Synchronization

This section describes the synchronization between the CPMs or CFMs.

7.3.1.1 Configuration and boot-env synchronization

Configuration and boot-env synchronization are supported in the **admin**>**redundancy**>**synchronize** and **config**>**redundancy**>**synchronize** contexts.

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7.3.1.2 State database synchronization

If a new standby CPM or CFM is inserted into the system, it synchronizes with the active CPM or CFM upon a successful boot process.

If the standby CPM or CFM is rebooted, it synchronizes with the active CPM or CFM after a successful boot process.

When configuration or state changes occur, an incremental synchronization is conducted from the active CPM or CFM to the standby CPM or CFM.

If the synchronization fails, the standby CPM or CFM does not reboot automatically. Use the **show redundancy synchronization** command to display synchronization output information.

If the active and standby CPMs or CFMs are not synchronized for any reason, you can manually synchronize the standby CPM or CFM by rebooting the standby by issuing the **admin reboot standby** command on the active or the standby CPM or CFM.

7.4 Synchronization and redundancy

The 7210 SAS-R6 and 7210 SAS-R12, and the 7210 SAS-Sx/S 1/10GE configured in the standalone-VC mode support CPM redundancy. Redundancy methods facilitate system synchronization between the active and standby CPMs so they maintain identical operational parameters, which prevents inconsistencies in the event of a CPM failure.

When automatic system synchronization is enabled for an entity, save or delete file operations that are configured on the primary, secondary or tertiary choices on the active CPM file system are mirrored in the standby CPM file system.

Although software configurations and images can be copied or downloaded from remote locations, synchronization can only occur locally between compact flash drives (cf1: and cf2:).

Synchronization can occur:

- **automatically**

  Automatic synchronization is disabled by default. To enable automatic synchronization, run the **config**>**redundancy**>**synchronize** command with the **boot-env** parameter or the **config** parameter.

  When the **boot-env** parameter is specified, the BOF, boot.ldr, configuration, and image files are automatically synchronized. When the **config** parameter is specified, only the configuration files are automatically synchronized.

  Automatic synchronization also occurs whenever the BOF is modified and when an **admin**>**save** command is entered with no filename specified.

- **manually**

  To execute synchronization manually, run the **admin**>**redundancy**> **synchronize** command with the **boot-env** parameter or the **config** parameter.

  When the **boot-env** parameter is specified, the BOF, `boot.ldr`, configuration, and image files are synchronized. When the **config** parameter is specified, only the configuration files are synchronized.

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Example

The following output is an example of information displayed during a manual synchronization of configuration files.

```
A:ALA-12>admin>redundancy# synchronize config
Syncing configuration......

Syncing configuration.....Completed.
A:ALA-12#
```

7.4.1 Active and standby designations on 7210 SAS-R6 and 7210 SAS-R12

Typically, the first Switch Fabric (SF) or CPM card installed in a redundant 7210 SAS-R6 and 7210 SAS-R12 chassis assumes the active CPM role, regardless of whether it is inserted in slot A or B. The next CPM installed in the same chassis then assumes the standby CPM role. If two CPMs are inserted simultaneously (or almost simultaneously) and boot at the same time, preference is given to the CPM installed in slot A.

If only one CPM is installed in a redundant 7210 SAS-R6 and 7210 SAS-R12, it becomes the active CPM regardless of the slot it is installed in.

To visually determine the active and standby designations, the Status LED on the faceplate is lit green (steady) to indicate the active designation. The Status LED on the second CPM faceplate is lit amber to indicate the standby designation.

Example

The following output sample shows that the CPM installed in slot A is acting as the active CPM and the CPM installed in slot B is acting as the standby.

```
A:7210SASR1# show card

===============================================================================
Card Summary
===============================================================================
Slot   Provisioned Type                          Admin Operational   Comments
           Equipped Type (if different)          State State
-------------------------------------------------------------------------------
1      imm-sas-10sfp+1xfp                        up    up
2      imm-sas-10sfp+1xfp                        up    up
A      cpm-sf-sas-R6                             up    up/active
B      cpm-sf-sas-R6                             up    up/standby
===============================================================================
A:7210SASR1#
```

The following console message is displayed if a CPM boots, detects an active CPM, and assumes the role of the standby CPM.

```
...
Slot A contains the Active CPM
```

This CPM (slot B) is the standby CPM.

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7.4.2 Active and standby designations on 7210 SAS-Sx/S 1/10GE in standalone-VC mode

On the 7210 SAS-Sx/S 1/10GE configured in the standalone-VC mode, the user must designate and configure two nodes as CPM-IMM nodes. During boot up, one of the configured nodes assumes the active CPM role and the other assumes the standby CPM role. Typically, the configured CPMA-IMM node is favored to be the active CPM and the CPMB-IMM is favored to be the standby CPM. If only one CPM-IMM node is configured, it becomes the active CPM.

To visually determine the active and standby designations, the Master LED on the faceplate is lit (steady) to indicate the active designation. The Master LED on the standby CPM faceplate blinks to indicate the standby designation.

Example

The following output sample shows two nodes configured as CPM-IMM nodes with one becoming the active node and the other becoming the standby node.

```
*A:CPM-A# show card
===============================================================================
Card Summary
===============================================================================
Slot      Provisioned Type                        Admin Operational   Comments
              Equipped Type (if different)        State State
-------------------------------------------------------------------------------
1         sas-s-48sfp-4sfpp                       up    up            CPMA-IMM
2         sas-s-24sfp-4sfpp                       up    up            CPMB-IMM
3         sas-s-24sfp-4sfpp                       up    up            IMM-ONLY
A         sfm-sas                                 up    up/active
B         sfm-sas                                 up    up/standby
===============================================================================
*A:CPM-A#
```

When CPM B boots, it waits 60 seconds to detect an active CPM A. If CPM A does not respond after 60 seconds, CPM B assumes the role of the active node.

7.4.3 When the active CPM goes offline

When an active CPM goes offline (due to reboot, removal, or failure), the standby CPM takes control without rebooting or initializing itself. It is assumed that the CPMs are synchronized, therefore, there is no delay in operability. When the CPM that went offline boots and comes back online, it becomes the standby CPM.

Example

The following console message is displayed when the active CPM goes offline and the standby CPM assumes the active role:

```
Active CPM in Slot A has stopped
Slot B is now active CPM


Attempting to exec configuration file:
'cf1:/config.cfg' ...

...
```


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```
Executed 49,588 lines in 8.0 seconds from file cf1:\config.cfg
```

7.4.4 Configuration guidelines for synchronization of active and standby CPM on 7210 SAS-R6 and 7210 SAS-R12

The following configuration guidelines apply when synchronizing the active and standby CPMs on the 7210 SAS-R6 and 7210 SAS-R12 systems:

- The active and standby CPM should boot from same boot drives (`cf1:\`, `cf2:\`, or `uf:\`). For example, if the active CPM is booted from `cf1:\`, the standby CPM must use `cf1:\` to bootup. Although it is possible to make the CPMs operational by booting them using any drive on active and standby, Nokia recommends that the same drives should be used to boot the system.
- The user should ensure that a valid bootstrap image (`boot.tim`) and BOF (`bof.cfg`) exist in the `cf1:\`, `cf2:\`, or `uf1:\` drive of both active and stand-by CPM cards. The user must verify that bof.cfg resides on the same drive as the boot.tim.
- The TiMOS application images (`cpm.tim` and `iom.tim`) and the configuration file can reside in any location (local or remote), but the locations in the BOF should be configured identically on both active and standby CPM for primary, secondary, and tertiary locations.
- **Boot-env** synchronization must be performed before **config** synchronization. To do so, run the **admin redundancy synchronize boot-env** command, followed by the **admin redundancy synchronize config** command.
- Synchronization can only occur locally between compact flash drives cf1:Active to cf1:Standby, cf2:Active to cf2:Standby, and uf1:Active to uf1:Standby. Synchronization across different drives is not supported.
- If the active and standby CPM are not synchronized for some reason, users can manually synchronize the standby CPM by running the **admin redundancy synchronize boot-env** CLI command, and rebooting the standby CPM by running the **admin reboot standby** command.

7.5 Network synchronization

This section describes the network synchronization capabilities available on 7210 SAS platforms. These capabilities involve multiple approaches to network timing, including Synchronous Ethernet, PTP/1588v2, adaptive timing, and others. These features address barriers to entry as follows:

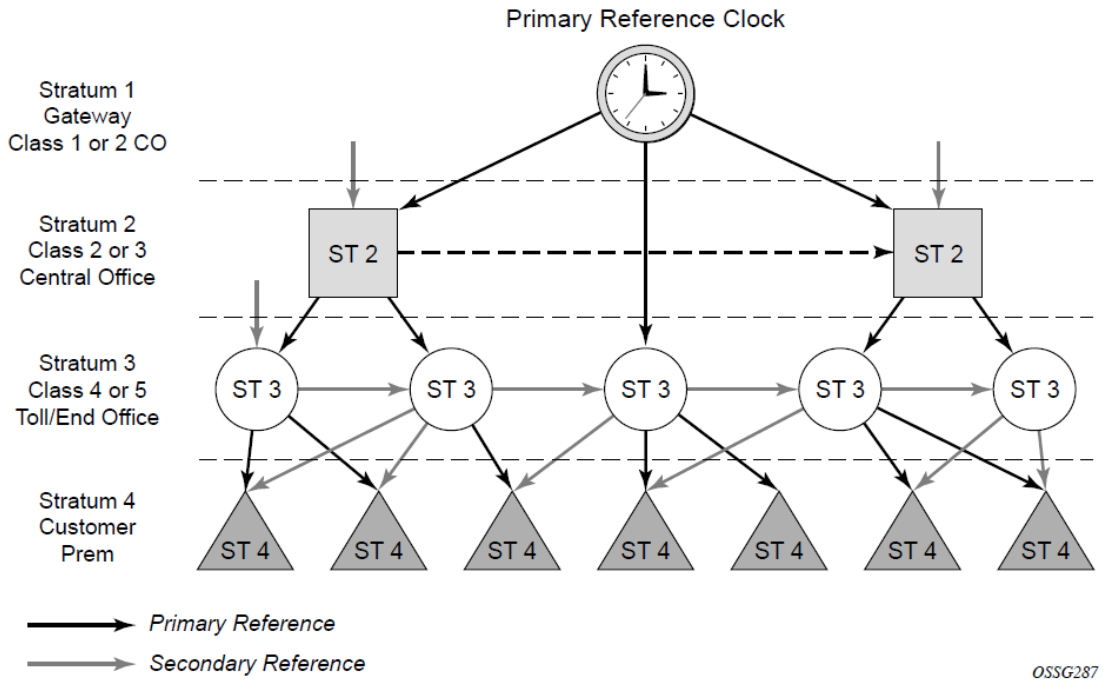
- provide synchronization quality required by mobile networks, such as radio operations and circuit emulation services (CES) transport
- augment and potentially replace the existing (SONET/SDH) timing infrastructure and deliver high quality network timing for time-sensitive wireline applications

Note:
Synchronous Ethernet and IEEE1588v2 PTP are not supported on virtual chassis (VCs).

Network synchronization is commonly distributed in a hierarchical PTP topology at the physical layer, as shown in the following figure.

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Figure 12: Conventional network timing architecture (North American nomenclature)



The architecture shown in the preceding figure provides the following benefits:

- It limits the need for high quality clocks at each network element and only requires that they reliably replicate input to remain traceable to its reference.
- It uses reliable physical media to provide transport of the timing signal. It does not consume any bandwidth and requires limited additional processing.

The synchronization network is designed so a clock always receives timing from a clock of equal or higher stratum or quality level. This ensures that if an upstream clock has a fault condition (for example, loses its reference and enters a holdover or free-run state) and begins to drift in frequency, the downstream clock will be able to follow it. For greater reliability and robustness, most offices and nodes have at least two synchronization references that can be selected in priority order (such as primary and secondary).

Further levels of resiliency can be provided by designing a capability in the node clock that will operate within prescribed network performance specifications without any reference for a specified timeframe. A clock operating in this mode is said to hold the last known state over (or holdover) until the reference lock is once again achieved. Each level in the timing hierarchy is associated with minimum levels of network performance.

Each synchronization capable port can be independently configured to transmit data using the node reference timing. In addition, some TDM channels can use adaptive timing or loop timing.

Transmission of a reference clock through a chain of Ethernet equipment requires that all equipment supports Synchronous Ethernet. A single piece of equipment that is not capable of performing Synchronous Ethernet breaks the chain. Ethernet frames will still get through but downstream devices should not use the recovered line timing because it will not be traceable to an acceptable stratum source.

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7.5.1 Central synchronization subsystem

The timing subsystem has a central clock located on the CPM. The timing subsystem performs several functions of the network element clock as defined by Telcordia (GR-1244-CORE) and ITU-T G.781 standards.

The central clock uses the available timing inputs to train its local oscillator. The number of timing inputs available to train the local oscillator varies per platform. The priority order of these references must be specified. This is a simple ordered list of inputs: (ref1, ref2, BITS (if available)).

The CPM clock output can drive the clocking for all line cards in the system. The routers support selection of the node reference using Quality Level (QL) indications. The recovered clock can derive its timing from one of the references available on that platform.

The recovered clock can derive the timing from any of the following references (also shown in Figure 13: Logical model of synchronization reference selection on 7210 SAS):

- **synchronous Ethernet ports**

  On the 7210 SAS-T (includes all variants), 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (all variants), 7210 SAS-S 1/10GE (all variants), and 7210 SAS-Sx 10/100GE

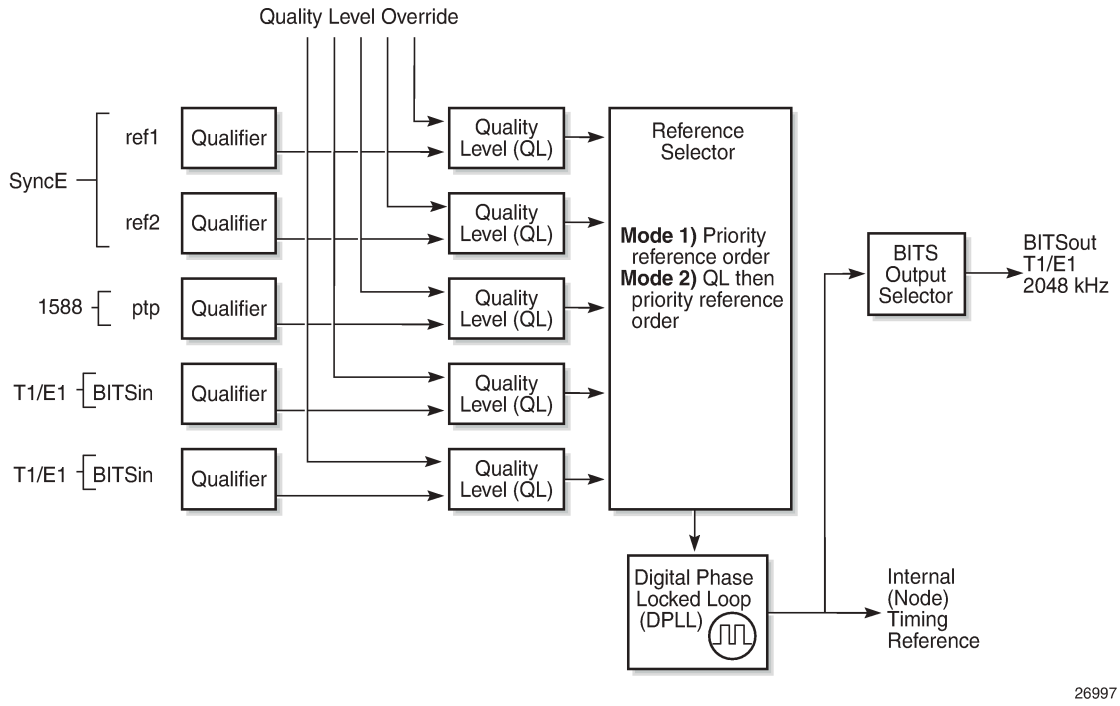
- **1588v2/PTP timeReceiver port**

  On the 7210 SAS-T (includes all variants), 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (all variants)

Figure 13: Logical model of synchronization reference selection on 7210 SAS shows a logical model of synchronization reference selection for the platforms, and Table 29: Synchronization options for 7210 SAS platforms provides a list of supported interfaces for each platform.

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Figure 13: Logical model of synchronization reference selection on 7210 SAS



On the 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-T, in addition to PTP and SyncE references, the recovered clock can be configured to derive the timing (frequency reference) from the BITS interface.

When quality Level (QL) selection mode is disabled, the reversion setting controls when the central clock can reselect a previously failed reference.

The following table lists the selection followed for two references in both revertive and non-revertive modes.

Table 28: Revertive, non-revertive timing reference switching operation

Status of reference A	Status of reference B	Active reference non-revertive case	Active reference revertive case
OK	OK	A	A
Failed	OK	B	B
OK	OK	B	A
OK	Failed	A	A
OK	OK	A	A
Failed	Failed	holdover	holdover
OK	Failed	A	A

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Status of reference A	Status of reference B	Active reference non-revertive case	Active reference revertive case
Failed	Failed	holdover	holdover
Failed	OK	B	B
Failed	Failed	holdover	holdover
OK	OK	A or B	A

7.5.2 Synchronization options available on 7210 SAS platforms

The following table lists the synchronization options supported on 7210 SAS platforms. The 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, and 7210 SAS-Sx 10/100GE support these synchronization options only when operating in the standalone mode.

Table 29: Synchronization options for 7210 SAS platforms

Synchronization options	7210 SAS platforms						
	T	S 1/10GE	R6	R12	Mxp[17]	Sx 1/10GE[17]	Sx 10/100GE[17]
SyncE with SSM (1GE and 10G/E fiber ports)	✓	✓	✓	✓	✓	✓	✓
SyncE with fixed copper ports[18]	✓[19]	✓[20]	✓	✓	✓[21]	✓[22]	
Adaptive Clock Recovery (ACR)							
1588v2/PTP with port-based timestamps (both for frequency and time – also called PTP pure mode)	✓		✓	✓	✓	✓	
1588v2/PTP with port-based timestamps (time only with SyncE or BITS (if supported) used for frequency recovery – also called PTP hybrid mode)	✓		✓	✓	✓	✓	✓[23]

17 Operating in standalone mode

18 Fixed copper ports using synchronous Ethernet can be used as a candidate reference or for distribution of recovered reference when the port is operating at a speed of 1000 Mb/s.

19 Supported only on fixed copper port

20 Supported only on copper variants

21 Supported only on combo ports with connection-type copper port

22 Supported on fixed copper port (either combo port configured for copper operation or copper port)

23 Supported only on 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 for G.8275.1 profile

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Synchronization options	7210 SAS platforms						
	T	S 1/10GE	R6	R12	Mxp[17]	Sx 1/10GE[17]	Sx 10/100GE[17]
PTP end-to-end (E2E) transparent clock						✓	✓
BITS	✓[24]		✓[25]	✓[25]	✓		
1pps and 10MHz interfaces	✓[26]		✓[26]	✓[26]	✓[26]		

7.5.3 Synchronization Status Messages

Synchronization Status Messages (SSM) are supported on devices that support Synchronous Ethernet. SSM allows the synchronization distribution network to determine the quality level of the clock sourcing a specific synchronization trail and also allows a network element to select the best of multiple input synchronization trails. SSMs are defined for various transport protocols (including SONET/SDH, T1/E1, and Synchronous Ethernet), for interaction with office clocks (such as BITS or SSUs) and embedded network element clocks.

SSM allows equipment to autonomously provision and reconfigure (by reference switching) their synchronization references, while helping to avoid the creation of timing loops. These messages are particularly useful for synchronization re-configurations when timing is distributed in both directions around a ring.

7.5.4 DS1 signals

DS1 signals can carry the quality level value of the timing source information using the SSM that is transported within the 1544 kb/s signal Extended Super Frame (ESF) Data Link (DL), as described in ITU-T Recommendation G.704. No such provision is extended to SF formatted DS1 signals.

The format of the ESF DL messages is 0xxx xxx0 1111 1111, with the rightmost bit transmitted first. The 6 bits denoted by xxx xxx contain the message; some of these messages are reserved for synchronization messaging. It takes 32 frames (4 ms) to transmit all 16 bits of a complete DL.

7.5.5 E1 signals

E1 signals can carry the quality level value of the timing source information using the SSM, as described in ITU-T Recommendation G.704.

One of the Sa4 to Sa8 bits is allocated for SSMs; choosing the Sa bit that carries the SSM is user-configurable. To prevent ambiguities in pattern recognition, it is necessary to align the first bit (San1) with frame 1 of a G.704 E1 multiframe.

---

17 Operating in standalone mode

24 Supports two BITS ports configured as input or output

25 Supports one BITS port (that is, BITS1), configured as input or output

26 1pps and 10MHz output available only when PTP is used as a reference for the system clock

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The San bits are numbered (n = 4, 5, 6, 7, 8). A San bit is organized as a 4-bit nibble San1 to San4. San1 is the most significant bit, and San4 is the least significant bit.

The message set in San1 to San4 is a copy of the set defined in SDH bits 5 to 8 of byte S1.

7.5.6 Synchronous Ethernet

Traditionally, Ethernet-based networks employ a physical layer transmitter clock derived from an inexpensive +/-100ppm crystal oscillator and the receiver locks onto it. Because data is packetized and can be buffered, there is no need for long-term frequency stability or for consistency between frequencies of different links.

Synchronous Ethernet is a variant of the line timing that derives the physical layer transmitter clock from a high-quality frequency reference, replacing the crystal oscillator with a frequency source traceable to a primary reference clock. This change is transparent to the other Ethernet layers and does not affect their operation. The receiver at the far end of the link is locked to the physical layer clock of the received signal, and ensures access to a highly accurate and stable frequency reference. In a manner analogous to conventional hierarchical network synchronization, this receiver can lock the transmission clock of other ports to this frequency reference, and establish a fully time-synchronous network.

Unlike methods that rely on sending timing information in packets over an unclocked physical layer, Synchronous Ethernet is not affected by impairments introduced by higher levels of networking technology (packet loss, packet delay variation). The frequency accuracy and stability in Synchronous Ethernet typically exceeds networks with unsynchronized physical layers.

Synchronous Ethernet allows operators to gracefully integrate existing systems and future deployments into a conventional industry-standard synchronization hierarchy. The concept is analogous to SONET/SDH system timing capabilities. The operator can select any (optical) Ethernet port as a candidate timing reference. The recovered timing from this port is used to time the system (for example, the CPM will lock to this provisioned reference selection). The operator then can ensure that all system output is locked to a stable traceable frequency source.

Note:

- The use of Synchronous Ethernet as a candidate reference and for distribution of recovered reference is supported on all 7210 SAS platforms as described in this document, except those operating in standalone-VC mode.
- Synchronous Ethernet using fiber Ethernet ports, including 10G and 100G (if available), is supported on all 7210 SAS platforms as described in this document, except those operating in standalone-VC mode.
- Please ensure that the SFP or XFP or SFP+ parts used with the SFP, XFP, and SFP+ ports support Synchronous Ethernet.
- Synchronous Ethernet is not supported on virtual chassis (VCs).

Synchronous Ethernet using fixed copper ports is supported only on the 7210 SAS-T, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE and 7210 SAS-Mxp. The fixed copper ports can be used as a candidate reference or for distribution of recovered reference . If the port is a fixed copper Ethernet port and in 1000 BASE-T mode of operation, there is a dependency on the 802.3 link timing for the Synchronous Ethernet functionality (see ITU-T G.8262). The 802.3 standard link timing states must align with the desired direction of Synchronous Ethernet timing flow. When a fixed copper Ethernet port is specified as an input reference for the node or when it is removed as an input reference for the node, an 802.3 link auto-negotiation is triggered to ensure the link timing aligns properly.

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The SSM of Synchronous Ethernet uses an Ethernet OAM PDU that uses the slow protocol subtype. For a complete description of the format and processing, see ITU-T G.8264.

7.5.6.1 Clock source quality level definitions

This section describes the clock source quality levels identified for tracking network timing flow in accordance with the network deployment options defined in Recommendation G.803 and G.781. The Option I network is developed on the original European SDH model; Option II network is a network developed on the North American SONET model.

In addition to the QL values received over SSM of an interface, the standards define the following additional codes for internal use:

- QL INVx is generated internally by the system if and when an unallocated SSM value is received, where x represents the binary value of this SSM. Within the SR OS, these independent values are assigned as the single value QL-INVALID.
- QL FAILED is generated internally by the system if and when the terminated network synchronization distribution trail is in the signal fail state.

The internal quality level of QL-UNKNOWN is used to differentiate from a received QL-STU code, but is equivalent for the purposes of QL selection.

The following table lists the synchronization message coding and source priorities for SSM values received on port.

Table 30: Synchronization message coding and source priorities

SSM value received on port				
SDH interface **SyncE interface in SDH mode**	**SONET interface** **SyncE interface in SONET mode**	**E1 interface**	**T1 interface (ESF)**	**Internal relative quality level**
0010 (prc)	0001 (prs)	0010 (prc)	00000100 11111111 (prs)	1. Best quality
	0000 (stu)		00001000 11111111 (stu)	2.
	0111 (st2)		00001100 11111111 (ST2)	3.
0100 (ssua)	0100 (tnc)	0100 (ssua)	01111000 11111111 (TNC)	4.
	1101 (st3e)		01111100 11111111 (ST3E)	5.
1000 (ssub)		1000 (ssub)		6.
	1010 (st3/eec2)		00010000 11111111 (ST3)	7.

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SSM value received on port				
SDH interface **SyncE interface in SDH mode**	**SONET interface** **SyncE interface in SONET mode**	**E1 interface**	**T1 interface (ESF)**	**Internal relative quality level**
1011 (sec/eec1)		1011 (sec)		8. Lowest quality qualified in QL-enabled mode
	1100 (smc)		00100010 11111111 (smc)	9.
			00101000 11111111 (st4)	10.
	1110 (pno)		01000000 11111111 (pno)	11.
1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)	12.
Any other	Any other	Any other	N/A	13. QL_INVALID
				14. QL_FAILED
				15. QL_UNC

The following table lists the synchronization message coding and source priorities for SSM values transmitted by interface type.

Table 31: Synchronization message coding and source priorities

SSM values to be transmitted by interface of type				
Internal relative quality level	**SDH interface** **SyncE interface in SDH mode**	**SONET interface** **SyncE interface in SONET mode**	**E1 interface**	**T1 interface (ESF)**
1. Best quality	0010 (prc)	0001 (PRS)	0010 (prc)	00000100 11111111 (PRS)
2.	0100 (ssua)	0000 (stu)	0100 (ssua)	00001000 11111111 (stu)
3.	0100 (ssua)	0111 (st2)	0100 (ssua)	00001100 11111111 (st2)
4.	0100 (ssua)	0100 (tnc)	0100 (ssua)	01111000 11111111 (tnc)
5.	1000 (ssub)	1101 (st3e)	1000 (ssub)	01111100 11111111 (st3e)

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SSM values to be transmitted by interface of type				
Internal relative quality level	**SDH interface** **SyncE interface in SDH mode**	**SONET interface** **SyncE interface in SONET mode**	**E1 interface**	**T1 interface (ESF)**
6.	1000 (ssub)	1010 (st3/eec2)	1000 (ssub)	00010000 11111111 (st3)
7.	1011 (sec/eec1)	1010 (st3/eec2)	1011 (sec)	00010000 11111111 (st3)
8. Lowest quality qualified in QL-enabled mode	1011 (sec/ eec1)	1100 (smc)	1011 (sec)	00100010 11111111 (smc)
9.	1111 (dnu)	1100 (smc)	1111 (dnu)	00100010 11111111 (smc)
10.	1111 (dnu)	1111 (dus)	1111 dnu	00101000 11111111 (st4)
11.	1111 (dnu)	1110 (pno)	1111 (dnu)	01000000 11111111 (pno)
12.	1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)
13.	1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)
14.	1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)
15.	1011 (sec/eec1)	1010 (st3/eec2)	1011 (sec)	00010000 11111111 (st3)

7.5.6.2 Synchronous Ethernet in a VC

Note:
This feature is only supported on the 7210 SAS-Sx/S 1/10GE in standalone-VC mode.

When a stack of 7210 SAS-Sx/S 1/10GE nodes are deployed in a VC configuration, it obtains accurate frequency from an upstream device using SyncE from one of the front panel ports. The recovered frequency is distributed to the other member nodes in the stack, allowing it to be further distributed to signalling endpoints connected to the 7210 SAS.

To obtain SyncE, configure up to two external reference sources for frequency using the **config**>**system**>**sync-if-timing**>**ref1** and **ref2** commands.

To distribute the recovered frequency to member nodes, two front-panel ports must be repurposed for each member node of the stack by configuring them as internal SyncE ports using the **config**>**system**>**vc-stack**>**vc-node**>**internal-synce-ports** command. Any 1GE or 10GE front-panel port can be used for

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configuration under the **internal-synce-ports** context on the member node of the stack. The configured internal SyncE ports are used to distribute the recovered frequency to other member nodes in the stack. The repurposed internal SyncE ports cannot be used for service delivery or as uplink ports for core network connectivity.

The two external references for the stack can use any front-panel port of any of the member node of the stack. The two external references cannot reference the ports configured as **internal-synce-ports**. The software automatically selects one external reference as primary and another as secondary based on priority and the **ql-selection**. The frequency from the selected primary reference is distributed to all member nodes of the stack using ports configured with the **internal-sycne-ports** command.

The two internal SyncE ports are connected to form a ring, with member nodes of the stack behaving as nodes of the ring (similar to how the nodes of the stack are connected using the stacking ports). The ring topology, created using the internal SyncE ports, provides a redundant path for the distribution of SyncE. This redundancy ensures improved availability in the event of a failure of one of the internal SyncE ports. The software on the member node automatically uses one of the internal SyncE ports as primary reference and another internal SyncE port as a secondary reference in case none of the external references configured for the stack is present on the member node.

When an external reference is available on the member node, the software uses one of the internal SyncE ports as a reference (either primary or secondary, based on its priority) for that member node. Additionally, it uses the external reference as the other reference (either primary or secondary based on its priority) for the member node.

7.5.6.2.1 Configuration guidelines for SyncE in a VC

The following configuration guidelines apply for using SyncE in a VC node:

- Before the internal SyncE ports are configured, the node must be available (administratively up), the card type must be provisioned, and the port must be administratively up.
- Revertive mode is not supported and cannot be configured.
- QL selection is enabled by default and cannot be configured.
- Only 1GE or 10GE fiber ports can be used as internal SyncE ports to distribute SyncE for nodes in the VC stack. Copper ports are not supported as internal SyncE ports. Combo ports are not supported as internal and external SyncE ports.
- In a VC node, the SyncE reference selection process is distributed across the nodes of the stack, and each node selects the best reference from available external references and internal SyncE ports. The selected SyncE reference is propagated across the stack using SSM QL values. SSM messages with QL values are transmitted on a priority basis out of the internal SyncE ports. It takes a short amount of time for all nodes in the stack to receive and act on the received QL values and run the selection algorithm to select the best reference.
- Before enabling SyncE, Nokia highly recommends configuring the **config**>**system**>**vc-stack**>**vc-node**>**internal-synce-ports** command for all nodes provisioned in the VC for the correct operation of SyncE distribution across all the nodes. The software assumes the correct physical connections are in place and cannot detect any incorrect connectivity among the nodes. This configuration determines the number of nodes in the VC and automatically configures the software for correct SyncE operation.
- When the **debug**>**sync-if-timing**>**force-reference** command is used, the system-wide **show**>**sync-if-timing** command displays the correct output with the external reference set to "diag". In addition, the per-card output of the **show**>**sync-if-timing** command displays "diag" mode on the nodes where

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external references are configured. This is expected behavior, indicating the system is ensuring that these nodes select the correct references after the **force-reference** command is issued.

- The software reconciles the status of SyncE on the individual nodes to the status of SyncE across all nodes in the VC to ensure that both are in sync. The software achieves this by changing the references on the nodes to the correct reference. The software raises a log event when this process starts and ends. The following is an example of this log event:

Example: VC reference adjustment

```
1234 2025/12/17 09:51:11.67 UTC MINOR: CHASSIS #3043 Base Card A
"Synchronous Timing interface, VC reference adjustment started"

1235 2025/12/17 09:51:17.67 UTC MINOR: CHASSIS #3044 Base Card A
"Synchronous Timing interface, VC reference adjustment Finished"
```

7.5.7 IEEE 1588v2 PTP

The Precision Time Protocol (PTP) is a timing-over-packet protocol defined in the IEEE 1588v2 standard 1588 PTP 2008.

PTP may be deployed as an alternative timing-over-packet option to ACR. PTP provides the capability to synchronize network elements to a Stratum-1 clock or primary reference clock (PRC) traceable source over a network that may or may not be PTP-aware. PTP has several advantages over ACR. It is a standards-based protocol, has lower bandwidth requirements, can transport both frequency and time, and can potentially provide better performance.

The basic types of PTP devices are the following:

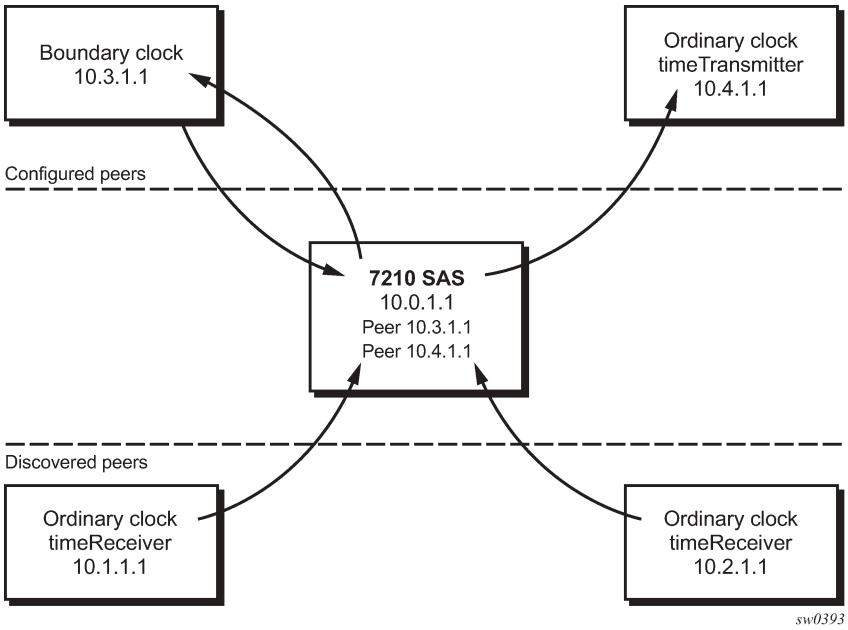
- ordinary clock
- boundary clock
- end-to-end transparent clock
- peer-to-peer transparent clock

Table 29: Synchronization options for 7210 SAS platforms lists the 7210 SAS platform support for the different types of PTP devices.

The 7210 SAS communicates with peer 1588v2 clocks, as shown in the following figure. These peers can be ordinary clock timeReceivers or boundary clocks. The communication can be based on either unicast IPv4 sessions transported through IP interfaces or Ethernet multicast PTP packets transported through an Ethernet port.

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Figure 14: Peer clocks



IP/UDP unicast and Ethernet multicast support for the 7210 SAS platforms is listed in the following table.

Note:
PTP is supported on all 7210 SAS platforms as described in this document, except the 7210 SAS-Sx 10/100GE and 7210 SAS-Sx/S 1/10GE operating in standalone-VC mode. See Configuration guidelines and restrictions for PTP for a list of PTP profiles, and the configuration guidelines and restrictions.

Table 32: IP/UDP unicast and Ethernet multicast support

Platform	IP/UDP Unicast	Ethernet Multicast
7210 SAS-T	Yes	Yes
7210 SAS-Mxp	Yes	Yes
7210 SAS-Sx 1/10GE	Yes	Yes[27]
7210 SAS-S 1/10GE	No	No
7210 SAS-Sx 10/ 100GE[28]	No	Yes[27]
7210 SAS-R6	Yes	Yes[29]

27 Supported only in the standalone mode of operation

28 Supported only on 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 variant

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Platform	IP/UDP Unicast	Ethernet Multicast
7210 SAS-R12	Yes	Yes[29]

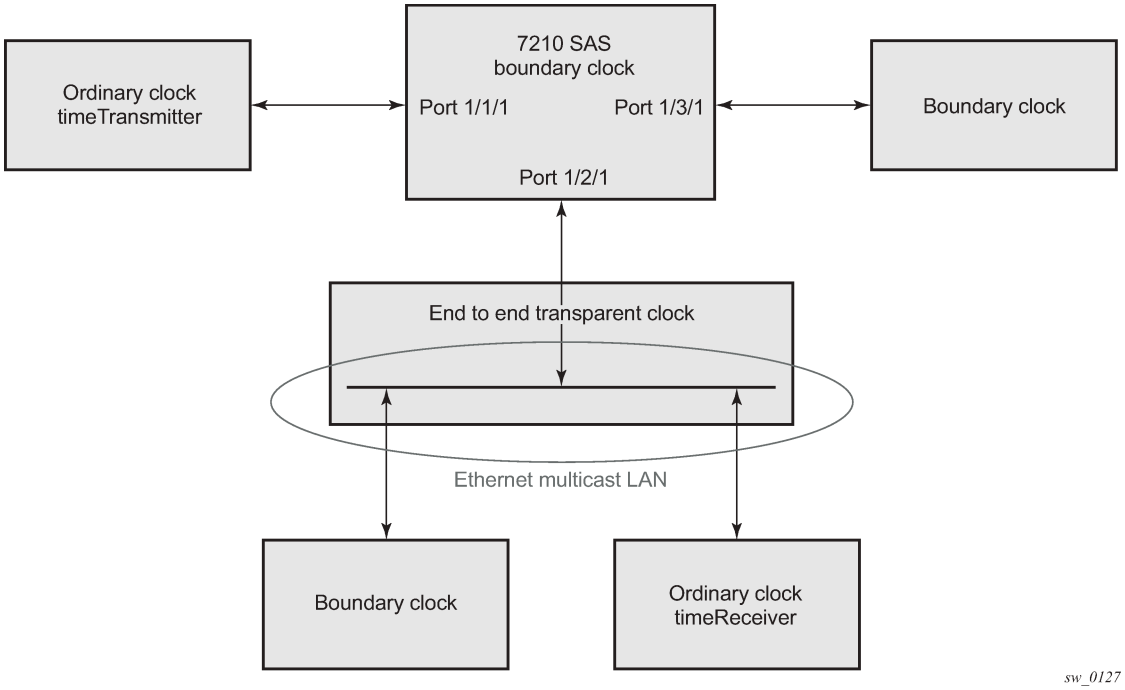
Unicast IP sessions support two types of peers: configured and discovered. The 7210 SAS operating as an ordinary clock timeReceiver or as a boundary clock must have configured peers for each PTP neighbor clock from which it might accept synchronization information. The 7210 SAS initiates unicast sessions with all configured peers. A 7210 SAS operating as a boundary clock accepts unicast session requests from external peers. If the peer is not configured, it is considered a discovered peer. The 7210 SAS can deliver synchronization information toward discovered peers (that is, timeReceivers).

For Ethernet multicast operation, the node listens for and transmits PTP messages using the configured multicast MAC address. Neighbor clocks are discovered via messages received through an enabled Ethernet port. The 7210 SAS supports only one neighbor PTP clock connecting into a single port (see Figure 15: Ethernet multicast ports); multiple PTP clocks connecting through a single port are not supported. This might be encountered with the deployment of an Ethernet multicast LAN segment between the 7210 SAS and the neighbor PTP ports using an end-to-end transparent clock or an Ethernet switch. The use of an Ethernet switch is not recommended because of PDV and potential performance degradation, but it can be used if appropriate for the application.

The 7210 SAS does not allow simultaneous PTP operations using both unicast IPv4 and Ethernet multicast. A change of profile to G.8275.1 or from G.8275.1 to another profile requires a reboot of the node.

The following figure shows one neighbor PTP clock connecting into a single port.

Figure 15: Ethernet multicast ports



[29] Supported only on IMM-b card

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Note:
7210 SAS platforms do not support ordinary clock timeTransmitter configuration.

The IEEE 1588v2 standard includes the concept of PTP profiles. These profiles are defined by industry groups or standards bodies that define the use of IEEE 1588v2 for specific applications.

The following profiles are supported for 7210 SAS platforms (as described in Table 32: IP/UDP unicast and Ethernet multicast support):

- IEEE 1588v2 (default profile)
- ITU-T Telecom profile (G.8265.1)
- ITU-T Telecom profile for time with full timing support (G.8275.1)

Note:
The following caveats apply to G.8275.1 support. See Configuration guidelines and restrictions for PTP for configuration guidelines and restrictions.

- PTP with Ethernet encapsulation is only supported with G.8275.1 profiles.
- PTP over IP encapsulation is only with the IEEE 1588v2 and G.8265.1 profiles; it is not supported for G.8275.1 profiles.

When a 7210 SAS receives Announce messages from one or more configured peers or multicast neighbors, it executes a Best timeTransmitter Clock Algorithm (BTCA) to determine the state of communication between itself and the peers. The system uses the BTCA to create a hierarchical topology, allowing the flow of synchronization information from the best source (the grandmaster clock) out through the network to all boundary and timeReceiver clocks. Each profile has a dedicated BTCA.

If the profile setting for the clock is "ieee1588-2008", the precedence order for the BTCA is as follows:

- priority1
- clock class
- clock accuracy
- PTP variance (offsetScaledLogVariance)
- priority2
- clock identity
- steps removed from the grandmaster

The 7210 SAS sets its local parameters as described in the following table.

Table 33: Local clock parameters when profile is set to ieee1588-2008

Parameter	Value
clockClass	248 – the 7210 SAS is configured as a boundary clock 255 – the 7210 SAS is configured as an ordinary clock time Receiver
clockAccuracy	FE - unknown
offsetScaledLogVariance	FFFF – not computed

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Parameter	Value
clockIdentity	Chassis MAC address following the guidelines of section 7.5.2.2.2 of IEEE 1588-2008

If the profile setting for the clock is "itu-telecom-freq" (ITU G.8265.1 profile), the precedence order for the best timeTransmitter selection algorithm is:

- clock class
- PTSF (Packet Timing Signal Fail) - Announce Loss (miss 3 Announce messages or do not get an Announce message for 6 seconds)
- priority

The 7210 SAS sets its local parameters as described in the following table.

Table 34: Local clock parameters when profile is set to itu-telecom-freq

Parameter	Value
clockClass	80-110 – value corresponding to the QL out of the central clock of the 7210 SAS as per Table 1/G.8265.1 255 – the 7210 SAS is configured as an ordinary clock time Receiver

The ITU-T profile is for use in environments with only ordinary clock timeTransmitters and timeReceivers for frequency distribution.

If the profile setting for the clock is "g8275dot1-2014", the precedence order for the best timeTransmitter selection algorithm is very similar to that used with the default profile. It ignores the priority1 parameter, includes a localPriority parameter, and includes the ability to force a port to never enter the timeReceiver state (**master-only**). The precedence is as follows:

- clock class
- clock accuracy
- PTP variance (offsetScaledLogVariance)
- priority2
- localPriority
- clock identity
- steps removed from the grandmaster

The 7210 SAS sets its local parameters as described in the following table.

Table 35: Local clock parameters when profile is set to g8275dot1-2014

Parameter	Value
clockClass	165 – the 7210 SAS is configured as a boundary clock and the boundary clock was previously locked to a grandmaster with clock class of 6

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Parameter	Value
	248 – the 7210 SAS is configured as a boundary clock 255 – the 7210 SAS is configured as an ordinary clock time Receiver
clockAccuracy	FE – unknown
offsetScaledLogVariance	FFFF – not computed
clockIdentity	Chassis MAC address following the guidelines of section 7.5.2.2.2 of IEEE 1588-2008

The 7210 SAS supports a limited number of configured (possible timeTransmitter or neighbor boundary clocks) and a discovered peers (timeReceivers).These peers use the unicast negotiation procedures to request service from the 7210 SAS clock. A neighbor boundary clock counts as two peers (both a configured and a discovered peer) toward the maximum limit.

The number of configured Ethernet ports is not restricted.

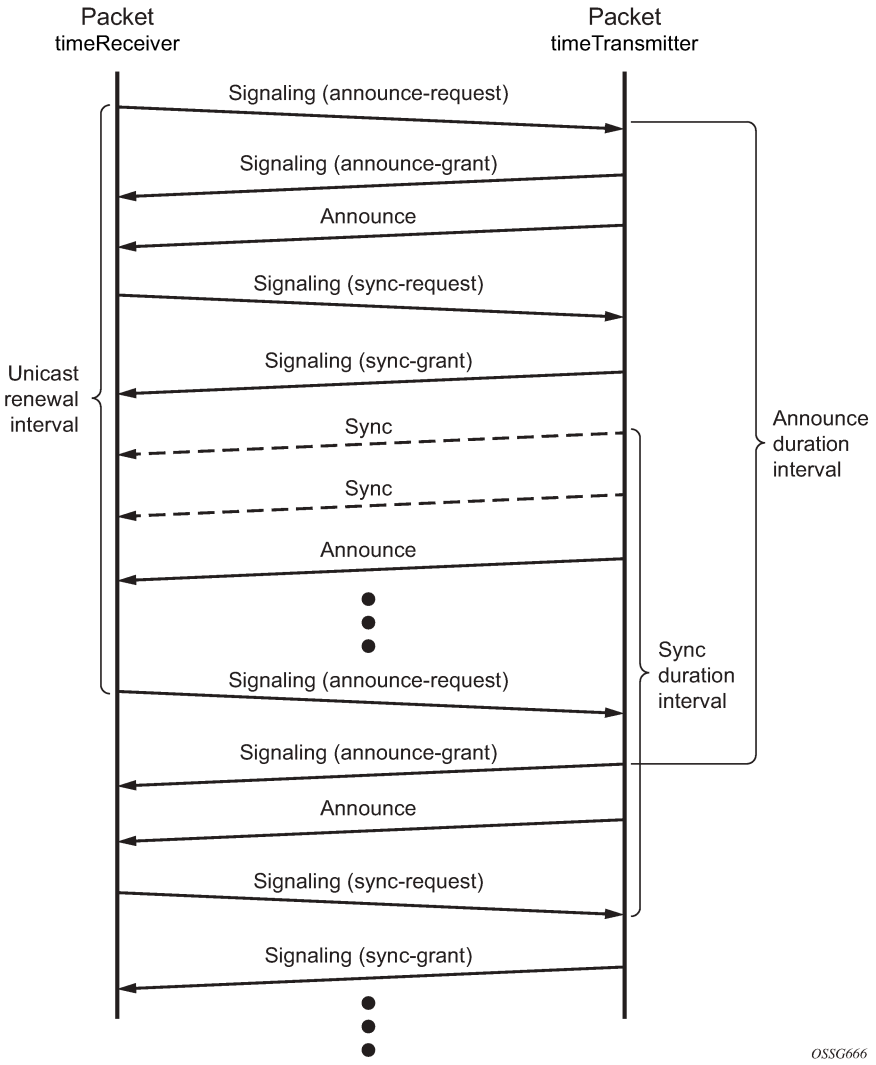
On the 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28, and 7210 SAS-T, there are limits on the number of timeReceivers enforced in the implementation for unicast and multicast timeReceivers.

Note:
Contact a Nokia technical support representative for scaling information about specific unicast message limits related to PTP.

The following figure shows the unicast negotiation procedure performed between a timeReceiver and a timeTransmitter clock that is selected to be the timeReceiver clock. The timeReceiver clock requests Announce messages from all peer clocks, but only requests Sync and Delay_Resp messages from the clock selected to be the timeTransmitter clock.

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Figure 16: Messaging sequence between the PTP timeReceiver clock and PTP timeTransmitter clocks



7.5.7.1 PTP clock synchronization

The IEEE 1588v2 standard synchronizes the frequency and time from a timeTransmitter clock to one or more timeReceiver clocks over a packet stream. This packet-based synchronization can be over IP/UDP unicast or Ethernet multicast.

As part of the basic synchronization timing computation, event messages are defined for synchronization messaging between the PTP timeReceiver clock and PTP timeTransmitter clock. A one-step or two-step synchronization operation can be used; the two-step operation requires a follow-up message after each synchronization message.

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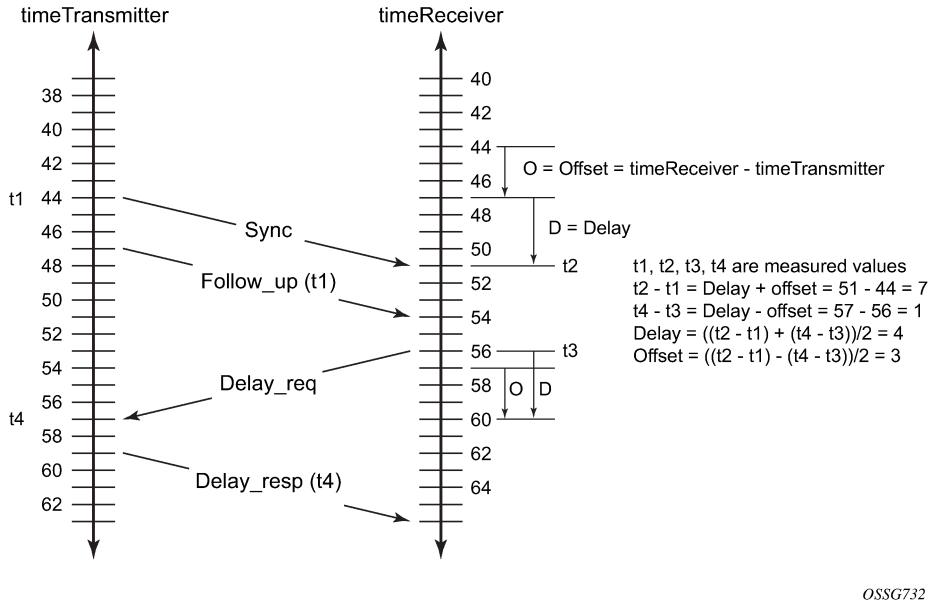
Note:

- The 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28, and 7210 SAS-T support only one-step timeTransmitter port operation.
- All platforms can operate timeReceiver ports that receive PTP messages from a one-step or two-step timeTransmitter port.

During startup, the PTP timeReceiver clock receives synchronization messages from the PTP timeTransmitter clock before a network delay calculation is made. Before any delay calculation, the delay is assumed to be zero. A drift compensation is activated after a number of synchronization message intervals occur. The expected interval between the reception of synchronization messages is user-configurable.

The following figure shows the basic synchronization timing computation between the PTP timeReceiver clock and PTP best timeTransmitter; the offset of the timeReceiver clock is shown referenced to the best timeTransmitter signal during startup.

Figure 17: PTP timeReceiver clock and timeTransmitter clock synchronization timing computation



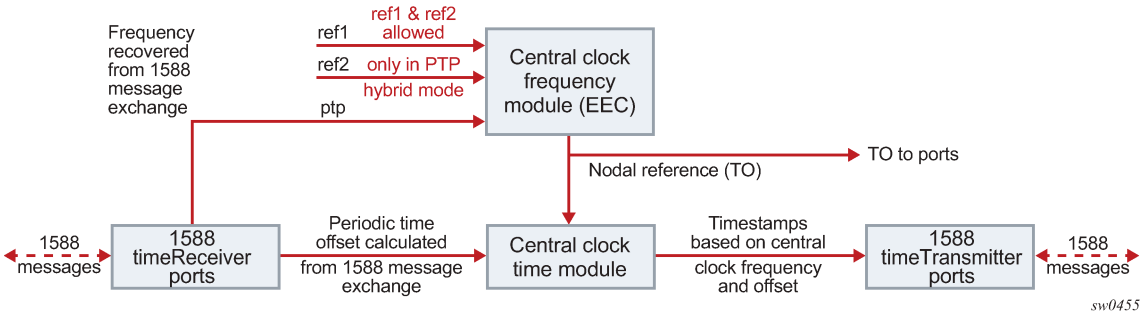
When the IEEE 1588v2 standard is used for distribution of a frequency reference, the timeReceiver calculates a message delay from the timeTransmitter to the timeReceiver based on the timestamps exchanged. A sequence of these calculated delays contains information about the relative frequencies of the timeTransmitter clock and timeReceiver clock, but also includes a noise component related to the PDV experienced across the network. The timeReceiver must filter the PDV effects to extract the relative frequency data and then adjust the timeReceiver frequency to align with the timeTransmitter frequency.

When the IEEE 1588v2 standard is used for distribution of time, the 7210 SAS calculates the offset between the 7210 SAS time base and the external timeTransmitter clock time base based on the four timestamps exchanged. The 7210 SAS determines the offset adjustment, and between these adjustments, it maintains the progression of time using the frequency from the central clock of the node. This allows time to be maintained using a Synchronous Ethernet input source even if the IEEE 1588v2 communications fail. When using IEEE 1588v2 for time distribution, the central clock should, at a minimum, have the PTP input reference enabled.

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The following figure shows the logical model for using PTP/1588 for network synchronization.

Figure 18: Logical model for using PTP/1588 for network synchronization on 7210 SAS platforms



7.5.7.2 Performance considerations

Although IEEE 1588v2 can be used on a network that is not PTP-aware, the use of PTP-aware network elements (boundary clocks) within the packet switched network improves synchronization performance by reducing the impact of PDV between the grandmaster clock and the timeReceiver clock. In particular, when IEEE 1588v2 is used to distribute high-accuracy time, such as for mobile base station phase requirements, the network architecture requires the deployment of PTP awareness in every device between the grandmaster and the mobile base station timeReceiver.

In addition, performance is also improved by the removal of any PDV caused by internal queuing within the boundary clock or timeReceiver clock. This is accomplished with hardware that is capable of port-based timestamping, which detects and timestamps the IEEE 1588v2 packets at the Ethernet interface.

7.5.7.3 PTP end-to-end Transparent Clock

Note:
This feature is supported only on the 7210 SAS-Sx 1/10GE and 7210 SAS-Sx 10/100GE.

The 7210 SAS devices support PTP end-to-end (E2E) Transparent Clock (TC) functionality, which allows the node to update the PTP correction fields (CFs) for the residence time of the PTP message. See Table 29: Synchronization options for 7210 SAS platforms for a list of platforms that support this functionality.

A CLI option is provided to enable the PTP port-based hardware timestamp on ports that receive and forward PTP messages. To enable the TC function, PTP must not be enabled on the node. When the timestamp option is enabled, the node identifies standards-based messages and updates the CF for PTP IP/UDP multicast and unicast messages, and for the PTP Ethernet multicast and unicast messages. The CF is updated for the residence time of the PTP message. Downstream PTP timeReceivers that receive the PTP message use the updated CF to measure the delay between the timeTransmitter and themselves.

You can enable the TC option by running the **configure>port>ethernet>ptp-hw-timestamp** command on ports (both ingress and egress) on which residence time in the PTP message must be updated when the message is in transit through the node. You can disable the residence time update by running the **no** form of this command on both ingress and egress ports, as required. No additional CLI commands are required to enable the PTP TC option.

Nokia recommends the following operational guidelines and examples for enabling and using the PTP TC feature:

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- Assume port 1/1/10 is connected to a PTP timeTransmitter clock (using a port, a SAP, or an IES IP interface) and 1/1/15 is connected to a PTP timeReceiver clock (using a port, a SAP, or an IES IP interface).

  To enable PTP TC in this scenario, you must enable the **ptp-hw-timestamp** command on both ports. To disable PTP TC, run the **no** form of this command on both ports.

- Assume port 1/1/10 is connected to a PTP timeTransmitter clock (using a port, a SAP, or an IES IP interface) and ports 1/1/15 and 1/1/16 have PTP timeReceivers (using a port, a SAP, or an IES IP interface), with a PTP session to the PTP timeTransmitter clock that is connected on port 1/1/10.

  To enable PTP TC, the **ptp-hw-timestamp** command must be enabled on all three ports.

  In this scenario, it is not possible to disable PTP TC only towards the timeReceiver connected on port 1/1/15. The functionality must be disabled on all three ports.

  Additionally, note that the PTP messages coming in on port 1/1/10 are not forwarded out of any ports other than 1/1/15 and 1/1/16, when the **ptp-hw-timestamp** command is enabled on port 1/1/10. Nokia recommends that when a set of PTP ports are enabled for **ptp-hw-timestamp**, the operator must ensure that PTP messages are forwarded to only the specific set of ports where the TC option is enabled, and not to other ports. Forwarding PTP messages to other ports that do not belong to the specific set may result in incorrect updates.

- You can enable PTP TC for a set of SAPs and also transparently forward PTP packets on other SAPs, while both SAPs share a common uplink to forward PTP messages. To implement this scenario, use MPLS tunnels with network ports as the uplinks. Nokia recommends the following configuration.
  - PTP hardware port-based timestamping must be disabled on the access ports where SAPs are configured. These access ports are typically used to connect to either PTP timeTransmitter or PTP timeReceivers that need to establish and exchange PTP messages transparently.
  - PTP hardware port-based timestamping must be enabled on the access ports where SAPs are configured and the TC function is required. These access ports are typically used to connect to either the PTP timeTransmitter or PTP timeReceivers.
  - PTP hardware port-based timestamping must be enabled on the network ports where the MPLS tunnels originate and terminate. In this case, the PTP TC function updates only the PTP messages that are not MPLS encapsulated.
  - See PTP message transparent forwarding for additional support information.

7.5.7.4 PTP message transparent forwarding

On bootup, port-based hardware timestamping is enabled by default on all ports on the 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28, and 7210 SAS-T, and the node processes both transit packets and locally destined PTP packets. Use the **ptp-hw-timestamp** command to disable port-based hardware timestamping in the following cases:

- to allow the node to transparently forward PTP packets when MPLS uplinks are used
- when PTP is enabled and used to synchronize and time the node (that is, PTP messages are originated and terminated by the node acting as a PTP OC-timeReceiver or BC)
- on ports that receive PTP packets that will be forwarded transparently

When PTP port-based hardware timestamp is disabled, the node does not update the correction field in PTP messages. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Interface Configuration Guide* for more information about the **ptp-hw-timestamping** command.

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For example, to enable transparent forwarding of PTP packets over MPLS tunnels, when access ports with SAPs are used to connect the PTP timeTransmitter or PTP timeReceivers, the **ptp-hw-timestamp** command can be used to disable PTP port-based hardware timestamping on these access ports.

Note:
The **ptp-hw-timestamp** command is only supported on the 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28, and 7210 SAS-T. Port-based hardware timestamping can be used for transparent PTP packet forwarding if PTP is enabled and used to time the node (that is, PTP messages are originated and terminated by the node acting as a PTP OC-timeReceiver or BC).

The following guidelines must be considered for transparent PTP packet forwarding:

- By default, PTP port-based hardware timestamping is enabled on all ports at bootup. To allow transparent PTP packet forwarding, the feature must be disabled using the **configure**>**port**>**no ptp-hw-timestamp** command.
- On 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28, and 7210 SAS-T, if the **ptp-hw-timestamp** command is enabled by executing the command on a set of ports, the node processes PTP packets that transit those ports to update the correction field for the packet residence time in the node. This allows accurate computation by PTP time and frequency recovery algorithms on PTP timeReceiver clocks that are connected to those ports.
- The command to enable PTP hardware timestamps for packets transiting the node should be configured on both the ingress and egress port where PTP packets are expected to be received and sent from (and where they need to be processed to update correction time). Configuring the PTP hardware timestamp command on only the ingress port or egress port is not recommended because this will result in incorrect updates to the correction field.
- For 7210 SAS-R6 and 7210 SAS-R12 platforms with IMM-b (IMMv2) and IMM-c cards, and for the 7210 SAS-Mxp and 7210 SAS-Sx 1/10GE, to enable transparent forwarding of PTP packets over MPLS tunnels, PTP hardware port-based timestamping must be disabled on the access ports where SAPs are configured. These access ports are used to connect to either PTP timeTransmitter or PTP timeReceivers that need to establish and exchange PTP messages transparently. PTP hardware port-based timestamping does not need to be disabled on the network ports where the MPLS tunnels originate and terminate. This means that these network ports can be used for PTP packet exchange when the node is a PTP boundary clock or ordinary clock timeReceiver. If the requirement is to forward PTP packets transparently when MPLS uplinks are not used or when a hybrid port with a SAP is used, PTP hardware port-based timestamping must be disabled on the access port and hybrid port.
- On the 7210 SAS-Mxp and 7210 SAS-Sx 1/10GE, PTP messages for the G.8265.1 and IEEE 1588v2 profiles are transparently forwarded only for a VPRN service on which hardware timestamping is enabled on the access port. This restriction only applies to PTP packets that are using IP/UDP unicast encapsulation.
- To enable transparent forwarding of PTP packets over MPLS tunnels on the 7210 SAS-T, you must disable hardware timestamping on access ports where SAPs are configured, and on the MPLS tunnel originating and terminating network ports. Consequently, these network ports cannot be used for PTP packet exchange when the node is a PTP boundary clock or ordinary clock timeReceiver.

  To use the node as a PTP boundary clock or ordinary clock timeReceiver, you must use separate ports. In other words, a different access port, network port, or hybrid port must be used for PTP message exchange when this node is configured to be a PTP boundary clock or ordinary clock timeReceiver, and it cannot be any of the ports (either ingress or egress ports) on which PTP packets are forwarded transparently.

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7.5.7.5 PTP capabilities

PTP messages are supported through IPv4 unicast with a fixed IP header size. The following table describes the supported message rates for timeReceiver and timeTransmitter states. The ordinary clock can only be used in the timeReceiver state. The boundary clock can be in both of these states.

Table 36: Support message rates for timeReceiver and timeTransmitter clock states

Support message	timeReceiver clock	timeTransmitter clock	
	Request rate	Grant rate	
		Min	Max
Announce	1 packet every 2 seconds	1 packet every 2 seconds	1 packet every 2 seconds
Sync	User-configurable with an option to configure 8/16/32/64 packets/second	8 packets/second	16 or 64 packets/second[30]
Delay_Resp	User-configurable with an option to configure 8/16/32/64 packets/second	8 packets/second	16 or 64 packets/second[30]
Duration	300 seconds	1 second	1000 seconds

State and statistics data for each timeTransmitter clock are available to assist in the detection of failures or unusual situations.

7.5.7.6 PTP ordinary timeReceiver clock for frequency

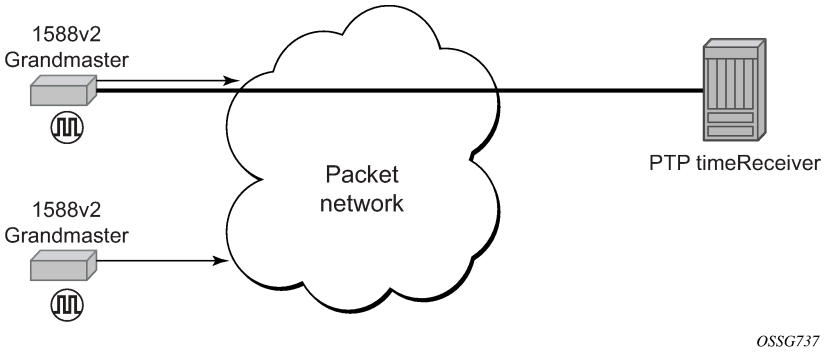
Traditionally, only clock frequency is required to ensure smooth transmission in a synchronous network. The PTP ordinary clock with timeReceiver capability on the 7210 SAS provides another option to reference a Stratum-1 traceable clock across a packet switched network. The recovered clock can be referenced by the internal SSU and distributed to all slots and ports.

The following figure shows a PTP ordinary timeReceiver clock network configuration.

[30] Maximum PPS depends on the profile in use

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Figure 19: timeReceiver clock



7.5.8 PTP boundary clock for frequency and time

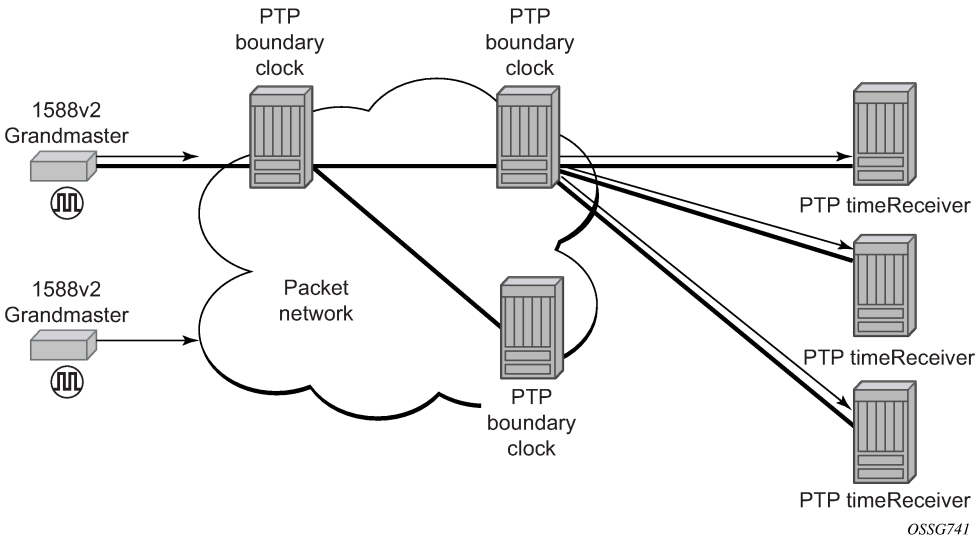
Although IEEE 1588v2 can function across a packet network that is not PTP-aware, performance may be unsatisfactory and unpredictable. PDV across the packet network varies with the number of hops, link speeds, utilization rates, and the inherent behavior of routers. By using routers with boundary clock functionality in the path between the grandmaster clock and the timeReceiver clock, one long path over many hops is split into multiple shorter segments, allowing better PDV control and improved timeReceiver performance. This allows PTP to function as a valid timing option in more network deployments and allows for better scalability and increased robustness in certain topologies, such as rings.

Boundary clocks can simultaneously function as a PTP timeReceiver of an upstream grandmaster (ordinary clock) or boundary clock, and as a PTP timeTransmitter of downstream timeReceivers (ordinary clock) and boundary clocks. The time scale recovered in the timeReceiver side of the boundary clock is used by the timeTransmitter side of the boundary clock. This allows time distribution across the boundary clock.

The following figure shows routers with boundary clock functionality in the path between grandmaster clock and the timeReceiver clock.

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Figure 20: Boundary clock



7.5.9 1PPS and 10MHz output interface

The 7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-R6, and 7210 SAS-R12 support 1PPS and 10 MHz output interfaces. These interfaces output the recovered signal from the system clock when PTP is enabled.

Note:
1pps and 10MHz signals are available only when PTP is enabled.

7.5.10 Configuration guidelines and restrictions for PTP

The following guidelines and restrictions apply for PTP configuration:

- On 7210 SAS devices, only a single profile (IEEE 1588v2, G.8265.1, or G.8275.1) can be enabled for all PTP communications (both towards its timeTransmitter and timeReceiver connections) at any point in time.
- The PTP G.8275.1 profile is supported only on the 7210 SAS-Mxp,7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28, and 7210 SAS-T devices.

  On the 7210 SAS-R12, the G.8275.1 profile is supported only for IMMv2 cards.

  When using the G.8275.1 profile, the following restrictions apply:

  – The delay and sync requests are set to 16 pps by default and are not configurable.
  – The announce rate is set to 8 pps by default and is not configurable.
  – A change of profile to G.8275.1 or from G.8275.1 to another profile requires a reboot of the node.
  – Only a single multicast timeReceiver is supported per port.
- PTP with Ethernet encapsulation is supported only with the G.8275.1 profile.
- PTP over IP encapsulation is not supported with the G.8275.1 profile. It is supported only with the IEEE 1588v2 and G.8265.1 profiles.

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- PTP timeReceiver capability is available on all the ports on the 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28, and 7210 SAS-T.
- When changing the **clock-type** to or from a boundary clock on the 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28, and 7210 SAS-T platforms, the node must be rebooted for the change to take effect. Nokia recommends taking appropriate measures to minimize service disruption during the reboot process.
- The 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, and 7210 SAS-T support the use of PTP and SyncE as a reference simultaneously. That is, on these 7210 SAS platforms, the **ref-order** can be set to **config**>**system**>**sync-if-timing**>**ref-order ref1 ref2 ptp**.
- The 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28, and 7210 SAS-T support the PTP hybrid mode of operation. Frequency recovery is provided by the central clock through either SyncE or BITS, depending on which reference is configured. PTP is used for time recovery only. In this mode, the node can recover very stable frequency using a reduced PTP packet rate.
- To enable PTP hybrid mode on the 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, and 7210 SAS-T, run the **config>system>ptp>clock>freq-source ssu** CLI command. To enable pure PTP mode, the user must run the command **config>system>ptp>clock>freq-source ptp**.

  For a change of value from **ssu** to **ptp** (or vice-versa) to take effect, the operator must save the configuration changes and reboot the node.
- On the 7210 SAS-R6 and 7210 SAS-R12, only the BITS1 port can be used to provide a reference to the system clock or to distribute the reference. The use of the BITS2 port is not supported.
- On the 7210 SAS-T and 7210 SAS-Mxp, both the BITS1 and BITS2 ports can be used to provide a reference to the system clock or to distribute the reference.
- On the 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, and 7210 SAS-T, an IP address must be configured under **config>system>security>source-address>application ptp** before PTP can be enabled for use. The use of the system IPv4 interface address or other loopback IPv4 interface address is recommended for PTP applications. The IPv4 address of an IPv4 interface over a port can also be used. The PTP software uses the configured IP address as the source IP address for both configured peers and discovered peers.
- On the 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-T, 1 pps and 10 MHz interface signals should only be used when PTP is enabled. Use these signals only after determining that the system is configured to use PTP as a reference and is locked to PTP.
- The 7210 SAS-S 1/10GE does not support IEEE 1588v2 PTP.
- On the 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28, and 7210 SAS-T, PTP port-based timestamping is enabled by default on all ports for all PTP packets at system bootup:
  - When this feature is enabled, PTP packets are not forwarded transparently through the node, regardless of the service used and whether PTP is configured as a system clock reference. To enable transparent forwarding, see PTP message transparent forwarding.
  - Regardless of whether PTP is enabled (**configure**>**sync-if-timing**>**ptp**>**no shutdown**) or disabled (**configure**>**sync-if-timing**>**ptp**>**shutdown**), the timestamp value stored in the correction-field (CF) is updated for all PTP packets that are in transit through the node. This affects all PTP packets that are not originated or terminated on the node.

    To prevent this occurrence, disable PTP port-based hardware timestamps on specific (all or select) ports by configuring the **configure**>**port**>**no ptp-hw-timestamp** CLI command on ports where

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PTP packets are in transit. When the feature is disabled, PTP packets in transit are transparently forwarded without changing the timestamp value.

7.5.11 Configuration example to use PTP and SyncE references

The 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, and 7210 SAS-T support the configuration of PTP and SyncE references at the same time. On these platforms, **ref-order** can be set to **config**>**system**>**sync-if-timing**>**ref-order ref1 ref2 ptp**.

Example

The following configuration example shows the simultaneous use of PTP and SyncE references:

```
*A:SAS-T-B>config>system>sync-if-timing# info detail
----------------------------------------------
            ql-selection
            ref-order ptp ref1 ref2 --
> All three reference can be configured simultaneously
            ref1
                source-port 1/1/1
                no shutdown
                no ql-override
            exit
            ref2
                source-port 1/1/7
                no shutdown
                no ql-override
            exit
            ptp
                no ql-override
                no shutdown
            exit
            revert
----------------------------------------------
```

7.6 Link Layer Discovery Protocol (LLDP)

The IEEE 802.1ab Link Layer Discovery Protocol (LLDP) is a unidirectional protocol that uses the MAC layer to transmit specific information about the capabilities and status of the local device. The LLDP can send as well as receive information from a remote device stored in the related MIB (or MIBs).

The LLDP does not contain a mechanism to solicit information received from other LLDP agents or to confirm the receipt of information. However, LLDP provides the flexibility to enable a transmitter and receiver separately, and the following LLDP agent configurations are allowed:

- only transmit information
- only receive information
- transmit and receive information

The information fields in each LLDP frame are contained in an LLDP Data Unit (LLDPDU) as a sequence of variable length information elements. Each information element includes Type, Length, and Value fields (TLVs).

- Type indicates the nature of information being transmitted.

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- Length indicates the length of the information string in octets.
- Value is the actual information that is transmitted. (For example, a binary bit map or an alphanumeric string that can contain one or more fields).

Each LLDPDU contains four mandatory TLVs and optional TLVs selected by the Network Management. The following is the format of an LLDPDU:

- Chassis ID TLV
- Port ID TLV
- Time To Live (TTL) TLV
- zero or more optional TLVs, depending on the maximum size of the LLDPDU allowed
- End of LLDPDU TLV

A concatenated string formed by the Chassis ID TLV and the Port ID TLV is used by a recipient to identify an LLDP port or agent. The combination of the Port ID and Chassis ID TLVs remains unchanged until the port or agent is operational.

The TTL field of a Time-To-Live TLV can be a zero or non-zero value. A zero TTL field value notifies the receiving LLDP agent to immediately discard all information related to sending LLDP agent. A non-zero TTL field value indicates the time duration for which the receiving LLDP agent should retain the information of the sending LLDP agent. The receiving LLDP agent discards all information related to the sending LLDP agent after the time interval indicated in the TTL field is complete.

Note:
A TTL zero value is used to signal that the sending LLDP port has initiated a port shutdown procedure.

The End Of LLDPDU TLV indicates the end of the LLDPDU.

The following information is included in the protocol as defined by the IEEE 802.1ab standard:

- Connectivity and management information about the local station to adjacent stations on the same IEEE 802 LAN is advertised.
- Network management information from adjacent stations on the same IEEE 802 LAN is received.
- It operates with all IEEE 802 access protocols and network media.
- Network management information schema and object definitions suitable for storing connection information about adjacent stations is established.
- It supports compatibility with a number of MIBs.

7.7 System resource allocation

This section describes system resource allocation including the allocation of TCAM resources, configuration guidelines and examples.

7.7.1 Allocation of ingress internal TCAM resources

In previous releases, the system statically allocated ingress TCAM resources for use by SAP ingress QoS classification, SAP ingress access control list (ACLs), identifying and sending CFM OAM packets to CPU for local processing, and so on. The resource allocation is not user-configurable. With the introduction of

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new capabilities including IPv6 classification, UP MEP support, and G8032-fast-flood, the static allocation of resources by software does not meet requirements of customers who typically want to use different features.

The user can allocate a fixed amount of resources per system (or per card on 7210 SAS-R6 and 7210 SAS-R12 devices) for QoS, ACLs, CFM/Y.1731 MEPs and other features. Of these, some parameters are boot-time parameters and others are run-time. A change in the current value of a boot-time parameter needs a node reboot or, on 7210 SAS-R6 and 7210 SAS-R12 devices, a card reset using the **reset** command, before the new value takes effect. Change in the current value of a parameter that is designated run-time takes effect immediately if the software determines that resources are available for use to accommodate the change.

On the 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-T, the system resource profile parameters are available using the **config**>**system**>**resource-profile** CLI context and the defined parameters are applicable to the entire node. On the 7210 SAS-R6 and 7210 SAS-R12, the parameters are defined as a system resource profile policy that the user must configure and associate with the IMM. The software reads the configured policy and allocates resources appropriately per IMM, allowing users to allocate resources to different features per IMM. On the 7210 SAS-R6 and 7210 SAS-R12, some system resource profile parameters apply to the entire node and not just the IMM. For more information, see System resource-profile router commands for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-T.

During bootup, the system reads the resource profile parameters and allocates resources to features in the order they appear in the configuration file.

Note:
The order in which the command appears in the configuration file is important.

Because resources are shared, the user must ensure that the sum total of such resources does not exceed the limit supported by the IMM or node. If the system determines that it cannot allocate the requested resources, the feature is disabled. For example, if the system determines that it cannot allocate resources for g8032-fast-flood, it disables the feature from use and G8032 eth-rings will not be able to use fast-flood mechanisms). Another example is the case where the system determines that it cannot allocate resources for IPv4-based SAP Ingress ACL classification, the system will not allow users to use IPv4-based SAP ingress ACL classification feature and fails the configuration when it comes upon the first SAP in the configuration file that uses an IPv4-based SAP ingress ACL policy.

For boot-time parameters, such as g8032-fast-flood-enable, the user must ensure that the configured services match the resources allocated. If the system determines that it cannot allocate resources to services, it fails the configuration file at the first instance where it encounters a command to which resources cannot be allocated. The available resources can be allocated to different features.

For ACL and QoS resources, the user has the option to allocate resources to limit usage per feature, regardless of the match criteria used. The sum of all resources used for different SAP ingress classification match-criteria is limited by the amount of resources allocated for SAP ingress classification. The user can also allocate resources by specific match criteria. The user can enable any supported match criteria and associate a fixed amount of resources with each match criteria in fixed sizes; the chunk size is dependent on the platform.

The system allocates resources based on the order of appearance in the configuration file, and fails any match criteria if the system does not have any more resources to allocate. In addition, the **max** keyword can be used to indicate that the system needs to allocate resources when they are first required, as long as the maximum amount of resources allocated for that feature is not exceeded or the maximum amount of resources available in the system is not exceeded. The 7210 SAS platforms allocate resources to each feature and match-criteria in fixed-size chunks.

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The **no** form of the **resource-profile** command disables the use of the corresponding match criteria or feature by deallocating all the resources allocated to the criteria or feature. For example:

1. Configuring the **system resource-profile internal-ingress-tcam qos-sap-ingress-resource no mac-match-enable** command deallocates all the resources allocated to SAP ingress QoS classification MAC match criteria. After this command is run, users cannot associate a SAP ingress policy with MAC match criteria defined to a SAP. Resources allocated to other criteria are unaffected and can continue to be used.
2. Configuring the **system resource-profile internal-ingress-tcam eth-cfm no up-mep** command deallocates all the resources allocated to CFM UP MEP. After this command is run, user cannot configure UP MEP.

If the system successfully runs the **no** command, it frees up resources used by the chunk or slice and make the resources, or the entire chunk/slice, available for use by other features. Before deallocating resources, the software checks if a service object is using the resource and fails the command if the object is in use. If resources are in use, they can be freed up by deleting a SAP, removing a policy association with a SAP, deleting a MEP, and so on. Some commands under the **system resource-profile** context do not take effect immediately and require a system reboot before the change occurs and resources are freed. The following is the handling of freed resources:

- If some entries in a slice are freed, they are made available for use by other SAPs using the same feature to which the chunk is allocated.
- If an entire chunk is freed, it is returned to the system free pool for possible use by other features.

For more information about specific CLI commands and features that use system resource allocation, see the CLI command and feature descriptions in the appropriate 7210 SAS software user manual.

7.7.2 Allocation of egress internal TCAM resources

Before the introduction of new capabilities, such as IPv6 match criteria, the system allocated egress TCAM resources on bootup for use by different criteria in SAP egress access control lists (ACLs) and other purposes; the resource allocation was not user configurable. With the introduction of new capabilities, such as IPv6 match criteria in egress, the static allocation of resources by software may not meet customer requirements if they want to use different features. Therefore, to facilitate user configuration and resource allocation in accordance with user needs, the ingress internal TCAM resource allocation capabilities have been extended to include the egress internal TCAM resources.

For information about specific CLI commands and features that use system resource allocation, see the CLI command and feature descriptions in the appropriate 7210 SAS software user manuals.

Note:
The commands in the **config**>**system**>**resource-profile** context, which require a reboot to take effect, are read and implemented by the system only during bootup. These commands do not take effect if the **exec** command is used to run the configuration file.

7.7.3 System resource allocation examples

This section provides system resource allocation examples.

Example: 1

```
config> system> resource-profile...
```


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```
...
   acl-sap-ingress 3
      mac-match-enable max
      ipv4-match-enable 1
      no ipv6_128-ipv4-match-enable
      no ipv6_64-only-match-enable
   exit
...
```

In the preceding CLI example, the system performs the following actions:

- 3 chunks are allocated for use by the SAP ingress ACL entries.
- 1 chunk is allocated for use by SAP ingress ACL entries that use ipv4-criteria. The system fails the configuration when the number of ACL entries that use ipv4-criteria exceeds the configured limit (that is, the system does not allocate in excess of the configured limit of 1 chunk).
- A chunk is allocated for use by SAP ingress ACL entries that use mac-criteria. After the **max** keyword is specified, the system allocates 1 chunk for use when an ingress ACL policy (with mac-criteria entries defined) is associated with a SAP. The system can allocate up to 2 chunks because the **max** keyword is used. More chunks are allocated when the user configures a SAP that uses mac-criteria and all entries in the allocated chunks are used up. The system fails the configuration if the number of ACL entries with mac-criteria exceeds the limit of 2 chunks allocated to SAP ingress ACL match (that is, the system does not allocate in excess of the configured limit of 3 chunks; up to 2 chunks of the configured 3 chunk limit are allocated to mac-criteria and 1 chunk is allocated to ipv4-criteria).
- The system fails a user attempt to use SAP ingress ACLs with IPv6 match criteria (and other combinations listed in the preceding list items), because the user has disabled these criteria.

Example: 2

```
config> system> resource-profile>
...
   acl-sap-ingress 3
      mac-match-enable max
      ipv4-match-enable 1
      no ipv6_128-ipv4-match-enable
      ipv6_64-only-match-enable max
   exit
...
```

In the preceding CLI example, the system performs the following actions:

- 3 chunks are allocated for use by the SAP ingress ACL entries. These resources are available for use with mac-criteria, ipv4-criteria and ipv6-64-bit match criteria.
- 1 chunk is allocated for use by SAP ingress ACL entries that use ipv4-criteria. The system fails the configuration if the number of ACL entries using ipv4-criteria exceeds the configured limit (that is, the system does not allocate more than the configured limit of 1 chunk).
- 1 chunk is allocated for use by SAP ingress ACL entries that use mac-criteria when the user associates an ingress ACL policy (with mac-criteria entries defined) with a SAP. Because the **max** keyword is used, the system can allocate more chunks, if a chunk is available for use.

  In this example, (assuming a SAP with an ingress ACL policy that uses ipv6-64-bit criteria is configured), as no additional chunks are available, mac-criteria cannot allocate more than 1 chunk (even if the **max** keyword is specified). The system fails the configuration if the number of ACL entries with mac-criteria exceeds the limit of 1 chunk allocated to SAP ingress ACL mac-criteria

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(that is, the system does not allocate more than the configured limit of 3 chunks = 1 for mac-criteria + for ipv4-criteria + 1 for ipv6-criteria).

- A chunk is allocated for use by SAP ingress ACL entries that use ipv6-64-bit criteria when the user associates an ingress ACL policy (with ipv6-64-bit-criteria entries defined) with a SAP. Because the **max** keyword is specified, the system can allocate more chunks, if a chunk is available for use.

  In this example, as there are no more chunks available, ipv6-64-bit criteria cannot allocate more than 1 chunk (even if the **max** keyword is specified). The system fails the configuration when the number of ACL entries with ipv6-64-bit criteria exceeds the limit of one chunk allocated to SAP ingress ACL match (that is, the system does not allocate more than the configured limit of 3 chunks = 1 for mac-criteria + 1 for ipv4-criteria + 1 for ipv6-64-bit criteria).

- The system fails any attempt to use SAP ingress ACLs with ipv6-128 bit match criteria (and the other combinations listed above), because the user has disabled these criteria.

In Example: 2, the user can run **no ipv4-match-enable** command to disable the use of ipv4-criteria. The system checks for SAPs that use ipv4-criteria and if found, fails the command; otherwise, the chunk freed for use with either mac-criteria or ipv6-64-bit criteria. The entire chunk is allocated to mac-criteria if the first SAP that needs resources requests for mac-criteria and no entries in the chunk are already allocated to mac-criteria, which leaves no resources for use by ipv6-64-bit criteria. In the same way, the entire chunk is allocated to ipv6-64-bit criteria, if the first SAP that needs resources requests for ipv6-64-bit criteria and no entries in the chunk are already allocated to ipv6-64-bit criteria, which leaves no resources for use by mac-criteria.

7.7.4 7210 SAS-R6 and 7210 SAS-R12 configuration guidelines for system resource profile

The following configuration guidelines apply to 7210 SAS-R6 and 7210 SAS-R12:

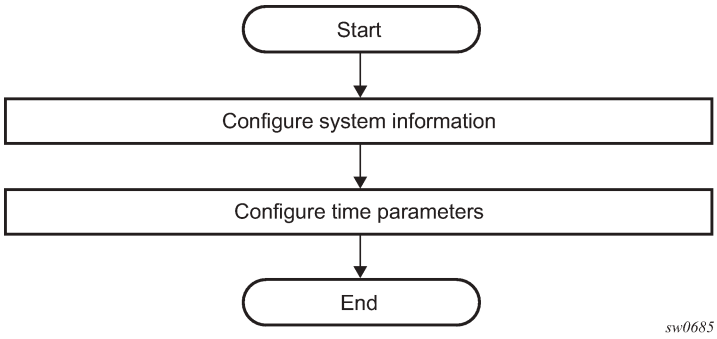
- The user can change the system-resource policy attached to a card/IMM in the following cases:
  - when the card/IMM state is unprovisioned
  - when the card/IMM is provisioned but not equipped
  - when the card/IMM is provisioned and equipped, but there is a mismatch between the two
- Upon provisioning the card, subsequent to attaching a new system-resource policy, the parameters specified in the policy are used (including any boot-time parameters).
- If the card is provisioned and equipped, and any boot-time parameter is changed in the system-resource policy, the user must issue the card reset command for all cards that are using the policy or reboot the chassis, for the policy change to take effect.

7.8 System configuration process overview

The following figure shows the process to provision basic system parameters.

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Figure 21: System configuration and implementation flow



7.9 Configuration notes

This section describes system configuration caveats.

To access the CLI, ensure that the 7210 SAS device is properly initialized and the boot loader and BOFs have successfully executed.

7.10 Configuring system management with CLI

This section provides information about configuring system management features with CLI.

7.11 Saving configurations

Whenever configuration changes are made, the modified configuration must be saved so the changes are not lost when the system is rebooted. The system uses the configuration and image files, as well as other operational parameters necessary for system initialization, according to the locations specified in the boot option file (BOF) parameters. See Boot options for more information about boot option files.

Configuration files are saved by executing implicit or explicit command syntax:

- An explicit save writes the configuration to the location specified in the **save** command syntax using the *file-url* option.
- An implicit save writes the configuration to the file specified in the primary configuration location.

  If the *file-url* option is not specified in the **save** command syntax, the system attempts to save the current configuration to the current BOF primary configuration source. If the primary configuration source (path and/or filename) has changed since the last boot, the new configuration source is used.

Use the **detail** option of the **save** command to save both default and non-default configuration parameters.

The **index** option ensures that the system preserves system indexes when a **save** command is executed, regardless of the persistent status in the BOF. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index, LSP IDs, and path IDs. This reduces resynchronizations of the Network Management System (NMS) with the affected network element.

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If the save attempt fails at the destination, an error occurs and is logged. The system does not try to save the file to the secondary or tertiary configuration sources unless the path and filename are explicitly named with the **save** command.

7.12 Basic system configuration

This section provides information to configure system parameters and provides configuration examples of common configuration tasks. The minimal system parameters that should be configured are System information parameters, Coordinates, and System time elements.

Example: Basic system configuration

```
A:ALA-12>config>system# info
#------------------------------------------
        name "ALA-12"
        coordinates "Unknown"
        snmp
        security
            snmp
                community "private" rwa version both
            exit
        exit
        time
            ntp
                server 192.168.15.221
                no shutdown
            exit
            sntp
                shutdown
            exit
            zone GMT
        exit
------------------------------------------------
A:ALA-12>config>system#
```

7.13 Common configuration tasks

This section provides an overview of the CLI commands used to configure the following system parameters: System information, Coordinates, System time elements, and System administration parameters.

7.13.1 System information

This section describes the basic system information parameters to configure the physical location of the router, contact information, location information for the router such as an address, floor, and room number, global positioning system (GPS) coordinates, and system name.

Use the CLI syntax displayed in this section to configure the system information parameters.

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7.13.1.1 System information parameters

This section describes the system information parameters.

7.13.1.1.1 Name

Use the **system name** command to configure a name for the device. The name is used in the prompt string. Only one system name can be configured. If multiple system names are configured, the last one encountered overwrites the previous entry.

Use the following CLI syntax to configure the system name.

```
config>system
        name <system-name>
```

Example: Command usage

```
config>system# name ALA-12
```

Example: System name configuration

```
sysName@domain>config>system# info
#------------------------------------------
echo "System Configuration "
#------------------------------------------
        name "ALA-12"
. . .
        exit
----------------------------------------------
sysName@domain>config>system#
```

7.13.1.1.2 Contact

Use the **contact** command to specify the name of a system administrator, IT staff member, or other administrative entity.

Use the following syntax to specify the contact name.

```
config>system
        contact <contact-name>
```

Example: Command usage to specify the contact name

```
config>system# contact “Fred Information Technology”
```

7.13.1.1.3 Location

Use the location command to specify the system location of the device. For example, enter the city, building address, floor, and room number where the router is located.

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Use the following CLI syntax to configure the location.

```
config>system
        location <location>
```

Example

The following example shows the command usage to configure the location of the device.

```
config>system# location “Bldg.1-floor 2-Room 201”
```

7.13.1.1.4 CLLI code

The Common Language Location code (CLLI code) is an 11-character standardized geographic identifier that is used to uniquely identify the geographic location of a router.

Use the following CLI command syntax to define the CLLI code.

```
config>system
        clli-code <clli-code>
```

Example: Defining the CLLI code

```
config>system# clli-code abcdefg1234
```

7.13.1.2 Coordinates

Use the optional **coordinates** command to specify the GPS location of the device. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

Use the following CLI syntax to configure the location.

```
config>system
        coordinates coordinates
```

Example: Command usage to configure the location

```
config>system# coordinates "N 45 58 23, W 34 56 12"
```

Example: Configuration output of general system commands

```
sysName@domain>config>system# info
#------------------------------------------
echo "System Configuration "
#------------------------------------------
name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"

. . .
        exit
-------------------------------------------
```


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```
A:ALA-12>config>system#
```

7.13.1.3 System time elements

This section describes system time elements.

The system clock maintains time according to Coordinated Universal Time (UTC). Configure information time zone and summer time (daylight savings time) parameters to correctly display time according to the local time zone.

7.13.1.3.1 Zone

The **zone** command sets the time zone and/or time zone offset for the device. The 7210 SAS OS supports system-defined and user-defined time zones.

Use the following CLI syntax to set the time zone.

```
config>system>time
        zone std-zone-name|non-std-zone-name [hh [:mm]]
```

Example: Command usage to set the time zone

```
config>system>time#
    config>system>time# zone GMT
```

Example: Zone output

```
A:ALA-12>config>system>time# info
----------------------------------------------
ntp
                server 192.168.15.221
                no shutdown
exit
sntp
                shutdown
exit
zone UTC
----------------------------------------------
A:ALA-12>config>system>time#
```

The following table describes the system-defined time zones.

Table 37: System-defined time zones

Acronym	Time zone name	UTC offset
Europe		
GMT	Greenwich Mean Time	UTC
WET	Western Europe Time	UTC
WEST	Western Europe Summer Time	UTC +1 hour

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Acronym	Time zone name	UTC offset
CET	Central Europe Time	UTC +1 hour
CEST	Central Europe Summer Time	UTC +2 hours
EET	Eastern Europe Time	UTC +2 hours
EEST	Eastern Europe Summer Time	UTC +3 hours
MSK	Moscow Time	UTC +3 hours
MSD	Moscow Summer Time	UTC +4 hours
US and Canada		
AST	Atlantic Standard Time	UTC -4 hours
ADT	Atlantic Daylight Time	UTC -3 hours
EST	Eastern Standard Time	UTC -5 hours
EDT	Eastern Daylight Saving Time	UTC -4 hours
CST	Central Standard Time	UTC -6 hours
CDT	Central Daylight Saving Time	UTC -5 hours
MST	Mountain Standard Time	UTC -7 hours
MDT	Mountain Daylight Saving Time	UTC -6 hours
PST	Pacific Standard Time	UTC -8 hours
PDT	Pacific Daylight Saving Time	UTC -7 hours
HST	Hawaiian Standard Time	UTC -10 hours
AKST	Alaska Standard Time	UTC -9 hours
AKDT	Alaska Standard Daylight Saving Time	UTC -8 hours
Australia and New Zealand		
AWST	Western Standard Time (for example, Perth)	UTC +8 hours
ACST	Central Standard Time (for example, Darwin)	UTC +9.5 hours
AEST	Eastern Standard/Summer Time (for example, Canberra)	UTC +10 hours
NZT	New Zealand Standard Time	UTC +12 hours
NZDT	New Zealand Daylight Saving Time	UTC +13 hours

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7.13.1.3.2 Summer time conditions

The **config**>**system**>**time**>**dst-zone** context configures the start and end dates and offset for summer time or daylight savings time to override system defaults or for user-defined time zones.

When configured, the time is adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

Example: CLI syntax to configure daylight savings time

```
config>system>time
        dst-zone zone-name
            end {end-week} {end-day} {end-month} [hours-minutes]
            offset offset
            start {start-week} {start-day} {start-month} [hours-minutes]
```

Example: Command usage to configure daylight savings time

```
 config>system# time
config>system>time# dst-zone pt
 config>system>time>dst-zone# start second sunday april 02:00
 end first sunday october 02:00
 config>system>time>dst-zone# offset 0
```

If the time zone configured is listed in Table 37: System-defined time zones , the starting and ending parameters and offset do not need to be configured with this command unless there is a need to override the system defaults. The command will return an error if the start and ending dates and times are not available either in Table 37: System-defined time zones or entered as optional parameters in this command.

Example: Sample output for the configured parameters

```
A:ALA-48>config>system>time>dst-zone# info
----------------------------------------------
                start second sunday april 02:00
                end first sunday october 02:00
                offset 0
----------------------------------------------
A:ALA-48>config>system>time>dst-zone# offset 0
```

7.13.1.3.3 NTP

Network Time Protocol (NTP) is defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis*. It enables participating network nodes to keep time more accurately and maintain time in a synchronized manner between all participating network nodes.

NTP time elements include: Authentication-check, Authentication-key, Broadcast, Broadcastclient, NTP-server, Peer, and Server.

7.13.1.3.3.1 Authentication-check

The **authentication-check** command provides the option to skip the rejection of NTP PDUs that do not match the authentication key or authentication type requirements. The default behavior when

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authentication is configured is to reject all NTP PDUs that have a mismatch in either the authentication key-id, type, or key.

When **authentication-check** is configured, NTP PDUs are authenticated on receipt. However, mismatches cause a counter to be incremented, one counter for key-id, one for type, and one for key value mismatches.

Use the following CLI syntax to authenticate NTP PDUs on receipt.

```
config>system>time>ntp
        authentication-check
```

Example: Command usage to authenticate NTP PDUs on receipt

```
config>system>time>ntp#
config>system>time>ntp# authentication-check
config>system>time>ntp# no shutdown
```

7.13.1.3.3.2 Authentication-key

This command configures an authentication key ID, key type, and key used to authenticate NTP PDUs sent to and received from other network elements participating in the NTP protocol. For authentication to work, the authentication key ID, authentication type and authentication key value must match.

Use the following CLI syntax to configure an authentication key ID, key type, and key.

```
config>system>time>ntp
        authentication-key key-id {key key} [hash | hash2] type
        {des|message-digest}
```

Example: Command usage

The following example shows the command usage to configure an authentication key ID, key type, and key.

```
 config>system>time>ntp#
config>system>time>ntp# authentication-key 1 key A type des
config>system>time>ntp# no shutdown
```

Example: Configuration output

The following sample configuration shows NTP disabled with the authentication-key parameter enabled.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
                shutdown
                authentication-key 1 key "OAwgNUlbzgI" hash2 type des
----------------------------------------------
A:sim1>config>system>time>ntp#
```

7.13.1.3.3.3 Broadcast

The **broadcast** command is used to transmit broadcast packets on a specific subnet.

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Use the following CLI syntax to transmit broadcast packets.

```
config>system>time>ntp
        broadcast [router router-name]{interface
            ip-int-name}[key-id key-id] [version version][ttl ttl]
```

Example: Command usage to transmit broadcast packets

```
config>system>time>ntp#
 config>system>time>ntp# broadcast interface int11 version 4
  ttl 127
 config>system>time>ntp# no shutdown
```

Example: Configuration output in the system>time context

The following sample configuration of the **system**>**time** context shows NTP enabled with the **broadcast** command configured.

```
A:sim1>config>system>time# info detail
----------------------------------------------
            ntp
                no shutdown
                authentication-check
                ntp-server
                broadcast interface int11 version 4 ttl 127
            exit
A:sim1>config>system>time#
```

Example: Configuration output in the config context

The following sample configuration shows NTP enabled in the **config** context with the **broadcast** command configured. At this level, the NTP broadcast commands are displayed at the end of the output after the router interfaces are shown.

```
A:sim1>config info

    ....

#--------------------------------------------------
echo "System Time NTP Configuration"
#--------------------------------------------------
    system
        time
            ntp
                broadcast interface toboth
            exit
        exit
    exit
A:sim1>config
```

7.13.1.3.4 Broadcastclient

The **broadcastclient** command enables listening to NTP broadcast messages on the specified interface.

Use the following CLI syntax to enable listening to NTP broadcast messages.

```
config>system>time>ntp
```


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```
        broadcastclient[router router-name] {interface ip-int-name} [authenticate]
```

Example: Command usage to enable listening to NTP broadcast messages

```
 config>system>time>ntp#
config>system>time>ntp# broadcastclient interface int11
config>system>time>ntp# no shutdown
```

Example: Configuration output

The following is a sample configuration of NTP enabled with the **broadcastclient** parameter enabled.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            ntp
                broadcastclient interface int11
                no shutdown
            exit
            dst-zone PT
                start second sunday april 02:00
                end first sunday october 02:00
                offset 0
            exit
            zone UTC
----------------------------------------------
A:ALA-12>config>system>time#
```

7.13.1.3.4.1 NTP-server

This command configures the node to assume the role of an NTP server. Unless the **server** command is used, this node will function as an NTP client only and will not distribute the time to downstream network elements. If an authentication **key-id** is specified in this command, the NTP server requires client packets to be authenticated.

Use the following CLI syntax to configure the node to function as an NTP client only.

```
config>system>time>ntp
        ntp-server [transmit key-id]
```

Example: Command usage

The following example shows the command usage to configure the node to function as an NTP client only.

```
config>system>time>ntp#
config>system>time>ntp# ntp-server transmit 1
config>system>time>ntp# no shutdown
```

Example: Configuration output

The following is a sample configuration output of NTP enabled with the **ntp-server** command configured.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
        no shutdown
        ntp-server
```


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```
-----------------------------------------------
A:sim1>config>system>time>ntp#
```

7.13.1.3.4.2 Peer

Configuration of an NTP peer configures symmetric active mode for the configured peer. Although any system can be configured to peer with any other NTP node, Nokia recommends to configure authentication and to configure known time servers as their peers. Use the **no** form of the command to remove the configured peer.

Use the following CLI syntax to configure symmetric active mode.

```
config>system>time>ntp
        peer ip-address [version version][key-id key-id]
        [prefer]
```

Example: Command usage to configure symmetric active mode

```
config>system>time>ntp#
config>system>time>ntp# peer 192.168.1.1 key-id 1
config>system>time>ntp# no shutdown
```

Example: Configuration output

The following is a sample configuration output of NTP enabled with the **peer** command configured.

```
A:sim1>config>system>time>ntp# info
-----------------------------------------------
            no shutdown
            peer 192.168.1.1 key-id 1
-----------------------------------------------
A:sim1>config>system>time>ntp#
```

7.13.1.3.4.3 Server

The **server** command is used when the node should operate in client mode with the NTP server specified in the address field. Use the **no** form of this command to remove the server with the specified address from the configuration. Up to five NTP servers can be configured.

Use the following CLI syntax to configure the node to operate in client mode.

```
config>system>time>ntp
        server {ip-address |ptp}[key-id key-id] [version version] [prefer]
```

Example: Command usage

The following example shows the command usage to configure the node to operate in client mode.

```
config>system>time>ntp#
config>system>time>ntp# server 192.168.1.1 key-id 1
config>system>time>ntp# no shutdown
```


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Example: Configuration output

The following is a sample configuration of NTP enabled with the **server** command configured.

```
A:7210SAS>config>system>time>ntp# info
----------------------------------------------
                ntp-server
                server ptp prefer
                broadcast interface "a1"
                no shutdown
----------------------------------------------
A:7210SAS>config>system>time>ntp#
```

7.13.1.3.5 SNTP

SNTP is a compact, client-only version of the NTP. SNTP can only receive the time from SNTP/NTP servers; it cannot be used to provide time services to other systems. SNTP can be configured in either broadcast or unicast client mode.

SNTP time elements include the Broadcast-client and Server-address.

Use the following CLI syntax to configure the SNTP.

```
config>system
    time
    sntp
        broadcast-client
        server-address ip-address [version version-number] [normal|preferred]
 [interval seconds]
        no shutdown
```

7.13.1.3.5.1 Broadcast-client

The **broadcast-client** command enables listening at the global device level to SNTP broadcast messages on interfaces with broadcast client enabled.

Use the following CLI syntax to enable listening to SNTP broadcast messages at the global device level.

```
config>system>time>sntp
        broadcast-client
```

Example: Command usage

The following example shows the command usage to enable listening to SNTP broadcast messages at the global device level.

```
 config>system>time>sntp#
config>system>time>sntp# broadcast-client
config>system>time>sntp# no shutdown
```


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Example: Configuration output

The following is a sample configuration output of SNTP enabled with the **broadcast-client** command enabled.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            sntp
                broadcast-client
                no shutdown
            exit
            dst-zone PT
                start second sunday april 02:00
                end first sunday october 02:00
                offset 0
            exit
            zone GMT
----------------------------------------------
A:ALA-12>config>system>time#
```

7.13.1.3.5.2 Server-address

The **server-address** command configures an SNTP server for SNTP unicast client mode.

Use the following CLI syntax to configure an SNTP server for unicast client mode.

```
config>system>time>sntp#
                    config>system>time>sntp# server-address ip-address version version-number]
 [normal|preferred] [interval seconds]
```

Example: Command usage

The following example shows the command usage to configure an SNTP server for unicast client mode.

```
  config>system>time>sntp#
 config>system>time# server-address 10.10.0.94 version
  1preferred interval 100
```

Example: Configuration output

The following is a sample configuration output of SNTP enabled with the **server-address** command configured.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            sntp
                server-address 10.10.0.94 version 1 preferred interval 100
                no shutdown
            exit
            dst-zone PT start-date 2006/04/04 12:00 end-date 2006/10/25 12:00
            zone GMT
----------------------------------------------
A:ALA-12>config>system>time#
```


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7.13.1.3.6 CRON

The **cron** command supports the Service Assurance Agent (SAA) functions and the ability to schedule turning on and off policies to meet "Time of Day" requirements. CRON functionality includes the ability to specify the commands that need to be run, when they will be scheduled, including one-time only functionality (oneshot), interval and calendar functions, as well as where to store the output of the results. In addition, CRON can specify the relationship between input, output, and schedule. Scheduled reboots, peer turn ups, service assurance agent tests and more can all be scheduled with CRON, as well as OAM events, such as connectivity checks, or troubleshooting runs.

CRON elements include Action, Schedule, Script, Time range, and Time of Day.

7.13.1.3.6.1 Action

Use this command to configure the parameters for a script, including the maximum amount of time to keep the results from a script run, the maximum amount of time a script may run, the maximum number of script runs to store and the location to store the results.

Use the following CLI syntax to configure the parameters for a script.

```
config>system>cron
    action action-name [owner action-owner]
        expire-time {seconds|forever}
        lifetime {seconds|forever}
        max-completed unsigned
        results file-url
        script script-name [owner script-owner]
        shutdown
```

Example: Command usage to configure the parameters for a script

```
config>system>cron# action test
        config>system>cron>action# results ftp://172.22.184.249/./sim1/test-results
        config>system>cron>action# no shut
```

Example: Configuration output

The following sample output shows a script named "test" receiving an action to store its results in a file called "test-results".

```
A:sim1>config>system>cron# info
----------------------------------------------
        script "test"
            location "ftp://172.22.184.249/./sim1/test.cfg"
            no shutdown
        exit
        action "test"
            results "ftp://172.22.184.249/./sim1/test-results"
            no shutdown
        exit
----------------------------------------------
A:sim1>config>cron# script
```


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7.13.1.3.6.2 Schedule

The schedule function configures the type of schedule to run, including one-time only (oneshot), periodic or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds). If end-time and interval are both configured, whichever condition is reached first is applied.

Use the following CLI syntax to configure the type of schedule to run.

```
config>system>cron
    schedule schedule-name [owner schedule-owner]
        action action-name [owner owner-name]
        count number
        day-of-month {day-number [..day-number]|all}
        description description-string
        end-time [date | day-name] time
        hour {hour-number [..hour-number] | all}
        interval seconds
        minute {minute-number [..minute-number]|all}
        month {month-number [..month-number]|month-name [..month-name]|all}
        no shutdown
        type {periodic|calendar|oneshot}
        weekday {weekday-number [..weekday-number]|day-name [..day-name]|all}
        shutdown
```

Example: Command usage to configure the type of schedule to run

```
config>system>cron# schedule test2
    config>system>cron>sched# day-of-month 17
    config>system>cron>sched# end-time 2007/07/17 12:00
    config>system>cron>sched# minute 0 15 30 45
    config>system>cron>sched# weekday friday
    config>system>cron>sched# shut
```

Example: Configuration output

The following is sample configuration output that schedules a script named "test2" to run every 15 minutes on the 17th of each month and every Friday until noon on July 17, 2007.

```
*A:SR-3>config>system>cron# info
----------------------------------------------
        schedule "test2"
            shutdown
            day-of-month 17
            minute 0 15 30 45
            weekday friday
            end-time 2007/07/17 12:00
        exit
----------------------------------------------
*A:SR-3>config>system>cron#
```

7.13.1.3.6.3 Script

The **script** command opens a new nodal context that contains information about a script.

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Use the following CLI syntax to create a nodal context.

```
config>system>cron
    script script-name [owner script-owner]
        description description-string
        location file-url
        shutdown
```

Example: Command usage to create a nodal context called "test"

```
config>system>cron# script test
config>system>cron>script#
```

Example: Configuration output that names a script "test"

```
A:sim1>config>system>cron# info
----------------------------------------------
        script "test"
            location "ftp://172.22.184.249/./sim1/test.cfg"
            no shutdown
        exit
----------------------------------------------
A:sim1>config>system>cron#
```

7.13.1.3.7 Time range

ACLs and QoS policy configurations may be enhanced to support time-based matching. CRON configuration includes time matching with the **schedule** subcommand. Schedules are based on events; time-range defines an end-time that is used as a match criteria.

Time range elements include Create, Absolute, Daily, Weekdays, Weekend, and Weekly.

7.13.1.3.7.1 Create

This command can be used to enable the **time-range** context.

Use the following syntax to create a time-range.

```
config>system>cron
        time-range name create
```

Example: Command usage to create a time-range called "test1"

```
config>system>cron# time-range test1 create
config>system>cron>time-range$
```

7.13.1.3.7.2 Absolute

The **absolute** command configures a start and end time that will not repeat.

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Use the following syntax to configure a non-repetitive time range.

```
config>system>cron>time-range$
        absolute absolute-time end absolute-time
```

Example: Command usage to configure a non-repetitive time range

```
config>system>cron>time-range$ absolute start 2006/05/05,11:00 end
2006/05/06,11:01
config>system>cron>time-range$
```

Output example

The following is a sample configuration output of an absolute time range beginning on May 5, 2006 at 11:00 and ending May 6, 2006 at 11:01.

```
A:sim1>config>system>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : test1
Triggers    : 0
Status      : Inactive
Absolute    : start 2006/05/05,11:00 end 2006/05/06,11:01
===============================================================================
A:sim1>config>system>cron>time-range#
```

7.13.1.3.7.3 Daily

The **daily** command configures the start and end of a periodic schedule for every day of the week (Sunday through Saturday).

Use the following syntax to configure a time range that is repeated daily.

```
config>system>cron>time-range$
        daily start time-of-day end time-of-day
```

Example: Command usage to create a time range that is repeated daily

```
config>system>cron>time-range$ daily start 11:00 end 12:00
config>system>cron>time-range$
```

Output example

The following is a sample configuration output of a daily time range beginning at 11:00 and ending at 12:00.

```
A:sim1>config>system>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : 1
Triggers    : 0
Status      : Inactive
Periodic    : daily   Start 11:00 End 12:00
===============================================================================
```


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```
A:sim1>config>system>cron>time-range#
```

7.13.1.3.7.4 Weekdays

The **weekdays** command configures the start and end of a periodic schedule for weekdays (Monday through Friday).

Use the following syntax to configure a time range that is repeated on weekdays.

```
config>system>cron>time-range$
        weekdays start time-of-day end time-of-day
```

Example: Command usage to create a time range that is repeated on weekdays

```
config>system>cron>time-range$ weekdays start 11:00 end 12:00
config>system>cron>time-range$
```

Output example

The following is a sample configuration output of a time range beginning at 11:00 and ending at 12:00. This schedule runs all weekdays during this time period.

```
A:sim1>config>system>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : 1
Triggers    : 0
Status      : Inactive
Periodic    : weekdays Start 11:00 End 12:00
===============================================================================
A:sim1>config>system>cron>time-range#
```

7.13.1.3.7.5 Weekend

The **weekend** command configures the start and end of a periodic schedule for weekends (Saturday and Sunday). The resolution must be at least one minute apart, for example, start at 11:00 and end at 11:01. A start time and end time of 11:00 is invalid.

Use the following syntax to configure a time range that is repeated on weekends.

```
config>system>cron>time-range$
        weekend start time-of-day end time-of-day
```

Example: Command usage to create a time range that is repeated on weekends

```
config>system>cron>time-range$ weekend start 11:00 end 12:00
config>system>cron>time-range$
```

Output example

The following is a sample configuration output of a weekend time range beginning at 11:00am and ending at 12:00pm, both Saturday and Sunday.

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To specify 11:00am to 12:00pm on Saturday or Sunday only, use the **absolute** parameter for one day, or the **weekly** parameter for every Saturday or Sunday accordingly. In addition, see the **schedule** parameter to schedule oneshot or periodic events in the **config**>**system**>**cron** context.

```
A:sim1>config>system>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : 1
Triggers    : 0
Status      : Inactive
Periodic    : weekend Start 11:00 End 12:00
```

7.13.1.3.7.6 Weekly

The **weekly** command configures the start and end of a periodic schedule for the same day every week, for example, every Friday. The start and end dates must be the same. The resolution must be at least one minute apart, for example, start at 11:00 and end at 11:01. A start time and end time of 11:00 is invalid.

Use the following syntax to configure a time range that is repeated weekly.

```
config>system>cron>time-range$
        weekly start time-in-week end time-in-week
```

Example: Command usage to create a time range is repeated weekly

```
config>system>cron>time-range$ start fri,01:01 end fri,01:02
config>system>cron>time-range$
```

Example: Configuration output

The following is a sample configuration output of a weekly time range beginning on Friday at 1:01am ending Friday at 1:02am.

```
A:sim1>config>system>cron>time-range$ info
----------------------------------------------
        weekly start fri,01:01 end fri,01:02
----------------------------------------------
A:sim1>config>system>cron>time-range$
```

7.13.1.3.8 Time of Day

Time of Day (TOD) suites are useful when configuring many types of time-based policies or when a large number of subscribers or SAPs require the same type of TOD changes. The TOD suite may be configured while using specific ingress or egress ACLs or QoS policies, and is an enhancement of the ingress and egress CLI trees.

Time of day elements include SAPs, Egress, and Ingress.

7.13.1.3.8.1 SAPs

- If a TOD Suite is assigned to a SAP, statistics collection are not collected for that SAP.

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- When an item is configured both on SAP level and in the TOD suite assigned to the SAP, the TOD-suite defined value takes precedence.
- A policy or filter assignment configured directly on a SAP has a lower priority than any assignment in a TOD Suite. Therefore, it is possible that a new direct configuration has no immediate effect. If the configuration is made by CLI, a warning is given.

7.13.1.3.8.2 Egress

This command is an enhancement for specific egress policies. Use this command to create time-range based associations of previously created filter lists, QoS and scheduler policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

7.13.1.3.8.3 Filters

In a TOD suite, filters that have entries with time-ranges may not be selected. Similarly, filter entries with a time-range may not be created while a TOD suite refers to that filter. QoS policies and filters referred to by a TOD suite must have scope "template" (default).

Use the following syntax to configure TOD-suite egress parameters.

```
config>system>cron
    tod-suite tod-suite-name create
        egress
            filter ip ip-filter-id [time-range time-range-name] [priority priority]
            filter ipv6 ipv6-filter-id [time-range time-range-name] [priority priority]
            filter mac mac-filter-id[time-range time-range-name] [priority priority]
```

Example: Command usage to configure TOD-suite egress parameters

```
config>system>cron>tod-suite$ egress filter ip 100
    config>system>cron>tod-suite$
```

Example: Configuration output

The following is a sample configuration output of an egress IP filter association with filter ID 100.

```
sim1>config>filter# ip-filter 100 create
A:sim1>config>filter>ip-filter$ entry 10 create
A:sim1>config>filter>ip-filter>entry$
A:sim1>config>system>cron>tod-suite# egress filter ip 100
A:sim1>config>system>cron>tod-suite# info detail
----------------------------------------------
            no description
            egress
                filter ip 100
            exit
----------------------------------------------
A:sim1>config>system>cron>tod-suite#
```


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7.13.1.3.8.4 Ingress

This command is an enhancement for specific ingress policies including filter lists and QoS policies. Use this command to create time-range based associations of previously created filter lists and QoS policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range. To configure a daily time-range across midnight, use a combination of two entries. An entry that starts at hour zero will take over from an entry that ends at hour 24.

Use the following syntax to configure time range based associations.

```
config>system>cron
        tod-suite tod-suite-name create
            ingress
                filter ip ip-filter-id [time-range time-range-name] [priority priority]
                filter ipv6 ipv6-filter-id [time-range time-range-name]
                filter mac mac-filter-id[time-range time-range-name] [priority priority]
                qos policy-id [time-range time-range-name] [priority priority]
```

Example: Command usage to configure an IP filter association

```
config>system>cron>tod-suite$ ingress filter ip 100
    config>system>cron>tod-suite$
```

Example: Configuration output

The following is a sample configuration output of an ingress IP filter association with filter ID 100.

```
sim1>config>filter# ip-filter 100 create
A:sim1>config>filter>ip-filter$ entry 10 create
A:sim1>config>filter>ip-filter>entry$
...
A:sim1>config>system>cron>tod-suite# ingress filter ip 100
A:sim1>config>system>cron>tod-suite# info detail
----------------------------------------------
            no description
            ingress
                filter ip 100
            exit
----------------------------------------------
A:sim1>config>system>cron>tod-suite#
```

Example: Command usage to configure an association with a SAP ingress QoS policy

```
 config>system>cron>tod-suite$ ingress qos 101
 config>system>cron>tod-suite$
```

Example: Configuration output

The following is a sample configuration output of an association with SAP ingress QoS policy 101.

```
A:sim1>config>qos# sap-egress 101 create
...
A:sim1>config>system>cron>tod-suite# ingress qos 101
A:sim1>config>system>cron>tod-suite# info detail
----------------------------------------------
            no description
            ingress
```


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```
                qos 101
            exit
-----------------------------------------
A:sim1>config>system>cron>tod-suite#
```

7.13.2 Configuring backup copies

The **config-backup** command allows you to specify the maximum number of backup versions of the configuration and index files kept in the primary location.

For example, assume the **config-backup** *count* is set to "5" and the configuration file is named `xyz.cfg`. When a **save** command is issued, the `xyz.cfg` file is saved with a .1 extension. Each subsequent **config-backup** command increments the numeric extension until the maximum count is reached. The oldest file ("5") is deleted as more recent files are saved.

xyz.cfg

xyz.cfg.1

xyz.cfg.2

xyz.cfg.3

xyz.cfg.4

xyz.cfg.**5**

xyz.ndx

Each persistent index file is updated at the same time as the associated configuration file. When the index file is updated, the save is performed to `xyz.cfg` and the index file is created as `xyz.ndx`. Synchronization between the active and standby is performed for all configurations and their associated persistent index files.

Use the following syntax to specify the maximum number of backup versions of the configuration and index files kept in the primary location.

```
config>system
        config-backup count
```

Example: Command usage

The following example shows the command usage to set the maximum number of backup versions of the configuration and index files kept in the primary location to 7.

```
config>system#
    config>system# config-backup 7
```

Example: Configuration output for the config-backup command

```
A:ALA-12>config>system>time# info
#------------------------------------------
echo "System Configuration"
#------------------------------------------
        name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
```


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```
        config-backup 7
...
-------------------------------------------
A:ALA-12>config>system>time#
```

7.14 System administration parameters

This section describes the system administration parameters and the CLI syntax to configure the parameters.

7.14.1 Disconnect

The **disconnect** command immediately disconnects a user from a console, Telnet, FTP, or SSH session.

Note:
Configuration modifications are saved to the primary image file.

Use the following syntax to disconnect a user from a session.

```
admin
        disconnect [address ip-address |username user-name |{console|telnet|ftp|ssh}]
```

Example: Command usage to disconnect a user from a session

```
 admin# disconnect
```

Example: Output of the disconnect command

```
ALA-1>admin# disconnect
ALA-1>admin# Logged out by the administrator
Connection to host lost.

C:\>
```

7.14.2 Set-time

Use the **set-time** command to set the system date and time. The time entered should be accurate for the time zone configured for the system. The system will convert the local time to UTC before saving to the system clock, which is always set to UTC. If SNTP or NTP is enabled (**no shutdown**), this command cannot be used. The **set-time** command does not take into account any daylight saving offset, if defined.

Use the following syntax to set the date and time.

```
admin
        set-time date time
```

Example: Command usage to set the date and time

```
admin# set-time 2007/02/06 04:10:00
```


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Example: Output of the set-time command

```
ALA-2# admin set-time 2007/02/06 04:10:00
ALA-2# show time
Thu Feb 2 04:10:04 GMT 2007
ALA-2#
```

7.14.3 Display-config

The **display-config** command displays the running configuration of the system.

Use the following syntax to display the running configuration of the system.

```
admin
        display-config [detail] [index]
```

Example: Command usage to display the running configuration of the system

```
admin# display-config detail
```

Example: Configuration output of the display-config detail command

```
A:ALA-12>admin# display-config detail
#------------------------------------------
echo "System Configuration"
#------------------------------------------
    system
        name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
        config-backup 7
        boot-good-exec "ftp://test:test@192.168.xx.xxx/./1xx.cfg.A"
        boot-bad-exec "ftp://test:test@192.168.xx.xxx/./1xx.cfg.1"
        lacp-system-priority 1
        no synchronize
        snmp
            shutdown
            engineID "0000197f000000000467ff00"
            packet-size 1500
            general-port 161
        exit
        login-control
            ftp
                inbound-max-sessions 3
            exit
            telnet
                inbound-max-sessions 5
                outbound-max-sessions 2
            exit
            idle-timeout 1440
            pre-login-message "Property of Service Routing Inc.
                               Unauthorized access prohibited."
            motd text "Notice to all users: Software upgrade scheduled
                       3/2 1:00 AM"
        exit
        security
            management-access-filter
```


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```
                default-action permit
                entry 1
                    no description
...
```

7.14.4 Tech-support

The **tech-support** command creates a system core dump.

Note:
This command should only be used with explicit authorization and direction from Nokia's Technical Assistance Center (TAC).

7.14.5 Save

The **save** command saves the running configuration to a configuration file. If the **debug-save** parameter is specified, debug configurations are saved in the configuration file; otherwise, the debug configurations are not saved between reboots.

Use the following syntax to save the running configuration.

```
admin
    save [file-url][detail][index]
    debug-save [file-url]
```

Example: Command usage to save the running configuration

```
admin# save ftp://test:test@192.168.x.xx/./1.cfg
    admin# debug-save debugsave.txt
```

Example: Configuration output of the save command

```
A:ALA-1>admin# save ftp://test:test@192.168.x.xx/./1x.cfg
Writing file to ftp://test:test@192.168.x.xx/./1x.cfg
Saving configuration ...Completed.
ALA-1>admin# debug-save ftp://test:test@192.168.x.xx/./debugsave.txt
Writing file to ftp://julie:julie@192.168.x.xx/./debugsave.txt
Saving debug configuration .....Completed.
A:ALA-1>admin#
```

See Using SFTP and PKI with the admin>save command for more information about when the SFTP client is used with the **admin>save** command.

7.14.6 Reboot

The **reboot** command reboots the router including redundant cards in redundant systems. If the **now** option is not specified, you are prompted to confirm the reboot operation. The **reboot upgrade** command forces an upgrade of the device firmware (CPLD and ROM) and reboots.

Use the following syntax to reboot the router.

```
admin
```


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```
        reboot [upgrade][auto-init][now]
```

Example: Command usage to reboot the router

```
admin# reboot now
```

Example: Output of the reboot command

```
A:ALA-1>admin# reboot now
Are you sure you want to reboot (y/n)? y
Rebooting...
Using preloaded VxWorks boot loader.
...
```

When an admin reboot auto-init command is issued, the system resets the existing BOF and reboots. The system startup process after the **admin reboot auto-init** command is executed is the same as the first time system boot described in System initialization.

Note:
After the BOF is reset, the system may not boot up with the last saved system configuration unless the new BOF also uses the same configuration file. If you require the system to boot up with the last saved system configuration, Nokia recommends that you should run the **admin>save file-url** command to save the current system configuration and modify the BOF to use this configuration.

Use the following syntax to reset the BOF and reboot.

```
admin# reboot auto-init [now]
```

Example: Output of the admin reboot auto-init command

```
Example: *A:ALA-1# admin reboot auto-init
WARNING: Configuration and/or Boot options may have changed since the last save.
Are you sure you want to reset the bof and reboot (y/n)? Y
Resetting...OK

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```

7.14.7 Post-boot configuration extension files

Two post-boot configuration extension files are supported and are triggered when either a successful or failed boot configuration file is processed. The commands specify URLs for the CLI scripts that are run following the completion of the boot-up configuration. A URL must be specified or no action is taken. The commands are persistent between router reboots and are included in the configuration saves (**admin>save**).

Use the following syntax to configure a URL for a CLI script that runs when the boot-up configuration is completed.

```
config>system
            boot-bad-exec file-url
            boot-good-exec file-url
```


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Example: Command usage

The following example shows the command usage to configure a URL for a CLI script that runs when the boot-up configuration is completed.

```
config>system# boot-bad-exec ftp://test:test@192.168.xx.xxx/./fail.cfg
config>system# boot-good-exec ftp://test:test@192.168.xx.xxx/./ok.cfg
```

Example: Command output

```
*A:ALA# configure system
*A:ALA>config>system# info
----------------------------------------------
#------------------------------------------------
echo "System Configuration"
#------------------------------------------------
        name "ALA"
        boot-good-exec "cf1:\good.cfg"
        boot-bad-exec "cf1:\bad.cfg"
        snmp
            shutdown
        exit
        login-control
            idle-timeout disable
            pre-login-message "ala-1" name
        exit
        time
            ntp
                authentication-key 1 key "SV3BxZCsIvI" hash type message-digest
                server 10.135.16.130
                peer 10.0.0.1 key-id 1
                no shutdown
            exit
            sntp
                server-address 10.135.16.90 preferred
                no shutdown
            exit
            zone UTC
        exit
        thresholds
            rmon
            exit
        exit
#------------------------------------------------
echo "System Security Configuration"
#------------------------------------------------
        security
            hash-control read-version all write-version 1
            telnet-server
            ftp-server
            snmp
                community "private" rwa version both
                community "public" r version both
            exit
            source-address
                application ftp 10.135.16.97
                application snmptrap 10.135.16.97
                application ping 10.135.16.97
                application dns 10.135.16.97
            exit
        exit
----------------------------------------------
```


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```
*A:ALA>config>system#
```

7.14.7.1 Show command output and console messages

The **show>system>information** command displays the current value of the bad and good exec URLs and indicates whether a post-boot configuration extension file was executed when the system was booted. If an extension file was executed, the **show>system>information** command also indicates if it completed successfully.

When executing a post-boot configuration extension file, status messages are output to the CONSOLE screen before the "Login" prompt.

Example

The following is a sample output of a failed boot-up configuration that caused a **boot-bad-exec** file containing another error to be executed.

```
Attempting to exec configuration file:
'ftp://test:test@192.168.xx.xxx/./12.cfg' ...
System Configuration
Log Configuration
MAJOR: CLI #1009 An error occurred while processing a CLI command -
File ftp://test:test@192.168.xx.xxx/./12.cfg, Line 195: Command "log" failed.
CRITICAL: CLI #1002 An error occurred while processing the configuration file.
The system configuration is missing or incomplete.
MAJOR: CLI #1008 The SNMP daemon is disabled.
If desired, enable SNMP with the 'config>system>snmp no shutdown' command.
Attempting to exec configuration failure extension file:
'ftp://test:test@192.168.xx.xxx/./fail.cfg' ...
Config fail extension
Enabling SNMP daemon
MAJOR: CLI #1009 An error occurred while processing a CLI command -
File ftp://test:test@192.168.xx.xxx/./fail.cfg, Line 5: Command "abc log" failed.
TiMOS-B-x.0.Rx both/hops NOKIA Copyright (c) 2016 Nokia.
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Built on Thu Nov 207 19:19:11 PST 2016 by builder in /rel5x.0/b1/Rx/panos/main


Login:
```

7.15 System timing

When synchronous Ethernet is enabled, the operator can select an Ethernet port as a candidate for timing reference. The timing information recovered from this port is used to time the system.

7.15.1 CLI command syntax for 7210 SAS platforms

This section describes the CLI command syntax to enable synchronous Ethernet on specific 7210 SAS platforms.

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7.15.1.1 CLI syntax for 7210 SAS-Mxp

Example

The following is a sample CLI configuration for the 7210 SAS-Mxp.

```
*A:SAS-M2>config>system>sync-if-timing# info detail
----------------------------------------------
            no ql-selection
            ref-order ref1 ref2 ptp bits1 bits2
            ref1
                source-port 1/1/9
                no shutdown
                no ql-override
            exit
            ref2
                source-port 1/1/19
                no shutdown
                no ql-override
            exit
            bits1
                interface-type e1 pcm31crc
                ssm-bit 8
                no ql-override
                input
                    no shutdown
                exit
                output
                    no shutdown
                exit
            exit
            bits2
                input
                    no shutdown
                exit
                output
                    no shutdown
                exit
            exit
            ptp
                shutdown
                no ql-override
            exit
            no revert
----------------------------------------------
*A:SAS-M2>config>system>sync-if-timing#
```

7.15.1.2 CLI syntax for 7210 SAS-R6 and 7210 SAS-R12

Example

The following is a sample CLI configuration for the 7210 SAS-R6 and 7210 SAS-R12.

```
*A:sasr_dutb>config>system>sync-if-timing# info detail
----------------------------------------------
            no ql-selection
            ref-order bits1 ref1 ref2 ptp
            ref1
```


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```
                shutdown
                no source-port
                no ql-override
            exit
            ref2
                shutdown
                no source-port
                no ql-override
            exit
            bits1
                interface-type ds1 esf
                no ql-override
                input
                    shutdown
                exit
                output
                    shutdown
                    line-length 110
                exit
            exit
            ptp
                shutdown
                no ql-override
            exit
            no revert
-----------------------------------------------
*A:sasr_dutb>config>system>sync-if-timing#
```

7.15.1.3 CLI syntax for 7210 SAS-Sx/S 1/10GE

Example

The following is a sample CLI configuration for the 7210 SAS-Sx/S 1/10GE.

```
*7210SAS>config>system>sync-if-timing# info detail
-----------------------------------------------
            no ql-selection
            ref-order ref1 ref2
            ref1
                shutdown
                no source-port
                no ql-override
            exit
            ref2
                shutdown
                no source-port
                no ql-override
            exit
            no revert
-----------------------------------------------
*7210SAS>config>system>sync-if-timing#
```


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7.15.1.4 CLI syntax for 7210 SAS-T

Example

The following is a sample CLI configuration for the 7210 SAS-T.

```
*A:SAS>config>system>sync-if-timing# info detail
----------------------------------------------
            no ql-selection
            ref-order ref1 ref2 ptp bits1 bits2
            ref1
                shutdown
                no source-port
                no ql-override
            exit
            ref2
                shutdown
                no source-port
                no ql-override
            exit
            bits1
                interface-type ds1 esf
                no ql-override
                input
                    shutdown
                exit
                output
                    shutdown
                    line-length 110
                exit
            exit
            bits2
                input
                    shutdown
                exit
                output
                    shutdown
                exit
            exit
            ptp
                shutdown
                no ql-override
            exit
            no revert
----------------------------------------------
*A:SAS>config>system>sync-if-timing#
```

7.15.2 Entering edit mode

To enter edit mode and edit timing references, enter the **begin** keyword at the **config**>**system**>**sync-if-timing#** prompt.

Use the following CLI syntax to enter the edit mode.

```
config>system>sync-if-timing
    begin
```


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Example

The following is a sample error message that is displayed if you try to modify **sync-if-timing** parameters without entering the **begin** keyword.

```
A:ALA-12>config>system>sync-if-timing>ref1# source-port 2/1/1
MINOR: CLI The sync-if-timing must be in edit mode by calling begin before any
 changes can be made.
MINOR: CLI Unable to set source port for ref1 to 2/1/1.
A:ALA-12>config>system>sync-if-timing>ref1#
```

Note:
Use **commit** to save or **abort** to discard the changes made in a session.

7.15.3 Configuring timing references

Example: Configuration of timing reference parameters

```
config>system# sync-if-timing
config>system>sync-if-timing# begin
config>system>sync-if-timing# ref1
config>system>sync-if-timing>ref1# source-port 1/1/1
config>system>sync-if-timing>ref1# no shutdown
config>system>sync-if-timing>ref1# exit
config>system>sync-if-timing# ref2
config>system>sync-if-timing>ref2# source-port 1/1/2
config>system>sync-if-timing>ref2# no shutdown
config>system>sync-if-timing>ref2# exit
config>system>sync-if-timing>commit
```

Example: Configuration output of the timing reference parameters

```
*7210-SAS>config>system>sync-if-timing#info detail

----------------------------------------------
ref-order ref1 ref2
ref1
source-port 1/1/1
no shutdown
exit
ref2
source-port 1/1/2
no shutdown
exit
no revert
----------------------------------------------
```

7.15.4 Using the revert command

The **revert** command allows the clock to revert to a higher-priority reference if the current reference goes offline or becomes unstable.

If revertive switching is enabled, the highest-priority valid timing reference is used. If a reference with a higher priority becomes valid, a switchover to that reference is initiated. If a failure on the current reference occurs, the next highest reference takes over.

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If non-revertive switching is enabled, the active reference always remains selected while it is valid, even if a higher priority reference becomes available. If the active reference becomes invalid, a reference switchover to a valid reference with the highest priority is initiated. The failed reference is eligible for selection when it becomes operational.

Use the following syntax to revert the clock to a higher priority reference.

```
config>system>sync-if-timing
        revert
```

7.15.5 Other editing commands

Other editing commands are:

- **commit**

  Saves changes made to the timing references during a session. Modifications are not persistent across system boots unless this command is entered.

- **abort**

  Discards changes that have been made to the timing references during a session.

Use the following syntax to abort or commit changes made to a timing reference.

```
config>system>sync-if-timing
        abort
        commit
```

7.15.6 Forcing a specific reference

You can force the system synchronous timing output to use a specific reference.

Note:
The **debug sync-if-timing force-reference** command should only be used to test and debug problems. After the system timing reference input has been forced, it will not revert to another reference unless explicitly reconfigured, or if the forced reference fails, or if the received QL code is QL-DNU/DUS and QL selection is enabled.

When the **debug sync-if-timing force-reference** command is run, the current system synchronous timing output is immediately referenced from the specified reference input. The reference must be qualified.

Debug configurations are not saved between reboots.

Use the following syntax to reference the current system synchronous timing output from the specifies reference input.

```
debug>sync-if-timing
         force-reference {ref1 | ref2}
```


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Example

The following example shows the command usage to reference the current system synchronous timing output from the specifies reference input.

```
debug>sync-if-timing# force-reference
```

7.16 Configuring system monitoring thresholds

This section describes how to configure system monitoring thresholds.

7.16.1 Creating events

The **event** command controls the generation and notification of threshold crossing events configured with the **alarm** command. When a threshold crossing event is triggered, the **rmon event** configuration optionally specifies whether an entry in the RMON-MIB log table will be created to record the event. It can also specify whether an SNMP notification (trap) will be generated for the event. There are two notifications for threshold crossing events; a rising alarm and a falling alarm.ping-address.

Creating an event entry in the RMON-MIB log table does not create a corresponding entry in the 7210 SAS event logs. However, when the event is set to trap, the generation of a rising alarm or falling alarm notification creates an entry in the event logs and that is distributed to the configured log destinations, including console, session, memory, file, syslog, or SNMP trap destination. The logger message includes a rising or falling threshold crossing event indicator, the sample type (absolute or delta), the sampled value, the threshold value, the *rmon-alarm-id*, the associated *rmon-event-id*, and the sampled SNMP object identifier.

The **alarm** command configures an entry in the RMON-MIB alarm table. The **alarm** command controls the monitoring and triggering of threshold crossing events. To trigger the notification or logging of a threshold crossing event, at least one associated **rmon event** must be configured.

The agent periodically takes statistical sample values from the MIB variable specified for monitoring and compares them to thresholds that have been configured with the **alarm** command. The **alarm** command configures the MIB variable to be monitored, the polling period (interval), sampling type (absolute or delta value), and rising and falling threshold parameters. If a sample has crossed a threshold value, the associated event is generated.

Preconfigured CLI threshold commands are available. Preconfigured commands hide some of the complexities of configuring RMON alarm and event commands and perform the same function. In particular, the preconfigured commands do not require the user to know the SNMP object identifier to be sampled. The preconfigured threshold configurations include memory warnings, alarms, and compact flash usage warnings and alarms.

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Example: CLI configuration to create events

```
config>system>thresholds# cflash-cap-warn cf1-B: rising-threshold 2000000 falling-
threshold 1999900 interval 240 trap startup-alarm either
```

```
config>system>thresholds# memory-use-alarm rising-threshold 50000000 falling-threshold
 45999999 interval 500 both startup-alarm either
```

```
config>system>thresh# rmon
```

```
config>system>thresh>rmon# event 5 both description "alarm testing" owner "Timos CLI"
```

Example: Command output

```
A:ALA-49>config>system>thresholds# info
----------------------------------------------
            rmon
                event 5 description "alarm testing" owner "Timos CLI"
            exit
            cflash-cap-warn cf1-B: rising-threshold 2000000 falling-
                                   threshold 1999900 interval 240 trap
            memory-use-alarm rising-threshold 50000000 falling-
                                   threshold 45999999 interval 500
----------------------------------------------
A:ALA-49>config>system>thresholds#
```

7.16.2 System alarm contact inputs

7210 SAS hardware supports alarm contact inputs that allow the operator to monitor and report changes in external environmental conditions. In a remote or outdoor deployment, alarm contact inputs allow the operator to detect conditions, for example, air conditioner fault, open door.

You can configure generation of events when alarm contact inputs transition between the open and close states. For each generated event, you can specify the following:

- action associated with each state transition
- severity associated with each state transition
- log message associated with each state transition

7.17 Configuring LLDP

Use the following syntax to configure LLDP.

```
config>system>lldp
        tx-interval <interval>
        tx-hold-multiplier <multiplier>
        reinit-delay <time>
        notification-interval <time>
        tx-credit-max <count>
        message-fast-tx <time>
        message-fast-init <count>
```


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```
        shutdown
```

Example: LLDP port configuration

```
*A:7210-SAS>config>port>ethernet>lldp# info
----------------------------------------------
       dest-mac nearest-bridge
              admin-status tx-rx
              tx-tlvs port-desc sys-cap
              tx-mgmt-address system
       exit
----------------------------------------------
*A:7210-SAS>config>port>ethernet>lldp#
```

Example: Global system LLDP configuration

```
A:7210-SAS>config>system>lldp# info
----------------------------------------------
        tx-interval 10
        tx-hold-multiplier 2
        reinit-delay 5
        notification-interval 10
----------------------------------------------
A:7210-SAS>config>system>lldp#
```

7.18 System command reference

7.18.1 Command hierarchies

- Configuration Commands
  - System information commands
  - Virtual chassis (VC) configuration commands
  - System alarm commands
  - PTP commands
  - System time commands
  - CRON commands
  - Script control commands
  - System administration (admin) commands
  - High availability (redundancy) commands
  - Configuration rollback commands for the 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp
  - Multi-chassis LAG commands
  - System port LAG MAC assignment commands for 7210 SAS-Mxp standalone, 7210 SAS-T, 7210 SAS-Sx 10/100GE standalone, and 7210 SAS-Sx 1/10GE: standalone and standalone-VC
  - System alarm contact commands

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  - System Synchronization Commands
    - System synchronization commands for 7210 SAS-T
    - System synchronization commands for 7210 SAS-Mxp
    - System synchronization commands for 7210 SAS-R6 and 7210 SAS-R12
    - System synchronization commands for 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Sx/S 1/10GE in standalone-VC mode
  - LLDP system commands
  - System Resource-Profile and Resource-Profile Router Commands
    - System resource-profile commands for 7210 SAS-T
    - System resource-profile commands for 7210 SAS-Mxp
    - System resource-profile router commands for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-T
    - System resource-profile commands related to BGP LU FRR and LDPoRSVP FRR for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-T
    - System resource-profile commands for 7210 SAS-Sx/S 1/10GE and 7210 SAS-Sx 10/100GE
    - System resource-profile commands for a Virtual Chassis
    - System resource-profile commands for 7210 SAS-R6 and 7210 SAS-R12
    - System resource-profile commands for MAC authentication
    - Global system resource profile commands for 7210 SAS-R6 and 7210 SAS-R12
    - Global system resource profile commands for a virtual chassis
- Show commands
- Clear commands
- Debug commands
- Tools commands

7.18.1.1 Configuration commands

7.18.1.1.1 System information commands

```
config
    - system
        - boot-bad-exec file-url
        - no boot-bad-exec
        - boot-good-exec file-url
        - no boot-good-exec
        - chassis
            - allow-imm-family imm-family
            - no allow-imm-family
        - clli-code clli-code
        - no clli-code
        - config-backup  count
        - no config-backup
        - contact contact-name
```


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```
        - no contact
        - coordinates coordinates
        - no coordinates
        - dhcp6
            - [no] snooping-enable
        - ip
            - [no] allow-cpu-fragmentation
            - [no] arp-accept-broadcast-reply
        - lacp-system-priority lacp-system-priority
        - no lacp-system-priority
        - lldp
        - location location
        - no location
        - login-control
        - name system-name
        - no name
        - oper-group name [create]
        - no oper-group name
            - hold-time
                - group-down time in seconds
                - no group-down
                - group-up time in seconds
                - no group-up
```

7.18.1.1.2 Virtual chassis (VC) configuration commands

```
config
    - system
        - vc-stack
            - vc-mac-address mac-address num-mac-addr num-mac-addr
            - no vc-mac-address
            - vc-node  slot-number mac-address ieee-address [create]
            - no vc-node  slot-number
                - internal-synce-ports port1 port-id [port2 port-id]
                - no internal-synce-ports
```

7.18.1.2 System alarm commands

```
config
    - system
        - thresholds
            - cflash-cap-alarm cflash-id rising-threshold threshold [falling-
threshold threshold] interval seconds [rmon-event-type] [startup-alarm alarm-type]
            - no cflash-cap-alarm cflash-id
            - cflash-cap-warn cflash-id rising-threshold threshold [falling-
threshold threshold] interval seconds [rmon-event-type] [startup-alarm alarm-type]
            - no cflash-cap-warn cflash-id
            - kb-memory-use-alarm rising-threshold threshold [falling-
threshold threshold] interval seconds [rmon-event-type] [startup-alarm alarm-type]
            - no kb-memory-use-alarm
            - kb-memory-use-warn rising-threshold threshold [falling-
threshold threshold] interval seconds [rmon-event-type] [startup-alarm alarm-type]
            - no kb-memory-use-warn
            - memory-use-alarm rising-threshold threshold [falling-threshold threshold]
 interval seconds [rmon-event-type] [startup-alarm alarm-type]
            - no memory-use-alarm
            - memory-use-warn rising-threshold threshold [falling-threshold threshold]
 interval seconds [rmon-event-type] [startup-alarm alarm-type]
```


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```
            - no memory-use-warn
            - [no] rmon
                - alarm rmon-alarm-id variable-oid oid-string interval seconds [sample-type]
[startup-alarm alarm-type] [rising-event rmon-event-id rising-threshold threshold] [falling
event rmon-event-id falling-threshold threshold] [owner owner-string]
                - no alarm rmon-alarm-id
                - event rmon-event-id [event-type] [description description-string]
[owner owner-string]
                - no event rmon-event-id
```

7.18.1.3 PTP commands

```
config
    - system
        - ptp
            - anno-rx-timeout count
            - no anno-rx-timeout
            - clock
                - freq-source  freq-source
                - no freq-source
            - clock-type boundary
            - clock-type ordinary {slave}
            - domain domain-value
            - no domain
            - local-priority priority
            - log-anno-interval log-interval
            - no log-anno-interval
            - log-sync-interval values
            - no log-sync-interval
            - network-type {sdh | sonet}
            - peer ip-address [create]
            - no peer ip-address
                - local-priority priority
                - [no] shutdown
            - port port-id [create]
            - no port port-id
                - address {01:1b:19:00:00:00 | 01:80:c2:00:00:0e}
                - local-priority priority
                - master-only {true | false}
                - [no] shutdown
            - priority1 priority-value
            - no priority1
            - priority2 priority-value
            - no priority2
            - profile {g8265dot1-2010 | ieee1588-2008 | g8275dot1-2014}
            - [no] shutdown
```

7.18.1.4 System time commands

```
root
    - admin
        - set-time [date] [time]
config
    - system
        - time
            - [no] ntp
                - [no] authentication-check
                - authentication-key key-id key key [hash | hash2] type {des | message-digest}
```


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```
                - no authentication-key key-id
                - [no] authentication-keychain name
                - [no] broadcast [router router-name] {interface ip-int-name} [key-id key-id
| authentication-keychain name]  [version version] [ttl ttl]
                - [no] broadcast [router router-name] {interface ip-int-name}
                - broadcastclient [router router-name] {interface ip-int-name} [authenticate]
                - [no]broadcastclient [router router-name] {interface ip-int-name}
                - [no] ntp-server [authenticate]
                - [no] peer ip-address [version version] [key-id key-id] [prefer]
[authentication-keychain name]
                - [no] server {ip-address | ptp} [version version] [key-id key-id] [prefer]
[authentication-keychain name]
                - [no] shutdown
            - [no] sntp
                - [no] broadcast-client
                - server-address ip-address [version version-number] [normal | preferred]
[interval seconds]
                - no server-address ip-address
                - [no] shutdown
            - [no] dst-zone [std-zone-name | non-std-zone-name]
                - end {end-week} {end-day} {end-month} [hours-minutes]
                - offset offset
                - start {start-week} {start-day} {start-month} [hours-minutes]
            - zone std-zone-name | non-std-zone-name [hh [:mm]]
            - no zone
```

7.18.1.5 CRON commands

```
config
    - system
        - cron
            - schedule schedule-name [owner schedule-owner]
            - no schedule
                - count number
                - no count
                - day-of-month {day-number [..day-number] | all}
                - no day-of-month
                - description description-string
                -  no description
                - end-time [date | day-name] time
                - no end-time
                - hour {..hour-number [..hour-number]|all}
                - no hour
                - interval seconds
                - no interval
                - minute {minute-number [..minute-number]|all}
                - no minute
                - month {month-number [..month-number]|month-name [..month-name]|all}
                - no month
                - script-policy script-policy-name [owner script-policy-owner]
                - no script-policy
                - shutdown
                - no shutdown
                - type schedule-type
                - weekday {weekday-number [..weekday-number]|day-name [..day-name]|all}
                - noweekday
            - time-range name [create]
            - no time-range
                - absolute start start-absolute-time end end-absolute-time
                - no absolute start start-absolute-time
                - daily start start-time-of-day end end-time-of-day
```


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```
                - no daily start start-time-of-day
                - description description-string
                - nodescription
                - weekdays start start-time-of-day end end-time-of-day
                - no weekdays start start-time-of-day
                - weekend start start-time-of-day end end-time-of-day
                - no weekend start start-time-of-day
                - weekly start start-time-in-week end end-time-in-week
                - no weekly start start-time-in-week
            - [no] tod-suite tod-suite-name [create]
                - [no] description description-string
                - egress
                    - filter ip ip-filter-id [time-range time-range-name] [priority priority]
                    - filter ipv6 ipv6-filter-id [time-range time-range-name]
[priority priority]
                    - filter mac mac-filter-id [time-range time-range-name] [priority priority]
                    - no filter ip ip-filter-id [time-range time-range-name]
                    - no filter ipv6 ipv6-filter-id [time-range time-range-name]
                    - no filter mac mac-filter-id [time-range time-range-name]
                - ingress
                    - filter ip ip-filter-id [time-range time-range-name] [priority priority]
                    - filter ipv6 ipv6-filter-id [time-range time-range-name]
[priority priority]
                    - filter mac mac-filter-id [time-range time-range-name]
[priority priority]
                    - no filter ip ip-filter-id [time-range time-range-name]
                    - no filter ipv6 ipv6-filter-id [time-range time-range-name]
                    - no filter mac mac-filter-id [time-range time-range-name]
                    - qos policy-id [time-range time-range-name] [priority priority]
                    - no qos policy-id [time-range time-range-name]
```

7.18.1.6 Script control commands

```
config
    - system
        - script-control
            - [no] script script-name [owner script-owner]
                - description description-string
                - no description
                - location file-url
                - no location
                - [no] shutdown
            - [no] script-policy policy-name [owner policy-owner]
                - expire-time {seconds | forever}
                - lifetime {seconds | forever}
                - max-completed unsigned
                - results file-url
                - no results
                - script script-name [owner script-owner]
                - no script
                - [no] shutdown
```

7.18.1.7 System administration (admin) commands

```
root
    - admin
        - auto-init stop
        - debug-save file-url
```


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```
        - disconnect {address ip-address | username user-name | console | telnet | ftp | ssh |
 netconf}
        - display-config [detail | index]
        - [no] enable-tech
        - radius-discovery
        - reboot [upgrade] [auto-init] [now]
        - reboot [active | standby | upgrade] [auto-init {chassis-role factory-default |
 satellite | standalone}] [now]
        - reboot [file-url] [detail] [index]
        - set-time date / time
        - system
            - security
                - system-password admin-password
        - tech-support [file-url]
        - virtual-chassis {slotid | slotid-range} image-sync
```

7.18.1.8 High availability (redundancy) commands

```
root
    - admin
        - display-config [detail | index]
        - redundancy
            - force-switchover [now]
            - rollback-sync
            - synchronize {boot-env | config}
```

7.18.1.9 Configuration rollback commands for the 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

```
root
    - admin
        - rollback
            - compare [to checkpoint2]
            - compare checkpoint1 to checkpoint2
            - delete checkpoint | rescue
            - revert checkpoint | rescue [now]
            - save [comment comment] [rescue]
            - view [checkpoint | rescue]
config
    - system
        - rollback
            - local-max-checkpoints [1..50]
            - no local-max-checkpoints
            - remote-max-checkpoints [1..200]
            - no remote-max-checkpoints
            - rescue-location file-url
            - rollback-location file-url/rollback filename
        - switchover-exec file-url
        - no switchover-exec
        - rollback-sync
        - no rollback-sync
    - redundancy
        - synchronize {boot-env | config}
        - no synchronize
```


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7.18.1.10 Multi-chassis LAG commands

```
config
    - redundancy
        - multi-chassis
            -  peer ip-address [create]
            - no peer ip-address
                - authentication-key authentication-key | hash-key [hash | hash2]
                - no authentication-key
                - description description-string
                - no description
                - [no] mc-lag
                    - hold-on-neighbor-failure multiplier
                    - no hold-on-neighbor-failure
                    - keep-alive-interval interval
                    - no keep-alive-interval
                    - lag lag-id lacp-key admin-key system-id system-id [remote-lag remote-lag-
id] system-priority system-priority
                    - lag lag-id [remote-lag remote-lag-id]
                    -  no lag lag-id
                    - [no] shutdown
                - peer-name name
                - no peer-name
                - [no] shutdown
                - source-address ip-address
                - no source-address
                - [no] sync
                    - [no] igmp
                    - [no] igmp-snooping
                    - port port-id [sync-tag sync-tag] [create]
                    - no port port-id
                        - range encap-range sync-tag sync-tag
                        - no range encap-range
                    - [no] shutdown
```

7.18.1.11 System port LAG MAC assignment commands for 7210 SAS-Mxp standalone, 7210 SAS-T, 7210 SAS-Sx 10/100GE standalone, and 7210 SAS-Sx 1/10GE: standalone and standalone-VC

```
config
    - system
        - port-lag-mac-assignment [v1-enable]
        - no port-lag-mac-assignment
```

7.18.1.12 System alarm contact commands

```
config
    - system
        - alarm-contact-in-power {on|off}
        - alarm-contact-input alarm-contact-input-id
            - [no] alarm-output-severity [critical | major | minor | none]
            - [no] clear-alarm-msg {alarm-msg-txt}
            - description description-string
            - normal-state [open | closed]
            - [no] shutdown
```


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```
            - [no] trigger-alarm-msg {alarm-msg-txt}
```

7.18.1.13 System synchronization commands for 7210 SAS-T

```
config
    - system
        - sync-if-timing
            - abort
            - begin
            - bits1
                - input
                    - no shutdown
                    - shutdown
                - interface-type {ds1 [{esf|sf}] | e1 [{pcm30crc|pcm31crc}]}
                - no interface-type
                - output
                    - line-length {110|220|330|440|550|660}
                    - no shutdown
                    - shutdown
                - no ql-override
                - ql-override {prs|stu|st2|tnc|st3e|st3|prc|ssua|ssub|sec}
                - ssm-bit sa-bit
            - bits2
                - input
                    - no shutdown
                    - shutdown
                - output
                    - no shutdown
                    - shutdown
            - commit
            - ref-order first second [third] [fourth] [fifth]
            - no ref-order
            - ptp
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec}
                - no ql-override
                - [no] shutdown
            - ref1
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec |
 eec1 | eec2}
                - no ql-override
                - [no] shutdown
                - source-port port-id
                - no source-port
            - ref2
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec |
 eec1 | eec2}
                - no ql-override
                - [no] shutdown
                - source-port port-id
                - no source-port
            - [no] ql-selection
            - [no] revert
```

7.18.1.14 System synchronization commands for 7210 SAS-Mxp

```
config
    - system
        - sync-if-timing
```


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```
            - abort
            - begin
            - bits1
                - input
                    - no shutdown
                    - shutdown
                - interface-type {ds1 [{esf | sf}] | e1 [{pcm30crc | pcm31crc}]}
                - no interface-type
                - output
                    - line-length {110 | 220 | 330 | 440 | 550 | 660}
                    - no shutdown
                    - shutdown
                - no ql-override
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec}
                - ssm-bit sa-bit
            - bits2
                - input
                    - no shutdown
                    - shutdown
                - output
                    - no shutdown
                    - shutdown
            - commit
            - ref-order first second [third] [fourth] [fifth]
            - no ref-order
            - ref1
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec |
eec1 | eec2}
                - no ql-override
                - [no] shutdown
                - source-port port-id
                - no source-port
            - ref2
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec |
eec1 | eec2}
                - no ql-override
                - [no] shutdown
                - source-port port-id
                - no source-port
            - [no] ql-selection
            - [no] revert
```

7.18.1.15 System synchronization commands for 7210 SAS-R6 and 7210 SAS-R12

```
config
    - system
        - sync-if-timing
            - abort
            - begin
            - bits1
                - input
                    - no shutdown
                    - shutdown
                - interface-type {ds1 [{esf | sf}] | e1 [{pcm30crc | pcm31crc}]}
                - no interface-type
                - output
                    - line-length {110 | 220 | 330 | 440 | 550 | 660}
                    - no shutdown
                    - shutdown
                - no ql-override
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec}
```


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```
                - ssm-bit sa-bit
            - commit
            - ref-order first second [third] [fourth]
            - no ref-order
            - ptp
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec}
                - no ql-override
                - [no] shutdown
            - ref1
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec |
eec1 | eec2}
                - no ql-override
                - [no] shutdown
                - source-port port-id
                - no source-port
            - ref2
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec |
eec1 | eec2}
                - no ql-override
                - [no] shutdown
                - source-port port-id
                - no source-port
            - [no] ql-selection
            - [no] revert
```

7.18.1.16 System synchronization commands for 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Sx/S 1/10GE in standalone-VC mode

```
config
    - system
        - sync-if-timing
            - abort
            - begin
            - commit
            - ref-order first second third
            - no ref-order
            - ref1
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec |
eec1 | eec2}
                - no ql-override
                - [no] shutdown
                - source-port port-id
                - no source-port
            - ref2
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec |
eec1 | eec2}
                - no ql-override
                - [no] shutdown
                - source-port port-id
                - no source-port
            - [no] ql-selection
            - [no] revert
```

7.18.1.17 LLDP system commands

```
configure
    - system
```


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```
        - lldp
            - lldp-med
                - network-policy network-policy-id [create]
                - no network-policy network-policy-id
                - application-type {voice | voice-signaling | guest-voice | guest-voice-
signaling | soft-phone-voice | video-conferencing | streaming-video | video-signaling}
                - no application-type
                - dot1p dot1p-value
                - no dot1p
                - ip-dscp ip-dscp
                - no ip-dscp
                - vlan-id 0..4094
                - no vlan-id
                - [no] vlan-tag-present
            - message-fast-tx time
            - no message-fast-tx
            - message-fast-tx-init count
            - no message-fast-tx-init
            - notification-interval time
            - no notification-interval
            - reinit-delay time
            - no reinit-delay
            - [no] shutdown
            - tx-credit-max count
            - no tx-credit-max
            - tx-hold-multiplier multiplier
            - no tx-hold-multiplier
            - tx-interval interval
            - no tx-interval
```

7.18.1.18 System resource-profile commands for 7210 SAS-T

```
configure
    - system
        - resource-profile
        - no resource-profile
            - decommission
                - entry entry-id port port-range to port-range
                - no entry entry-id
            - egress-internal-tcam
                - acl-sap-egress [num-resources]
                - no acl-sap-egress
                    - ipv4-ipv6-128-match-enable num-resources
                    - no ipv4-ipv6-128-match-enable
                    - mac-ipv4-match-enable num-resources
                    - no mac-ipv4-match-enable
                    - mac-ipv6-64bit-match-enable num-resources
                    - no mac-ipv6-64bit-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - egress-sap-aggregate-meter
                - no egress-sap-aggregate-meter num-resources
            - ingress-internal-tcam
                - acl-sap-ingress [num-resources]
                - no acl-sap-ingress
                    - ipv4-ipv6-128-match-enable num-resources
                    - no ipv4-ipv6-128-match-enable
                    - ipv4-match-enable num-resources
                    - no ipv4-match-enable
                    - ipv6-64-only-match-enable num-resources
                    - no ipv6-64-only-match-enable
```


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```
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - g8032-fast-flood-enable
                - no g8032-fast-flood-enable
                - eth-cfm [num-resources]
                - no eth-cfm
                    - up-mep num-resources
                    - no up-mep
                - qos-sap-ingress-resource num-resources
                - no qos-sap-ingress-resource
                    - ipv4-mac-match-enable num-resources
                    - no ipv4-mac-match-enable
                    - ipv4-match-enable num-resources
                    - no ipv4-match-enable
                    - ipv6-ipv4-match-enable num-resources
                    - no ipv6-ipv4-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - no sap-aggregate-meter
                - sap-aggregate-meter num-resources
            - qos
                - mbs-pool {node | port}
                - no mbs-pool
```

7.18.1.19 System resource-profile commands for 7210 SAS-Mxp

```
configure
    - system
        - resource-profile
        - no resource-profile
            - egress-internal-tcam
                - acl-sap-egress [num-resources]
                - no acl-sap-egress
                    - ipv4-ipv6-128-match-enable num-resources
                    - no ipv4-ipv6-128-match-enable
                    - mac-ipv4-match-enable num-resources
                    - no mac-ipv4-match-enable
                    - mac-ipv6-64bit-match-enable num-resources
                    - no mac-ipv6-64bit-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
            - ingress-internal-tcam
                - acl-sap-ingress [num-resources]
                - no acl-sap-ingress
                    - ipv4-ipv6-128-match-enable num-resources
                    - no ipv4-ipv6-128-match-enable
                    - ipv4-match-enable num-resources
                    - no ipv4-match-enable
                    - ipv4-port-range-match-enable num-resources
                    - no ipv4-port-range-match-enable
                    - ipv6-64-only-match-enable num-resources
                    - no ipv6-64-only-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                -  dhcp-snooping-sdp-resource [num-resources]
                -  no dhcp-snooping-sdp-resource
                - eth-cfm [num-resources]
                - no eth-cfm
                    - down-mep num-resources
                    - no down-mep
                    - up-mep num-resources
```


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```
                - no up-mep
            - ip-mpls-protocols num-resources
            - no ip-mpls-protocols
            - qos-access-port-ingress-resource num-resources
            - no qos-access-port-ingress-resource
            - qos-access-port-shared-res num-resources
            - no qos-access-port-shared-res
                - dot1p-dscp-table-match-meter num-resources
                - no dot1p-dscp-table-match-meter
                - ipv4-match-enable num-resources
                - no ipv4-match-enable
                - ipv4-port-range-match-enable num-resources
                - no ipv4-port-range-match-enable
            - qos-sap-egress-resource num-resources
            - no qos-sap-egress-resource
            - qos-sap-ingress-resource num-resources
            - no qos-sap-ingress-resource
                - ip-dscp-port-if-match-enable num-resources
                - no ip-dscp-port-if-match-enable
                - ipv4-mac-match-enable num-resources
                - no ipv4-mac-match-enable
                - ipv4-match-enable num-resources
                - no ipv4-match-enable
                - ipv6-ipv4-match-enable num-resources
                - no ipv6-ipv4-match-enable
                - mac-match-enable num-resources
                - no mac-match-enable
            - no sap-aggregate-meter
            - sap-aggregate-meter num-resources
        - qos
            - no port-scheduler-mode
            - port-scheduler-mode
        - qos-access-port-shared-res-mode
        - no qos-access-port-shared-res-mode
        - sap-scale-mode mode
        - no sap-scale-mode
```

7.18.1.20 System resource-profile router commands for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-T

```
configure
    - system
        - resource-profile
            - router
                - ecmp max-routes-dest
                - no ecmp
                - ldp-ecmp percent-value
                - no ldp-ecmp
                - max-ipv6-routes number
                - no max-ipv6-routes
                - max-ip-subnets number
                - no max-ip-subnets
```

7.18.1.21 System resource-profile commands related to BGP LU FRR and LDPoRSVP FRR for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-T

```
configure
```


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```
    - system
        - resource-profile
            - enable-bgp3107-frr
            - no enable-bgp3107-frr
            - enable-ldporsvp-frr
            - no enable-ldporsvp-frr
```

7.18.1.22 System resource-profile commands for 7210 SAS-Sx/S 1/10GE and 7210 SAS-Sx 10/100GE

```
configure
    - system
        - resource-profile
        - no resource-profile
            - egress-internal-tcam
                - acl-sap-egress [num-resources]
                - no acl-sap-egress
                    - [no] ipv6-128bit-match-enable num-resources
                    - mac-ipv4-match-enable num-resources
                    - no mac-ipv4-match-enable
                    - mac-ipv6-64bit-match-enable num-resources
                    - no mac-ipv6-64bit-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - egress-sap-aggregate-meter num-resources
                - no egress-sap-aggregate-meter num-resources
            - ingress-internal-tcam
                - acl-sap-ingress [num-resources]
                - no acl-sap-ingress
                    - ipv4-ipv6-128-match-enable num-resources
                    - no ipv4-ipv6-128-match-enable
                    - ipv4-match-enable num-resources
                    - no ipv4-match-enable
                    - ipv6-64-only-match-enable num-resources
                    - no ipv6-64-only-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                -  dhcp-snooping-sdp-resource [num-resources]
                -  no dhcp-snooping-sdp-resource
                - eth-cfm [num-resources]
                - no eth-cfm
                    - up-mep num-resources
                    - no up-mep
                    - down-mep num-resources
                    - no down-mep
                - qos-access-port-ingress-resource num-resources
                - no qos-access-port-ingress-resource
                - qos-sap-ingress-resource [num-resources]
                - no qos-sap-ingress-resource
                    - ipv4-mac-match-enable num-resources
                    - no ipv4-mac-match-enable
                    - ipv4-match-enable num-resources
                    - no ipv4-match-enable
                    - ipv6-ipv4-match-enable num-resources
                    - no ipv6-ipv4-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - no sap-aggregate-meter
                - sap-aggregate-meter num-resources
            - sap-scale-mode mode
```


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```
            - no sap-scale-mode
```

7.18.1.23 System resource-profile commands for a Virtual Chassis

```
configure
    - system
        - resource-profile
        - no resource-profile
            - description description-string
            - no description
            - egress-internal-tcam
                - acl-sap-egress [num-resources]
                - no acl-sap-egress
                    - [no] ipv6-128bit-match-enable num-resources
                    - mac-ipv4-match-enable num-resources
                    - no mac-ipv4-match-enable
                    - mac-ipv6-64bit-match-enable num-resources
                    - no mac-ipv6-64bit-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - egress-sap-aggregate-meter num-resources
                - no egress-sap-aggregate-meter num-resources
            - g8032-control-sap-tags vlan-range
            - no g8032-control-sap-tags
            - ingress-internal-tcam
                - acl-sap-ingress [num-resources]
                - no acl-sap-ingress
                    - ipv4-ipv6-128-match-enable num-resources
                    - no ipv4-ipv6-128-match-enable
                    - ipv4-match-enable num-resources
                    - no ipv4-match-enable
                    - ipv6-64-only-match-enable num-resources
                    - no ipv6-64-only-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - eth-cfm [num-resources]
                - no eth-cfm
                    - up-mep num-resources
                    - no up-mep
                    - sap-down-mep num-resources
                    - no sap-down-mep
                    - sdp-down-mep-ing-mip num-resources
                    - no sdp-down-mep-ing-mip
                - no qos-sap-ingress-resource
                - qos-sap-ingress-resource [num-resources]
                    - ipv4-mac-match-enable num-resources
                    - no ipv4-mac-match-enable
                    - ipv4-match-enable num-resources
                    - no ipv4-match-enable
                    - ipv6-ipv4-match-enable num-resources
                    - no ipv6-ipv4-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - no sap-aggregate-meter
                - sap-aggregate-meter num-resources
```


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7.18.1.24 System resource-profile commands for 7210 SAS-R6 and 7210 SAS-R12

```
configure
    - system
        - resource-profile  policy-id [create]
        - no resource-profile  policy-id
            - description description-string
            - no description
            - egress-internal-tcam
                - acl-sap-egress [num-resources]
                - no acl-sap-egress
                    - [no] ipv6-128bit-match-enable num-resources
                    - mac-ipv4-match-enable num-resources
                    - no mac-ipv4-match-enable
                    - mac-ipv6-64bit-match-enable num-resources
                    - no mac-ipv6-64bit-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - egress-sap-aggregate-meter num-resources
                - no egress-sap-aggregate-meter num-resources
                - eth-cfm [num-resources]
                - no eth-cfm
                    - bidir-mip-egress [num-resources]
                    - no bidir-mip-egress
            - g8032-control-sap-tags vlan-range
            - no g8032-control-sap-tags
            - ingress-internal-tcam
                - acl-sap-ingress [num-resources]
                - no acl-sap-ingress
                    - ipv4-ipv6-128-match-enable num-resources
                    - no ipv4-ipv6-128-match-enable
                    - ipv4-match-enable num-resources
                    - no ipv4-match-enable
                    - ipv6-64-only-match-enable num-resources
                    - no ipv6-64-only-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - cpu-protection [num-resources]
                - no cpu-protection]
                - eth-cfm [num-resources]
                - no eth-cfm
                    - up-mep num-resources
                    - no up-mep
                    - down-mep num-resources
                    - no down-mep
                - qos-access-port-ingress-resource num-resources
                - no qos-access-port-ingress-resource
                - qos-network-ingress-resource [num-resources]
                - no qos-network-ingress-resource
                - qos-sap-egress-resource num-resources
                - no qos-sap-egress-resource
                - qos-sap-ingress-resource [num-resources]
                - no qos-sap-ingress-resource
                    - ip-dscp-port-if-match-enable num-resources
                    - no ip-dscp-port-if-match-enable
                    - ipv4-mac-match-enable num-resources
                    - no ipv4-mac-match-enable
                    - ipv4-match-enable num-resources
                    - no ipv4-match-enable
                    - ipv6-ipv4-match-enable num-resources
                    - no ipv6-ipv4-match-enable
                    - mac-match-enable num-resources
```


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```
                    - no mac-match-enable
                - no sap-aggregate-meter
                - sap-aggregate-meter num-resources
```

7.18.1.25 System resource-profile commands for MAC authentication

```
configure
    - system
        - resource-profile  policy-id [create]
        - no resource-profile  policy-id
            - egress-internal-tcam
                - mac-auth-res num-resources
            - ingress-internal-tcam
                - mac-auth-res num-resources
```

7.18.1.26 Global system resource profile commands for 7210 SAS-R6 and 7210 SAS-R12

```
configure
    - system
        - global-res-profile
            - enable-bgp3107-frr
            - no enable-bgp3107-frr
            - enable-ldporsvp-frr
            - no enable-ldporsvp-frr
            - qos
                - no port-scheduler-mode
                - port-scheduler-mode
            - router
                - no ecmp
                - ecmp
                - ldp-ecmp percent-value
                - no ldp-ecmp
                - no max-ipv6-routes
                - max-ipv6-routes number
                - no max-ip-subnets
                - max-ip-subnets number
            - sap-scale-mode mode
            - no sap-scale-mode
            - sf-ingress-internal-tcam
                - eth-cfm-upmeps  max_slices
                - eth-cfm-upmeps
                - g8032-fast-flood max_slices
                - no g8032-fast-flood
                - mpls-p2mp max_slices
                - no mpls-p2mp
```

7.18.1.27 Global system resource profile commands for a virtual chassis

```
configure
    - system
        - global-res-profile
            - enable-bgp3107-frr
            - no enable-bgp3107-frr
            - enable-ldporsvp-frr
            - no enable-ldporsvp-frr
```


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```
            - router
                - no ecmp
                - ecmp
                - ldp-ecmp percent-value
                - no ldp-ecmp
                - no max-ipv6-routes
                - max-ipv6-routes number
                - no max-ip-subnets
                - max-ip-subnets number
```

7.18.1.28 Show commands

```
show
    - alarm-contact-input alarm-contact-input-id [detail]
    - alarm-contact-input all
    - chassis [environment] [power-supply]
    - system
        - chassis [imm-family]
        - chassis {active | configured}
        - connection [address ip-address [interface interface-name]] [port port-number]
 [detail]
        - cpu [sample-period seconds]
        - cron
            - schedule action-name [owner owner-name]
            - tod-suite tod-suite-name [detail] associations failed-associations
            - time-range name associations [detail]
        - global-res-profile [detail]
        - global-res-profile {active | configured}
        - information
        - lldp
        - memory-pools
        - ntp [{peers | peer peer-address} | {servers | server server-address} | [all]]
 [detail]
        - rollback [rescue]
        - resource-profile [active|configured] policy-id [detail]
        - ptp
            - peer ip-address [router router-instance | service-name service-name] [detail]
            - peers [router router-instance | service-name service-name] [detail]
            - port port-id [detail]
            - statistics
            - unicast [router router-instance | service-name service-name]
        - sntp
        - sync-if-timing
        - script-control
            - script [script-name] [owner script-owner]
            - script-policy script-policy-name [owner owner-name]
            - script-policy run-history [run-state]
        - thresholds
        - time
        - time
    - redundancy
        - multi-chassis
            - all [detail]
            - mc-lag peer [ip-address] [lag lag-id]
            - mc-lag [peer ip-address [lag lag-id]] statistics
            - sync [peer ip-address]
            - sync peer ip-address detail
        - synchronization
    - pools
    - force-reference
    - oper-group [group-name]
```


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```
    - oper-group group-name [detail]
    - oper-group group-name [monitoring]
    - uptime
```

7.18.1.29 Clear commands

```
clear
    - screen action-name [owner owner-name]
    - system
        - ptp inactive-peers
        - ptp peer ip-address statistics
        - ptp statistics
            - port port-id statistics
        - script-control
            - script-policy
                - completed [script-policy-name] [owner owner-name]
        - sync-if-timing {ref1 | ref2}
        - sync-if-timing {ref1 | ref2 | bits1 | bits2}
```

7.18.1.30 Debug commands

```
debug
    - sync-if-timing
        - force-reference {ref1 | ref2 | ptp}
        - force-reference {ref1 | ref2 | bits1 | bits2 | ptp}
        - no force-reference
    - [no] system
        - ntp [router router-name] [interface ip-int-name]
```

7.18.1.31 Tools commands

```
tools
    - perform
        - system
            - ssh
                - gen-keypair url-string curve {secp256r1 | secp384r1 | secp521r1} [secure-
download-type]
                - gen-keypair url-string ed25519 [secure-download-type]
                - gen-keypair url-string rsa key-size [secure-download-type]
```

7.18.2 Command descriptions

- Configuration commands
- Show commands
- Clear commands
- Debug commands
- Tools commands

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7.18.2.1 Configuration commands

- Generic commands
- System information commands
- System alarm commands
- PTP commands
- Date and time commands
- System synchronization commands
- Generic commands
- System administration commands
- System alarm contact commands
- Redundancy commands
- Rollback commands
- Peer commands
- MC-LAG commands
- LLDP system commands
- LLDP Ethernet port commands
- System resource-profile commands
- Global system resource profile commands

7.18.2.1.1 Generic commands

shutdown

Syntax

[**no**] **shutdown**

Context

config>system>ptp

config>system>time>ntp

config>system>time>sntp

config>system>cron>sched

config>system>script-control>script-policy

config>system>script-control>script

config>system>sync-if-timing>ref1

config>system>sync-if-timing>ref2

config>redundancy>multi-chassis>peer

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config>redundancy>multi-chassis>peer>mc-lag

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Note:
The **config**>**redundancy**>**multi-chassis**>**peer** and **config**>**redundancy**>**multi-chassis**>**peer**>**mc-lag** contexts are not supported on 7210 SAS platforms configured in the access-uplink operating mode

This command administratively disables the entity. When disabled, an entity does not change, reset, or remove any configuration settings or statistics.

The operational state of the entity is disabled as well as the operational state of any entities contained within. Many objects must be shut down before they may be deleted.

The **no** form of this command places the entity into an administratively enabled state.

Default

no shutdown

Special Cases

PTP Protocol Handling

Applies only to 7210 SAS-Mxp. When the **no shutdown** command is issued in the **configure**>**system**>**ptp** context, resources are allocated to enable processing of the protocol by the node. When the **shutdown** command is issued in the **configure**>**system**>**ptp** context, the resources are deallocated.

Note:
Resources for PTP are allocated when the protocol is enabled in the base routing instance. Resources are deallocated when the configuration of the last PTP context under the base routing instance is shutdown

description

Syntax

description *description-string*

no description

Context

config>system>cron>sched

config>system>cron>time-range

config>system>cron>tod-suite

config>system>script-control>script

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config>redundancy>multi-chassis>peer

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Note:
The **config**>**redundancy**>**multi-chassis**>**peer** context is not supported on 7210 SAS platforms configured in the access-uplink operating mode

This command creates a text description stored in the configuration file for a configuration context.

The **description** command associates a text string with a configuration context to help identify the content in the configuration file.

The **no** form of this command removes the string from the configuration.

Parameters

string

Specifies the description character string. Allowed values are any string up to 80 characters composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

7.18.2.1.2 System information commands

boot-bad-exec

Syntax

boot-bad-exec *file-url*

no boot-bad-exec

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures a URL for a CLI script to exec following a failure of a boot-up configuration. The command specifies a URL for the CLI scripts to be run following the completion of the boot-up configuration. A URL must be specified or no action is taken.

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The commands are persistent between router reboots and are included in the configuration saves (**admin save**).

See the exec command for related commands. This command executes the contents of a text file as if they were commands entered at the console.

Default

no boot-bad-exec

Parameters

file-url

Specifies the location and name of the CLI script file executed following failure of the boot-up configuration file execution. When this parameter is not specified, no CLI script file is executed.

Values *file url* — *local-url* | *remote-url*: 255 chars max

local-url — [*cflash-id*/ | *usb-flash-id*][file-path]

remote-url — [{ftp://} login:pswd@remote-locn/][file-path]

remote-locn — [*hostname* | *ipv4-address*]

ipv4-address— a.b.c.d

usb-flash-id —	uf1: (7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, and 7210 SAS-Sx 10/100GE)
	uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)
cflash-id —	cf1:, cf2: (7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx 10/100GE, and 7210 SAS-Sx 1/10GE: standalone and standalone-VC)
	cf2:, cf2-A:, cf2-B: (7210 SAS-R6 and 7210 SAS-R12)

boot-good-exec

Syntax

boot-good-exec *file-url*

no boot-good-exec

Context

config>system

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Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Use this command to configure a URL for a CLI script to exec following the success of a boot-up configuration.

See the exec command for related commands. This command executes the contents of a text file as if they were commands entered at the console.

Default

no boot-good-exec

Parameters

file-url

Specifies the location and name of the CLI script file executed following failure of the boot-up configuration file execution. When this parameter is not specified, no CLI script file is executed.

Values *file url* — *local-url* | *remote-url*: 255 chars max

local-url — [*cflash-id*/ | *usb-flash-id*][file-path]

remote-url — [{ftp://} login:pswd@remote-locn/][file-path]

remote-locn — [*hostname* | *ipv4-address*]

ipv4-address — a.b.c.d

usb-flash-id — uf1: (7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, and 7210 SAS-Sx 10/100GE)

uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cflash-id — cf1:, cf2: (7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx 10/100GE, and 7210 SAS-Sx 1/10GE: standalone and standalone-VC)

cf2:, cf2-A:, cf2-B: (7210 SAS-R6 and 7210 SAS-R12)

allow-imm-family

Syntax

allow-imm-family *imm-family*

no allow-imm-family

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Context

config>system>chassis

Platforms

7210 SAS-R6 and 7210 SAS-R12

Description

This command allows the users to configure the type of IMM they plan to use with the chassis. The type of IMM planned to be used in a chassis needs to be configured up-front, so that on system boot, the software can allocate appropriate resources based on the IMM type.

The software checks that the IMMs provisioned (and equipped) in the chassis is a member of the IMM family type currently configured (active value) by the user. If the user provisioned IMM does not match the IMM types allowed, the software detects a errors in provisioning mismatch and marks the operational state of the IMM to be down.

Note:

- The user can add in support for any IMM family type by repeated execution of this command. IMM family type will be added, only if the current supported family types are compatible with each other, else an error is returned.
- A change in the current value of IMM family requires a reboot of the node to take effect. therefore, the user configured value for IMM family type takes effect only after the next reboot.

Default

no allow-imm-family

Parameters

imm-family

Specifies the type of IMM family type to be used in a chassis.

Values imm-sas-r-b, imm-sas-r-c

Default imm-sas-r-b

clli-code

Syntax

clli-code *clli-code*

no clli-code

Context

config>system

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Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command creates a Common Language Location Identifier (CLLI) code string for the router. A CLLI code is an 11-character standardized geographic identifier that uniquely identifies geographic locations and certain functional categories of equipment unique to the telecommunications industry.

No CLLI validity checks other than truncating or padding the string to eleven characters are performed.

Only one CLLI code can be configured, if multiple CLLI codes are configured the last one entered overwrites the previous entry.

The **no** form of this command removes the CLLI code.

Parameters

clli-code

Specifies the 11 character string CLLI code. Any printable, seven bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes. If more than 11 characters are entered, the string is truncated. If less than 11 characters are entered the string is padded with spaces.

config-backup

Syntax

config-backup *count*

no config-backup

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the maximum number of backup versions maintained for configuration files and BOF.

For example, assume *count* is set to 5, and the configuration file is called `xyz.cfg.` When a **save** command is executed, the file `xyz.cfg` is saved with a .1 extension. Each subsequent **config-backup** command increments the numeric extension until the maximum count is reached.

xyz.cfg

xyz.cfg.1

xyz.cfg.2

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xyz.cfg.3

xyz.cfg.4

xyz.cfg.5

xyz.ndx

Each persistent index file is updated at the same time as the associated configuration file. When the index file is updated, the save is performed to `xyz.cfg` and the index file is created as `xyz.ndx`. Synchronization between the active and standby is performed for all configurations and their associated persistent index files.

The **no** form of this command reverts the configuration to the default value.

Default

5

Parameters

count

Specifies the maximum number of backup revisions.

Values 1 to 9

contact

Syntax

contact *contact-name*

no contact

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command creates a text string that identifies the contact name for the device.

Only one contact can be configured, if multiple contacts are configured the last one entered will overwrite the previous entry.

The **no** form of this command reverts to the default.

Parameters

contact-name

Specifies the contact name character string. The string may be up to 80 characters. Any printable, seven-bit ASCII characters can be used within the string. If the string contains

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special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

coordinates

Syntax

coordinates *coordinates*

no coordinates

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command creates a text string that identifies the system coordinates for the device location. For example, the command `coordinates "37.390 -122.0550"` is read as latitude 37.390 north and longitude 122.0550 west.

Only one set of coordinates can be configured. If multiple coordinates are configured, the last one entered overwrites the previous entry.

The **no** form of this command reverts to the default value.

Parameters

coordinates

Specifies the coordinates describing the device location character string. The string may be up to 80 characters. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes. If the coordinates are subsequently used by an algorithm that locates the exact position of this node then the string must match the requirements of the algorithm.

dhcp6

Syntax

dhcp6

Context

config>system

Platforms

7210 SAS-Mxp and 7210 SAS-Sx/S 1/10GE (standalone)

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Description

Commands in this context configure system-wide DHCPv6 parameters.

snooping-enable

Syntax

[no] snooping-enable

Context

config>system>dhcp6

Platforms

7210 SAS-Mxp and 7210 SAS-Sx/S 1/10GE (standalone)

Description

This command enables DHCPv6 snooping in a VPLS service at the per-node level to allow the software to appropriately allocate resources to process DHCPv6 messages received on the node. To enable DHCPv6 snooping at the individual service-object level, the user must first configure this command to enable DHCPv6 snooping at the per-node level.

When this command is enabled, the software intercepts both DHCPv4 and DHCPv6 messages received by the node and sends them to the CPU for further processing. If the service object (for example, SAPs and SDP bindings) has DHCPv4 and DHCPv6 snooping enabled, the software adds and removes options to the received DHCPv4 and DHCPv6 client messages.

If this command is enabled and DHCPv4 snooping is disabled at the service object level, the software continues to intercept DHCPv4 messages received by the node and sends them to the CPU to be forwarded as-is without any processing to add or remove options. Similarly, if the command is enabled and DHCPv6 snooping is disabled at the service object level, the software continues to intercept DHCPv6 messages received by the node and sends them to the CPU to be forwarded as-is without any processing to add or remove options.

If this command is not enabled, DHCPv6 snooping does not function and enabling DHCPv6 snooping at the service object level has no effect.

Default

no snooping-enable

ip

Syntax

ip

Context

config>system

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Platforms

7210 SAS-Mxp

Description

Commands in this context configure system-wide IP router parameters.

allow-cpu-fragmentation

Syntax

[**no**] **allow-cpu-fragmentation**

Context

config>system>ip

Platforms

7210 SAS-Mxp

Description

This command enables CPU-based IP fragmentation. When **allow-cpu-fragmentation** is enabled, the CPM extracts oversized IPv4 packets from the datapath, fragments them using the system CPU, and inserts the fragmented packets back into the datapath. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Router Configuration Guide* for more information about IP fragmentation.

The **no** form of this command disables CPU-based IP fragmentation.

Default

no allow-cpu-fragmentation

arp-accept-broadcast-reply

Syntax

[no] arp-accept-broadcast-reply

Context

config>system>ip

Platforms

7210 SAS-Mxp (standalone)

Description

This command enables the processing of broadcast Gratuitous ARP (GARP) replies by the node. When enabled, this command uses two entries in the pool of entries allocated using the **config**>**system**>**resource-profile**>**ing-internal-tcam**>**ip-mpls-protocols** command. If no resources are

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available in the pool, the command fails. Other protocols that use this pool can be disabled to make room for this protocol.

The **no** form of this command disables the processing of GARP replies received by the node. The ARP tables are not updated.

Default

no arp-accept-broadcast-reply

lacp-system-priority

Syntax

lacp-system-priority *lacp-system-priority*

no lacp-system-priority

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the Link Aggregation Control Protocol (LACP) system priority on aggregated Ethernet interfaces. LACP allows the operator to aggregate multiple physical interfaces to form one logical interface.

Default

32768

Parameters

lacp-system-priority

Specifies the LACP system priority.

Values 1 to 65535

location

Syntax

location *location*

no location

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Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command creates a text string that identifies the system location for the device.

Only one location can be configured. If multiple locations are configured, the last one entered overwrites the previous entry.

The **no** form of this command reverts to the default value.

Parameters

location

Specifies the location as a character string. The string may be up to 80 characters. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

login-control

Syntax

login-control

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context configure login control.

name

Syntax

name *system-name*

no name

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Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command creates a system name string for the device.

For example, *system-name* parameter ALA-1 for the **name** command configures the device name as ALA-1.

Only one system name can be configured. If multiple system names are configured, the last one encountered overwrites the previous entry.

The **no** form of this command reverts to the default value.

Default

the default system name is set to the chassis serial number which is read from the backplane EEPROM

Parameters

system-name

Specifies the system name as a character string. The string may be up to 32 characters. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

oper-group

Syntax

oper-group *name* [**create**]

no oper-group *name*

Context

config>system

Platforms

7210 SAS-T (access-uplink), 7210 SAS-Sx/S 1/10GE (standalone), and 7210 SAS-Sx 10/100GE (standalone)

Description

This command creates a system-wide group name that is used to associate of service objects (for example, ports). The status of the group is derived from the status of its members. The group status can then be used to influence the status of non-member objects. For example, when a group status is marked as down, the objects that monitor the group change their status accordingly.

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The **no** form of this command removes the group. All object associations must be removed before running the **no oper-group** command.

Default

no oper-group

Parameters

name

Specifies the operational group identifier, up to 32 characters.

create

Keyword to create the configuration context. Once the context is created, it is possible to navigate into the context without the **create** keyword.

hold-time

Syntax

hold-time

Context

config>system>oper-group

Platforms

7210 SAS-T (access-uplink), 7210 SAS-Sx/S 1/10GE (standalone), and 7210 SAS-Sx 10/100GE (standalone)

Description

Commands in this context configure hold time information.

group-down

Syntax

group-down *time in seconds*

no group-down

Context

config>system>oper-group>hold-time

Platforms

7210 SAS-T (access-uplink), 7210 SAS-Sx/S 1/10GE (standalone), and 7210 SAS-Sx 10/100GE (standalone)

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Description

This command configures the wait time (in seconds) before notifying clients monitoring this group when the oper-group operational status transitions from down to up. A value of zero indicates that transitions are reported immediately to monitoring clients.

The **no** form of this command reverts the value to the default.

Default

group-down 0

Parameters

time in seconds

Specifies the time, in seconds.

Values 0 to 3600

group-up

Syntax

group-up *time in seconds*

no group-up

Context

config>system>oper-group>hold-time

Platforms

7210 SAS-T (access-uplink), 7210 SAS-Sx/S 1/10GE (standalone), and 7210 SAS-Sx 10/100GE (standalone)

Description

This command configures the wait time (in seconds) before notifying clients monitoring this group when the oper-group operational status transitions from up to down.

The **no** form of this command reverts the value to the default.

Default

group-up 4

Parameters

time in seconds

Specifies the time, in seconds.

Values 0 to 3600

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7.18.2.1.3 Virtual Chassis (VC) configuration commands

vc-stack

Syntax

vc-stack

Context

config>system

Platforms

7210 SAS-Sx 1/10GE: standalone-VC and 7210 SAS-S 1/10GE: standalone-VC

Description

Commands in this context configure VC parameters.

vc-mac-address

Syntax

vc-mac-address *mac-address* **num-mac-addr** *num-mac-addr*

no vc-mac-address

Context

config>system>vc-stack

Platforms

7210 SAS-Sx 1/10GE (standalone-VC) and 7210 SAS-S 1/10GE (standalone-VC)

Description

This command configures a MAC address for a VC. This command provides an option to assign a MAC address other than the chassis MAC belonging to the CPM-A node. By assigning the MAC address instead of using the chassis MAC address belonging to the CPM-A node, operators do not need to change the MAC address when the CPM-A card is physically replaced with another card.

The **no** form of this command reverts the value to the default MAC address specified in the BOF.

Parameters

mac-address

Specifies the MAC address of the VC.

Values xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx

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num-mac-addr

Specifies the number of MAC addresses available for use on a LAG. The number of MAC addresses specified must match up with the number of LAGs in use. The LAG will become operationally down if no MAC addresses are available for allocation.

Values 1 to 126

vc-node

Syntax

vc-node *slot-number* **mac-address** *ieee-address* [**create**]

no vc-node *slot-number*

Context

config>system>vc-stack

Platforms

7210 SAS-Sx 1/10GE (standalone-VC) and 7210 SAS-S 1/10GE (standalone-VC)

Description

Commands in this context configure the VC stack node.

The **no** form of this command disables the use of the VC stack node.

Default

no vc-node

Parameters

slot-number

Specifies the slot number used on the VC stack node.

Values 1 to 8

ieee-address

Specifies the destination MAC address for the VC stack node.

Values xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx (no multicast/broadcast address)

create

Keyword used to create the VC stack node.

internal-synce-ports

Syntax

internal-synce-ports port1 *port-id* [**port2** *port-id*]

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no internal-synce-ports

Context

config>system>vc-stack>vc-node

Platforms

7210 SAS-Sx 1/10GE (standalone-VC) and 7210 SAS-S 1/10GE (standalone-VC)

Description

The command configures internal SyncE ports. These ports distribute recovered frequency to other member nodes in the stack. The repurposed internal SyncE ports cannot be used for service delivery or as uplink ports for core network connectivity.

The **no** form of this command disables the use of internal SyncE ports.

Default

no internal-synce-ports

Parameters

port-id

Specifies the port ID, up to 17 characters.

7.18.2.1.4 System alarm commands

thresholds

Syntax

thresholds

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context configure monitoring thresholds.

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kb-memory-use-alarm

Syntax

kb-memory-use-alarm rising-threshold *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]

no kb-memory-use-warn

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures memory use, in kilobytes, alarm thresholds.

The **no** form of this command removes the parameters from the configuration.

Parameters

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated **startup-alarm** is equal to **rising** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the **falling-threshold** value.

Default 0

Values –2147483648 to 2147483647

falling-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated **startup-alarm** is equal to **falling** or **either**.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the **rising-threshold** value.

Default 0

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Values –2147483648 to 2147483647

interval ***seconds***

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs

Values log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm ***alarm-type***

Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and **startup-alarm** is equal to **rising** or **either**, a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values rising, falling, either

Default either

kb-memory-use-warn

Syntax

kb-memory-use-warn rising-threshold *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]

no kb-memory-use-warn

Context

config>system>thresholds

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Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures memory usage, in kilobytes, for warning thresholds

Parameters

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated **startup-alarm** is equal to **rising** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the **falling-threshold** value.

Values –2147483648 to 2147483647

Default 0

falling-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated **startup-alarm** is equal to **falling** or **either**.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the **rising-threshold** value.

Values –2147483648 to 2147483647

Default 0

interval *seconds*

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs.

Values log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** command.

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trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm ***alarm-type***

Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and **startup-alarm** is equal to **rising** or **either**, a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values rising, falling, either

Default either

cflash-cap-alarm

Syntax

cflash-cap-alarm *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]

no cflash-cap-alarm *cflash-id*

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command enables capacity monitoring of the compact flash specified in this command. The severity level is alarm. Both a rising and falling threshold can be specified.

The **no** form of this command removes the configured compact flash threshold alarm.

Parameters

cflash-id

Specifies the name of the cflash device to be monitored.

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Values cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-S 1/10GE: standalone and standalone-VC)

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated **startup-alarm** is equal to **rising** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the **falling-threshold** value.

Values –2147483648 to 2147483647

Default 0

falling-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated **startup-alarm** is equal to **falling** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value raises above this threshold and reaches greater than or equal the **rising-threshold** value.

Values –2147483648 to 2147483647

Default 0

interval *seconds*

Specifies the polling period, in seconds, over which the data is sampled and compared with the rising and falling thresholds.

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs

Values log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log

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destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm ***alarm-type***

Specifies the alarm that may be sent when this alarm is first created.

If the first sample is greater than or equal to the rising threshold value and **startup-alarm** is equal to **rising** or **either**, a single rising threshold crossing event is generated.

If the first sample is less than or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Default either

Values rising, falling, either

cflash-cap-warn

Syntax

cflash-cap-warn *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]

no cflash-cap-warn *cflash-id*

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command enables capacity monitoring of the compact flash specified in this command. The severity level is warning. Both a rising and falling threshold can be specified.

The **no** form of this command removes the configured compact flash threshold warning.

Parameters

cflash-id

Specifies the name of the cflash device to be monitored.

Values cf1:, cf2:, uf1: (7210 SAS-T, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp)

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cf2:, cf2-A:, cf2-B:, uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cf1:, cf2: (7210 SAS-S 1/10GE: standalone and standalone-VC)

rising-threshold ***threshold***

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated **startup-alarm** is equal to **rising** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the **falling-threshold** value.

Values –2147483648 to 2147483647

Default 0

falling-threshold ***threshold***

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated **startup-alarm** is equal to **falling** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value raises above this threshold and reaches greater than or equal the **rising-threshold** value.

Values –2147483648 to 2147483647

Default 0

interval ***seconds***

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs.

Values log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

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both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm *alarm-type*

Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and **startup-alarm** is equal to **rising** or **either**, a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values rising, falling, either

Default either

memory-use-alarm

Syntax

memory-use-alarm rising-threshold *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]

no memory-use-alarm

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

The memory thresholds are based on monitoring the TIMETRA-SYSTEM-MIB sgiMemoryUsed object. This object contains the amount of memory currently used by the system. The severity level is Alarm. The absolute sample type method is used.

The **no** form of this command removes the configured memory threshold warning.

Parameters

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated **startup-alarm** is equal to **rising** or **either**.

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After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the **falling-threshold** value.

Default 0

Values –2147483648 to 2147483647

falling-threshold ***threshold***

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated **startup-alarm** is equal to **falling** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value raises above this threshold and reaches greater than or equal the **rising-threshold** value.

Values –2147483648 to 2147483647

Default 0

interval ***seconds***

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs.

Values log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm ***alarm-type***

Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and **startup-alarm** is equal to **rising** or **either**, a single rising threshold crossing event is generated. If the first sample is less than

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or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values rising, falling, either

Default either

memory-use-warn

Syntax

memory-use-warn rising-threshold *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]

no memory-use-warn

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

The memory thresholds are based on monitoring MemoryUsed object. This object contains the amount of memory currently used by the system. The severity level is Alarm.

The absolute sample type method is used.

The **no** form of this command removes the configured compact flash threshold warning.

Parameters

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated **startup-alarm** is equal to **rising** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the **falling-threshold** value.

Default 0

Values –2147483648 to 2147483647

falling-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and

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the value at the last sampling interval was greater than this threshold. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated **startup-alarm** is equal to falling or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value raises above this threshold and reaches greater than or equal the **rising-threshold** value.

Default 0

Values –2147483648 to 2147483647

interval ***seconds***

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs.

Values log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm ***alarm-type***

Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and **startup-alarm** is equal to **rising** or **either**, a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values rising, falling, either

Default either

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rmon

Syntax

rmon

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context configure generic RMON alarms and events.

Generic RMON alarms can be created on any SNMP object-ID that is valid for RMON monitoring (for example, an integer-based datatype).

The configuration of an event controls the generation and notification of threshold crossing events configured with the **alarm** command.

alarm

Syntax

alarm *rmon-alarm-id* **variable-oid** *oid-string* **interval** *seconds* [*sample-type*] [**startup-alarm** *alarm-type*] [**rising-event** *rmon-event-id* **rising-threshold** *threshold*] [**falling-event** *rmon-event-id* **falling threshold** *threshold*] [**owner** *owner-string*]

no alarm *rmon-alarm-id*

Context

config>system>thresholds>rmon

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures an entry in the RMON-MIB alarm Table. This command controls the monitoring and triggering of threshold crossing events. In order for notification or logging of a threshold crossing event to occur there must be at least one associated **rmon**>**event** configured.

The agent periodically takes statistical sample values from the MIB variable specified for monitoring and compares them to thresholds that have been configured with the alarm command. The alarm command configures the MIB variable to be monitored, the polling period (interval), sampling type (absolute or

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delta value), and rising and falling threshold parameters. If a sample has crossed a threshold value, the associated event is generated.

The **no** form of this command removes an *rmon-alarm-id* from the configuration.

Parameters

rmon-alarm-id

Specifies the alarm being configured. The number of alarms that can be created is limited to 1200.

Values 1 to 65535

variable-oid *oid-string*

Specifies the variable to be sampled. Only SNMP variables that resolve to an ASN.1 primitive type of integer (integer, Integer32, Counter32, Counter64, Gauge, or TimeTicks) may be sampled. The *oid-string* may be expressed using either the dotted string notation or as object name plus dotted instance identifier. For example, "1.3.6.1.2.1.2.2.1.10.184582144" or "ifInOctets.184582144".

The oid-string has a maximum length of 255 characters

interval *seconds*

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds. In the case of **delta** type sampling, the interval should be set short enough that the sampled variable is very unlikely to increase or decrease by more than 2147483647 - 1 during a single sampling interval. To avoid creating unnecessary processing overhead, the interval value should not be set too low.

Values 1 to 2147483647

sample-type

Specifies the method of sampling the selected variable and calculating the value to be compared against the thresholds.

Default absolute

Values **absolute** — Specifies that the value of the selected variable will be compared directly with the thresholds at the end of the sampling interval. **delta** — Specifies that the value of the selected variable at the last sample will be subtracted from the current value, and the difference compared with the thresholds.

startup-alarm *alarm-type*

Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value an **startup-alarm** is equal to **rising** or **either**, a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Default either

Values rising, falling, either

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rising-event *rmon-event-id*

Specifies the action to be taken when a rising threshold crossing event occurs. If there is no corresponding **event** configured for the specified *rmon-event-id*, then no association exists and no action is taken. If the **rising-event** r*mon-event-id* has a value of zero (0), no associated event exists.

If a **rising-event** r*mon-event-id* is configured, the CLI requires a rising threshold to also be configured.

Default 0

Values 0 to 65535

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated **startup-alarm** is equal to **rising** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling threshold value.

Values –2147483648 to 2147483647

Default 0

falling-event *rmon-event-id*

Specifies the action to be taken when a falling threshold crossing event occurs. If there is no corresponding event configured for the specified rmon-event-id, then no association exists and no action is taken. If the falling-event has a value of zero (0), no associated event exists.

If a falling event is configured, the CLI requires a falling-threshold to also be configured.

Values –2147483648 to 2147483647

Default 0

falling-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated **startup-alarm** is equal to **falling** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the **rising-threshold** value.

Values –2147483648 to 2147483647

Default 0

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owner *owner*

Specifies the owner. The owner identifies the creator of this alarm. It defaults to "TiMOS CLI". This parameter is defined primarily to allow entries that have been created in the RMON-MIB alarmTable by remote SNMP managers to be saved and reloaded in a CLI configuration file. The owner will not normally be configured by CLI users and can be a maximum of 80 characters.

Default TiMOS CLI

event

Syntax

event *rmon-event-id* [*event-type*] [**description** *description-string*] [**owner** *owner-string*]

no event *rmon-event-id*

Context

config>system>thresholds>rmon

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures an entry in the RMON-MIB event table. The **event** command controls the generation and notification of threshold crossing events configured with the **alarm** command. When a threshold crossing event is triggered, the **rmon**>**event** configuration optionally specifies if an entry in the RMON-MIB log table should be created to record the occurrence of the event. It may also specify that an SNMP notification (trap) should be generated for the event. The RMON-MIB defines two notifications for threshold crossing events: Rising Alarm and Falling Alarm.

Creating an event entry in the RMON-MIB log table does not create a corresponding entry in the TiMOS event logs. However, when the *event-type* is set to **trap**, the generation of a Rising Alarm or Falling Alarm notification creates an entry in the TiMOS event logs and that is distributed to whatever TiMOS log destinations are configured: CONSOLE, session, memory, file, syslog, or SNMP trap destination.

The TiMOS logger message includes a rising or falling threshold crossing event indicator, the sample type (absolute or delta), the sampled value, the threshold value, the *rmon-alarm-id*, the associated *rmon-event-id* and the sampled SNMP object identifier.

This **no** form of this command removes an *rmon-event-id* from the configuration.

Parameters

rmon-event-type

Specifies the type of notification action to be taken when this event occurs.

Values log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-

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MIB log table entries can be viewed using the **show system thresholds** command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

description description-string

Specifies a user configurable string that can be used to identify the purpose of this event. This is an optional parameter and can be up to 80 characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

owner *owner*

Specifies the creator of this alarm. This parameter is defined primarily to allow entries that have been created in the RMON-MIB alarmTable by remote SNMP managers to be saved and reloaded in a CLI configuration file. The owner will not normally be configured by CLI users and can be a maximum of 80 characters.

Default TiMOS CLI

7.18.2.1.5 PTP commands

ptp

Syntax

ptp

Context

config>system

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

Commands in this context configure parameters for IEEE 1588-2008, Precision Time Protocol.

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anno-rx-timeout

Syntax

anno-rx-timeout *count*

no anno-rx-timeout

Context

config>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures the PTP announce receipt timeout count in the Announce message.

Note:
When the G.8275.1 profile is configured, the 7210 SAS supports a *count* value of 3 only.

The **no** form of this command reverts the count to the default value.

Default

anno-rx-timeout 3

Parameters

count

Specifies the PTP announce receipt timeout count.

Values 2 to 10

clock

Syntax

clock

Context

config>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

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Description

Commands in this context configure the source of frequency reference for PTP.

freq-source

Syntax

freq-source *freq-source*

no freq-source

Context

config>system>ptp>clock

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures a stable frequency reference obtained through one of the line references (SyncE or bits) for the PTP clock. This is achieved by specifying **ssu** to be the frequency source for PTP. This mode of operation where PTP is used only for time recovery, and SyncE or BITS is used for frequency recovery, is known as PTP hybrid mode.

If the frequency reference is set to **ssu**, PTP is running in hybrid mode (if PTP is also in a **no shutdown** state) using the recovered frequency provided by the central clock through either of the configured references (SyncE or BITS, whichever is configured as a reference for the central clock). In this setting, PTP cannot be configured as a reference in the **ref-order**. The CLI blocks this configuration. The reverse is also true; that is, if PTP is configured under **ref-order**, this parameter cannot be set to **ssu**.

If the frequency reference is set to **ptp**, PTP runs in pure mode, potentially being configured as a frequency reference in **ref-order**.

Note:
See Configuration guidelines and restrictions for PTP for more information about command usage.

The **no** form of this command reverts to the default value.

Default

freq-source ptp

Parameters

freq-source

Specifies whether PTP is used for frequency and time recovery, or only for time recovery. If **ptp** is specified, PTP is used for both frequency and time recovery. If **ssu** is specified, PTP is used only for time recovery.

Values ptp, ssu

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clock-type

Syntax

clock-type boundary

clock-type ordinary slave

Context

config>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures the type of clock. The **clock-type** can only be changed when PTP is **shutdown**.

When changing the **clock-type** to or from a boundary clock on the 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Mxp, and 7210 SAS-T platforms, the node must be rebooted for the change to take effect.

Default

ordinary slave

Parameters

boundary

Keyword to configure the clock as a boundary clock capable of functioning as both a timeTransmitter and timeReceiver concurrently.

ordinary slave

Keyword to configure the clock as an ordinary PTP timeReceiver.

domain

Syntax

domain *domain*

no domain

Context

config>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

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Description

This command configures the PTP domain.

The domain cannot be modified unless PTP is shut down.

If the PTP profile is modified, the domain is changed to the default domain for the new PTP profile.

The **no** form of this command reverts to the default configuration.The default value depends on the configured profile.

Default

0 for **ieee1588-2008**

4 for **g8265dot1-2010**

24 for **g8275dot1-2014**

Parameters

domain

Specifies the PTP domain.

Values 0 to 255 for **ieee1588-2008**
0 to 255 for **g8265dot1-2010**
24 to 43 for **g8275dot1-2014**

local-priority

Syntax

local-priority *priority*

Context

config>system>ptp

config>system>ptp>peer

config>system>ptp>port

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures the local priority used to choose between PTP timeTransmitters in the best timeTransmitter clock algorithm (BTCA). This setting is relevant when the profile is set to **g8265dot1-2010** or **g8275dot1-2014**. The parameter is ignored when the profile is set to **ieee1588-2008**. The value 1 is the highest priority and 255 is the lowest priority.

For **g8265dot1-2010**, this command sets the priority to select between timeTransmitter clocks with the same quality.

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For **g8275dot1-2014**, this command sets the value of the **localPriority** associated with the Announce messages received from the external clocks (**ptp>peer** or **ptp>port**), or the local clock (PTP).

Default

local-priority 128

Parameters

priority

Specifies the value of the local priority.

Values 1 to 255

log-anno-interval

Syntax

log-anno-interval *log-interval*

no log-anno-interval

Context

config>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures the PTP Announce interval.

Note:
When the G.8275.1 profile is configured, the 7210 SAS supports a *log-interval* value of –3 only. The system automatically changes the value to –3 when this profile is configured.

The **no** form of this command reverts to the default value.

Default

log-anno-interval 1

Parameters

log-interval

Specifies the PTP Announce interval, specified as the logarithm to the base 2, in seconds.

Values –3 to 4, where –3 = 0.125 s, –2 = 0.25 s, –1 = 0.5 s, 0 = 1 s, 1 = 2 s, 2 = 4 s, 3 = 8 s, 4 = 16 s

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log-sync-interval

Syntax

log-sync-interval *values*

no log-sync-interval

Context

config>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures the message interval used for transmission of multicast synchronization messages.

This command applies only if the profile is set to **ieee1588-2008** or **g8265dot1-2010**. It does not apply when **g8275dot1-2014** is configured. When the profile is set to **g8275dot1-2014**, the value is set to –4 (16 packets/s) and cannot be changed.

For multicast messages used on PTP Ethernet ports, this command configures the message interval used for synchronization messages transmitted by the local node when the port is in the timeTransmitter state.

The **no** form of this command reverts the message interval to the default value.

Default

–6 (64 packets/s) for **ieee1588-2008**

–6 (64 packets/s) for **g8265dot1-2010**

–4 (16 packets/s) for **g8275dot1-2014**

Parameters

values

Specifies the message interval, in log form.

Values –6 to –3, where –6 = 64 packets/s, –5 = 32 packets/s, –4 = 16 packets/s, –3 = 8 packets/s

network-type

Syntax

network-type {**sdh** | **sonet**}

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Context

config>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures the codeset used to encode the QL values into PTP clockClass values when the profile is configured for G.8265.1. The codeset is defined in G.8265.1, Table 1.

This configuration only applies to the range of values observed in the clockClass values transmitted out of the node in Announce messages. The 7210 SAS supports the reception of any valid value in G.8265.1, Table 1.

This command applies only if the PTP profile is set to **g8265dot1-2010**.

Default

network-type sdh

Parameters

sdh

Specifies the values used on a G.781 Option 1 compliant network.

sonet

Specifies the values used on a G.781 Option 2 compliant network.

peer

Syntax

peer *ip-address* [**create**]

no peer *ip-address*

Context

config>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-T (network and access-uplink)

Description

Commands in this context configure parameters associated with remote PTP peers.



Note:
The maximum supported number of PTP peers depends on the supported PTP PPS rate on 7210 SAS platforms. Contact a Nokia representative for more information.

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If the **clock-type** is **ordinary slave** or **boundary**, and PTP is not shut down, the last peer cannot be deleted. This prevents the user from having PTP enabled without any peer configured and enabled.

The **no** form of this command deletes the specified peer.

Parameters

ip-address

Specifies the IPv4 address of the remote peer.

Values a.b.c.d

create

Keyword to create the peer.

shutdown

Syntax

[**no**] **shutdown**

Context

configure>system>ptp>peer

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-T (network and access-uplink)

Description

This command disables or enables a specific PTP peer. Shutting down a peer sends cancel unicast negotiation messages on any established unicast sessions. When the peer is shut down, all received packets from the peer are ignored.

If the **clock-type** is **ordinary slave** or **boundary**, and PTP is not shut down, the last enabled peer cannot be shut down. This prevents the user from having PTP enabled without any peer configured and enabled.

Default

no shutdown

port

Syntax

port *port-id* [**create**]

no port *port-id*

Context

config>system>ptp

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Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures PTP over Ethernet on the physical port. The PTP process transmits and receives PTP messages through the port using Ethernet encapsulation (as opposed to UDP/IPv4 encapsulation).

The frames are transmitted with no VLAN tags even if the port is configured for **dot1q** or **qinq** modes for **encap-type**. In addition, the received frames from the external PTP clock must also be untagged.

There are two reserved multicast addresses allocated for PTP messages, as defined in IEEE 1588-2008 Annex F (see the address command for more information). Either address can be configured for the PTP messages sent through this port.

This command applies only if the PTP profile is set to **g8275dot1-2014**.

Changing the encapsulation or the port type of the Ethernet port is not permitted when PTP Ethernet multicast operation is configured on the port. To change the encapsulation or port type, the physical port must be shut down.

The **no** form of this command deletes the specified PTP port.

Parameters

port-id

Specifies a physical port.

Values *slot/mda/port*

create

Keyword to create the PTP port.

address

Syntax

address {**01:1b:19:00:00:00** | **01:80:c2:00:00:0e**}

Context

config>system>ptp>port

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures the MAC address to be used as the multicast destination MAC address for transmitted PTP messages.

This command applies only if the PTP profile is set to **g8275dot1-2014**.

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The IEEE Std 1588-2008 Annex F defines two reserved addresses for PTP messages:

- 01-1B-19-00-00-00 — for all messages except peer delay mechanism messages
- 01-80-C2-00-00-0E — for peer delay mechanism messages

The system accepts PTP messages received using either destination MAC address, regardless of the address configured by this command.

Default

01:1b:19:00:00:00

master-only

Syntax

master-only {**true** | **false**}

Context

config>system>ptp>port

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command prevents the local port from ever entering the timeReceiver state. This can be used to ensure that the 7210 SAS never draws synchronization from the attached external device.

This command only applies if the profile is set to **g8275dot1-2014**.

If the **clock-type** command is set to **ordinary slave**, the **master-only** value is set the false.

Parameters

true

Keyword to prevent the local port from entering the timeReceiver state.

false

Keyword to allow the local port to enter the timeReceiver state or timeTransmitter state.

shutdown

Syntax

[**no**] **shutdown**

Context

config>system>ptp>port

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Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command disables or enables a specific PTP port. When the PTP port is shut down, all PTP Ethernet messages are dropped on the IOM. They are not counted in the PTP message statistics. No PTP packets are transmitted by the node toward this port.

If the **clock-type** is **ordinary slave** or **boundary**, and PTP is not shut down, the last enabled port cannot be shut down. This prevents the user from having PTP enabled without any means to synchronize the local clock to a parent clock.

This command only applies if the profile is set to **g8275dot1-2014**.

The **no** form of this command disables the specific PTP port.

Default

no shutdown

Special Cases

PTP Protocol Handling

Applies only to the 7210 SAS-Mxp. When the first instance of the PTP protocol is created and the **no shutdown** command is issued in the base routing instance, resources are allocated to enable CPU processing of the protocol. The resources are deallocated when the last instance is removed from the configuration using the **shutdown** command.

priority1

Syntax

priority1 *priority-value*

no priority1

Context

config>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures the priority1 value of the local clock. This parameter is only used when the profile is set to **ieee1588-2008**. This value is used by the BTCA to determine which clock should provide timing for the network. It is also used as the advertised value in Announce messages and as the local clock value in data set comparisons.

The **no** form of this command reverts to the default value.

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Default

priority1 128

Parameters

priority-value

Specifies the value of the priority1 field.

Values 0 to 255

priority2

Syntax

priority2 *priority-value*

no priority2

Context

config>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures the priority2 value of the local clock. This parameter is only used when the profile is set to i**eee1588-2008** or **g8275dot1-2014**. This value is used by the BTCA to determine which clock should provide timing for the network. It is also used as the advertised value in Announce messages and as the local clock value in data set comparisons.

The **no** form of this command reverts to the default value.

Default

priority2 128

Parameters

priority-value

Specifies the value of the priority2 field.

Values 0 to 255

profile

Syntax

profile {**g8265dot1-2010** | **ieee1588-2008** | **g8275dot1-2014**}

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Context

config>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 (standalone), 7210 SAS-T (network and access-uplink)

Description

This command configures the profile for the internal PTP clock. This profile defines the BTCA behavior.

Note:
The 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 supports only the G.8275.1 profile.

The profile cannot be changed unless PTP is shut down.

When the profile is changed, the domain is changed to the default value for the new profile. On some 7210 SAS platforms, a profile change requires a node reboot. See Configuration guidelines and restrictions for PTP for more information.

Descriptions in the **config**>**system**>**ptp** context indicate whether the command is applicable based on the configured profile.

Default

profile g826dot1-2010

Parameters

g8265dot1-2010

Keyword to conform to the ITU-T G.8265.1 specification.

ieee1588-2008

Keyword to conform to the 2008 version of the IEEE 1588 standard.

g8275dot1-2014

Keyword to conform to the ITU-T G.8275.1 specification.

7.18.2.1.6 Date and time commands

set-time

Syntax

set-time [*date*] [*time*]

Context

admin

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Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command sets the local system time.

The time entered should be accurate for the time zone configured for the system. The system will convert the local time to UTC before saving to the system clock which is always set to UTC. This command does not take into account any daylight saving offset if defined.

Parameters

date

Specifies the local date and time accurate to the minute in the YYYY/MM/DD format.

Values YYYY is the four-digit year

MM is the two-digit month

DD is the two-digit date

time

Specifies the time (accurate to the second) in the hh:mm[:ss] format. If no seconds value is entered, the seconds are set to 00.

Values hh is the two-digit hour in 24 hour format (00=midnight, 12=noon)

mm is the two-digit minute

Default 0

time

Syntax

time

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context configure the system time zone and time synchronization parameters.

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7.18.2.1.7 Network Time Protocol commands

ntp

Syntax

[**no**] **ntp**

Context

config>system>time

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context configure Network Time Protocol (NTP) and its operation. This protocol defines a method to accurately distribute and maintain time for network elements. Furthermore this capability allows for the synchronization of clocks between the various network elements.

The **no** form of this command stops the execution of NTP and removes its configuration.

authentication-check

Syntax

[**no**] **authentication-check**

Context

config>system>time>ntp

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command provides the option to skip the rejection of NTP PDUs that do not match the authentication key ID, type or key requirements. The default behavior when authentication is configured is to reject all NTP protocol PDUs that have a mismatch in either the authentication key ID, type or key.

When **authentication-check** is enabled, NTP PDUs are authenticated on receipt. However, mismatches cause a counter to be increased, one counter for type and one for key ID, one for type, value mismatches. These counters are visible in a show command.

The **no** form of this command allows authentication mismatches to be accepted; the counters however are maintained.

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Default

authentication-check — rejects authentication mismatches

authentication-key

Syntax

authentication-key *key-id* {**key** *key*} [**hash** | **hash2**] **type** {**des** | **message-digest**}

no authentication-key *key-id*

Context

config>system>time>ntp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command sets the authentication key ID, type and key used to authenticate NTP PDUs sent to or received by other network elements participating in the NTP protocol. For authentication to work, the authentication key ID, type and key value must match.

The **no** form of this command removes the authentication key.

Parameters

key-id

Specifies the authentication key ID that will be used by the node when transmitting or receiving Network Time Protocol packets.

Entering the **authentication-key** command with a key ID value that matches an existing configuration key will result in overriding the existing entry.

Recipients of the NTP packets must have the same authentication key ID, type, and key value in order to use the data transmitted by this node. This is an optional parameter.

Values 1 to 255

key

Specifies the authentication key associated with the configured key ID, the value configured in this parameter is the actual value used by other network elements to authenticate the NTP packet.

The key can be any combination of ASCII characters up to maximum 32 characters for message-digest (MD5) or maximum 8 characters for DES (length limits are not encrypted). If spaces are used in the string, enclose the entire string in quotation marks (".").

hash

Specifies that the key is entered in an encrypted form. If the hash or hash2 parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security,

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all keys are stored in encrypted form in the configuration file with the hash or hash2 parameter specified.

hash2

Specifies that the key is entered in a more complex encrypted form that involves more variables then the key value alone, this means that hash2 encrypted variable can't be copied and pasted. If the hash or hash2 parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the hash or hash2 parameter specified.

type

Specifies if DES or message-digest authentication is used.

Values **des** — Specifies that DES authentication is used for this key

message-digest — Specifies that MD5 authentication, in accordance with RFC 2104, is used for this key.

authentication-keychain

Syntax

authentication-keychain *name*

no authentication-keychain

Context

config>system>time>ntp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the authentication keychain used to handle unsolicited NTP requests.

If the system receives a request with a key ID that matches both the configured key and the keychain, the system checks the MAC ID using the key information first. If the key authentication fails, the system then checks the MAC ID using the information from the keychain.

The **no** form of this command removes the authentication keychain.

Default

no authentication-keychain

Parameters

name

Specifies the keychain name, up to 32 characters.

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broadcast

Syntax

broadcast [**router** *router-name*] {**interface** *ip-int-name*} [**key-id** *key-id* | **authentication-keychain** *name*] [**version** *version*] [**ttl** *ttl*]

no broadcast [**router** *router-name*] {**interface** *ip-int-name*}

Context

config>system>time>ntp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the node to transmit NTP packets on a given interface. Broadcast messages can easily be spoofed, thus, authentication is strongly recommended.

The **no** form of this command removes the address from the configuration.

Parameters

router

Specifies the router name used to transmit NTP packets. Base is the default.

Values Base, management

Default Base

ip-int-name

Specifies the local interface on which to transmit NTP broadcast packets, up to 32 characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

key-id *key-id*

Specifies the authentication key and authentication type used by this node to receive and transmit NTP packets to and from an NTP server and peers. If an NTP packet is received by this node both authentication key and authentication type must be valid otherwise the packet will be rejected and an event/trap generated.

Values 1 to 255

authentication-keychain *name*

Specifies the keychain name, up to 32 characters.

version *version*

Specifies the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode in which case all versions will be accepted.

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Values 2 to 4

Default 4

ttl *ttl*

Specifies the IP Time To Live (TTL) value.

Values 1 to 255

broadcastclient

Syntax

broadcastclient [**router** *router-name*] {**interface** *ip-int-name*} [**authenticate**]

no broadcastclient [**router** *router-name*] {**interface** *ip-int-name*}

Context

config>system>time>ntp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the node to receive broadcast packets on a given subnet. Broadcast messages can easily be spoofed, thus, authentication is strongly recommended. If broadcast is not configured then received NTP broadcast traffic will be ignored. Use the show command to view the state of the configuration.

The **no** form of this command removes the address from the configuration.

Parameters

router router-name

Specifies the router name used to receive NTP packets.

Values Base, management

Default Base

interface ip-int-name

Specifies the local interface on which to receive NTP broadcast packets, up to 32 characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

authenticate

Specifies whether or not to require authentication of NTP PDUs. When enabled, NTP PDUs are authenticated upon receipt.

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ntp-server

Syntax

ntp-server [**authenticate**]

no ntp-server

Context

config>system>time>ntp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the node to assume the role of an NTP server. Unless the server command is used, this node will function as an NTP client only and will not distribute the time to downstream network elements.

Default

no ntp-server

Parameters

authenticate

Keyword to make authentication a requirement. If authentication is required, the authentication key ID received in a message must have been configured in the **authentication-key** command, and that the key ID type and value must also match.

peer

Syntax

peer *ip-address* [**key-id** *key-id*] [**version** *version*] [**prefer**] [**authentication-keychain** *name*]

no peer *ip-address*

Context

config>system>time>ntp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

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Description

This command configures symmetric active mode for an NTP peer. Although any system can be configured to peer with any other NTP node it is recommended to configure authentication and to configure known time servers as their peers.

The **no** form of this command removes the configured peer.

Parameters

ip-address

Specifies the IP address of the peer that requires a peering relationship to be set up.

key-id *key-id*

Specifies the *key-id* that identifies the configured authentication key and authentication type used by this node to transmit NTP packets to an NTP peer. Successful authentication requires that both peers must have configured the same authentication key ID, type and key value.

If an NTP packet is received by this node, the authentication key ID, type, and key value must be valid otherwise the packet will be rejected and an event/trap generated.

Values 1 to 255

version *version*

Specifies the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode in which case all three nodes are accepted.

Default 4

Values 2 to 4

prefer

Specifies the preferred peer. When configuring more than one peer, one remote system can be configured as the preferred peer. When a second peer is configured as preferred, the new entry overrides the old entry.

authentication-keychain *name*

Specifies the keychain name, up to 32 characters.

server

Syntax

server {*ip address* | **ptp**} [**key-id** *key-id*] [**version** *version*] [**prefer**] [**authentication-keychain** *name*]

no server *ip address*

Context

config>system>time>ntp

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Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command is used when the node should operate in client mode with the NTP server specified in the address field of this command.

Up to five NTP servers can be configured.

If the internal PTP process is to be used as a source of time for System Time and OAM time then it must be specified as a server for NTP. If PTP is specified then the prefer parameter must also be specified. Once PTP has established a UTC traceable time from an external grandmaster then it shall always be the source for time into NTP even if PTP goes into time holdover.



Note:
Use of the internal PTP time source for NTP will promote the internal NTP server to stratum 1 level. This may impact the NTP network topology.

The **no** form of this command removes the server with the specified address from the configuration.

Parameters

ip-address

Specifies the IP address of a node that acts as an NTP server to this network element.

Values a.b.c.d

ptp

Keyword to configure the internal PTP process as a time server into the NTP process. The **prefer** keyword is mandatory with this server option. The **ptp** keyword is supported only on the 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE (standalone), and 7210 SAS-T.

key-id *key-id*

Specifies the configured authentication key and authentication type used by this node to transmit NTP packets to an NTP server. If an NTP packet is received by this node, the authentication key ID, type, and key value must be valid otherwise the packet will be rejected and an event/trap generated.

Values 1 to 255

version *version*

Specifies the NTP version number that is expected by this node.

Default 4

Values 2 to 4

prefer

Specifies the preferred peer. When configuring more than one peer, one remote system can be configured as the preferred peer. When a second peer is configured as preferred, the new entry overrides the old entry.

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authentication-keychain *name*

Specifies the keychain name, up to 32 characters.

7.18.2.1.8 SNTP commands

sntp

Syntax

[**no**] **sntp**

Context

config>system>time

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command creates the context to edit the Simple Network Time Protocol (SNTP).

SNTP can be configured in either broadcast or unicast client mode. SNTP is a compact, client-only version of the NTP. SNTP can only receive the time from SNTP/NTP servers. It cannot be used to provide time services to other systems.

The system clock is adjusted automatically during system initialization and periodically to ensure that the local time is close to server's time. However, if the time difference between the SNTP/NTP server and the system clock is more than 2.5 seconds, the software corrects the system time gradually adjusted over an interval.

SNTP is created in an administratively enabled state (**no shutdown**).

The **no** form of this command removes the SNTP instance and configuration. SNTP does not need to be administratively disabled when removing the SNTP instance and configuration.

Default

no sntp

broadcast-client

Syntax

[**no**] **broadcast-client**

Context

config>system>time>sntp

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Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command enables listening to SNTP/NTP broadcast messages on interfaces with broadcast client enabled at global device level.

If this global parameter is configured, the **ntp-broadcast** parameter must be configured on selected interfaces on which NTP broadcasts are transmitted.

SNTP must be shutdown prior to changing either to or from broadcast mode.

The **no** form of this command disables broadcast client mode.

Default

no broadcast-client

server-address

Syntax

server-address *ip-address* [**version** *version-number*] [**normal** | **preferred**]

[**interval** *seconds*]

no server-address

Context

config>system>time>sntp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command creates an SNTP server for unicast client mode.

Parameters

ip-address

Specifies the IP address of the SNTP server.

version ***version-number***

Specifies the SNTP version supported by this server.

Values 1 to 3

Default 3

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normal | preferred

Specifies the preference value for this SNTP server. When more than one time-server is configured, one server can have preference over others. The value for that server should be set to **preferred**. Only one server in the table can be a preferred server.

Default normal

interval *seconds*

Specifies the frequency at which this server is queried.

Values 64 to 1024

Default 64

7.18.2.1.9 CRON commands

cron

Syntax

cron

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context create scripts, script parameters and schedules that support the Service Assurance Agent (SAA) functions.

CRON features are saved to the configuration file on both primary and backup control modules. If a control module switchover occurs, CRON events are restored when the new configuration is loaded. If a control module switchover occurs during the execution of a CRON script, the failover behavior will be determined by the contents of the script.

schedule

Syntax

schedule *schedule-name* [**owner** *schedule-owner*]

[**no**] **schedule**

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Context

config>system>cron

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the type of schedule to run, including one-time only (oneshot), periodic or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds).

The **no** form of this command removes the context from the configuration.

Parameters

schedule-name

Specifies the name of the schedule.

owner *schedule-owner*

Specifies the owner name of the schedule.

count

Syntax

count *number*

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the total number of times a CRON interval schedule is run. For example, if the interval is set to 600 and the count is set to 4, the schedule runs 4 times at 600 second intervals.

Parameters

number

Specifies the number of times the schedule is run.

Values 1 to 65535

Default 65535

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day-of-month

Syntax

day-of-month {*day-number* [..*day-number*] **all**}

[**no**] **day-of-month**

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command specifies which days of the month that the schedule will occur. Multiple days of the month can be specified. When multiple days are configured, each of them will cause the schedule to trigger. If a day-of-month is configured without configuring the **month**, **weekday**, **hour** and **minute** commands, the event will not execute.

Using the **weekday** command as well as the **day-of-month** command will cause the script to run twice. For example, consider that "today" is Monday January 1. If "Tuesday January 5" is configured, the script will run on Tuesday (tomorrow) as well as January 5 (Friday).

See the month, weekday, hour, and minute commands for more information.

The **no** form of this command removes the specified day-of-month from the list.

Parameters

day-number

Specifies the day. The positive integers specify the day of the month counting from the first of the month. The negative integers specify the day of the month counting from the last day of the month. For example, configuring *day-of-month* -5, 5 in a month that has 31 days will specify the schedule to occur on the 27th and 5th of that month.

Integer values must map to a valid day for the month in question. For example, February 30 is not a valid date.

Values 1 to 31, -31 to -1 (maximum 62 day-numbers)

all

Specifies all days of the month.

end-time

Syntax

end-time [*date* | *day-name*] *time*

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[**no**] **end-time**

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command is used concurrently with type **periodic** or **calendar**. Using the type of **periodic**, end-time determines at which interval the schedule will end. Using the type of **calendar**, end-time determines on which date the schedule will end.

When **no end-time** is specified, the schedule runs forever.

Parameters

date

Specifies the date to schedule a command.

Values YYYY:MM:DD in year:month:day number format

day-name

Specifies the day of the week to schedule a command.

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday

time

Specifies the time of day to schedule a command.

Values hh:mm in hour:minute format

hour

Syntax

hour {..*hour-number* [..*hour-number*] | **all**}

[**no**] **hour**

Context

config>system>cron>sched

Platforms

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Description

This command specifies which hour to schedule a command. Multiple hours of the day can be specified. When multiple hours are configured, each of them will cause the schedule to trigger. The **day-of-month** or **weekday** must also be specified. All days of the month or weekdays can be specified. If an hour is configured without configuring the **month**, **weekday**, **day-of-month** and **minute** commands, the event will not execute. See the month, weekday, day-of-month, and minute commands for more information.

The **no** form of this command removes the specified hour from the configuration.

Parameters

hour-number

Specifies the hour to schedule a command.

Values 0 to 23 (maximum 24 hour-numbers)

all

Specifies all hours.

interval

Syntax

interval *seconds*

[**no**] **interval**

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command specifies the interval between runs of an event.

Parameters

seconds

Specifies the interval, in seconds, between runs of an event.

Values 30 to 4,294,967,295

minute

Syntax

minute {*minute-number* [..*minute-number*]| **all**}

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[**no**] **minute**

Context

config>system>cron>sched

Platforms

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Description

This command specifies the minute to schedule a command. Multiple minutes of the hour can be specified. When multiple minutes are configured, each of them will cause the schedule to occur. If a minute is configured, but no hour or day is configured, the event will not execute. If a minute is configured without configuring the **month**, **weekday**, **day-of-month** and **hour** commands, the event will not execute.

See the month, weekday, day-of-month, and hour commands for more information.

The **no** form of this command removes the specified minute from the configuration.

Parameters

minute-number

Specifies the minute to schedule a command.

Values 0 to 59 (maximum 60 minute-numbers)

all

Specifies all minutes.

month

Syntax

month {*month-number* [*..month-number*] | *month-name* [*..month-name*] | **all**}

no month

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command specifies the month when the event should be executed. Multiple months can be specified. When multiple months are configured, each of them will cause the schedule to trigger. If a month is configured without configuring the **weekday**, **day-of-month**, **hour**, and **minute** commands, the event will not execute.

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See the weekday, day-of-month, hour and minute commands for more information.

The **no** form of this command removes the specified month from the configuration.

Parameters

month-number

Specifies a month by number.

Values 1 to 12 (maximum 12 month-numbers)

all

Specifies all months.

month-name

Specifies a month by name.

Values january, february, march, april, may, june, july, august, september, october, november, december (maximum 12 month names)

type

Syntax

type {*schedule-type*}

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command specifies how the system should interpret the commands contained within the schedule node.

Parameters

schedule-type

Specifies the type of schedule for the system to interpret the commands contained within the schedule node.

Values **periodic** — Specifies a schedule which runs at a given interval. The **interval** must be specified for this feature to run successfully.

calendar — Specifies a schedule which runs based on a calendar. The **month**, **weekday**, **day-of-month**, **hour**, and **minute** must be specified for this feature to run successfully.

oneshot — Specifies a schedule which runs one time only. As soon as the first event specified in these parameters takes place and the

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associated event occurs, the schedule enters a shutdown state. **month**, **weekday**, **day-of-month**, **hour**, and **minute** must be specified for this feature to run successfully.

See interval, month, weekday, day-of-month, hour and minute for more information.

Default periodic

weekday

Syntax

weekday {*weekday-number* [..*weekday-number*]|*day-name* [..*day-name*]| **all**}

no weekday

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command specifies which days of the week that the schedule will fire on. Multiple days of the week can be specified. When multiple days are configured, each of them will cause the schedule to occur. If a weekday is configured without configuring the **month**, **day-of-month**, **hour**, and **minute** commands, the event will not execute.

See the month, day-of-month, hour and minute commands for more information.

Using the **weekday** command as well as the **day-of month** command will cause the script to run twice. For example, consider that "today" is Monday January 1. If "Tuesday January 5" is configured, the script will run on Tuesday (tomorrow) as well as January 5 (Friday).

The **no** form of this command removes the specified weekday from the configuration.

Parameters

day-number

Specifies a weekday by number.

Values 1 to 7 (maximum 7 week-day-numbers)

day-name

Specifies a day by name.

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday (maximum 7 weekday names)

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all

Specifies all days of the week.

7.18.2.1.10 Time range commands

time-range

Syntax

time-range *name* [**create**]

no time-range

Context

config>system>cron

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures a time range.

The **no** form of this command removes the name of the time-range from the configuration.

Parameters

name

Specifies a name for the time range, up to 32 characters.

absolute

Syntax

absolute start *start-absolute-time* **end** *end-absolute-time*

no absolute

Context

config>system>cron>time-range

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures an absolute time interval that will not repeat.

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The **no** form of this command removes the absolute time range from the configuration.

Parameters

start *absolute-time*

Specifies starting parameters for the absolute time-range.

Values *absolute-time* — *year*/*month*/*day*,*hh*:*mm*

year — 2005 to 2099

month — 1 to 12

day — 1 to 31

hh — 0 to 23

mm — 0 to 59

end *absolute-time*

Specifies end parameters for the absolute time-range.

Values *absolute-time* — *year*/*month*/*day*,*hh*:*mm*

year — 2005 to 2099

month — 1 to 12

day — 1 to 31

hh — 0 to 23

mm — 0 to 59

daily

Syntax

daily start *start-time-of-day* **end** *end-time-of-day*

no daily start

Context

config>system>cron>time-range

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the start and end of a schedule for every day of the week. To configure a daily time-range across midnight, use a combination of two entries. An entry that starts at hour zero will take over from an entry that ends at hour 24.

The **no** form of this command removes the daily time parameters from the configuration.

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Parameters

start-time-of-day

Specifies the starting time for the time range.

Values *start-time-of-day* — *hh*:*mm*

hh — 0 to 23

mm — 0 to 59

end-time-of-day

Specifies the ending time for the time range.

Values *end-time-of-day* — *hh*:*mm*

hh — 0 to 23

mm — 0 to 59

weekdays

Syntax

weekdays start *start-time-of-day* **end** *end-time-of-day*

no weekdays start

Context

config>system>cron>time-range

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the start and end of a weekday schedule.

The **no** form of this command removes the weekday parameters from the configuration.

Parameters

start-time-of-day

Specifies the starting time for the time range.

Values *start-time-of-day* — *hh*:*mm*

hh — 0 to 23

mm — 0 to 59

end-time-of-day

Specifies the ending time for the time range.

Values *end-time-of-day* — *hh*:*mm*

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hh — 0 to 23

mm — 0 to 59

weekend

Syntax

weekend start *start-time-of-day* **end** *end-time-of-day*

no weekend start

Context

config>system>cron>time-range

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures a time interval for every weekend day in the time range.

The resolution must be at least one minute apart; for example, start at 11:00 and end at 11:01. An 11:00 start and end time is invalid. This example configures a start at 11:00 and an end at 11:01 on both Saturday and Sunday.

The **no** form of this command removes the weekend parameters from the configuration.

Parameters

start-time-of-day

Specifies the starting time for the time range.

Values *start-time-of-day — hh*:*mm*

hh — 0 to 23

mm — 0 to 59

end-time-of-day

Specifies the ending time for the time range.

Values *end-time-of-day — hh*:*mm*

hh — 0 to 23

mm — 0 to 59

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weekly

Syntax

weekly start *start-time-in-week* **end** *end-time-in-week*

no weekly start

Context

config>system>cron>time-range

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures a weekly periodic interval in the time range.

This command configures the start and end of a schedule for the same day every week; for example, every Friday. The start and end dates must be the same. The resolution must be at least one minute apart, for example, start at 11:00 and end at 11:01. A start time and end time of 11:00 is invalid.

The **no** form of this command removes the weekly parameters from the configuration.

Default

no time-range

Parameters

start start-time-in-week

Specifies the start day and time of the week.

Values *start-time-in-week* — *day*,*hh*:*mm*

day — sun, mon, tue, wed, thu, fri, sat sunday, monday, tuesday, wednesday, thursday, friday, saturday

hh — 0 to 23

mm — 0 to 59

end end-time-in-week

Specifies the end day and time of the week.

Values *end-time-in-week* — *day*,*hh*:*mm*

day — sun, mon, tue, wed, thu, fri, sat sunday, monday, tuesday, wednesday, thursday, friday, saturday

hh — 0 to 23

mm — 0 to 59

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7.18.2.1.11 Time of day commands

tod-suite

Syntax

tod-suite *tod-suite name* **create**

no tod-suite

Context

config>system>cron

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context modify time of day (TOD) parameters.

Default

no tod-suite

egress

Syntax

egress

Context

config>system>cron>tod-suite

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command enables the TOD suite egress parameters.

ingress

Syntax

ingress

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Context

config>system>cron>tod-suite

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command enables the TOD suite ingress parameters.

filter

Syntax

filter ip*ip-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]

no filter ip *ip-filter-id* [**time-range** *time-range-name*]

filter ipv6*ipv6-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]

no filter ipv6 *ipv6-filter-id* [**time-range** *time-range-name*]

filter mac*mac-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]

no filter mac *mac-filter-id* [**time-range** *time-range-name*]

Context

config>system>cron>tod-suite>egress

config>system>cron>tod-suite>ingress

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command creates time-range based associations of previously created filter policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

Parameters

ip-filter *ip-filter-id*

Specifies an IP filter for this tod-suite.

Values 1 to 65535

ipv6-filter *ip-filter-id*

Specifies an IPv6 filter for this tod-suite.

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Values 1 to 65535

time-range *time-range-name*

Specifies a name for the time-range, up to 32 characters. If the time-range is not populated the system will assume the assignment to mean "all times". Only one entry without a time-range is allowed for every type of policy. The system does not allow the user to specify more than one policy with the same time-range and priority.

priority *priority*

Specifies the priority of the time-range. Only one time-range assignment of the same type and priority is allowed.

Values 1 to 10

mac *mac-filter-id*

Specifies a MAC filter for this tod-suite.

Values 1 to 65535

qos

Syntax

qos *policy-id* [**time-range** *time-range-name*] [**priority** *priority*]

no qos *policy-id* [**time-range** *time-range-name*]

Context

config>system>cron>tod-suite>ingress

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command creates time-range based associations of previously created QoS policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

The **no** form of this command reverts to the default.

Parameters

policy-id

Specifies an egress QoS policy for this tod-suite.

Values 1 to 65535

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time-range *time-range-name*

Specifies a name for the time-range, up to 32 characters. If the time-range is not populated the system will assume the assignment to mean "all times". Only one entry without a time-range is allowed for every type of policy. The system does not allow the user to specify more than one policy with the same time-range and priority.

Default "NO-TIME-RANGE" policy

priority *priority*

Specifies the priority of the time-range. Only one time-range assignment of the same type and priority is allowed.

Values 1 to 10

Default 5

scheduler-policy

Syntax

[**no**] **scheduler-policy** *scheduler-policy-name* [**time-range** *time-range-name*] [**priority** *priority*]

Context

config>system>cron>tod-suite>egress

config>system>cron>tod-suite>ingress

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command creates time-range based associations of previously created scheduler policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

Parameters

scheduler-policy-name

Specifies a scheduler policy for this tod-suite, up to 32 characters.

time-range *time-range-name*

Specifies the name of the time-range, up to 32 characters. If the time-range is not populated the system will assume the assignment to mean "all times". Only one entry without a time-range is allowed for every type of policy. The system does not allow the user to specify more than one policy and the same time-range and priority.

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priority ***priority***

Specifies the time-range priority. Only one time-range assignment of the same type and priority is allowed.

Values 1 to 10

7.18.2.1.12 Script control commands

script-control

Syntax

script-control

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context configure the script and script parameters.

script

Syntax

script *script-name* [**owner** *script-owner*]

no script

Context

config>system>script-control>script-policy

config>system>script-control

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command is used to configure a script to be run.

The **no** form of this command removes the script.

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Default

no script

Parameters

script-name

Specifies the name of the script, up to 32 characters.

script-owner

Specifies the name of the script owner, up to 32 characters.

The owner is an arbitrary name and not necessarily a user name. Commands in the scripts are not authorized against the owner.

Default "TiMOS CLI"

location

Syntax

location *file-url*

no location

Context

config>system>script-control>script

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command is used to identify the location of a script to be scheduled.

The **no** form of this command removes the location.

Default

no location

Parameters

file-url

Specifies the location to search for scripts.

Values *file-url* — *local-url* | *remote-url*

local-url — [*cflash-id*/] [*file-path*]

255 chars maximum, including *cflash-id* directory length 99 characters maximum each

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remote url — [{ftp:// | tftp://}| l*ogin*:*password@remote-location/*][*file-path*]

255 characters maximum

directory length 99 characters maximum each

remote-location — [*hostname* | *ipv4-address* | *ipv6-address*]

ipv4-address — *a.b.c.d*

ipv6-address — x:x:x:x:x:x:x:x[-*interface*]

x:x:x:x:x:x:d.d.d.d[-*interface*]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — 32 characters maximum, for link local addresses

cflash-id — cf1:

usb-flash-id — uf1:

script-policy

Syntax

[**no**] **script-policy** *policy-name* [**owner** *policy-owner*]

Context

config>system>script-control

config>system>cron>schedule

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context configure script policy parameters for a script.

Parameters

policy-name

Specifies the name of the policy, up to 32 characters.

policy-owner

Specifies the name of the policy owner, up to 32 characters.

The owner is an arbitrary name and not necessarily a user name. Commands in the scripts are not authorized against the owner.

Default "TiMOS CLI"

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expire-time

Syntax

expire-time {*seconds* | **forever**}

Context

config>system>script-control>script-policy

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command is used to configure the maximum length of time to keep the run history status entry from a script run.

Default

expire-time 3600

Parameters

seconds

Specifies the time to keep the run history status entry, in seconds.

Values 0 to 21474836

forever

Keyword to run the history status entry indefinitely.

lifetime

Syntax

lifetime {*seconds* | **forever**}

Context

config>system>script-control>script-policy

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command is used to configure the maximum length of time that a script may run.

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Default

lifetime 3600

Parameters

seconds

Specifies the maximum amount of time that a script may run, in seconds.

Values 0 to 21474836

forever

Keyword to allow a script to run indefinitely.

max-completed

Syntax

max-completed *unsigned*

Context

config>system>script-control>script-policy

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command enables user to configure the maximum number of scripts to keep the run history status entries.

Default

max-completed 1

Parameters

unsigned

Specifies the maximum number of script run history status entries to keep.

Values 1 to 1500

results

Syntax

results *file-url*

no results

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Context

config>system>script-control>script-policy

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command specifies the location where the system writes the output of an event script's execution.

The **no** form of this command removes the file location from the configuration. Scripts will not execute if there is no result location defined.

Default

no results

Parameters

file-url

Specifies the location to send the CLI output from script runs. The *file-url* is a location, directory, and filename prefix to which a data and timestamp suffix is added when the results files are created during a script run, as follows:

*file-url*_YYYYMMDD-hhmmss.uuuuuu.out

where: YYYYMMDD — date

hhmmss — hours, minutes, and seconds

uuuuuu — microseconds (padded to 6 characters with leading zeros)

Values *file-url* — *local-url* | *remote-url*

local-url — [*cflash-id*/] [*file-path*]

255 chars maximum, including *cflash-id* directory length 99 characters maximum each

remote url — [{ftp:// | tftp://}| *login*:*password*@*remote-location*/][*file-path*]

255 characters maximum

directory length 99 characters maximum each

remote-location — [*hostname* | *ipv4-address* | *ipv6-address*]

ipv4-address — *a.b.c.d*

ipv6-address — x:x:x:x:x:x:x:x[-*interface*]

x:x:x:x:x:x:d.d.d.d[-*interface*]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — 32 characters maximum, for link local addresses

cflash-id — cf1:

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usb-flash-id — uf1:

7.18.2.1.13 System time commands

dst-zone

Syntax

[**no**] **dst-zone** [*std-zone-name* | *non-std-zone-name*]

Context

config>system>time

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the start and end dates and offset for summer time or daylight savings time to override system defaults or for user defined time zones.

When configured, the time is adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

If the time zone configured is listed in Table 26: System-defined time zones , the starting and ending parameters and offset do not need to be configured with this command unless it is necessary to override the system defaults. The command returns an error if the start and ending dates and times are not available either in Table 26: System-defined time zones on or entered as optional parameters in this command.

Up to five summer time zones may be configured, for example, for five successive years or for five different time zones. Configuring a sixth entry will return an error message. If no summer (daylight savings) time is supplied, it is assumed no summer time adjustment is required.

The **no** form of this command removes a configured summer (daylight savings) time entry.

Parameters

std-zone-name

Specifies the standard time zone name. The standard name must be a system-defined zone in Table 26: System-defined time zones . For zone names in the table that have an implicit summer time setting, for example MDT for Mountain Daylight Saving Time, the remaining **start-date**, **end-date** and **offset** parameters need to be provided unless it is necessary to override the system defaults for the time zone.

Values ADT, AKDT, CDT, CEST, EDT, EEST, MDT, PDT, WEST, NDT, NZDT

non-std-zone-name

Specifies the non-standard time zone name, up to 5 characters. See zone for more information about creating a user-defined name.

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end

Syntax

end {*end-week*} {*end-day*} {*end-month*} [*hours-minutes*]

Context

config>system>time>dst-zone

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures start of summer time settings.

Parameters

end-week

Specifies the starting week of the month when the summer time will end.

Values first, second, third, fourth, last

Default first

end-day

Specifies the starting day of the week when the summer time will end.

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday

Default sunday

end-month

Specifies the starting month of the year when the summer time will take effect.

Values january, february, march, april, may, june, july, august, september, october, november, december

Default january

hours

Specifies the hour at which the summer time will end.

Values 0 to 24

Default 0

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minutes

Specifies the number of minutes, after the hours defined by the *hours* parameter, when the summer time will end.

Values 0 to 59

Default 0

offset

Syntax

offset *offset*

Context

config>system>time>dst-zone

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command specifies the number of minutes that will be added to the time when summer time takes effect. The same number of minutes will be subtracted from the time when the summer time ends.

Parameters

offset

Specifies the number of minutes added to the time at the beginning of summer time and subtracted at the end of summer time, expressed as an integer.

Default 60

Values 0 to 60

start

Syntax

start {*start-week*} {*start-day*} {*start-month*} [*hours-minutes*]

Context

config>system>time>dst-zone

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Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures start of summer time settings.

Parameters

start-week

Specifies the starting week of the month when the summer time will take effect.

Values first, second, third, fourth, last

Default first

start-day

Specifies the starting day of the week when the summer time will take effect.

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday

Default sunday

start-month

Specifies the starting month of the year when the summer time will take effect.

Values january, february, march, april, may, june, july, august, september, october, november, december

Default january

hours

Specifies the hour at which the summer time will take effect.

Values 0 to 23

Default 0

minutes

Specifies the number of minutes, after the hours defined by the *hours* parameter, when the summer time will take effect.

Values 0 to 59

Default 0

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zone

Syntax

zone [*std-zone-name* | *non-std-zone-name*] [*hh* [*:mm*]]

no zone

Context

config>system>time

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command sets the time zone and time zone offset for the device.

The OS supports system-defined and user-defined time zones. The system-defined time zones are listed in Table 26: System-defined time zones .

For user-defined time zones, the zone and the UTC offset must be specified.

The **no** form of this command reverts to the default of Coordinated Universal Time (UTC). If the time zone in use was a user-defined time zone, the time zone will be deleted. If a **dst-zone** command has been configured that references the zone, the summer commands must be deleted before the zone can be reset to UTC.

Default

zone utc

Parameters

std-zone-name

Specifies the standard time zone name. The standard name must be a system-defined zone, listed in Table 26: System-defined time zones . For zone names in the table that have an implicit summer time setting, for example MDT for Mountain Daylight Saving Time, the remaining **start-date**, **end-date** and **offset** parameters need to be provided unless it is necessary to override the system defaults for the time zone.

For system-defined time zones, a different offset cannot be specified. If a new time zone is needed with a different offset, the user must create a new time zone. Note that some system-defined time zones have implicit summer time settings which causes the switchover to summer time to occur automatically; configuring the **dst-zone** parameter is not required.

Values MT, WET, CET, EET, MSK, MSD, AST, NST, EST, CST, MST, PST, HST, AKST, AWST, ACST, AEST, NZST, UTC

non-std-zone-name

Specifies the non-standard time zone name, up to 5 characters.

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hh [:mm]

Specifies the hours and minutes offset from UTC time, expressed as integers. Some time zones do not have an offset that is an integral number of hours. In these instances, the *minutes-offset* must be specified. For example, the time zone in Pirlanngimpi, Australia UTC + 9.5 hours.

Values hh — -11 to 12
mm — 0 to 59

Default *hh* — 0
mm — 0

7.18.2.1.14 System synchronization commands

sync-if-timing

Syntax

sync-if-timing

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink and standalone-VC operating mode

Description

Commands in this context create or modify timing reference parameters.

abort

Syntax

abort

Context

config>system>sync-if-timing

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink and standalone-VC operating mode

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Description

This command discards changes that have been made to the synchronous interface timing configuration during a session.

begin

Syntax

begin

Context

config>system>sync-if-timing

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink and standalone-VC operating mode

Description

This command creates or edits the system synchronous interface timing configuration.

bits1

Syntax

bits1

Context

config>system>sync-if-timing

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

Commands in this context configure parameters for the Building Integrated Timing Supply (BITS).

Note:

- The 7210 SAS-R6 supports the configuration of only the BITS1 interface for use as an input or output reference. The 7210 SAS-R12 has only a single BITS port on the front panel, unlike the 7210 SAS-R6, which has two ports. Therefore, this command is invalid for the 7210 SAS-R12.
- The 7210 SAS-T and 7210 SAS-Mxp allow for configuration of both BITS1 and BITS2 interface as an input and output reference.
- On the 7210 SAS-T and 7210 SAS-Mxp, the BITS1 configuration parameters such as bits-interface-type, line-length, and source-reference are inherited for BITS2 interface. CLI commands are available that provide the user an option to administratively control the BITS2

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interface, allowing them to shutdown or enable the BITS2 input and output independently of BITS1 interface. Read the other commands for more information.

shutdown

Syntax

[**no**] **shutdown**

Context

config>system>sync-if-timing>bits1>input

config>system>sync-if-timing>bits1>output

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command administratively disables the entity. When disabled, an entity does not change, reset, or remove any configuration settings or statistics.

The operational state of the entity is disabled as well as the operational state of any entities contained within. Many objects must be shut down before they may be deleted.

The **no** form of this command places the entity into an administratively enabled state.

Default

no shutdown

bits2

Syntax

bits2

Context

config>system>sync-if-timing

Platforms

7210 SAS-T (network and access-uplink) and 7210 SAS-Mxp

Description

Commands in this context configure parameters for the Building Integrated Timing Supply (BITS).

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Note:

- The 7210 SAS-R6 and 7210 SAS-R12 only support the configuration of the BITS1 interface for use as an input or output reference.
- The 7210 SAS-T and 7210 SAS-Mxp support the configuration of both BITS1 and BITS2 interface as an input and output reference.
- On the 7210 SAS-T and 7210 SAS-Mxp, the BITS1 configuration parameters such as bits-interface-type, line-length, source-reference, and so on, are inherited for the BITS2 interface. CLI commands are available to administratively control the BITS2 interface, allowing the user to shutdown or enable the BITS2 input and output independently of the BITS1 interface.

shutdown

Syntax

[**no**] **shutdown**

Context

config>system>sync-if-timing>bits2>input

config>system>sync-if-timing>bits2>output

Platforms

7210 SAS-T (network and access-uplink) and 7210 SAS-Mxp

Description

This command administratively disables the entity. When disabled, an entity does not change, reset, or remove any configuration settings or statistics.

The operational state of the entity is disabled as well as the operational state of any entities contained within. Many objects must be shut down before they may be deleted.

The **no** form of this command places the entity into an administratively enabled state.

Default

no shutdown

input

Syntax

input

Context

config>system>sync-if-timing>bits1

config>system>sync-if-timing>bits2

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Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

Commands in this context configure the external BITS timing reference input from the node. The user has the option to enable or disable the BITS interface input independently of each other.

Note:

- The 7210 SAS-R6 and 7210 SAS-R12 only support the configuration of the BITS1 interface for use as an input or output reference.
- The 7210 SAS-T and 7210 SAS-Mxp support the configuration of both BITS1 and BITS2 interface as an input and output reference.
- On the 7210 SAS-T and 7210 SAS-Mxp, the BITS1 configuration parameters such as bits-interface-type, line-length and source-reference are inherited for the BITS2 interface. CLI commands are available to administratively control the BITS2 interface, allowing the user to shutdown or enable the BITS2 input and output independently of the BITS1 interface.

output

Syntax

output

Context

config>system>sync-if-timing>bits1

config>system>sync-if-timing>bits2

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

Commands in this context configure the external BITS timing reference output from the node. The user has the option to enable or disable the BITS interface output independently of each other.

Note:

- The 7210 SAS-R6 and 7210 SAS-R12 only support the configuration of the BITS1 interface for use as an input or output reference.
- The 7210 SAS-T and 7210 SAS-Mxp support the configuration of both BITS1 and BITS2 interface as an input and output reference.
- On the 7210 SAS-T and 7210 SAS-Mxp, the BITS1 configuration parameters such as bits-interface-type, line-length, source-reference, and so on, are inherited for the BITS2 interface. CLI commands are available to administratively control the BITS2 interface, allowing the user to shutdown or enable the BITS2 input and output independently of the BITS1 interface.

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interface-type

Syntax

interface-type {**ds1** [{**esf** | **sf**}] | **e1** [{**pcm30crc** | **pcm31crc**}]}

no interface-type

Context

config>system>sync-if-timing>bits1

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command configures the BITS port to support one of the available interface types, through T1/DS1 or E1 synchronization interface and the desired framing with that interface type.

Note:
On the 7210 SAS-T and 7210 SAS-Mxp, BITS2 inherits the values configured for BITS1.

The **no** form of this command reverts to the default configuration.

Default

ds1 esf

Parameters

ds1 esf

Specifies Extended Super Frame (ESF). This is a framing type used on DS1 circuits that consists of 24 192-bit frames, The 193rd bit provides timing and other functions.

ds1 sf

Specifies Super Frame (SF), also called D4 framing. This is a common framing type used on DS1 circuits. SF consists of 12 192-bit frames. The 193rd bit provides error checking and other functions. ESF supersedes SF.

e1 pcm30crc

Specifies the pulse code modulation (PCM) type. PCM30CRC uses PCM to separate the signal into 30 user channels with CRC protection.

e1 pcm31crc

Specifies the pulse code modulation (PCM) type. PCM31CRC uses PCM to separate the signal into 31 user channels with CRC protection.

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line-length

Syntax

line-length {**110, 220, 330, 440, 550, 660**}

Context

config>system>sync-if-timing>bits1>output

Platforms

7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command configures the line-length parameter of the BITS output. This is the distance in feet between the network element and the office clock (BITS/SSU).

This command is only applicable when the BITS interface-type is DS1.

Note:
On the 7210 SAS-T and 7210 SAS-Mxp, BITS2 inherits the values configured for BITS1.

Default

110

Parameters

110

Specifies that the distance is from 0 to 110 feet.

220

Specifies that the distance is from 110 to 220 feet.

330

Specifies that the distance is from 220 to 330 feet.

440

Specifies that the distance is from 330 to 440 feet.

550

Specifies that the distance is from 440 to 550 feet.

660

Specifies that the distance is from 550 to 660 feet.

ssm-bit

Syntax

ssm-bit *sa-bit*

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Context

config>system>sync-if-timing>bits1

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command configures which sa-bit to use for conveying SSM information when the BITS interface-type is E1.

SSM is not available when the BITS interface-type is either T1/DS1 SF synchronization interface.

Note:
On the 7210 SAS-T and 7210 SAS-Mxp, BITS2 inherits the values configured for BITS1.

Default

8

Parameters

sa-bit

Specifies the sa-bit value.

Values 4 to 8

commit

Syntax

commit

Context

config>system>sync-if-timing

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode; not supported on 7210 SAS platforms configured in the standalone-VC operating mode

Description

This command saves changes made to the system synchronous interface timing configuration.

ptp

Syntax

ptp

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Context

config>system>sync-if-timing

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE (standalone), 7210 SAS-Sx 10/100GE, and 7210 SAS-T (network and access-uplink)

Description

Commands in this context configure parameters for system timing via IEEE 1588-2008, Precision Time Protocol.

This command is only available on the systems supporting the 1588-2008 frequency recovery engine.

ql-override

Syntax

ql-override {**prs** | **stu** | **st2** | **tnc** | **st3e** | **st3** | **sec** | **prc** | **ssu-a** | **ssu-b**}

no ql-override

Context

config>system>sync-if-timing>ptp

config>system>sync-if-timing>ref1

config>system>sync-if-timing>ref2

config>system>sync-if-timing>bits1

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink and standalone-VC operating mode

Description

Note:

- The **config**>**system**>**sync-if-timing**>**bits1** context is not supported on the 7210 SAS-Sx 10/100GE, 7210 SAS-S 1/10GE (standalone and standalone-VC mode), and 7210 SAS-Sx 1/10GE (standalone and standalone-VC mode).
- The **config**>**system**>**sync-if-timing**>**ptp** context is not supported on the7210 SAS-S 1/10GE (standalone and standalone-VC mode) and 7210 SAS-Sx 1/10GE (standalone and standalone-VC mode).

This command configures the QL value to be used for the reference for SETS input selection and BITS output. This value overrides any value received by that reference's SSM process.

Default

no ql-override

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Parameters

prs

Specifies the SONET Primary Reference Source Traceable.

stu

Specifies the SONET Synchronous Traceability Unknown.

st2

Specifies the SONET Stratum 2 Traceable.

tnc

Specifies the SONET Transit Node Clock Traceable.

st3e

Specifies the SONET Stratum 3E Traceable.

st3

Specifies the SONET Stratum 3 Traceable.

prc

Specifies the SDH Primary Reference Clock Traceable.

ssu-a

Specifies the SDH Primary Level Synchronization Supply Unit Traceable.

ssu-b

Specifies the SDH Second Level Synchronization Supply Unit Traceable.

sec

Specifies the SDH Synchronous Equipment Clock Traceable.

ql-selection

Syntax

[**no**] **ql-selection**

Context

config>system>sync-if-timing

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink and standalone-VC operating mode

Description

This command specifies that the selection of system timing reference and BITS output timing reference (if available on the platform) takes into account quality level. This command turns-on or turns-off SSM encoding as a means of timing reference selection.

Default

no ql-selection

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ref-order

Syntax

ref-order *first second third* [*fourth*] [*fifth*]

ref-order *ptp*

no ref-order

Context

config>system>sync-if-timing

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink and standalone-VC operating mode

Description

This command organizes the priority order of the timing references. The synchronous equipment timing subsystem can lock to different timing reference inputs, those specified in the **ref1**, **ref2** and **ptp** command configuration.

If a reference source is disabled, the clock from the next reference source as defined by **ref-order** is used. If all reference sources are disabled, then clocking is derived from a local oscillator.

If a **sync-if-timing** reference is linked to a source port that is operationally down, the port is no longer qualified as a valid reference. Depending on the platform used, either SFP or Fixed copper ports can be used as a reference.

Note:

- On the 7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-R6, and 7210 SAS-R12, all three timing references can be enabled at the same time. In other words, it is allowed to specify the syncE and PTP references simultaneously. Only syncE and BITS are allowed as a reference.
- The 7210 SAS-Sx 1/10GE (standalone) only supports the *first* and *second* parameters and it is allowed to specify the syncE and PTP references simultaneously.
- The7210 SAS-S 1/10GE (standalone) and 7210 SAS-Sx 10/100GE (standalone) only support *first* and *second* parameters.
- The 7210 SAS-Sx 1/10GE (standalone-VC) and 7210 SAS-S 1/10GE (standalone-VC) only supports *first* and *second* parameters; it is allowed to specify SyncE references. PTP references are not allowed.

The **no** form of this command reverts the reference order to the default values.

Default

bits1 bits2 ref1 ref2 ptp (7210 SAS-Mxp)

ref1 ref2 ptp bits1 bits2 (7210 SAS-T)

ref1 ref2 (7210 SAS-S 1/10GE (standalone))

ref1 ref2 ptp (7210 SAS-Sx 1/10GE (standalone) and 7210 SAS-Sx 10/100GE (standalone))

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ref1 ref2 (7210 SAS-Sx 1/10GE VC)

bits1 ref1 ref2 ptp (7210 SAS-R6 and 7210 SAS-R12)

Parameters

first

Specifies the first timing reference to use in the reference order sequence.

second

Specifies the second timing reference to use in the reference order sequence.

third

Specifies the third timing reference to use in the reference order sequence. This parameter is supported only on 7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-R6, and 7210 SAS-R12 devices.

fourth

Specifies the fourth timing reference to use in the reference order sequence. This parameter is supported only on 7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-R6, and 7210 SAS-R12 devices.

fifth

Specifies the fifth timing reference to use in the reference order sequence. This parameter is supported only on 7210 SAS-T and 7210 SAS-Mxp devices.

ptp

Specifies that PTP must be used as a timing reference.

ref1

Syntax

ref1

Context

config>system>sync-if-timing

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode; not supported on 7210 SAS platforms configured in the standalone-VC operating mode

Description

Commands in this context configure parameters for the first timing reference.

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ref2

Syntax

ref2

Context

config>system>sync-if-timing

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode; not supported on 7210 SAS platforms configured in the standalone-VC operating mode

Description

Commands in this context configure parameters for the second timing reference.

revert

Syntax

[**no**] **revert**

Context

config>system>sync-if-timing

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode; not supported on 7210 SAS platforms configured in the standalone-VC operating mode

Description

This command allows the clock to revert to a higher priority reference if the current reference goes offline or becomes unstable.

If revertive switching is enabled, the highest-priority valid timing reference will be used. If a reference with a higher priority becomes valid, a reference switch over to that reference will be initiated. If a failure on the current reference occurs, the next highest reference takes over.

If non-revertive switching is enabled, the valid active reference always remains selected, even if a higher-priority reference becomes available. If this reference becomes invalid, a reference switch over to a valid reference with the highest priority will be initiated. When the failed reference becomes operational, it is eligible for selection.

Default

no revert

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source-port

Syntax

source-port *port-id*

no source-port

Context

config>system>sync-if-timing>ref1

config>system>sync-if-timing>ref2

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode; not supported on 7210 SAS platforms configured in the standalone-VC operating mode

Description

This command configures the source port for timing reference **ref1** or **ref2**. If the port is unavailable or the link is down, the reference sources are reevaluated according to the reference order configured using the **ref-order** command.

The **no** form of this command deletes the source port from the reference.

Parameters

port-id

Specifies the physical port.

Values *slot/mda/port*

7.18.2.1.15 Generic commands

shutdown

Syntax

[**no**] **shutdown**

Context

config>system>time>sntp

config>system>lldp

config>system>sync-if-timing>ptp

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Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Note:
The **config**>**system**>**sync-if-timing**>**ptp** context is not supported on the 7210 SAS-S 1/10GE (standalone and standalone-VC mode) and 7210 SAS-Sx 1/10GE (standalone-VC mode).

This command administratively disables an entity. When disabled, an entity does not change, reset, or remove any configuration settings or statistics.

The operational state of the entity is disabled as well as the operational state of any entities contained within. Many objects must be shut down before they may be deleted.

The **no**form of this command administratively enables an entity.

Unlike other commands and parameters where the default state is not indicated in the configuration file, the **shutdown** and **no shutdown** states are always indicated in system generated configuration files.

The **no** form of this command places an entity in an administratively enabled state.

description

Syntax

description *description-string*

no description

Context

config>system>time>sntp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

The command creates a string that can be used to identify the purpose of this event. This is an optional parameter and can be 80 characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

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7.18.2.1.16 System administration commands

admin

Syntax

admin

Context

<root>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure administrative system commands. Only authorized users can execute the commands in the **admin** context.

auto-init

Syntax

auto-init stop

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode; not supported on 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS platforms configured in the standalone-VC operating mode

Description

This command specifies that the system saves the BOF with the BOF parameter primary-image pointing to the both.tim on the local flash. When the system boots up for the first-time, auto-init can potentially use the TiMOS images available on the local flash to boot up and provide a user login prompt. With this command, user is provided with an option to stop the auto-init process and complete successful boot.

If the user does not use this command to stop the auto-init process, the system reboots and attempts to find the BOF again using DHCP.

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debug-save

Syntax

debug-save *file-url*

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command saves existing debug configuration. Debug configurations are not preserved in configuration saves.

Parameters

file-url

Specifies the file URL location to save the debug configuration.

Values *file-url* — *local-url* | *remote-url*

local-url — [*cflash-id*/ | *usb-flash-id*] [*file-path*]

255 chars maximum, including *cflash-id*

directory length 99 characters maximum each

remote url — [{ftp://} *login*:*password*@*remote-location*/][*file- path*]

255 characters maximum

directory length 99 characters maximum each

remote-location — [*hostname* | *ipv4-address*]

ipv4-address — *a.b.c.d*

usb-flash-id — uf1: (7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, and 7210 SAS-Sx 10/100GE)

uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cflash-id — cf1:, cf2: (7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx 10/100GE, and 7210 SAS-Sx 1/10GE: standalone and standalone-VC)

cf2:, cf2-A:, cf2-B: (7210 SAS-R6 and 7210 SAS-R12)

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disconnect

Syntax

disconnect {**address** *ip-address* | **username** *user-name* | **console** | **telnet** | **ftp** | **ssh** | **netconf**}

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command disconnects a user from a console, Telnet, FTP, or SSH session.

If any of the console, Telnet, FTP, SSH, or NETCONF options are specified, only the respective console, Telnet, FTP, SSH, or NETCONF sessions are affected.

If no console, Telnet, FTP, SSH, or NETCONF options are specified, all sessions from the IP address or from the specified user are disconnected.

Any task that the user is executing is terminated. FTP files accessed by the user will not be removed.

A major severity security log event is created specifying what was terminated and by whom.

Parameters

address *ip-address*

Specifies the IP address to disconnect, specified in dotted-decimal notation.

Values *ipv4-address* — a.b.c.d

ipv6-address — x:x:x:x:x:x:x:x (eight 16-bit pieces)

x:x:x:x:x:x:d.d.d.d

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

username *user-name*

Specifies the name of the user.

console

Keyword to disconnect the console session.

telnet

Keyword to disconnect the Telnet session.

ftp

Keyword to disconnect the FTP session.

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ssh

Keyword to disconnect the SSH session.

netconf

Keyword to disconnect the NETCONF session.

display-config

Syntax

display-config [**detail** | **index**]

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays the system's running configuration.

By default, only non-default settings are displayed.

Parameters

detail

Displays default and non-default configuration parameters.

index

Displays only persistent-indexes.

reboot

Syntax

reboot [**active** | **standby** | **upgrade**] [**auto-init** {**chassis-role factory-default** | **satellite** | **standalone**}] [**now**]

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode; not supported on 7210 SAS platforms configured in the standalone-VC operating mode

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Description

This command is used only to reboot the system, initiate an upgrade of the firmware along with a reboot of the node, or initiate an auto-init boot procedure along with a reboot of the node.

If no options are specified, the user is prompted to confirm the reboot operation. For example:

```
ALA-1>admin# reboot
Are you sure you want to reboot (y/n)?
```

If the **now** option is specified, no boot confirmation messages appear.

Parameters

active

Keyword to reboot the active CPM. This keyword is only supported on 7210 SAS-R6 and 7210 SAS-R12 platforms.

standby

Keyword to reboot the standby CPM. This keyword is only supported on 7210 SAS-R6 and 7210 SAS-R12 platforms.

upgrade

Keyword to upgrade card firmware (CPLD and ROM) during chassis reboot. The 7210 SAS OS and the boot.tim support functionality to perform automatic firmware upgrades. The automatic upgrade must be enabled in the 7210 SAS OS Command Line Interface (CLI) when rebooting the system.

When the **upgrade** keyword is specified, a chassis flag is set for the boot loader (boot.tim) and on the subsequent boot of the 7210 SAS OS on the chassis, any firmware images requiring upgrading will be upgraded automatically.

If an 7210 SAS is rebooted with the **admin reboot** command (without the **upgrade** keyword), the firmware images are left intact.

During any firmware upgrade, automatic or manual, it is imperative that during the upgrade procedure:

- Power must NOT be switched off or interrupted.
- The system must NOT be reset.
- No cards are inserted or removed.

Any of the above conditions may render cards inoperable requiring a return of the card for resolution.

now

Keyword to force a reboot of the router immediately without an interactive confirmation.

auto-init

Keyword to reset the BOF and initiates a reboot. This keyword is not supported on 7210 SAS-R6 and 7210 SAS-R12 platforms.

chassis-role

Specifies the operating mode of the chassis at boot up. This keyword is only supported on 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp platforms.

Values factory-default, satellite, standalone

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save

Syntax

save [*file-url*] [**detail**] [index]

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command saves the running configuration to a configuration file. For example:

```
A:ALA-1>admin# save ftp://test:test@192.168.x.xx/./100.cfg
Saving configuration .........Completed.
```

By default, the running configuration is saved to the primary configuration file.

Parameters

file-url

Specifies the file URL location to save the configuration file.

Values *file-url* — *local-url* | *remote-url*

local-url — [*cflash-id/*] [*file-path*]

255 chars maximum, including *cflash-id*

directory length 99 characters maximum each

remote url — [{ftp:// | tftp://}*login*:*password@remote-location/*][*file- path*]

255 characters maximum

directory length 99 characters maximum each

remote-location — [*hostname* | *ipv4-address* | *ipv6-address*]

ipv4-address — *a.b.c.d*

ipv6-address — x:x:x:x:x:x:x:x[-*interface*]

x:x:x:x:x:x:d.d.d.d[-*interface*]

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — 32 characters maximum, for link local addresses

usb-flash-id —	uf1: (7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, and 7210 SAS-Sx 10/100GE)

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uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)

cflash-id — cf1:, cf2: (7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx 10/100GE, and 7210 SAS-Sx 1/10GE: standalone and standalone-VC)

cf2:, cf2-A:, cf2-B: (7210 SAS-R6 and 7210 SAS-R12)

Default the primary configuration file location

detail

Keyword to save both default and non-default configuration parameters.

index

Keyword to force a save of the persistent index file regardless of the persistent status in the BOF file. The index option can also be used to avoid an additional boot required while changing your system to use the persistence indexes.

system-password

Syntax

system-password admin-password

Context

admin>system>security

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This operational command changes a local system password.

Parameters

admin-password

Keyword to change the administrative password.

enable-tech

Syntax

[**no**] **enable-tech**

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Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command enables the shell and kernel commands.

Note:
This command should only be used with authorized direction from the Nokia Technical Assistance Center (TAC).

tech-support

Syntax

tech-support *file-url*

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command creates a system core dump.

Note:
This command should only be used with authorized direction from the Nokia Technical Assistance Center (TAC).

Parameters

file-url

Specifies the file URL location to save the binary file.

Values *file-url* — *local-url* | *remote-url*

local-url — [*cflash-id/* | *usb-flash-id*]] [*file-path*]

255 chars maximum, including cflash-id

directory length 99 characters maximum each

remote url — [{ftp://}*login*:*password@remote-location*/][*file- path*]

255 characters maximum

directory length 99 characters maximum each

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remote-location — [*hostname* | *ipv4-address*]

ipv4-address — *a.b.c.d*

usb-flash-id —	uf1: (7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, and 7210 SAS-Sx 10/100GE)
	uf1:, uf1-A:, uf1-B: (7210 SAS-R6 and 7210 SAS-R12)
cflash-id —	cf1:, cf2: (7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx 10/100GE, and 7210 SAS-Sx 1/10GE: standalone and standalone-VC)
	cf2:, cf2-A:, cf2-B: (7210 SAS-R6 and 7210 SAS-R12)

virtual-chassis

Syntax

virtual-chassis {*slotid* | *slotid-range*} **image-sync**

Context

admin

Platforms

7210 SAS-Sx 1/10GE standalone-VC, 7210 SAS-S 1/10GE: standalone-VC

Description

This command upgrades the boot.tim file on the IMM-only node in a virtual chassis (VC) and ensures that on the next reboot of the node, the newer bootloader image is used to boot the system. Bootloader images are copied to all the available storage locations on the card, ensuring that a back up copy is available if the primary storage device fails.

The `boot.tim` file can be upgraded on a single IMM-only node or on a range of IMM-only nodes in a VC.

The **image-sync** keyword initiates image synchronization of the IMM-only node. It copies the boot.tim from the active CPM to the card/node identified by the *slot-id* or *slotid-range* parameter.

Parameters

slotid

Specifies the card slot number.

Values 1 to 8

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slotid-range

Specifies the card slot numbers for a range of cards.

Values 1 to 8

image-sync

Keyword to initiate image synchronization of the IMM-only node.

7.18.2.1.17 System alarm contact commands

alarm-contact-in-power

Syntax

alarm-contact-in-power {**on** | **off**}

Context

config>system

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command allows the user to enable a supply of +24V power to the alarm input. With this feature, users can use the power supplied through the alarm input pin to supply power to the external sensor devices, and Equipment cabinet door sensors, and so on connected to the alarm input, instead of using an external power source for the external sensor devices.

If the users want to use an external power source, they disable the supply of power to the alarm input pin by using this command. By default, power is not supplied to the alarm input pin

Note:
Read the 7210 SAS device specific Installation Guides for a description of how to connect the external sensor devices to use this capability.

Default

off

Parameters

on

Keyword to turn on power to the alarm input pin.

off

Keyword to turn off power to the alarm input pin.

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alarm-contact-input

Syntax

alarm-contact-input *alarm-contact-input-id*

Context

config>system

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

Commands in this context configure one of four available alarm contact input pins.

Parameters

alarm-contact-input-id

Specifies the alarm contact input pin.

Values 1 to 4 (7210 SAS-T and 7210 SAS-Mxp)

Values 1 to 3 (7210 SAS-R6 and 7210 SAS-R12)

alarm-output-severity

Syntax

[**no**] **alarm-output-severity** {**critical** | **major** | **minor** | **none**}

Context

config>system>alarm-contact-input

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command allows the user to relay alarms from the alarm-contact input to the alarm-contact output by associating an appropriate alarm-contact output with the alarm-contact input. The system generates or clears the alarm-contact output when it triggers or clears the alarm for the associated alarm-contact input.

If multiple alarm-contact input pins share an alarm-contact output, the system generates the alarm-contact output even if any one of the alarm-contact input is triggered and the system clears alarm-contact output only when all the alarm-contact input pins are cleared.

The severity parameter configured by the user determines the appropriate alarm-contact output to be used for generation and clearing the alarm.

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Note:
The system relays the alarm-contact input to the appropriate alarm-contact output only if the alarm-contact output is available on the platform.

Default

major

Parameters

critical

Specifies that a critical alarm output is generated or cleared.

major

Specifies that a major alarm output is generated or cleared.

minor

Specifies that a minor alarm output is generated or cleared. This parameter is only supported on 7210 SAS-T and 7210 SAS-Mxp.

none

Specifies that no alarm output is generated or cleared.

clear-alarm-msg

Syntax

[**no**] **clear-alarm-msg** {*alarm-msg-text*}

Context

config>system>alarm-contact-input

Platforms

7210 SAS-T network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command allows the user to configure a text message for use along with SNMP trap and Log message that are sent when the system clears an alarm. The system generates a default message if the message is not configured.

The **no** form of this command removes the configured alarm clear message.

Parameters

alarm-msg-text

Specifies a printable character string, up to 160 characters.

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description

Syntax

description *description-string*

Context

config>system>alarm-contact-input

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command describes an alarm contact input pin. The description provides an indication of the usage or attribute of the pin. It is stored in the CLI configuration file and helps the user in identifying the purpose of the pin.

normal-state

Syntax

normal-state [**open** | **closed**]

Context

config>system>alarm-contact-input

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command configures the normal state to be associated with the alarm-contact input. When the system detects a transition from the normal state, an alarm is generated. The alarm is cleared when the system detects a transition is back to the normal state.

Parameters

open

Specifies an open normal-state. When the system detects a transition to the closed state, an alarm is generated. The alarm is cleared when the system detects a transition back to the open state.

closed

Specifies a closed normal-state. When the system detects a transition to the open state, and alarm is generated. The alarm is cleared when the system detects a transition back to the closed state.

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shutdown

Syntax

[**no**] **shutdown**

Context

config>system>alarm-contact-input

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command stops tracking the state changes associated with the alarm contact input.The system does not generate or clear the alarms for the alarm-contact input, but if an alarm is generated for the alarm-contact-input, the system clears the alarm when the **shutdown** command is executed.

The **no** form of this command starts tracking the state changes associated with the alarm contact input.

Default

shutdown

trigger-alarm-msg

Syntax

[**no**] **trigger-alarm-msg** {*alarm-msg-text*}

Context

config>system>alarm-contact-input

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command allows the user to configure a text message for use along with SNMP trap and Log message that are sent when the system generates an alarm. The system generates a default message if the message is not configured.

The **no** form of this command removes the configured alarm trigger message.

Parameters

alarm-msg-text

Specifies a printable character string, up to 160 characters.

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7.18.2.1.18 Redundancy commands

redundancy

Syntax

redundancy

Context

admin

config

Platforms

7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE: standalone-VC

Description

Commands in this context configure redundancy operations.

rollback-sync

Syntax

rollback-sync

Context

admin>redundancy

Platforms

7210 SAS-R6 and 7210 SAS-R12

Description

This command copies the entire set of rollback checkpoint files from the active CPM CF to the inactive CPM CF.

synchronize

Syntax

synchronize {**boot-env** | **config**}

Context

admin>redundancy

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Platforms

7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE (standalone-VC)

Description

This command performs a synchronization of the standby CPM's images and/or configuration files to the active CPM. Either the **boot-env** or **config** parameter must be specified.

In the **admin**>**redundancy** context, this command performs a manually triggered standby CPM synchronization. When the standby CPM takes over operation following a failure or reset of the active CPM, it is important to ensure that the active and standby CPM have identical operational parameters. This includes the saved configuration, CPM and XCMIOM images.

The active CPM ensures that the active configuration is maintained on the standby CPM. However, to ensure smooth operation under all circumstances, runtime images and system initialization configurations must also be automatically synchronized between the active and standby CPM. If synchronization fails, alarms and log messages that indicate the type of error that caused the failure of the synchronization operation are generated. When the error condition ceases to exist, the alarm is cleared.

Only files stored on the router are synchronized. If a configuration file or image is stored in a location other than on a local compact flash, the file is not synchronized; for example, storing a configuration file on an FTP server.

The **no** form of this command removes the parameter from the configuration.

Parameters

boot-env

Keyword to synchronize all files required for the boot process (loader, BOF, images, and config).

config

Keyword to synchronize only the primary, secondary, and tertiary configuration files.

display-config

Syntax

display-config [**detail** | **index**]

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays the system's running configuration.

By default, only non-default settings are displayed.

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Parameters

detail

Displays default and non-default configuration parameters.

index

Displays only persistent-indexes.

force-switchover

Syntax

force-switchover [**now**]

Context

admin>redundancy

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone-VC

Description

This command forces a switchover to the standby CPM/CFM card. The primary CPM/CFM reloads its software image and becomes the secondary CPM/CFM.

Parameters

now

Keyword to force the switchover to the redundant CPM/CFM card immediately.

switchover-exec

Syntax

switchover-exec *file-url*

no switchover-exec

Context

config>system

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone-VC

Description

This command specifies the location and name of the CLI script file executed following a redundancy switchover from the previously active CPM/CFM card. A switchover can happen because of a fatal failure or by manual action.

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The CLI script file can contain commands for environment settings, debug (excluding mirroring settings), and other commands not maintained by the configuration redundancy.

The following commands are not supported in the switchover-exec file: **clear**, **configure**, **candidate**, **oam**, **tools**, **oam**, **ping**, **traceroute**, **mstat**, **mtrace** and **mrinfo**.

If the *file-url* parameter is not specified, no CLI script file is executed.

Parameters

file-url

Specifies the location and name of the CLI script file.

Values *file url* — *local-url* | *remote-url*

255 chars max

local-url — [*cflash-id*/] [*file-path*]

remote-url — [{ftp:// | tftp://} *login*:*pswd*@*remote-locn*/] [*file-path*]

cflash-id — cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

rollback-sync

Syntax

[**no**] **rollback-sync**

Context

config>redundancy

Platforms

7210 SAS-R6 and 7210 SAS-R12

Description

The command enables automatic synchronization of rollback checkpoint files between the active CPM and inactive CPM. When automatic synchronization is enabled, a rollback save will cause the new checkpoint file to be saved on both the active and standby CPMs. The suffixes of the old checkpoint files on both active and standby CPMs are incremented. Automatic synchronization only causes the ONE new checkpoint file to be copied to both CFs (the other 9 checkpoints are not automatically copied from active to standby but that can be done manually with **admin**>**red**>**rollback-sync**).

Automatic synchronization of rollback checkpoint files across CPMs is only performed if the rollback-location is configured as a local *file-url* (for example, "cf3:/rollback-files/rollback). Synchronization is not done if the rollback-location is remote.

Note:
The **config red sync** {**boot-env** | **config**} and **admin red sync** {**boot-env** | **config**} commands do not apply to rollback checkpoint files. These commands do not manually or automatically sync rollback checkpoint files. The dedicated **rollback-sync** command must be used to sync rollback checkpoint files.

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synchronize

Syntax

synchronize {**boot-env** | **config**}

no synchronize

Context

config>redundancy

Platforms

7210 SAS-R6 and 7210 SAS-R12

Description

This command enables automatic synchronization of the standby CPM/CFM's images and config files to the active CPM/CFM. Either the **boot-env** or **config** parameter must be specified.

When the standby CPM/CFM takes over operation following a failure or reset of the active CPM/CFM, it is important to ensure that the active and standby CPM/CFMs have identical operational parameters. This includes the saved configuration, CPM and IOM images. This includes the saved configuration and CFM images.

The active CPM/CFM ensures that the active configuration is maintained on the standby CPM/CFM. However, to ensure smooth operation under all circumstances, runtime images and system initialization configurations must also be automatically synchronized between the active and standby CPM/CFM.

If synchronization fails, alarms and log messages that indicate the type of error that caused the failure of the synchronization operation are generated. When the error condition ceases to exist, the alarm is cleared.

Only files stored on the router are synchronized. If a configuration file or image is stored in a location other than on a local compact flash, the file is not synchronized; for example, storing a configuration file on an FTP server.

The **no** form of this command removes the parameter from the configuration.

Default

config

Parameters

boot-env

Keyword to synchronize all files required for the boot process (loader, BOF, images, and config).

config

Keyword to synchronize only the primary, secondary, and tertiary configuration files.

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multi-chassis

Syntax

multi-chassis

Context

config>redundancy

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure multi-chassis parameters.

peer-name

Syntax

peer-name *name*

no peer-name

Context

config>redundancy>multi-chassis>peer

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies a peer name.

Parameters

name

Specifies the peer name, up to 32 characters. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

source-address

Syntax

source-address *ip-address*

no source-address

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Context

config>redundancy>multi-chassis>peer

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies the source address used to communicate with the multi-chassis peer.

Parameters

ip-address

Specifies the source address used to communicate with the multi-chassis peer.

Values a.b.c.d (no multicast address)

sync

Syntax

[**no**] **sync**

Context

config>redundancy>multi-chassis>peer

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure synchronization parameters.

igmp

Syntax

[**no**] **igmp**

Context

config>redundancy>multi-chassis>peer>sync

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command specifies whether IGMP protocol information should be synchronized with the multi-chassis peer.

Default

no igmp

igmp-snooping

Syntax

[**no**] **igmp-snooping**

Context

config>redundancy>multi-chassis>peer>sync

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies whether IGMP snooping information should be synchronized with the multi-chassis peer.

Default

no igmp-snooping

port

Syntax

port *port-id* [**sync-tag** *sync-tag*] [**create**]

no port *port-id*

Context

config>redundancy>multi-chassis>peer>sync

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies the port to be synchronized with the multi-chassis peer and a synchronization tag to be used while synchronizing this port with the multi-chassis peer.

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Parameters

port-id

Specifies the port to be synchronized with the multi-chassis peer.

Values *slot/mda/port* or *lag-id* or *pw-id*

sync-tag

Specifies a synchronization tag, up to 32 characters, to be used while synchronizing this port with the multi-chassis peer.

create

Keyword to create an entry.

range

Syntax

range *encap-range* **sync-tag** *sync-tag*

no range *encap-range*

Context

config>redundancy>multi-chassis>peer>sync>port

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures a range of encapsulation values.

Parameters

encap-range

Specifies a range of encapsulation values on a port to be synchronized with a multi-chassis peer.

Values dot1q — *start-qtag-end-qtag*

start-qtag — 0 to 4094

end-qtag — 0 to 4094

qinq — *qtag1.start-qtag2-qtag1.end-qtag2-start-qtag1.*end-qtag1.**

qtag1 —1 to 4090

start-qtag1 — 1 to 4090

start-qtag2 — 1 to 4090

end-qtag1 — 1 to 4090

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sync-tag ***sync-tag***

Specifies a synchronization tag, up to 32 characters, to be used while synchronizing this encapsulation value range with the multi-chassis peer.

7.18.2.1.19 System port LAG MAC assignment commands for 7210 SAS-Mxp standalone, 7210 SAS-T, 7210 SAS-Sx 10/100GE standalone, and 7210 SAS-Sx 1/10GE: standalone and standalone-VC

port-lag-mac-assignment

Syntax

port-lag-mac-assignment [**v1-enable**]

no port-lag-mac-assignment

Context

config>system

Platforms

7210 SAS-Mxp standalone, 7210 SAS-T (network mode and access-uplink mode), 7210 SAS-Sx 10/100GE standalone, and 7210 SAS-Sx 1/10GE: standalone and standalone-VC

Description

This command enables new MAC address assignments to avoid an overlap between port MAC addresses and LAG MAC addresses.

In the current default assignments of MAC addresses to ports and LAGs, the MAC addresses that are allocated to the LAGs overlap with the MAC addresses of the physical ports; for example, the MAC address assigned by the system to LAG 1 is the same as the MAC address of port 27.

Use this command to change the MAC address assignment scheme to ensure that the LAG MAC addresses are not the same as the MAC addresses of the physical ports. The new scheme is referred to in the system as "v1".

A reboot is required for this command to take effect.

WARNING:
The MAC address for some ports will change after this command is run. Ensure required changes are made to other service objects (for example, CFM up MEPs, and so on) that reference local MAC addresses, and to MAC addresses that reference remote peer devices, if required. Failure to make such changes could result in unpredictable behavior.

The **no** form of this command reverts to the default MAC address assignment scheme for ports and LAGs. The use of the default configuration is not recommended; it is available only to maintain the current mode of operation, if absolutely necessary.

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Parameters

v1-enable

Mandatory keyword that forces the system to use the new scheme of MAC address assignment.

7.18.2.1.20 Rollback commands

compare

Syntax

compare [**to** *checkpoint2*]

compare *checkpoint1* **to** *checkpoint2*

Context

admin>rollback

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

Description

This command displays the differences between rollback checkpoints and the active operational configuration, with *checkpoint1* as the base/first file to which *checkpoint2* is compared.

When no parameters are defined, this command compares the active configuration to the most recent rollback file. when the *checkpoint2* parameter is defined, this command compares the active configuration to the specified file. When both checkpoint parameters are defined, this command compares one specified file to another specified file.

A **compare** operation does not check authorization of each line of output. Permission to execute the **compare** command should only be given to users who are allowed to view the entire system configuration.

The defaults for *checkpoint1* and *checkpoint2* are context-aware and differ based on the branch in which the command is executed. In general, the default for *checkpoint1* matches the context from which the command is issued.

Parameters

checkpoint1*, *checkpoint2

Specifies the configuration files to use as comparison sources.

Values **active-cfg** — The active operational system configuration.

rescue — The rollback rescue file from the configured rescue location.

latest-rb — The most recent rollback checkpoint file from the configured rollback location, with the suffix *.rb.

checkpoint-id — The ID value of a specific rollback checkpoint file from the configured rollback location with the suffix *.rb.*x*. The range is 1 to 9

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but the maximum value depends on the local and remote checkpoints. See local-max-checkpoints and remote-max-checkpoints for more information.

delete

Syntax

delete *checkpoint* | *rescue*

Context

admin>rollback

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

Description

This command deletes a rollback checkpoint file and decrements the suffix ID numbers of all older rollback checkpoint files.

If the **config redundancy rollback-sync** command is enabled, the **rollback delete** command will also delete the equivalent checkpoint in the standby checkpoint file and shuffle the suffixes on the standby CF.

It is not advised to manually delete a rollback checkpoint (for example, using the **file delete** command). If a rollback checkpoint file is manually deleted without using the **admin rollback delete** command then the suffixes of the checkpoint files are NOT shuffled, nor is the equivalent checkpoint file deleted from the standby CF. This manual deletion creates a "hole" in the checkpoint file list until enough new checkpoints have been created to roll the "hole" off the end of the list.

Parameters

checkpoint* | *rescue

Specifies the rollback checkpoint or rescue file to delete.

Values **rescue** — The rollback rescue file from the configured rescue location.

latest-rb — The most recent rollback checkpoint file from the configured rollback location, with the suffix *.rb.

checkpoint-id — The ID value of a specific rollback checkpoint file from the configured rollback location with the suffix *.rb.*x*. The range is 1 to 9 but the maximum value depends on the local and remote max checkpoints. See local-max-checkpoints and remote-max-checkpoints for more information.

revert

Syntax

revert *checkpoint* | *rescue* [**now**]

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Context

admin>rollback

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

Description

This command initiates a configuration rollback revert operation that will return the configuration state of the node to a previously saved checkpoint. The rollback revert minimizes impacts to running services. There are no impacts in areas of configuration that did not change since the checkpoint. Configuration parameters that changed (or items on which changed configuration have dependencies) are first removed (revert to default) and the previous values are then restored (can be briefly service impacting in changed areas).

Parameters

checkpoint* | *rescue

Specifies the rollback checkpoint or rescue file to revert to.

Values **rescue** — The rollback rescue file from the configured rescue location.

latest-rb — The most recent rollback checkpoint file from the configured rollback location, with the suffix *.rb.

checkpoint-id — The ID value of a specific rollback checkpoint file from the configured rollback location with the suffix *.rb.*x*. The range is 1 to 9 but the maximum value depends on the local and remote max checkpoints. See local-max-checkpoints and remote-max-checkpoints for more information.

now

Keyword to force a rollback reversion without prompting for confirmation.

save

Syntax

save [**comment** *comment*] [**rescue**]

Context

admin>rollback

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

Description

This command saves the current operational configuration as a rollback checkpoint file at the configured rollback location, using the filename specified by the **rollback-location** command, with the suffix *.rb.

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The suffixes of all previously saved rollback checkpoint files are automatically incremented by one (*.rb becomes *.rb.1, *.rb.1 becomes *.rb.2, and so on).

If the optional **rescue** keyword is not used, this command saves a rollback checkpoint at the location and with the filename specified by the rollback location with a suffix of ".rb". The previously saved checkpoints will have their suffixes incremented by one (.rb.1 becomes.rb.2, and so on). If there are already as many checkpoint files as the maximum number supported, the last checkpoint file is deleted.

By default, there can be a maximum of 10 rollback checkpoint files, the latest with suffix *.rb and nine older files with suffixes *.rb.1 through *.rb.9. If the maximum number of checkpoint files is reached and a new one is saved, the oldest checkpoint file is deleted. The maximum number of rollback checkpoint files that can be saved can be configured with the **local-max-checkpoints** and **remote-max-checkpoints** commands.

If the **rescue** keyword is used, this command saves the current operational configuration as a rescue rollback file at the location and with the filename specified by the **rescue-location** command. The rescue file uses the suffix *.rc. There can be only one rescue file saved at a time. Saving a new rescue file deletes and replaces any existing rescue file.

A valid rollback checkpoint and rescue location must be configured with the **rollback-location** and **rescue-location** commands before saving a checkpoint or rescue file.

See rollback-location, rescue-location, local-max-checkpoints and remote-max-checkpoints for more information.

Parameters

comment *comment*

Specifies a string, up to 255 characters, describing the associated rollback checkpoint file.

rescue

Keyword to save the current operational configuration as a rescue file.

view

Syntax

view [*checkpoint* | *rescue*]

Context

admin>rollback

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

Description

This command displays the configuration settings saved in a rollback checkpoint or rescue file, or the active operational system configuration.

Parameters

checkpoint* | *rescue

Specifies the configuration file to view.

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Values **rescue** — The rollback rescue file from the configured rescue location.

latest-rb — The most recent rollback checkpoint file from the configured rollback location, with the suffix *.rb.

checkpoint-id — The ID value of a specific rollback checkpoint file from the configured rollback location with the suffix *.rb.*x*.

The range is 1 to 9 but the maximum value depends on the local and remote max checkpoints. See local-max-checkpoints and remote-max-checkpoints for more information.

local-max-checkpoints

Syntax

local-max-checkpoints [*1..50*]

no local-max-checkpoints

Context

config>system>rollback

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

Description

This command configures the maximum number of rollback checkpoint files when the rollback location is on the local compact flash.

Default

10

Parameters

1..50

Specifies the maximum number of rollback checkpoint files.

remote-max-checkpoints

Syntax

remote-max-checkpoints [*1..200*]

no remote-max-checkpoints

Context

config>system>rollback

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Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

Description

This command configures the maximum number of rollback checkpoint files that can be saved on a remote device.

Default

10

Parameters

1..200

Specifies the maximum number of rollback checkpoint files.

rescue-location

Syntax

no rescue-location *file-url*

Context

config>system>rollback

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

Description

The location and filename of the rescue configuration is configurable to be local (on the compact flash) or remote. The suffix ".rc" will be automatically appended to the filename when a rescue configuration file is saved. Trivial FTP (tftp) is not supported for remote locations.

A valid rescue location must be configured before a rescue configuration is saved.

rollback-location

Syntax

no rollback-location *file-url*

Context

config>system>rollback

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

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Description

This command configures the location and generic filename of the rollback rescue configuration file.

A rescue file can be saved locally on the compact flash or on a remote device. The file URL must not contain a suffix, just a path/directory and filename. The suffixes for rollback checkpoint files are ".rb", ".rb.1", ..., ".rb.9" and are automatically appended to rollback checkpoint files.

A valid **rollback-location** must be configured before a **rollback save** command is executed.

Parameters

file-url

Specifies the local or remote file path for the rollback rescue configuration file.

Values *file-url* — *local-url* | *remote-url*

local-url — [*cflash-id/*] [*file-path*]
255 chars maximum, including *cflash-id*
directory length 99 characters maximum each

remote url — [{ftp://} *login*:*password@remote-location*] [*file-path*]
255 characters maximum
directory length 99 characters maximum each

remote-location — [*hostname* | *ipv4-address* | *ipv6-address*]

ipv4-address — *a.b.c.d*

ipv6-address — x:x:x:x:x:x:x:x[-*interface*]
x:x:x:x:x:x:d.d.d.d[-*interface*]
x — 0 to FFFF (hexadecimal)
d — 0 to 255 (decimal)

interface — 32 characters maximum, for link local addresses

cflash-id — cf1:, cf2

usb-flash-id — uf1:

7.18.2.1.21 Peer commands

peer

Syntax

peer *ip-address* [**create**]

no peer *ip-address*

Context

config>redundancy>multi-chassis

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures a multi-chassis redundancy peer.

Parameters

ip-address

Specifies a peer IP address. Multicast address are not allowed.

Values a.b.c.d

create

Keyword to create the configuration context.

authentication-key

Syntax

authentication-key *authentication-key* | *hash-key* [**hash** | **hash2**]

no authentication-key

Context

config>redundancy>multi-chassis>peer

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the authentication key used between this node and the multi-chassis peer. The authentication key can be any combination of letters or numbers.

Parameters

authentication-key

Specifies the authentication key. Allowed values are any string up to 20 characters composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

hash-key

Specifies the hash key. The key can be any combination of ASCII characters up to 33 (hash1-key) or 55 (hash2-key) characters (encrypted). If spaces are used in the string, the entire string must be enclosed within double quotes.

hash

Specifies that the key is entered in an encrypted form. If the **hash** or **hash2** parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security,

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all keys are stored in encrypted form in the configuration file with the **hash** or **hash2** parameter specified.

hash2

Specifies that the key is entered in a more complex encrypted form that involves more variables then the key value alone, this means that hash2 encrypted variable cannot be copied and pasted. If the **hash** or **hash2** parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the **hash** or **hash2** parameter specified.

7.18.2.1.22 MC-LAG commands

mc-lag

Syntax

[**no**] **mc-lag**

Context

config>redundancy>multi-chassis>peer>mc-lag

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure multi-chassis LAG operations and related parameters.

The **no** form of this command administratively disables multi-chassis LAG. MC-LAG can only be issued only when **mc-lag** is shutdown.

hold-on-neighbor-failure

Syntax

hold-on-neighbor-failure *multiplier*

no hold-on-neighbor-failure

Context

config>redundancy>multi-chassis>peer>mc-lag

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command specifies the interval that the standby node will wait for packets from the active node before assuming a redundant-neighbor node failure. This delay in switch-over operation is required to accommodate different factors influencing node failure detection rate, such as IGP convergence, or HA switch-over times and to prevent the standby node to take action prematurely.

The **no** form of this command reverts to the default value.

Default

3

Parameters

multiplier

Specifies the time interval that the standby node will wait for packets from the active node before assuming a redundant-neighbor node failure.

Values 2 to 25

keep-alive-interval

Syntax

keep-alive-interval *interval*

no keep-alive-interval

Context

config>redundancy>multi-chassis>peer>mc-lag

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command sets the interval at which keep-alive messages are exchanged between two systems participating in MC-LAG. These keep-alive messages are used to determine remote-node failure and the interval is set in deciseconds.

The **no** form of this command reverts to the default value.

Default

1s (10 hundreds of milliseconds means interval value of 10)

Parameters

interval

Specifies the time interval expressed in deciseconds.

Values 5 to 500

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lag

Syntax

lag *lag-id* **lacp-key** *admin-key* **system-id** *system-id* [**remote-lag** *remote-lag-id*] **system-priority** *system-priority*

lag *lag-id* [**remote-lag** *remote-lag-id*]

no lag *lag-id*

Context

config>redundancy>multi-chassis>peer>mc-lag

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command defines a LAG that is forming a redundant pair for MC-LAG with a LAG configured on the given peer. The same LAG group can be defined only in the scope of one peer.

The same **lacp-key**, **system-id**, and **system-priority** must be configured on both nodes of the redundant pair in order for MC-LAG to become operational. In order for MC-LAG to become operational, all of the parameters (**lacp-key**, **system-id**, **system-priority**) must be configured the same on both nodes of the same redundant pair.

The partner system (the system connected to all links forming MC-LAG) will consider all ports using the same **lacp-key**, **system-id**, and **system-priority** as the part of the same LAG. In order to achieve this in MC operation, both redundant-pair nodes have to be configured with the same values. In case of a mismatch, MC-LAG is kept operationally down.

Parameters

lag-id

Specifies the LAG identifier, expressed as a decimal integer. Specifying the *lag-id* allows the mismatch between *lag-id* on the redundant pair. If no *lag-id* is specified, it is assumed that the neighbor system uses the same *lag-id* as a part of the given MC-LAG. If no matching MC-LAG group can be found between neighbor systems, the individual LAGs will operate as usual (no MC-LAG operation is established).

Values 1 to 25

lacp-key *admin-key*

Specifies a 16 bit key that needs to be configured in the same manner on both sides of the MC-LAG in order for the MC-LAG to come up.

Values 1 to 65535

system-id *system-id*

Specifies a 6 byte value expressed in the same notation as MAC address.

Values xx:xx:xx:xx:xx:xx

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xx — 00 to FF

remote-lag ***remote-lag-id***

Specifies the LAG ID on the remote system.

Values 1 to 800

system-priority ***system-priority***

Specifies the system priority to be used in the context of the MC-LAG. The partner system will consider all ports using the same **lacp-key**, **system-id**, and **system-priority** as part of the same LAG.

Values 1 to 65535

7.18.2.1.23 LLDP system commands

lldp

Syntax

lldp

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context configure system-wide Link Layer Discovery Protocol parameters.

lldp-med

Syntax

lldp-med

Context

config>system>lldp

Platforms

7210 SAS-Sx 1/10GE: standalone and standalone-VC

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Description

This command creates the context to configure system-wide LLDP Media Endpoint Discovery (LLDP-MED) information.

network-policy

Syntax

network-policy *network-policy-id* [**create**]

no network-policy *network-policy-id*

Context

config>system>lldp>lldp-med

Platforms

7210 SAS-Sx 1/10GE: standalone and standalone-VC

Description

This command configures network policies, which send configuration information using LLDP-MED TLVs. The configured policy specifies the network policy configuration that must be provided to the LLDP-MED endpoint device. Multiple policies can be configured with different application types.

By default, the system creates network policy 1, which is not associated with a port. The user must explicitly configure a policy for use with a port, or use the default network policy 1, and enable transmission and reception of LLDP-MED TLVs on the port.

The **no** form of the command removes the configured network policy ID.

Parameters

network-policy-id

Specifies the network policy ID.

Values 1 to 65535

create

Keyword to create a network policy.

application-type

Syntax

application-type {**voice** | **voice-signaling** | **guest-voice** | **guest-voice-signaling** | **soft-phone-voice** | **video-conferencing** | **streaming-video** | **video-signaling**}

no application-type

Context

config>system>lldp>lldp-med>network-policy

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Platforms

7210 SAS-Sx 1/10GE: standalone and standalone-VC

Description

This command configures the application type for the specified network policy.

The configured **application-type** is used to match with the application type received from an LLDP-MED endpoint device and provides the endpoint device with the network policy configured for the requested application type.

The **no** form of this command configures the Network Policy TLV to send the application type value "not_specified" to the LLDP-MED endpoint device.

Default

no application-type

Parameters

voice

Keyword to configure the voice application type for the network policy.

voice-signaling

Keyword to configure the voice signaling application type for the network policy.

guest-voice

Keyword to configure the guest voice application type for the network policy.

guest-voice-signaling

Keyword to configure the guest voice signaling application type for the network policy.

soft-phone-voice

Keyword to configure the soft phone voice application type for the network policy.

video-conferencing

Keyword to configure the video conferencing application type for the network policy.

streaming-video

Keyword to configure the video streaming application type for the network policy.

video-signaling

Keyword to configure the video signaling application type for the network policy.

dot1p

Syntax

dot1p *dot1p-value*

no dot1p

Context

config>system>lldp>lldp-med>network-policy

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Platforms

7210 SAS-Sx 1/10GE: standalone and standalone-VC

Description

This command configures the dot1p value for the network policy.

The **no** form of this command reverts to the default value.

Default

dot1p 0

Parameters

dot1p-value

Specifies the dot1p value.

Values 0 to 7

ip-dscp

Syntax

ip-dscp *ip-dscp*

no ip-dscp

Context

config>system>lldp>lldp-med>network-policy

Platforms

7210 SAS-Sx 1/10GE: standalone and standalone-VC

Description

This command configures the IP DSCP value for the network policy.

The **no** form of this command reverts to the default value.

Default

ip-dscp 0

Parameters

ip-dscp

Specifies the IP DSCP value.

Values 0 to 63

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vlan-id

Syntax

vlan-id *0..4094*

no vlan-id

Context

config>system>lldp>lldp-med>network-policy

Platforms

7210 SAS-Sx 1/10GE: standalone and standalone-VC

Description

This command configures the VLAN ID for the network policy.

The **no** form of this command reverts to the default value.

Default

vlan-id 0

Parameters

0..4094

Specifies the VLAN ID.

Values 0 to 4094

vlan-tag-present

Syntax

[**no**] **vlan-tag-present**

Context

config>system>lldp>lldp-med>network-policy

Platforms

7210 SAS-Sx 1/10GE: standalone and standalone-VC

Description

This command configures the application specified by the **application-type** to use a VLAN tagged packet, using the configured VLAN ID in the VLAN tag.

The **no** form of this command disables the use of a VLAN tag.

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Default

no vlan-tag-present

message-fast-tx

Syntax

message-fast-tx *time*

no message-fast-tx

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the duration of the fast transmission period.

Parameters

time

Specifies the fast transmission period, in seconds.

Values 1 to 3600

Default 1

message-fast-tx-init

Syntax

message-fast-tx-init *count*

no message-fast-tx-init

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the number of LLDPDUs to send during the fast transmission period.

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Parameters

count

Specifies the number of LLDPDUs to send during the fast transmission period.

Values 1 to 8

Default 4

notification-interval

Syntax

notification-interval *time*

no notification-interval

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the minimum time between change notifications.

Parameters

time

Specifies the minimum time, in seconds, between change notifications.

Values 5 to 3600

Default 5

reinit-delay

Syntax

reinit-delay *time*

no reinit-delay

Context

config>system>lldp

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Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the time before reinitializing LLDP on a port.

Parameters

time

Specifies the time, in seconds, before reinitializing LLDP on a port.

Values 1 to 10

Default 2

tx-credit-max

Syntax

tx-credit-max *count*

no tx-credit-max

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the maximum consecutive LLDPDUs transmitted.

Parameters

count

Specifies the maximum consecutive LLDPDUs transmitted.

Values 1 to 100

Default 5

tx-hold-multiplier

Syntax

tx-hold-multiplier *multiplier*

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no tx-hold-multiplier

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the multiplier of the **tx-interval**.

Parameters

multiplier

Specifies the multiplier of the tx-interval.

Values 2 to 10

Default 4

tx-interval

Syntax

tx-interval *interval*

no tx-interval

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures the LLDP transmit interval time.

Parameters

interval

Specifies the LLDP transmit interval time.

Values 5 to 32768

Default 30

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7.18.2.1.24 LLDP Ethernet port commands

lldp

Syntax

lldp

Context

config>port>ethernet

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context configure Link Layer Discovery Protocol (LLDP) parameters on the specified port.

dest-mac

Syntax

dest-mac {*bridge-mac*}

Context

config>port>ethernet>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command configures destination MAC address parameters.

Parameters

bridge-mac

Specifies destination bridge MAC type to use by LLDP.

Values **nearest-bridge** — Specifies to use the nearest bridge

nearest-non-tpmr — Specifies to use the nearest non-Two-Port MAC Relay (TPMR)

nearest-customer — Specifies to use the nearest customer

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admin-status

Syntax

admin-status {**rx** | **tx** | **tx-rx** | **disabled**}

Context

config>port>ethernet>lldp>dstmac

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command specifies the administratively desired status of the local LLDP agent.

Parameters

rx

Specifies that the LLDP agent will receive, but will not transmit LLDP frames on this port.

tx

Specifies that the LLDP agent will transmit LLDP frames on this port and will not store any information about the remote systems connected.

tx-rx

Specifies that the LLDP agent will transmit and receive LLDP frames on this port.

disabled

Specifies that the LLDP agent will not transmit or receive LLDP frames on this port. If there is remote systems information which is received on this port and stored in other tables, before the port's admin status becomes disabled, the information will naturally age out.

notification

Syntax

[**no**] **notification**

Context

config>port>ethernet>lldp>dstmac

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

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Description

This command enables LLDP notifications.

The **no** form of this command disables LLDP notifications.

tx-mgmt-address

Syntax

tx-mgmt-address [**system**]

no tx-mgmt-address

Context

config>port>ethernet>lldp>dstmac

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command specifies which management address to transmit.

The **no** form of this command reverts value to the default.

Default

no tx-mgmt-address

Parameters

system

Specifies to use the system IP address. If this parameter is specified, the system address will only be transmitted once it has been configured.

tx-tlvs

Syntax

tx-tlvs [**port-desc**] [**sys-name**] [**sys-desc**] [**sys-cap**]

no tx-tlvs

Context

config>port>ethernet>lldp>dstmac

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

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Description

This command specifies which LLDP TLVs to transmit.

The **no** form of this command reverts to the default.

Default

no tx-tlvs

Parameters

port-desc

Specifies that the LLDP agent should transmit port description TLVs.

sys-name

Specifies that the LLDP agent should transmit system name TLVs.

sys-desc

Specifies that the LLDP agent should transmit system description TLVs.

sys-cap

Specifies that the LLDP agent should transmit system capabilities TLVs.

7.18.2.1.25 System resource-profile commands

resource-profile

Syntax

resource-profile *policy-id* [**create**]

no resource-profile *policy-id*

Context

configure>system

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone-VC

Description

Commands in this context configure resource profile parameters on the system.

Default

1

Parameters

policy-id

Specifies a resource profile policy.

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Values 1 to 16

create

Keyword to create a resource profile instance.

resource-profile

Syntax

resource-profile

no resource-profile

Context

configure>system

Platforms

7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE: standalone, and 7210 SAS-Sx 10/100GE

Description

Commands in this context configure resource profile parameters on the system.

enable-bgp3107-frr

Syntax

enable-bgp-3107-frr

no enable-bgp3107-frr

Context

config>system>resource-profile

Platforms

7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE

Description

This command enables the allocation of MPLS FIB and protection group resources required for enabling uniform fast reroute (FRR) for BGP RFC 3107 LU routes resolved using RSVP-TE LSPs. This is a per-node configuration and enabling the command affects all BGP LU routes.

Caution:
If the command is enabled, the amount of resources required is twice the amount required without uniform FRR, and the number of BGP LU routes that can be accommodated in the MPLS FIB is therefore halved if uniform FRR is enabled. Ensure that sufficient MPLS resources are available to accommodate all required BGP LU routes before using this command.

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The **no** form of this command disables the use of uniform FRR for BGP LU routes.

Default

no enable-bgp3107-frr

enable-ldporsvp-frr

Syntax

enable-ldporsvp-frr

no enable-ldporsvp-frr

Context

config>system>resource-profile

Platforms

7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE

Description

This command enables the allocation of MPLS FIB and protection group resources required for enabling uniform FRR for LDP-over-RSVP LSPs (LDP FECs resolved using RSVP-TE LSPs). This is a per-node configuration and enabling the command affects all LDP-over-RSVP LSPs.



Caution:
If the command is enabled, the amount of resources required is twice the amount required without uniform FRR, and the number of LDP-over-RSVP LSPs that can be accommodated in the MPLS FIB is therefore halved if uniform FRR is enabled. Ensure that sufficient MPLS resources are available to accommodate all required LDP-over-RSVP LSPs before using this command.

The **no** form of this command disables the use of uniform FRR for LDP-over-RSVP LSPs.

Default

no enable-ldporsvp-frr

g8032-fast-flood-enable

Syntax

[**no**] **g8032-fast-flood-enable**

Context

configure>system>resource-profile>ingress-internal-tcam

Platforms

7210 SAS-T

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Description

This command configures the G.8032 fast-flood feature. When this command is executed, it is stored in the configuration file after **admin save** is executed. A system reboot is required for this command to take effect.

Nokia recommends enabling this command to improve service failover time due to failures in the ring path. When fast flood is enabled, on failure detection in one of the paths of the ETH-ring, along with MAC flush, the system starts to flood the traffic on-to the available path.

If this command is present in the configuration file, on reboot, the system allocates resources for G.8032, by reducing the amount of resources available for use with ACLs. When this command is used, G.8032 fastflood needs an entire chunk with "512" entries, therefore the amount of resources available for use with ACLs is reduced by "512". The user needs to free up resources used by ACLs and make them available for use by G.8032, before enabling this command. The user should ensure that the resource usage of ACLs has been appropriately modified before reboot, to make way for use of this feature. The user can free up resources by either disabling the use of ACLs with a SAP or deleting a SAP, so that an entire chunk of 512 entries is available.

Before enabling the **g8032-fast-flood-enable** command, the user must check if sufficient resources are available. The **tools dump system-resources** command is available to check if sufficient resources are available. The 'Ingress Shared CAM Entries' field, shown in the output below **tools dump system resources** command, must be more than or equal to 512 (the 'Free' column in the following output).

```
| Total | Allocated | Free
------------------------------+-----------+-----------+------------
Ingress Shared CAM Entries | 0 | 0 | 512
```

The **no** form of this command removes the allocated resources for use by G.8032.The entire resource pool is available for use by ACLs. The **no** form of this command takes affect only on reboot.

Default

no g8032-fast-flood-enable

decommission

Syntax

decommission

Context

config>system>resource-profile

Platforms

7210 SAS-T (network and access-uplink)

Description

Commands in this context decommission a port. Ports which are decommissioned using this command are not available for provisioning services. The packet buffers are taken away from the decommissioned port and allocated to port(s) as specified by the entries configured under the decommission command.

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This command allocates more packet buffers to a certain port or group of ports and enables those ports to absorb larger bursts.

entry

Syntax

entry *entry-id* **port** *port-range* **to** *port-range*

no entry *entry-id*

Context

config>system>resource-profile>decommission

Platforms

7210 SAS-T (network and access-uplink)

Description

This command decommissions a port or group of ports and allocates buffers to ports that need more packet buffers for absorbing larger bursts. It allows the user to configure the entries which list the ports to be decommissioned. Ports whose packet buffers are taken away are given on the left-hand of the **to** keyword, and ports to which buffers are allocated to are given on the right-hand side.

This command allows the user to specify either a port or a group of ports on both sides, using a list or range of ports. This allows the user to decommission a single port and allocate buffers to a single port or group of ports, or decommission a group of ports and allocate buffers to a single port or group of ports.

Packet buffers taken away from a port or group of ports specified on the left-hand side are distributed equally among the group of ports, if the right-hand side of the **to** keyword specifies a group of ports or to the configured port if the right-hand side specifies a single port. Packet buffers are added to the MBS pool of the port (the MBS pool is shared by the 8 queues on the port) and the CBS portion of the queues is not modified.

The administrative and operational states of the port are not affected by configuring the port in a decommission entry.

Note:

- Any changes to the command, example - modifying the list of ports in existing entries or execution of **no entry** command or addition of new entries, takes effect only after a reboot of the node. The user is allowed to make change when the node is up, but the changes does not happen until a reboot of the system.
- The ports on the CES MDA cannot be specified in the **decommission** command.

The software maintains two lists of entries, one which is in effect currently and one which has been modified by the user and takes effect during the next reboot. These lists can be displayed using the show command. The configuration file always stores the list of entries as configured by the user so that upon reboot, the modified entries and new entries (if any) take effect.

The following guidelines are to be adhered while configuring the **entry** command.

- A port cannot be specified more than once in any of the entries. In other words, if two entries specify the same port ID, the software errors out the last entry which has the same port ID.

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- A port appearing on the left-hand side of the **to** keyword in any entry cannot appear on the right-hand side of any other entries (including the same entry) and the converse also holds true.
- If the user has specified a group of ports using a port range, the software expands the range to a list of ports and then makes the required checks (that is, checks listed in the first and second bullets) for each port in the list with the list of currently configured group of ports.
- Either a port ID or a list of port ID or port ID ranges can be specified on the left-hand side and the right hand-side of the 'to' keyword. See the following description for port ID specification to know more about the restrictions that apply when configuring a port range and list of ports.
- The list of entries is processed in the ascending order of the entry IDs, that is, an entry with a lower entry ID is processed before entry with a higher entry ID.

The **no** form of this command removes the entry from the list of decommissioned ports. The **no** form of this command requires a reboot to take effect.

The following examples show the list of ports, range of ports, and a combination of list of ports and range of ports that can be specified.

List of ports can be specified as:

- 1/1/1, 1/1/2, 1/2/1, 1/1/10 is allowed
- 1/1/10, 1/1/2, 1/1/9, 1/1/5 is allowed

Range of ports can be specified as:

- 1/1/2-1/1/5 is allowed
- 1/2/1-1/2/2 is allowed
- 1/1/10-1/1/2 is not allowed
- 1/1/1 – 1/2/2 is not allowed

A combination of list of ports and range of ports can be specified as:

- 1/1/5,1/1/6,1/1/10-1/1/15,1/1/25 is allowed
- 1/1/5,1/1/6,1/1/10-1/1/12,1/1/13-1/1/15 is allowed
- 1/1/5,1/1/6,1/1/10-1/1/12,1/2/1-1/2/2 is allowed

Parameters

entry-id

Specifies a number in the range 1 to 30. A maximum of 30 entries can be created by the user.

Values 1 to 30

port-range

Specifies the port, list of ports, a port range, or a combination of these that are being decommissioned when they appear on the left-hand side of the **to** keyword. This parameter identifies the port or group of ports that receives the packet buffers from the decommissioned ports. A group of ports can be specified as a list of ports or as a range of ports.

The list of ports can be specified in any order using a comma to separate the list of ports, while a port range must always be specified in the ascending order of port IDs (in other words, the first port number specified in the range must be greater than the second port

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number in the range) and a single range cannot refer to ports on different MDA or different IMMs or different slots.

egress-internal-tcam

Syntax

egress-internal-tcam

Context

configure>system>resource-profile

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context allocate resources from the egress internal TCAM pool.

The egress internal TCAM resource pool is shared by multiple features. The resources are allocated to features in chunks of fixed size; multiple features cannot share the same chunk. The users can allocate the available resources based on their feature scaling requirements. The system allocates resources to the feature from its allocated chunk until the chunk runs out of resources. The users can reallocate chunks of resources from features that do not need to be enabled.

To free up the resources for use by one or more features, modify the configuration to release the chunks of resources that are in use by other features. For example, to free up a chunk of resources allocated to egress ACLs MAC criteria and allocate it to IP criteria, perform the following steps.

1. Remove the association of SAPs with egress ACLs that use a MAC criteria policy.
2. Change the resource profile configuration to allocate the chunk to IP criteria.
3. Create and associate the SAPs with the IP criteria.

To free up a chunk of resources used by egress ACLs and allocate it to the SAP egress aggregate meter (on platforms that support this feature), perform the following steps.

1. Remove the association of SAPs with egress ACLs.
2. Change the resource profile configuration to reduce the chunk resources allocated to egress ACLs (and reduce the value of chunks in use by the egress ACLs match criteria).
3. Allocate the chunk of resources to the SAP egress aggregate meter feature (on platforms that support this feature).
4. Configure the SAPs with the aggregate meter rate.

The egress internal TCAM resource pool is shared among the following features on different platforms:

- **7210 SAS-T access-uplink mode**

  Egress ACLs (all of IPv4, IPv6, MAC match-criteria), Per SAP Egress Aggregate Meter, and MAC authentication
- **7210 SAS-T network mode**

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Per SAP Egress Aggregate meter, Egress ACLs (all of IPv4, IPv6, and MAC match-criteria), and MAC authentication

- **7210 SAS-Mxp mode**

  Egress ACLs (all of IPv4, IPv6, and MAC match-criteria) and MAC authentication

- **7210 SAS-Sx 1/10GE mode (standalone and standalone-VC)**

  Per SAP Egress Aggregate meter, Egress ACLs (all of IPv4, IPv6, and MAC match-criteria), and MAC authentication

- **7210 SAS-S 1/10GE mode (standalone and standalone-VC)**

  Per SAP Egress Aggregate meter, Egress ACLs (all of IPv4, IPv6, and MAC match-criteria), and MAC authentication

- **7210 SAS-Sx 10/100GE mode**

  Per SAP Egress Aggregate meter and Egress ACLs (all of IPv4, IPv6, and MAC match-criteria)

- **7210 SAS-R6 IMMv2 and IMM-c**

  Per SAP Egress Aggregate meter, Egress ACLs (all of IPv4, IPv6, and MAC match-criteria), Ethernet CFM (bidirectional MIP), and MAC authentication

- **7210 SAS-R12 IMMv2 and IMM-c**

  Per SAP Egress Aggregate meter and Egress ACLs (all of IPv4, IPv6, and MAC match-criteria), Ethernet CFM (bidirectional MIP)

Note:

- In some scenarios, reassigning a chunk of resources among features may require the node to be rebooted. See the CLI description of the feature for more information.
- The egress internal TCAM pool of resources is available per node on the 7210 SAS-T, 7210 SAS-Sx/S 1/10GE (standalone), 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp. On the 7210 SAS-Sx/S 1/10GE (standalone-VC), 7210 SAS-R6, and 7210 SAS-R12, it is available as a per-IMM pool of resources.
- It is possible to configure a resource profile per node or per card in a virtual chassis.
- The number of chunks and the number of resources per chunk varies for the 7210 SAS platforms. Contact your Nokia technical support representative for more information.
- To be enabled, some features require the allocation of a specific number of chunks (greater than 1). If the minimum number of chunks is not assigned, the system cannot allocate the required resources to the feature, which causes the command associated with the feature to fail.

acl-sap-egress

Syntax

acl-sap-egress [*num-resources*]

no acl-sap-ingress

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Context

configure>system>resource-profile>egress-internal-tcam

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command enables the user to allocate maximum resources for use by egress filter policies using any of the supported match criteria. This command limits the total amount of chunks allocated for use by egress filter policies to the value specified by *num-resources*. In other words, the cumulative sum of chunks allocated to different match criteria supported by filter policies cannot exceed the value configured with *num-resources*.

Note:

- The resources in the egress-internal-tcam resource pool are shared with other features (for example, SAP egress aggregate meter). To assign resources to this feature, resources may be reallocated from other features by disabling the policies association with a SAP, and others.
- On the 7210 SAS platforms, some of the Egress ACL match criteria require a minimum amount of resources greater than 1, to be allocated before the match criteria can be used. In other words, use of SAP egress aggregate meter is mutually exclusive to use of egress ACLs with the following match criteria - mac-ipv4 match, ipv6-128bit match, mac-ipv6-64bit match. All these match criteria require a minimum of 2 resources. SAP egress aggregate meter and egress ACLs MAC match criteria can be enabled simultaneously, with each feature sharing the available resources equally among them.

The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a filter policy using any of the match criteria.

Parameters

num-resources

Specifies the amount of resources that can be allocated for use by ACL policies.

Values The following table lists the parameter values.

Table 38: Number of resources available for acl-sap-egress

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T Network mode (per node)	0	2	2
7210 SAS-R6 and 7210 SAS-R12 (per IMMv2)	0	2	2
7210 SAS-R6 and 7210 SAS-R12 (per IMM-c)	0	2	2

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Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-Mxp (per node)	0	2	2
7210 SAS-Sx 1/10GE (per node) (standalone)	0	2	2
7210 SAS-Sx 1/10GE (standalone-VC)	0	2	2
7210 SAS-S 1/10GE (per node) (standalone)	0	2	2
7210 SAS-S 1/10GE (standalone-VC)	0	2	2
7210 SAS-Sx 10/100GE (per node)	0	2	2

egress-sap-aggregate-meter

Syntax

[**no**] **egress-sap-aggregate-meter** *num-resources*

Context

configure>system>resource-profile>egress-internal-tcam

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, 7210 SAS-R6 and 7210 SAS-R12

Description

This command allocates resources for use by SAP egress aggregate policer from the egress-internal-tcam resource pool. This command limits the total amount of chunks allocated for use by SAP egress aggregate meter to the value specified by the *num-resources* parameter.

Note:

- The resources in the egress-internal-tcam resource pool are shared with other features (for example, SAP egress aggregate meter). To assign resources to this feature, resources may be reallocated from other features by disabling the policies association with a SAP, and others.
- On the 7210 SAS platforms, some of the Egress ACL match criteria require a minimum amount of resources greater than 1, to be allocated before the match criteria can be used. In other words, use of SAP egress aggregate meter is mutually exclusive to use of egress ACLs with the following match criteria - mac-ipv4 match, ipv6-128bit match, mac-ipv6-64bit match. All these match criteria require a minimum of 2 resources. SAP egress aggregate meter and egress ACLs MAC match criteria can be enabled simultaneously, with each feature sharing the available resources equally among them.

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The **no** form of this command specifies that software does not allocate any resources for use by the SAP egress aggregate policer. If no resources are allocated for use, the software fails all attempts to enable the configuration of the **sap-aggregate-meter** command for a SAP.

Default

no egress-sap-aggregate-meter

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

Values 0 to 2

Default 0

ipv6-128bit-match-enable

Syntax

[**no**] **ipv6-128bit-match-enable** *num-resources*

Context

configure>system>resource-profile>egress-internal-tcam>acl-sap-egress

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates maximum resources for use by egress filter policies using ipv6 criteria with 128-bit IPv6 addresses.

The resources cannot be shared with any other egress filter policies that specify other match criteria. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Router Configuration Guide* for more information about resource allocation and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies using ipv6 criteria with 128-bit IPv6 addresses. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a filter policy using this match criteria.

Default

no ipv6-128bit-match-enable

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Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria. A minimum value of 2 (indicating two chunks of resources) must be allocated to use this match-criteria. If not, association of a policy with ipv6-128bit criteria to a SAP will fail. It is mutually exclusive to use of SAP egress aggregate meter.

Values The following table lists the parameter values.

Table 39: Number of resources available for ipv6-128bit-match-enable

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T access-uplink mode (per node)	0	2	0
7210 SAS-T network mode (per node)	0	2	0
7210 SAS-Sx 1/10GE (standalone)	0	2	0
7210 SAS-Sx 1/10GE (standalone-VC)	0	2	0
7210 SAS-S 1/10GE (standalone)	0	2	0
7210 SAS-S 1/10GE (standalone-VC)	0	2	0
7210 SAS-Sx 10/100GE	0	2	0
7210 SAS-Mxp	0	2	0
7210 SAS-R6 and 7210 SAS-R12 (per IMM)	0	2	0

mac-ipv4-match-enable

Syntax

[**no**] **mac-ipv4-match-enable** *num-resources*

Context

configure>system>resource-profile>egress-internal-tcam>acl-sap-egress

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates maximum resources for use by egress filter policies using IPv4 criteria or MAC criteria. The resources allocated are allocated on a first-come-first-serve basis among service entities (for example, SAP and IP interface) using IPv4 and MAC criteria egress filter policies.

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The resources cannot be shared with any other egress filter policies that specify other match criteria. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Router Configuration Guide* for more information about resource allocation and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies using MAC or IPv4 criteria. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a filter policy using this match criteria.

Default

mac-ipv4-match-enable 2 (to maintain backward compatibility with earlier releases)

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria. A minimum value of 2 (indicating two chunks of resources) must be allocated to use this match-criteria. If not, association of a policy with mac and ipv4 criteria to a SAP will fail. It is mutually exclusive to use of SAP egress aggregate meter.

Values The following table lists the parameter values.

Table 40: Number of resources available for mac-ipv4-match-enable

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T access-uplink mode (per node)	0	2	0
7210 SAS-T network mode (per node)	0	2	0
7210 SAS-S 1/10GE (per node) (standalone)	0	2	0
7210 SAS-Sx 1/10GE standalone-VC)	0	2	2
7210 SAS-S 1/10GE (per node) (standalone)	0	2	0
7210 SAS-S 1/10GE (standalone-VC)	0	2	2
7210 SAS-Sx 10/100GE (per node)	0	2	2
7210 SAS-R6 and 7210 SAS-R12 IMM-c (per node)	0	2	2
7210 SAS-Mxp	0	2	0
7210 SAS-R6 and 7210 SAS-R12 IMMv2 and IMM-c	0	2	0

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mac-ipv6-64bit-match-enable

Syntax

[**no**] **mac-ipv6-64bit-match-enable** *num-resources*

Context

configure>system>resource-profile>egress-internal-tcam>acl-sap-egress

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates maximum resources for use by egress filter policies using MAC criteria or IPv6 criteria using only the upper 64-bits of the IPv6 addresses. The resources allocated are allocated on a first-come-first-serve basis among service entities (for example, SAP and IP interface) using IPv6 64-bit and MAC criteria egress filter policies.

The resources cannot be shared with any other egress filter policies that specify other match criteria. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Router Configuration Guide* for more information about resource allocation and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies using MAC or IPv6 64-bit criteria. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example SAP and IP interface) with a filter policy using this match criteria.

Default

no mac-ipv6-64bit-match-enable

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria. A minimum value of 2 (indicating two chunks of resources) must be allocated to use this match-criteria. If not, association of a policy with mac and ipv6 64bit criteria to a SAP will fail. It is mutually exclusive to use of SAP egress aggregate meter.

Values The following table lists the parameter values.

Table 41: Number of resources available for mac-ipv6-64bit-match-enable

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T access-uplink mode (per node)	0	2	0
7210 SAS-T network mode (per node)	0	2	0

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Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-Sx 1/10GE (per node) (standalone)	0	2	0
7210 SAS-Sx 1/10GE (standalone-VC)	0	2	0
7210 SAS-S 1/10GE (per node) (standalone)	0	2	0
7210 SAS-S 1/10GE (standalone-VC)	0	2	0
7210 SAS-Sx 10/100GE (per node)	0	2	0
7210 SAS-Mxp	0	2	0
7210 SAS-R6 and 7210 SAS-R12 IMMv2 and IMM-c	0	2	0

mac-match-enable

Syntax

[**no**] **mac-match-enable** *num-resources*

Context

configure>system>resource-profile>egress-internal-tcam>acl-sap-egress

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates maximum resources for use by egress filter policies using MAC criteria. The resources allocated are allocated on a first-come-first-serve basis among service entities (for example, SAP and IP interface) using MAC criteria egress filter policies. This option provides the use of all available resources exclusively by MAC criteria egress filter policies and provides larger number of policies to be used.

The resources cannot be shared with any other egress filter policies that specify other match criteria. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Router Configuration Guide* for more information about resource allocation and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies using MAC criteria. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a filter policy using this match criteria.

Note:
It is possible to use MAC policies by allocating resources that are shared with other match criteria. This option allows for better scaling.

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Default

no mac-match-enable

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

Values 0 to 2

Default 0

eth-cfm

Syntax

eth-cfm [*num-resources*]

no eth-cfm

Context

configure>system>resource-profile>egress-internal-tcam

Platforms

7210 SAS-R6 (IMMv2 and IMM-c) and 7210 SAS-R12 (IMMv2 and IMM-c)

Description

Note:
This command applies only to VPLS SAPs on IMMv2 and IMM-c.

Commands in this context allocate resources for CFM bidirectional MIPs in a VPLS service.

The **no** form of this command allows the MIPs to retain the Down MEP by de-allocating the resources.

On the 7210 SAS-R6 and 7210 SAS-R12, the system does not allocate any ETH-CFM resource slices by default. The user must allocate ETH-CFM resource slices manually. The default number of resource slices is 0 and a maximum of 1 slice can be allocated.

Parameters

num-resources

Specifies the maximum amount of resources for use by ETH-CFM. Entering a value of **def** allocates the default number of resource slices.

Values The following table lists the parameter values.

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Table 42: Number of resources available for eth-cfm

Platforms	Min value	Max value	Default
7210 SAS-R6	0	1	0
7210 SAS-R12	0	1	0
7210 SAS-R6 and 7210 SAS-R12 IMM-c[31]	0	1	0

bidir-mip-egress

Syntax

bidir-mip-egress [*num-resources*]

no bidir-mip-egress

Context

configure>system>resource-profile>egress-internal-tcam>eth-cfm

Platforms

7210 SAS-R6 (IMMv2 and IMM-c) and 7210 SAS-R12 (IMMv2 and IMM-c)

Description

This command allocates resources for the VPLS bidirectional MIP (both ingress and egress directions) on SAPs only from the egress internal TCAM resource pool.

Note:

- The resources in the egress internal TCAM resource pool are shared with other features.

  To assign resources to a specific feature, resources can be reallocated from other features. For example, you can release resources by disabling the policies associated with a SAP.
- Resources must be allocated from this pool before bidirectional MIPs can be configured on VPLS SAPs.
- Bidirectional MIPs on VPLS SAPs can be enabled only when the **bidir-mip-egress** resource slice is allocated and **vpls-sap-bidir** is enabled in the **configure**>**service**>**vpls**>**eth-cfm** context.

The **no** form of this command allocates no resources to this feature.

Default

no bidir-mip-egress

31 Applicable only on SAPs.

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Parameters

num-resources

Specifies the number of resources to allocate.

Values 0 to 1

mac-auth-res

Syntax

mac-auth-res *num-resources*

no mac-auth-res

Context

config>system>resource-profile>egress-internal-tcam

config>system>resource-profile>ingress-internal-tcam

Platforms

7210 SAS-Mxp (standalone), 7210 SAS-R6 (all IMMs), 7210 SAS-R12 (all IMMs), 7210 SAS-Sx/S 1/10GE (standalone), 7210 SAS-T (network and access-uplink operating modes)

Description

This command configures the allocation of resources for MAC authentication from the ingress internal TCAM pool and egress internal TCAM pool. Resources must be allocated from both ingress and egress TCAM pools before MAC authentication can be used. If resources are not allocated from both pools, the system returns an error message and MAC authentication cannot be enabled.

The configured number of resources specifies the number of resource pool slices allocated for use by MAC authentication. One entry is used for each authenticated source MAC address. The maximum number of MAC addresses that can be authenticated is limited by the number of entries allocated to the feature using this command. The maximum number of MAC address entries is limited by the maximum number of entries available in the ingress internal TCAM pool and the egress internal TCAM pool.

The **no** form of this command removes all resources allocated to MAC authentication; further attempts to enable MAC authentication on an Ethernet port using the **mac-auth** command will fail unless resources are first reallocated using the **mac-auth-res** command. The **no** form of the **mac-auth-res** command cannot be executed when MAC authentication is enabled on at least one port.

Default

no mac-auth-res

Parameters

num-resources

Specifies the number of resources to allocate for MAC authentication. Configuring a value of 0 is equivalent to configuring **no mac-auth-res** and effectively disables MAC authentication.

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Values 0 to 1

g8032-control-sap-tags

Syntax

[**no**] **g8032-control-sap-tags** *vlan-range*

Context

configure>system>resource-profile

Platforms

7210 SAS-Sx 1/10GE (standalone-VC), 7210 SAS-R6, 7210 SAS-R12

Description

This command configures the range of VLANs per IMM to be used internally with G8032 MEPs that support hardware CCM message processing.

Note:
Users must ensure that the VLANs configured for use with G8032 MEPs are not configured for any of the SAPs configured on the IMM.

Use one of the VLANs configured with this command to configure the VLAN for the G8032 MEP **configure>eth-ring>path>eth-cfm>mep>control-sap-tag**.

Default

no g8032-control-sap-tags

Parameters

vlan-range

Specifies the range of VLANs per IM.

Values *start-vlan* — 3000 to 3512 (7210 SAS-R6 and 7210 SAS-R12)
512 to 768 (7210 SAS-Sx 1/10GE (standalone-VC))
end -vlan — 3000 to 3512 (7210 SAS-R6 and 7210 SAS-R12)
512 to 768 (7210 SAS-Sx 1/10GE (standalone-VC))

qos-sap-egress-resource

Syntax

qos-sap-egress-resource *num-resources*

no qos-sap-egress-resource

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Context

config>system>res-prof>ingress-internal-tcam

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

Description

This command configures resource allocation for SAP-based egress queuing from the ingress-internal-tcam resource pool. If port-based queuing is disabled, users must allocate resources for SAP-based egress queuing using this command. If no resources are allocated, SAPs cannot be created.

When port-based queuing is enabled, resources can be taken away from SAP-based egress queues and allocated to other features that share the ingress-internal-tcam pool (for example, SAP ingress QoS and Ingress ACLs).

Note:
This command is not supported on IMM-c cards. SAP functionality with per SAP egress queues is not supported on IMM-c cards.

The **no** form of this command reverts to the default value.

Default

0

Parameters

num-resources

Specifies the amount of resources that are allocated towards SAP-based egress queues.

Values 0 to 2

ingress-internal-tcam

Syntax

ingress-internal-tcam

Context

configure>system>resource-profile

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context allocate ingress internal TCAM resources.

The ingress internal TCAM resource pool is shared by multiple features. The resources are allocated in chunks of fixed size; multiple features cannot share the same chunk. The users can allocate the available

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resources based on their feature scaling requirements. The resource usage for different features is provided in the CLI description. The system allocates resources to the feature from its allocated chunk until the chunk runs out of resources. The users can reallocate chunks of resources from features that do not need to be enabled.

To free up the resources for use by one or more features, modify the configuration to release chunks of resources that are in use by other features. For example, to free up a chunk of resources allocated to ingress ACLs MAC criteria and allocate the chunk to IP criteria, perform the following steps.

1. Remove the association of all the SAPs with ingress ACLs that use a MAC criteria policy.
2. Change the resource profile configuration to allocate the chunk to IP criteria.
3. Create (can be done before hand) and associate the SAPs with IP criteria.

For another example, to free up a chunk of resources used by ingress ACLs and allocate it towards SAP ingress QoS classification, perform the following steps.

1. Remove the association of all the SAPs with ingress ACLs.
2. Change the resource profile configuration to reduce the chunk resources allocated to ingress ACLs (and also to reduce the amount configured for specific match-criteria).
3. Allocate the chunk of resources to SAP ingress QoS classification feature.
4. Configure the SAPs with the SAP ingress QoS policies.

The following table describes the sharing of the ingress internal TCAM resource pool among the features on different 7210 SAS platforms.

Table 43: Ingress internal TCAM resource sharing (platforms and features)

Platform	Features sharing ingress internal TCAM resource pool
7210 SAS-T access-uplink mode	• SAP ingress QoS classification (all of IPv4, IPv6, and MAC match-criteria) • ingress ACLs (all of IPv4, IPv6, and MAC match-criteria) • Ethernet CFM UP MEP • SAP ingress aggregate meter • MAC authentication
7210 SAS-T network mode	• SAP ingress QoS classification (all of IPv4, IPv6, and MAC match-criteria) • ingress ACLs (all of IPv4, IPv6, and MAC match-criteria) • Ethernet CFM Up MEP • G8032 Fast-flood support • SAP ingress aggregate meter • MAC authentication
7210 SAS-Mxp	• SAP ingress QoS classification (all of IPv4, IPv6, and MAC match-criteria) • ingress ACLs (all of IPv4, IPv6, and MAC match-criteria)

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Platform	Features sharing ingress internal TCAM resource pool
	• Ethernet CFM Up MEP, ingress MIPs, and Epipe bidirectional MIPs • SAP ingress aggregate meter • MAC authentication • access port ingress QoS policies • network port QoS policies • IP-MPLS control plane protocols • DHCPv6 snooping on VPLS SDP bindings
7210 SAS-R6 and 7210 SAS-R12	On the 7210 SAS-R6 and 7210 SAS-R12, the features that share the resource pool are different based on the IMM card type. On IMMv2 and IMM-c cards[32], this resource pool is shared among the following features: • SAP ingress QoS classification (all of IPv4, IPv6, and MAC match-criteria) • ingress ACLs (all of IPv4, IPv6, and MAC match-criteria) • Ethernet CFM MEP (Up and Down), ingress MIPs, and Epipe bidirectional MIPs • SAP ingress aggregate meter • network port and IP interface ingress QoS classification • SAP egress based queuing and scheduling (not applicable to IMM-c cards) • CPU protection • MAC authentication (7210 SAS-R6 only) • access port ingress QoS policies
7210 SAS-Sx 1/10GE (standalone)	• SAP ingress QoS classification (IPv4 and IPv6 match-criteria) • ingress ACLs (all of IPv4, IPv6, and MAC match-criteria) • Ethernet CFM Up MEP, Down MEP, ingress MIPs, and Epipe bidirectional MIPs • SAP ingress aggregate meter • access port ingress QoS policies • MAC authentication • DHCPv6 snooping on VPLS SDP bindings
7210 SAS-Sx 1/10GE (standalone-VC)	• SAP ingress QoS classification (IPv4 and IPv6 match-criteria) • ingress ACLs (all of IPv4, IPv6, and MAC match-criteria)

[32] IMM-c cards cannot be installed in the same 7210 SAS-R6 chassis.

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Platform	Features sharing ingress internal TCAM resource pool
	• Ethernet CFM Up MEP, SAP Down MEP, SDP Down MEP, ingress MIPs, and Epipe bidirectional MIPs • SAP ingress aggregate meter • MAC authentication
7210 SAS-S 1/10GE (standalone)	• SAP ingress QoS classification (IPv4 and IPv6 match-criteria) • ingress ACLs (all of IPv4, IPv6, and MAC match-criteria) • Ethernet CFM Up MEP, Down MEP, ingress MIPs, and Epipe bidirectional MIPs • SAP ingress aggregate meter • access port ingress QoS policies • MAC authentication
7210 SAS-S 1/10GE (standalone-VC)	• SAP ingress QoS classification (IPv4 and IPv6 match-criteria) • ingress ACLs (all of IPv4, IPv6, and MAC match-criteria) • Ethernet CFM Up MEP, SAP Down MEP, SDP Down MEP, ingress MIPs, and Epipe bidirectional MIPs • SAP ingress aggregate meter • MAC authentication
7210 SAS-Sx 10/100GE	• SAP ingress QoS classification (IPv4 and IPv6 match-criteria) • ingress ACLs (all of IPv4, IPv6, and MAC match-criteria) • Ethernet CFM Up MEP, Down MEP, ingress MIPs, and Epipe bidirectional MIPs • access port ingress QoS policies

Note:

- In some scenarios, reassigning a chunk of resources among features may require the node to be rebooted. See the CLI description of the specific feature for more information.
- The ingress internal TCAM pool of resources is available per node on the 7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE (standalone), and 7210 SAS-Sx 10/100GE. On the 7210 SAS-Sx/S 1/10GE (standalone-VC), 7210 SAS-R6, and 7210 SAS-R12, it is available as a per-IMM pool of resources.
- The number of chunks and the number of resources per chunk varies among the different platforms. Contact your Nokia technical support representative for more information.
- To be enabled, some features require the allocation of a specific number of chunks (greater than 1). If the minimum number of chunks is not assigned, the system cannot allocate the required resources to the feature, which causes the command associated with the feature to fail.

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acl-sap-ingress

Syntax

acl-sap-ingress [*num-resources*]

no acl-sap-ingress

Context

configure>system>resource-profile>ingress-internal-tcam

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates maximum resources for use by ingress filter policies using any of the supported match criteria. This command limits the total amount of chunks allocated for use by ingress filter policies to the value specified by *num-resources*. In other words, the cumulative sum of chunks allocated to different match criteria supported by ingress filter policies cannot exceed the value configured with *num-resources*.

Ingress ACL resources are shared with SAP ingress aggregate meter. See the sap-aggregate-meter command for more information.

The **no** form of this command removes any allocated resources for use by filter policies. Consequently, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a filter policy using any of the match criteria.

Parameters

num-resources

Specifies the amount of resources that can be allocated for use by ACL policies.

Some platforms include the value **def**. If the user specifies **def**, the software allocates the default amount of resources based on the 7210 SAS platform. On the 7210 SAS-R6 and 7210 SAS-R12, the amount of default resources allocated also varies based on the IMM plugged into the slot.

Values The following table lists the parameter values and the values used for the **def** keyword on different 7210 SAS platforms and on different IMM types.

Table 44: Number of resources available for acl-sap-ingress

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T access-uplink mode (per node)	0	7	3
7210 SAS-T network mode (per node)	0	6	3

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Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-R6 and 7210 SAS-R12 (per IMMv2)	0	10	3
7210 SAS-R6 and 7210 SAS-R12 (per IMM-c)	0	8[33]	3
7210 SAS-Mxp (per node)	0	10	3
7210 SAS-Sx 1/10GE (per node) (standalone)	0	6	3
7210 SAS-Sx 1/10GE (standalone-VC)	0	5	2
7210 SAS-S 1/10GE (per node) (standalone)	0	6	3
7210 SAS-S 1/10GE (standalone-VC)	0	5	2
7210 SAS-Sx 10/100GE (per node)	0	4	1

ipv4-ipv6-128-match-enable

Syntax

[**no**] **ipv4-ipv6-128-match-enable**

Context

configure>system>resource-profile>ingress-internal-tcam>acl-sap-ingress

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates maximum resources for use by ingress filter policies using ipv6 criteria with 128-bit IPv6 addresses.

The resources can be shared with IPv4 ingress filter policies. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Router Configuration Guide* for more information about how to allow filter policies using IPv4 criteria to share resources with filter policies that use IPv6 criteria with 128-bit address and resource allocation and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by ingress filter policies using ipv6 criteria with 128-bit IPv6 addresses. If no resources are allocated for use,

[33] The maximum value is 9 if **qos-network-ingress-resource** is configured as 0.

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the software fails all attempts to associate a service entity (for example, SAP and IP interface) with an ingress filter policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

Some platforms include the value **max**. If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to the service entity associated with an ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam acl-sap-ingress** command) and chunks are available for use.

Values The following table lists the parameter values.

Table 45: Number of resources available for ipv4-ipv6-128-match-enable

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T access-uplink mode (per node)	0	7	3
7210 SAS-T Network Mode (per node)	0	6	3
7210 SAS-R6 and 7210 SAS-R12 (per IMMv2)	0 (per IMM)	7	max
7210 SAS-R6 and 7210 SAS-R12 (per IMM-c)	0 (per IMM)	7[34]	max
7210 SAS-Mxp (per node)	0	10	max
7210 SAS-Sx 1/10GE (per node) (standalone)	0	6	max
7210 SAS-Sx 1/10GE (standalone-VC)	0	5	max
7210 SAS-S 1/10GE (per node) (standalone)	0	6	max
7210 SAS-S 1/10GE (standalone-VC)	0	5	max
7210 SAS-Sx 10/100GE (per node)	0	4	max

ip-dscp-port-if-match-enable

Syntax

ip-dscp-port-if-match-enable *num-resources*

no ip-dscp-port-if-match-enable

[34] The maximum value is 9 if **acl-sap-ingress** is configured as 9.

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Context

configure>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource

Platforms

7210 SAS-Mxp, 7210 SAS-R6 and 7210 SAS-R12

Description

This command allocates resources for use by SAP ingress QoS policies that use IP DSCP table-based classification.

The available resources are used by software to allocate policers for SAPs whose ingress policy uses the IP DSCP table-based classification policy. The users need to allocate resources from the ingress internal TCAM pool before DSCP classification can be used. This means users need to take away resources from other features such as mac-match criteria from the SAP ingress classification or ACL ingress to allocate resources for DSCP classification.

See the *7210 SAS-Mxp, R6, R12, S, Sx, T Quality of Service Guide* for more information about resource allocation and fields available for use.

The **no** form of this command does not allocate any resources for use by SAP ingress QoS policies using a DSCP table-based classification policy. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a SAP ingress QoS policy using the DSCP table-based classification policy.

Parameters

num-resources

Specifies the maximum amount of resources (slices) for use by the DSCP table-based classification policy. Each slice has a fixed number of entries. DSCP table-based classification requires exclusive use of the allocated resources.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to SAPs associated with an ingress filter policy using this criteria, provided that the total amount of resources allocated does not exceed the resources allocated to qos-sap-ingress-qos resource pool (configured with the **config system resource-profile ingress-internal-tcam qos-sap-ingress-resource** command) and chunks are available for use.

Values 0 to 10, **max** (7210 SAS-Mxp)
0 to 12, **max** (7210 SAS-R6 and 7210 SAS-R12)

Default 0

ipv4-mac-match-enable

Syntax

ipv4-mac-match-enable *num-resources*

no ipv4-mac-match-enable

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Context

configure>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates maximum resources for use by SAP ingress QoS policies using both MAC (any) and IPv4 criteria (any) criteria in a policy.

The available resources is used by software to allocate resources for SAP ingress policies using the following criteria - either both IPv4 criteria any and MAC criteria any, only mac criteria any, only ipv4 criteria, dot1p-only criteria, ipv4 dscp-only criteria and ipv6 dscp-only criteria. It is not used for SAP ingress policies that use ipv6 criteria any.

See the *7210 SAS-Mxp, R6, R12, S, Sx, T Quality of Service Guide* for more information about resource allocation.

The **no** form of this command specifies that the software does not allocate any resources for use by SAP ingress QoS policies using both MAC and IPv4 criteria. If no resources are allocated for use, then software fails all attempts to associate a service entity (for example, SAP and IP interface) with an ingress filter policy or SAP ingress QoS policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this match criteria. If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to SAPs associated with an ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam qos-sap-ingress-resource** command) and chunks are available for use.

Values The following table lists the parameter values.

Table 46: Number of resources available for ipv4-mac-match-enable

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T access-uplink mode (per node)	0	7	max
7210 SAS-T network mode (per node)	0	6	max
7210 SAS-R6 and 7210 SAS-R12 (per IMMv2)	0	12	max
7210 SAS-R6 and 7210 SAS-R12 (per IMM-c)	0	10	max
7210 SAS-Mxp (per node)	0	10	max
7210 SAS-Sx 1/10GE (per node) (standalone)	0	7	max

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Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-Sx 1/10GE (standalone-VC)	0	6	max
7210 SAS-S 1/10GE (per node) (standalone)	0	7	max
7210 SAS-S 1/10GE (standalone-VC)	0	6	max
7210 SAS-Sx 10/100GE (per node)	0	3	max

ipv4-match-enable

Syntax

ipv4-match-enable *num-resources*

no ipv4-match-enable

Context

configure>system>resource-profile>ingress-internal-tcam>acl-sap-ingress

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates maximum resources for use by ingress filter policies using IPv4 criteria.

The resource cannot be shared with ingress filter policies using mac criteria or ipv6 criteria. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Router Configuration Guide* for more information about resource allocation and fields available for use.

Ingress ACL resources are shared with SAP ingress aggregate meter. See the sap-aggregate-meter command for more information.

The **no** form of this command specifies that the software does not allocate any resources for use by ingress filter policies using ipv4 criteria. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with an ingress filter policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to SAPs associated with an ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam acl-sap-ingress** command) and chunks are available for us.

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Values The following table lists the parameter values.

Table 47: Number of resources available for ipv4-match-enable

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T access-uplink mode (per node)	0	2	max
7210 SAS-T network mode (per node)	0	2	max
7210 SAS-R6 and 7210 SAS-R12 (per IMMv2)	0	12	max
7210 SAS-R6 and 7210 SAS-R12 (per IMM-c)	0	9	max
7210 SAS-Mxp (per node)	0	10	max
7210 SAS-Sx 1/10GE (per node) (standalone)	0	6	max
7210 SAS-Sx 1/10GE (standalone-VC)	0	5	max
7210 SAS-S 1/10GE (per node) (standalone)	0	6	max
7210 SAS-S 1/10GE (standalone-VC)	0	5	max
7210 SAS-Sx 10/100GE (per node)	0	4	max

ipv4-match-enable

Syntax

ipv4-match-enable *num-resources*

no ipv4-match-enable

Context

configure>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates maximum resources for use by SAP ingress QoS policies using IPv4 criteria (any).

The resource cannot be shared with SAP ingress QoS filter policies using mac criteria or ipv6 criteria. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Quality of Service Guide* for more information about resource allocation and fields available for use.

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The **no** form of this command specifies that the software does not allocate any resources for use by SAP ingress QoS policies using ipv4 criteria. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a SAP ingress QoS policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with a SAP ingress QoS policy using this match criteria. It continues to allocate resources to SAPs associated with a SAP ingress QoS policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to SAP ingress QoS policies (configured with the **config system resource-profile ingress-internal-tcam qos-sap-ingress- resource** command) and chunks are available for use.

Values The following table lists the parameter values.

Table 48: Number of resources available for ipv4-match-enable

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T access-uplink mode (per node)	0	7	max
7210 SAS-T network mode (per node)	0	6	max
7210 SAS-R6 and 7210 SAS-R12 (per IMMv2)	0	12	max
7210 SAS-R6 and 7210 SAS-R12 (per IMM-c)	0	10	max
7210 SAS-Mxp (per node)	0	10	max
7210 SAS-Sx 1/10GE (per node) (standalone)	0	7	max
7210 SAS-Sx 1/10GE (standalone-VC)	0	6	max
7210 SAS-S 1/10GE (per node) (standalone)	0	7	max
7210 SAS-S 1/10GE (standalone-VC)	0	6	max
7210 SAS-Sx 10/100GE (per node)	0	3	max

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ipv6-64-only-match-enable

Syntax

ipv6-64-only-match-enable *num-resources*

no ipv6-64-only-match-enable

Context

configure>system>resource-profile>ingress-internal-tcam>acl-sap-ingress

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates maximum resources for use by ingress filter policies using ipv6 criteria with 64-bit IPv6 addresses. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Router Configuration Guide* for more information about resource allocation and fields available for use.

The resources cannot be shared with IPv4 filter policies or IPv6 filter policies specifying 128-bit addresses.

Ingress ACL resources are shared with SAP ingress aggregate meter. See the sap-aggregate-meter command for more information.

The **no** form of this command specifies that the software does not allocate any resources for use by filter policies using ipv6 criteria with 64-bit IPv6 addresses. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with an ingress filter policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to SAPs associated with an ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam acl-sap-ingress** command) and chunks are available for use.

Values The following table lists the parameter values.

Table 49: Number of resources available for ipv6-64-only-match-enable

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T Access-uplink mode (per node)	0	7	max

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Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T Network Mode (per node)	0	6	max
7210 SAS-R6 and 7210 SAS-R12 IMM-c (per IMM)	0	9	max
7210 SAS-Mxp (per node)	0	10	max
7210 SAS-Sx 1/10GE (per node) (standalone)	0	6	0
7210 SAS-Sx 1/10GE (standalone-VC)	0	5	max
7210 SAS-S 1/10GE (per node) (standalone)	0	6	0
7210 SAS-S 1/10GE (standalone-VC)	0	5	max
7210 SAS-Sx 10/100GE (per node)	0	4	0

mac-match-enable

Syntax

mac-match-enable *num-resources*

no mac-match-enable

Context

configure>system>resource-profile>ingress-internal-tcam>acl-sap-ingress

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command allocates maximum resources for use by ingress filter policies using mac criteria.

The resources cannot be shared with policies that use either IPv4 or IPv6 match criteria. Refer the *7210 SAS-Mxp, R6, R12, S, Sx, T Router Configuration Guide* for more information about the resource allocation for ingress filter policy and fields available for use with ingress filter policy.

The **no** form of this command specifies that the software does not allocate any resources for use by ingress filter policies using mac criteria. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with an ingress filter policy using this match criteria.

Note:
Ingress ACL resources are shared with SAP ingress aggregate meter. See the sap-aggregate-meter command for more information.

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Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to SAPs associated with an ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam acl-sap-ingress** command) and chunks are available for use.

Values The following table lists the parameter values.

Table 50: Number of resources available for mac-match-enable

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T Access-Uplink mode (per node)	0	2	max
7210 SAS-T Network Mode (per node)	0	2	max
7210 SAS-R6 and 7210 SAS-R12 IMM-c (per IMM)	0	9	max
7210 SAS-Mxp (per node)	0	10	max
7210 SAS-Sx 1/10GE (per node) (standalone)	0	6	max
7210 SAS-Sx 1/10GE (standalone-VC)	0	5	max
7210 SAS-S 1/10GE (per node) (standalone)	0	6	max
7210 SAS-S 1/10GE (standalone-VC)	0	5	max
7210 SAS-Sx 10/100GE (per node)	0	4	max

mac-match-enable

Syntax

mac-match-enable *num-resources*

no mac-match-enable

Context

configure>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

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Description

This command allocates maximum resources for use by SAP ingress QoS policies using MAC criteria (any).

The resources cannot be shared with policies that use either IPv4 or IPv6 match criteria. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Quality of Service Guide* for more information about the resource allocation for SAP ingress QoS policy.

The **no** form of this command specifies that the software does not allocate any resources for use by SAP ingress QoS policies using mac criteria. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a SAP ingress QoS policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to SAPs associated with SAP ingress QoS policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to SAP ingress QoS policies (configured with the **config system resource-profile ingress-internal-tcam qos-sap-ingress-resource** command) and chunks are available for use.

Values The following table lists the parameter values.

Table 51: Number of resources available for mac-match enable

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T Access-Uplink mode (per node)	0	7	max
7210 SAS-T Network Mode (per node)	0	6	max
7210 SAS-R6 and 7210 SAS-R12 (per IMMv2)	0	12	max
7210 SAS-R6 and 7210 SAS-R12 (per IMM-c)	0	10	max
7210 SAS-Mxp (per node)	0	10	max
7210 SAS-Sx 1/10GE (per node) (standalone)	0	7	max
7210 SAS-Sx 1/10GE (standalone-VC)	0	6	max
7210 SAS-S 1/10GE (per node) (standalone)	0	7	max
7210 SAS-S 1/10GE (standalone-VC)	0	6	max

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Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-Sx 10/100GE (per node)	0	3	max

cpu-protection

Syntax

cpu-protection [*num-resources*]

no cpu-protection

Context

configure>system>resource-profile>ingress-internal-tcam

Platforms

7210 SAS-R6 and 7210 SAS-R12

Description

This command allocates CAM entries and meters for CPU protection rules and policies by removing entries from other features that share the ingress internal TCAM resource pool.

Default

cpu-protection 0

Parameters

num-resources

Specifies the number of resources. Specifying the **def** keyword specifies the default number of resources.

Values 0 to 2, **def**

Default 0

dhcp-snooping-sdp-resource

Syntax

dhcp-snooping-sdp-resource *num-resources*

no dhcp-snooping-sdp-resource

Context

configure>system>resource-profile>ingress-internal-tcam

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Platforms

7210 SAS-Mxp and 7210 SAS-Sx/S 1/10GE (standalone)

Description

This command configures the resources required to classify and intercept DHCPv6 messages received on SDP bindings (spoke SDP and mesh SDP in TLDP VPLS services).

Note: The user must first configure this command before DHCPv6 snooping can be enabled in the SDP bindings context. Failure to do so causes the DHCPv6 snooping configuration to fail.

The **no** form of this command specifies that the software does not allocate any resources to process DHCPv6 messages received on SDP bindings (spoke-SDP and mesh SDP).

Default

no dhcp-snooping-sdp-resource

Parameters

num-resources

Specifies the maximum resource allocation required to process DHCPv6 messages.

Values 0 to 1

eth-cfm

Syntax

eth-cfm *num-resources*

no eth-cfm

Context

configure>system>resource-profile>ingress-internal-tcam

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates resources for CFM Up MEPs, CFM Down MEPs, ingress MIPs, and bidirectional MIPs (ingress and egress MIPs).

Note:
On most 7210 SAS platforms, ingress MIPs and bidirectional MIP resources are allocated from the Down MEP and Up MEP resource pool. See the down-mep and up-mep commands for more information.

The **no** form of this command specifies that the software does not allocate any resources for use by CFM UP MEPs, and it will allocate the default amount of resources for CFM Down MEPs.

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Parameters

num-resources

Specifies the maximum number of resources available for use by ETH-CFM.

Values The following table lists the parameter values.

Table 52: Number of resources available for eth-cfm

Platforms	Min value (per node)	Max value (per node)	Default
7210 SAS-T Access-Uplink mode (per node)	0	1	0
7210 SAS-T Network mode (per node)	0	1	0
7210 SAS-R6 and 7210 SAS-R12 (per IMMv2)	1	3	1
7210 SAS-R6 and 7210 SAS-R12 (per IMM-c)	1	3	1
7210 SAS-Mxp (per node)	1	3	1
7210 SAS-Sx 1/10GE (per node) (standalone)	1	3	1
7210 SAS-Sx 1/10GE (standalone-VC)	2	4	2
7210 SAS-S 1/10GE (per node) (standalone)	1	3	1
7210 SAS-S 1/10GE (standalone-VC)	2	4	2
7210 SAS-Sx 10/100GE (per node)	1	3	1

down-mep

Syntax

down-mep *num-resources*

no down-mep

Context

configure>system>resource-profile>ingress-internal-tcam>eth-cfm

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE

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Description

This command enables the user to allocate more resources and increase the number of CFM/Y.1731 Down MEPs. By default, the system allocates a single slice for use with Down MEP.

Resources from this pool are allocated towards the following:

- down MEP on SDP binding
- on the 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE (standalone), and 7210 SAS-Sx 10/100GE (standalone), ingress and egress MIPs for Epipe SAPs and Epipe SDP bindings
- on the 7210 SAS-R6 and 7210 SAS-R12, ingress and egress MIPs (that is, bidirectional MIPs) for Epipe SAPs and Epipe SDP bindings



Note:
On the 7210 SAS-R6 and 7210 SAS-R12, bidirectional MIPs also use the Up MEP resource pool.

- On the 7210 SAS-R6 and 7210 SAS-R12, this is a per-IMM resource. For SAPs, the resources are required only on the IMM for which the SAP is allocated. For SDP bindings, resources are required on all IMMs because MPLS packets could be received on any network port.
- Some entries are reserved for system internal use.

The **no** form of this command is not supported. At least a single slice must be allocated for use with Down MEPs because some of the resources are reserved for system internal use. The software enforces it and errors out an attempt to change it to a value less than 1.

Parameters

num-resources

Specifies the maximum amount of resources for use by **down-mep**.

Values 1 to 3

Default 1

sap-down-mep

Syntax

sap-down-mep *num-resources*

no sap-down-mep

Context

configure>system>resource-profile>ingress-internal-tcam>eth-cfm

Platforms

7210 SAS-Sx/S 1/10GE: standalone-VC

Description

This command configures resources for CFM/Y.1731 down MEPs on SAPs.

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The **no** form of this command removes resources for down MEPs on SAPs.

Default

1

Parameters

num-resources

Specifies the maximum amount of resources for use by down MEPs on SAPs.

Values 1

sdp-down-mep-ing-mip

Syntax

sdp-down-mep-ing-mip *num-resources*

no sdp-down-mep-ing-mip

Context

configure>system>resource-profile>ingress-internal-tcam>eth-cfm

Platforms

7210 SAS-Sx/S 1/10GE: standalone-VC

Description

This command configures resources for CFM/Y.1731 Down MEPs on SDPs and ingress MIPs on SAPs and SDP bindings. In addition, resources for bidirectional MIPs configured on an Epipe SAP and Epipe SDP binding are allocated from this pool.

Note:
On the 7210 SAS-Sx/S 1/10GE operating in standalone-VC mode, bidirectional MIPs configured on Epipe SAPs and Epipe SDP bindings also require resources from the Up MEP resource pool.

The **no** form of this command removes resources for Down MEPs on SDPs, ingress MIPs, and bidirectional MIPs.

Default

sdp-down-mep-ing-mip 1

Parameters

num-resources

Specifies the maximum amount of resources for use by Down MEPs on SDPs and ingress MIPs.

Values 1 to 2

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up-mep

Syntax

up-mep *num-resources*

no up-mep

Context

configure>system>resource-profile>ingress-internal-tcam>eth-cfm

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates resources for CFM Up MEPs.

Resources for Up MEPs created on SAPs and SDP bindings are allocated from this pool.

Note:

- On the 7210 SAS-R6 and 7210 SAS-R12, when an Up MEP on an SDP binding is created, resources are allocated for the Up MEP on all IMMs, and when an Up MEP on a SAP is created, resources are allocated only on the IMM for which the SAP is configured or on the set of IMMs if the SAP is configured over a LAG.
- On the 7210 SAS-R6 and 7210 SAS-R12, resources from this pool are used only for Up MEPs configured in Epipe services. Up MEPs configured in a VPLS service use resources from a different pool.
- On the 7210 SAS-R6 and 7210 SAS-R12, and on the 7210 SAS-Sx/S 1/10GE operating in standalone-VC mode, resources from this pool are also used for bidirectional MIPs configured on Epipe SAPs and Epipe SDP bindings.
- When a user-configured MAC address other than the port MAC is used, additional resources are required.

The **no** form of this command specifies that the software does not allocate any resources for use by CFM Up MEPs. If no resources are allocated for use, the software fails all attempts to configure an Up MEP and bidirectional MIPs on applicable platforms (see preceding Note).

Default

up-mep 0

Parameters

num-resources

Specifies the maximum number of resources available for use by CFM Up MEPs.

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Values 0 to 2 (7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE: standalone and standalone-VC, 7210 SAS-Sx 10/100GE, 7210 SAS-Mxp)

0 to 1 (7210 SAS-T)

ipv6-ipv4-match-enable

Syntax

ipv6-ipv4-match-enable *num-resources*

no ipv6-ipv4-match-enable

Context

configure>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates resources from the SAP ingress QoS resource pool for ipv6-criteria. Users need to use this command before using IPv6 criteria SAP ingress QoS policies.

These resources can be shared with SAP ingress policies that use IPv4 criteria.

See the *7210 SAS-Mxp, R6, R12, S, Sx, T Router Configuration Guide* for more information about the resource allocation for ingress filter policy and fields available for use with ingress filter policy.

See the *7210 SAS-Mxp, R6, R12, S, Sx, T Quality of Service Guide* for more information about the resource allocation for SAP ingress QoS policy.

The **no** form of this command specifies that the software does not allocate any resources for use by ingress SAP QoS policies using IPv6 criteria. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with an ingress filter policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this SAP ingress Qos policy match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with a SAP ingress QoS policy using this match criteria. It continues to allocate resources to SAPs associated with SAP ingress QoS policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to SAP ingress QoS policies (configured with the command **config system resource-profile ingress-internal-tcam qos-sap-ingress-resource** command) and chunks are available for use.

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Values The following table lists the parameter values.

Table 53: Number of resources available for ipv6-ipv4-match-enable

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T Access-Uplink mode (per node)	0	7	0
7210 SAS-T Network Mode (per node)	0	6	0
7210 SAS-R6 and 7210 SAS-R12 (per IMMv2)	0	12	max
7210 SAS-R6 and 7210 SAS-R12 (per IMM-c)	0	10	max
7210 SAS-Mxp (per node)	0	10	0
7210 SAS-Sx 1/10GE (per node) (standalone)	0	7	0
7210 SAS-Sx 1/10GE (standalone-VC)	0	6	0
7210 SAS-S 1/10GE (per node) (standalone)	0	7	0
7210 SAS-S 1/10GE (standalone-VC)	0	6	0
7210 SAS-Sx 10/100GE (per node)	0	3	0

ip-mpls-protocols

Syntax

ip-mpls-protocols *num-resources*

no ip-mpls-protocols

Context

config>system>resource-profile>ing-internal-tcam

Platforms

7210 SAS-Mxp

Description

This command configures an additional slice from the ingress-internal-tcam resource pool for use by the IP and MPLS protocols.

On boot up, by default, the software allocates a single slice of entries from the ingress-internal-tcam resource pool for use by the IP and MPLS control protocols. Entries from that slice are allocated to the following protocols on a first-come-first-serve basis when the user enables the protocol: OSPFv2, OSPFv3, BGP, IS-IS, LDP, RSVP, VRRP, MC-LAG, VRRPv3, PCEP, PIM, IGMP, DHCP, DHCPv6, and PTP.

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However, the default single slice of entries is not sufficient if all IP and MPLS control-plane protocols are enabled simultaneously. To allocate an additional slice to IP and MPLS protocols, use this command to set the value of *num-resources* to 2.

Note:
The software allocates protocol entries when the protocol is enabled and deallocates the protocol entries when the protocol (and all instances of the protocol, if any) is disabled. See the relevant CLI command descriptions for more information about resource allocation for specific protocols. To display information about the utilization of resources allocated to IP and MPLS protocols, use the **tools**>**dump**>**system-resources** CLI command.

The **no** form of this command reverts to the default value.

Default

ip-mpls-protocols 1

Parameters

num-resources

Specifies the number of slices to be allocated for IP and MPLS control-plane protocols.

Values 1, 2

qos-access-port-ingress-resource

Syntax

qos-access-port-ingress-resource *num-resources*

no qos-access-port-ingress-resource

Context

configure>system>res-profile>ing-internal-tcam

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE (standalone), and 7210 SAS-Sx 10/100GE (standalone)

Description

This command allocates ingress internal TCAM resources to access-ingress port policies when the access port is configured in port mode. If adequate TCAM resources are not allocated, setting the **access-ingress-qos-mode** command to **port-mode** is not allowed.

If access ports are currently configured to use a port-based access ingress QoS policy, setting the **qos-access-port-ingress-resource** command to 0 (which will set the number of resources allocated to the access port ingress QoS policy to 0) is not allowed. Resources allocated to access ingress QoS policies are used to allocate meter resources for the port-based access ingress QoS policy.

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Note:
On the 7210 SAS-Sx 10/100GE, the sum of resources, also called slices, allocated to SAP ingress policies using the **config>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource** command and to access ingress policies using the **config>system>resource-profile>ingress-internal-tcam>qos-access-port-ingress-resource** command must not exceed 3.

The **no** form of this command reverts to the default value.

Default

qos-access-port-ingress-resource 0

Parameters

num-resources

Specifies the amount of resources allocated to QoS access port ingress policies.

Values The following table lists the number of resources that can be allocated to QoS access port ingress policies per 7210 SAS platform.

Table 54: Number of resources allocated to QoS access port ingress policies on 7210 SAS platforms

7210 SAS platform	Number of resources
7210 SAS-Mxp	0 to 4
7210 SAS-R6 IMM-b	0 to 3
7210 SAS-R6 IMM-c	0 to 1
7210 SAS-R12	0 to 3
7210 SAS-Sx/S 1/10GE	0 to 7
7210 SAS-Sx 10/100GE	0 to 2

qos-access-port-shared-res

Syntax

qos-access-port-shared-res *num-resources*

no qos-access-port-shared-res

Context

config>system>res-prof>ing-internal-tcam

Platforms

7210 SAS-Mxp

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Description

Commands in this context allocate resources for shared access-ingress QoS policies from the ingress internal TCAM resource pool.

Resources must be allocated using this command before using shared access-ingress policies when the **config>system>resource-profile>qos-access-port-shared-res-mode** command is enabled.

By default, no resources are allocated. If **config>qos>access-ingress>ip-criteria** is configured with the **use-port-range** keyword, a minimum *num-resources* value of two must be configured, as the IP criteria uses two slices in inter-slice double-wide mode.

The **no** form of this command reverts to the default value.

Default

qos-access-port-shared-res 0

Parameters

num-resources

Specifies the number of resources allocated to shared access-ingress QoS policies.

Values 0 to 10

dot1p-dscp-table-match-meter

Syntax

dot1p-dscp-table-match-meter *num-resources*

no dot1p-dscp-table-match-meter

Context

config>system>res-prof>ing-internal-tcam>qos-access-port-shared-res

Platforms

7210 SAS-Mxp

Description

This command allocates resources for meters when the shared access-ingress QoS policy's classification criteria is set to use table-classification criteria.

The **no** form of this command reverts to the default value.

Default

dot1p-dscp-table-match-meter 0

Parameters

num-resources

Specifies the number of resources allocated to dot1p DSCP table match meters.

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Values 0 to 10, max

ipv4-match-enable

Syntax

ipv4-match-enable *num-resources*

no ipv4-match-enable

Context

config>system>res-prof>ing-internal-tcam>qos-access-port-shared-res

Platforms

7210 SAS-Mxp

Description

This command allocates resources for classification match entries and meters configured when the shared access-ingress QoS policy's classification criteria is set to use CAM criteria and IPv4 criteria match entries are configured for use.

The **no** form of this command reverts to the default value.

Default

ipv4-match-enable 0

Parameters

num-resources

Specifies the number of resources allocated to IPv4-based classification entries.

Values 0 to 10, max

ipv4-port-range-match-enable

Syntax

ipv4-port-range-match-enable *num-resources*

no ipv4-port-range-match-enable

Context

config>system>res-prof>ing-internal-tcam>qos-access-port-shared-res

config>system>res-prof>ing-internal-tcam>acl-sap-ingress

Platforms

7210 SAS-Mxp

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Description

This command allocates resources for the following depending on the configuration context.

For the **config>system>res-prof>ing-internal-tcam>qos-access-port-shared-res** context, this command allocates resources for classification match entries and meters when the classification criteria of the shared access-ingress QoS policy is set to use CAM criteria and IPv4 criteria match entries with port range values (specified using the **config>qos>access-ingress>ip-criteria use-port-range** command) are configured.

For the **config>system>res-prof>ing-internal-tcam>acl-sap-ingress** context, this command allocates resources for ACL **ip-criteria** entries configured to use port range values.

The values for the *num-resources* parameter are specified in multiples of two, as each entry from the **ip-criteria** command configured with the **use-port-range** keyword occupies one entry each from the two slices.

The **no** form of this command reverts to the default value.

Default

ipv4-port-range-match-enable 0

Parameters

num-resources

Specifies the number of resources allocated to **ip-criteria** policies with the **use-port-range** keyword configured.

Values 0, 2, 4, 6, 8, 10, max

qos-network-ingress-resource

Syntax

qos-network-ingress-resource *num-resources*

no qos-network-ingress-resource

Context

config>system>res-prof>ing-internal-tcam

Platforms

7210 SAS-R6 and 7210 SAS-R12

Description

This command removes resources allocated to port-based and IP interface-based network ingress QoS policies associated with network and hybrid ports, and makes the resources available for other features that share the ingress-internal-tcam resource pool (for example, SAP ingress classification and ingress ACLs).

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Note:

- The minimum *num-resources* configurable is 0 and the maximum *num-resources* configurable is 2. The default *num-resources* is 2 for the default system resource profile and user-configured system resource profile. A value of 1 is not allowed.
- If the user configures the value 2, one slice is allocated to the network QoS policy IP interface, and one slice is allocated to the network QoS policy port.
- A reboot is not required after assigning a new value to the **qos-network-ingress-resource** command. That is, the value of this command can be changed from 0 to 2 if there are resources available in the ingress-internal-tcam pool. Similarly, the value can be changed from 2 to 0 if no network or hybrid ports are configured. If a network port or hybrid port is configured, changing the value from 2 to 0 is fails and the system sends an error message.

The **no** form of this command reverts to the default value.

Default

qos-network-ingress-resource 0

Parameters

num-resources

Specifies the number of resources allocated to network ingress QoS policy queues.

Values 0, 2, **def**

qos-sap-ingress-resource

Syntax

qos-sap-ingress-resource *num-resources*

no qos-sap-ingress-resource

Context

configure>system>resource-profile>ing-internal-tcam

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allocates maximum resources for use by SAP ingress QoS policies using any of the supported match criteria. This command limits the total amount of chunks allocated for use by SAP ingress QoS policies to the value specified by *num-resources*. That is, the cumulative sum of chunks allocated to different match criteria supported by SAP ingress QoS policies cannot exceed the value configured with *num-resources*.

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Note:
On the 7210 SAS-Sx 10/100GE, the sum of resources, also called slices, allocated to SAP ingress policies using the **config>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource** command and to access ingress policies using the **config>system>resource-profile>ingress-internal-tcam>qos-access-port-ingress-resource** command must not exceed 3.

If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a SAP ingress QoS policy using any of the match criteria.)

The **no** form of this command specifies that the software does not allocate any resources for use by SAP ingress QoS policies.

Parameters

num-resources

Specifies the amount of resources that can be allocated for use by SAP ingress QoS policies.

If the user specifies **def**, the software allocates the default amount of resources based on the 7210 SAS platform. On 7210 SAS-R6 and 7210 SAS-R12, the amount of default resources allocated also varies based on the IMM plugged into the slot.

Values The following table lists the parameter values and provides the values used for **def** keyword on different 7210 SAS platforms and on different IMM types.

Table 55: Number of resources available for qos-sap-ingress-resource

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T Access-uplink mode (per node)	0	7	4
7210 SAS-T Network Mode (per node)	0	6	3
7210 SAS-R6 and 7210 SAS-R12 (per IMMv2)	0	12	5
7210 SAS-R6 and 7210 SAS-R12 (per IMM-c)	0	10	4
7210 SAS-Mxp (per node)	0	10	5
7210 SAS-Sx 1/10GE (per node) (standalone)	0	7	4
7210 SAS-Sx 1/10GE (standalone-VC)	0	6	4
7210 SAS-S 1/10GE (per node) (standalone)	0	7	4
7210 SAS-S 1/10GE (standalone-VC)	0	6	4

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Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-Sx 10/100GE (per node)	0	3	3

qos-sap-egress-resource

Syntax

qos-sap-egress-resource *num-resources*

no qos-sap-egress-resource

Context

config>system>res-prof>ing-internal-tcam

Platforms

7210 SAS-R6 and 7210 SAS-R12 (only supported on IMMv2 cards; not supported on IMM-c cards)

Description

This command configures resource allocation for SAP-based egress queuing. If port-based queuing is disabled, then users must allocate resources for SAP-based egress queuing using this command. If no resources are allocated, SAPs cannot be created.

When port-based queuing is enabled, resources can be taken away from SAP-based egress queues and allocated to other features that share the **ingress-internal-tcam** pool (for example, SAP ingress qos and Ingress ACLs).

The **no** form of this command reverts to the default value.

Default

0

Parameters

num-resources

Specifies the amount of resources that are allocated towards SAP-based egress queues.

Values 0 to 2

sap-aggregate-meter

Syntax

sap-aggregate-meter *num-resource*

no sap-aggregate-meter

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Context

configure>system>resource-profile>ingress-internal-tcam

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode; not supported on the 7210 SAS-Sx 1/10GE and 7210 SAS-Sx 10/100GE

Description

This command allocates maximum resources for use by meters/policers used to implement SAP ingress aggregate meter functionality from the global pool of ingress CAM resources. Before using the **configure service sap ingress aggregate-meter-rate** command, the user must ensure that resources are allocated to aggregate meters using this command.



Note:
For the command to take effect, the node must be restarted after making the change.

This command allocates meter resources from the available global ingress CAM resource pool. By default, when resources are allocated to SAP ingress QoS policy, along with the CAM classification entries, meter resources are also allocated. Hence, if the user needs to use SAP aggregate meter functionality they cannot allocate all the available resources in the global resource pool to SAP ingress QoS policies and ETH-CFM UP MEP. They need to allocate some resources for use by SAP aggregate meter (or SAP ingress ACLs or G8032-fast-flood feature).

By default, when resources are allocated for ingress ACLs, only classification entries are used and meters resources are not used. SAP aggregate meter resources can use meters from this pool of meter resources. In other words, SAP aggregate meters are stolen from the unused meters in the resources allocated to ingress ACLs.

If the user allocates resources for ingress ACLs and configures resources for SAP aggregate meter using this command, the software does the following.

- It does not allocate any additional resources from the available global ingress CAM resource pool to SAP aggregate meter, if it can allocate the required number of meters from the chunks/resources allocated to ingress ACLs. For example, if the user has allocated 2 chunks of 512 entries each for ingress ACLs and then configures sap-aggregate-meter to use 2 chunks to use about 512 aggregate meters, the software will not allocate any additional entries from the available global resource pool.
- If the number of ingress ACL resources allocated by user is less than the number of resources assigned by the user to sap-aggregate-meter, then it allocates the difference from the available global ingress CAM resource pool. For example, if the user has allocated 1 chunk of 512 entries for ingress ACLs and then configures sap-aggregate-meter to use 2 chunks to use about 512 aggregate meters, the software will allocate 1 additional chunk (2 chunks required for SAP aggregate - 1 chunk alloted to ingress ACLs) for use with SAP aggregate meter. The classification entries associated with additional chunk alloted for SAP aggregate-meter can be used by the ingress ACLs policies. It cannot be used by SAP ingress QoS policies and eth-cfm UP MEP.

Similar checks as above are performed when the user allocates resources for SAP aggregate meters using this command and then configures resources for ingress ACLs. That is, the software does the following.

- It does not allocate any additional entries from the available global ingress CAM resource pool to ingress ACLs, if it can allocate the required number of classification entries from the chunks allocated to SAP aggregate meter feature. For example, if the user has allocated 2 chunks of 512 entries each for SAP aggregate meters and then configures ingress ACLs to use 2 chunks to use about 512

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classification entries, the software will not allocate any additional entries from the available global resource pool.

- If the number of SAP aggregate meter resources allocated by user is less than the number of resources requested by the user for ingress ACLs, then it allocates the difference from the available global ingress CAM resource pool. For example, if the user has allocated 1 chunk of 512 entries for SAP aggregate meters and then configures ingress ACLs to use 2 chunks, the software will allocate 1 additional chunk (2 chunks required for ingress ACLs - 1 chunk alloted to SAP aggregate meter) for use with ingress ACLs. The meter resources associated with additional chunk alloted for ingress ACLs can be assigned to the SAP aggregate feature, if need be.

See the 7210 SAS-Mxp, R6, R12, S, Sx, T Quality of Service Guide and the *7210 SAS-Mxp, R6, R12, S, Sx, T Router Configuration Guide* for more information about use of SAP aggregate feature, ingress CAM resource allocation, and use of ACLs policies respectively.

The **no** form of this command specifies that the software does not allocate any resources for use by SAP ingress aggregate meter. If no resources are allocated for use, the software fails all attempts to associate an aggregate-meter with SAP ingress.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **def**, the software allocates the default amount of resources based on the 7210 SAS platform. On 7210 SAS-R6 and 7210 SAS-R12, the amount of default resources allocated also varies based on the IMM plugged into the slot.

Values The following table lists the parameter values and provides the values used for **def** keyword on different 7210 SAS platforms and on different IMM types.

Table 56: Number of resources available for sap-aggregate-meter

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T Access-uplink mode (per node)	0	2	2
7210 SAS-R6 and 7210 SAS-R12 (per IMMv2)	0	4	3
7210 SAS-R6 and 7210 SAS-R12 (per IMM-c)	0	4	3
7210 SAS-Mxp (per node)	0	4	3
7210 SAS-Sx 1/10GE (per node) (standalone)	0	3	3
7210 SAS-Sx 1/10GE (standalone-VC)	0	3	2
7210 SAS-S 1/10GE (per node) (standalone)	0	3	3

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Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-S 1/10GE (standalone-VC)	0	3	2
7210 SAS-Sx 10/100GE (per node)	Not Supported	Not Supported	Not Supported

qos

Syntax

qos

Context

configure>system>resource-profile

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp

Description

Commands in this context configure QoS parameters.

mbs-pool

Syntax

mbs-pool {**node** | **port**}

Context

configure>system>resource-profile>qos

Platforms

7210 SAS-T (network and access-uplink)

Description

On 7210 SAS-T, the user has an option to configure the MBS pool per node or per port. This command allows the user to configure the MBS pool as per their requirement. A reboot is needed whenever the value of this parameter is changed for the new values to take effect.

If the users configure a per node MBS pool, then each of the 8 queues available on a port is allocated a CBS amount of committed buffers. The remaining amount of buffers is allocated towards the MBS pool that is available for sharing among all the queues across all the ports of the node. In other words the MBS pool is per node.

If the users configure a per port MBS pool, the available buffers are equally divided up among the all the ports of the node. With this scheme of allocation, each port gets some portion of the buffers for its

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exclusive use. Some of these buffers are allocated towards the CBS per queue and the rest is assigned to the per port MBS pool. To allow operators better control over which ports get larger portion of queue buffers, operator is provided with an option to decommission ports. The commands associated with decommissioning of ports are only allowed when the node is booted with the option to use per-port MBS pool. In other words, decommission entries are executed only if the **mbs-pool** parameter is set to **port**.

If the **mbs-pool** parameter is set to **node** and decommission entries are configured, then an error should be reported. All decommission entries must be removed if the **mbs-pool** parameter needs to be changed from port to node.

Default

node

Parameters

node

Keyword to use per-node MBS pool.

port

Keyword to use per-port MBS pool, along with an option to relocate buffers to ports that need better burst handling capability using the decommissioning commands.

port-scheduler-mode

Syntax

port-scheduler-mode

no port-scheduler-mode

Context

config>system>resource-profile>qos

Platforms

7210 SAS-Mxp

Description

This command configures the queuing mode to be used for SAPs configured on all the ports of the node.

When port-scheduler-mode is enabled, software allocates 8 egress queues per port and all the SAPs configured on the access port or hybrid port will share the 8 egress queues for traffic sent out of that port. In this mode, SAPs configured on hybrid port shares the egress queues with network port traffic. Enabling port-scheduler-mode affects the behavior for all the SAPs configured on all the access and hybrid port. In this mode, per SAP egress queues are not available.

In this mode, resources allocated towards SAP egress queues in the ingress-internal-tcam pool are not required by this feature and can be allocated towards other features. See the qos-sap-egress-resource command for more information.

The **no** form of this command disables port-scheduler-mode, causing per SAP egress queues to be available for use. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Quality of Service Guide* for more information about the two modes.

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Enabling or disabling **port-scheduler-mode** requires a reboot of the node.

Default

no port-scheduler-mode

qos-access-port-shared-res-mode

Syntax

qos-access-port-shared-res-mode

no qos-access-port-shared-res-mode

Context

configure>system>resource-profile

Platforms

7210 SAS-Mxp

Description

This command configures the QoS access port shared resource mode. When this command is executed, the nodes operates in the shared access-ingress QoS policy mode and shares access-ingress port policies across access ports. In this mode, the system uses a new default shared access-ingress QoS policy, which is associated with all access ports during bootup or access port instantiation. A node reboot is required for the new shared access-ingress QoS policy mode to take effect.

Users can create a custom shared access-ingress QoS policy and associate it with the port. Resources can be allocated for classification and meters using the **config>system>res-profile>ingress-internal-tcam>qos-access-port-shared-res** *num-resources* command. When this command is configured, the existing **config>system>resource-profile>ingress-internal-tcam>qos-access-port-ingress-resource** command cannot be used and is ignored, but not blocked, by the software.

The value of the **config>system>resource-profile>qos-access-port-shared-res-mode** command cannot be changed if there are any ports configured with **config>port>ethernet>access-ingress-qos-mode port-mode**. A reboot is required to update this command.

When operating in the shared resource mode, shared and non-shared access-ingress QoS policies cannot be used at the same time on the node. To use an exclusive access-ingress QoS policy for a port, create a shared access-ingress QoS policy and associate it with a single port. The only way to ensure exclusive use of a shared access-ingress QoS policy is to not associate the policy with multiple ports. The system provides no mechansim to enforce exclusivity. The user can create as many shared access-ingress QoS policies as the number of ports on the node, and each port on the node can be exclusively associated with these shared access-ingress QoS policies. This allows the user to mimic the behavior on non-shared access-ingress QoS policies when the node is operating in the shared resource mode.

Default

no qos-access-port-shared-res-mode

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router

Syntax

router

Context

configure>system>resource-profile

configure>system>global-res-profile

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Note:
The **configure**>**system**>**resource-profile** context is supported on the 7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE: standalone, and 7210 SAS-Sx 10/100GE.

The **configure**>**system**>**global-res-profile** context is supported on the 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone-VC.

Commands in this context configure router parameters that is applicable to the entire chassis (in other words it applies to all IMMs).

ecmp

Syntax

ecmp *max-routes-dest*

no ecmp

Context

configure>system>resource-profile>router

configure>system>global-res-profile>router

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

Note:
The **configure**>**system**>**resource-profile** context is supported on the 7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE: standalone, and 7210 SAS-Sx 10/100GE.

The **configure**>**system**>**global-res-profile** context is supported on the 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone-VC.

This command configures the maximum amount of routes of same cost to the same IP destination/prefix when path sharing is enabled using IP ECMP. To enable optimum usage of hardware resources, software allocates hardware resources in groups of fixed number of entries. A group is a set of IP next-hop entries used by ECMP routes. The number of IP next-hop entries per group (which in turn dictates the maximum number of shared IP paths per IP destination/prefix) is also specified with commands. The software uses the same group if all the IP next-hop in use for the ECMP routes is the same.

This parameter also dictates the maximum number of paths that a single LDP FEC can use.

This command does not enable the use of IP ECMP. To enable IP ECMP, the user must use the **config router ecmp** command. The number of routes specified using the **config router ecmp** command cannot exceed the number of routes specified by this command, though it can be lesser. If its lesser, the software will use only the specified number routes. Specifying a lesser number of routes with **config router ecmp** will result in wastage of hardware resources. To enable LDP ECMP, see the **configure system resource-profile router ldp-ecmp** command.

Note:

- This command is a boot-time parameter and any change will take effect only after a reboot.
- On 7210 SAS-R6 and 7210 SAS-R12, the value specified with this command is used across all IMMs in the chassis.

Default

1

Parameters

max-routes-dest

Specifies the number of ECMP routes.

Values 1 to 16

ldp-ecmp

Syntax

ldp-ecmp *percent-value*

no ldp-ecmp

Context

configure>system>resource-profile>router

configure>system>global-res-profile>router

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Note:
The **configure**>**system**>**resource-profile** context is supported on the 7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE: standalone, and 7210 SAS-Sx 10/100GE.

The **configure**>**system**>**global-res-profile** context is supported on the 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone-VC.

This command enables LDP ECMP and configures the percentage of the total amount of hardware ECMP resources to be allocated for use by LDP ECMP FECs.

The remaining amount of resources are allocated for use by IP ECMP. In other words, the hardware ECMP resources are shared by IP ECMP and LDP ECMP and this command allow user to allocate resources to them.

The **no** form disables LDP ECMP (by allocating zero resources to it) and the system installs only a single next-hop for every LDP FEC.

Note:
On 7210 SAS-R6 and 7210 SAS-R12, it is a system wide limit, applicable to all IMMs. If the user changes this value dynamically, the system adjusts the usage among IP and LDP ECMP as per the configuration.

The user can change the value of resources allocated towards IP ECMP routes and LDP ECMP FECs without requiring a reboot of the node as long as the following conditions are met. The **configure system resource-profile router ldp-ecmp command** cannot be modified until the value of the **configure router ecmp** command is set to 1. It is similar to the behavior available for the **configure system resource-profile router ecmp command**. The value cannot be changed until the value of the **configure router ecmp** command is set to 1.

Default

no ldp-ecmp

Parameters

percent-value

Specifies the percentage of ECMP hardware resources to allocate to LDP ECMP. The rest is allocated towards IP ECMP.

Values 0 to 100

max-ip-subnets

Syntax

max-ip-subnets *number*

no max-ip-subnets

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Context

configure>system>resource-profile>router

configure>system>global-res-profile>router

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Note:
The **configure**>**system**>**resource-profile**>**router** context is supported on the 7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE: standalone, and 7210 SAS-Sx 10/100GE.

The **configure**>**system**>**global-res-profile**>**router** context is supported on the 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone-VC.

This command configures the number of directly connected IP interfaces and subnets (both IPv4 and IPv6) the user plans to use on the node, so that only the requisite number of entries in the L3 forwarding table are allocated. On the 7210 SAS platforms, the hardware L3 forwarding table (that is, the IP IFB) stores the IP routes (both IPv4 and IPv6) received from routing peers and also stores the IP address prefix for the directly connected interfaces. The rest are available for use by IP routes received from peers.

This command provides the flexibility to earmark resources based on the number of directly connected interfaces required on the node, allowing the user to decrease the number of resources for directly connected subnets and consequently increase the number of entries available for IP routes received from peers. See the description of the max-ipv6-routes command for more information about IP route allocation.

Note:

- Each IPv4 subnet configured on the node requires 1 entry and each IPv6 subnet configured on the node requires 2 entries. Each IPv6 /64-bit address prefix requires twice the amount of space needed for an IPv4 address prefix. Additionally, the user must account for resources required for IPv6 primary and secondary addresses assigned to an IPv6 interface.
- The number of entries available for IP routes received from a peer is equal to the total number of L3 forwarding entries supported for the platform subtracted by the number of entries specified by this command.
- The software allocates entries from this pool on a FCFS (first come first serve) model based on the order of configuration of IP interfaces. An error is generated when the maximum limit is reached.

Default

no max-ip-subnets (Software allocates a fixed number of entries towards this to maintain backward compatibility with releases prior to Release 7.0.R3).

Parameters

number

Specifies the number of IP subnets for directly connected IP interfaces.

Values The following table lists the parameter values.

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The minimum number of IPv6 interfaces is 2.

Table 57: Number of resources available for maximum IP subnets

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-T	1	12000	500
7210 SAS-R6 (IMMv2)	1	28672	2000
7210 SAS-R12	1	28672	2000
7210 SAS-R6 and 7210 SAS-R12 IMM-c	1	12288	2000
7210 SAS-Mxp	1	28672	850
7210 SAS-Sx 1/10GE (standalone and standalone-VC)	1	12288	2000
7210 SAS-S 1/10GE (standalone and standalone-VC)	1	12288	2000
7210 SAS-Sx 10/100GE	1	12288	2000

max-ipv6-routes

Syntax

[**no**] **max-ipv6-routes** *number*

Context

configure>system>resource-profile>router

configure>system>global-res-profile>router

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Note:
The **configure**>**system**>**resource-profile**>**router** context is supported on the 7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE (standalone), and 7210 SAS-Sx 10/100GE.

The **configure**>**system**>**global-res-profile**>**router** context is supported on the 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE (standalone-VC).

This command allocates route entries for /64-bit IPv6 prefix. Entries in the IPv4 forwarding table are shared among IPv4 and IPv6 routes. Before adding routes for IPv6 destinations, route entries in the route lookup

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table must be allocated for IPv6 addresses using this command. The remainder of the L3 forwarding table is used for IPv4 routing entries. The system does not allocate any IPv6 route entries by default for /64-bit prefix, and the user must allocate some resources before using IPv6.

Each IPv6 /64-bit route requires twice the amount of resources taken up by an IPv4 route. The number of hardware route entries allocated by the software for IPv6 /64-bit routes is equal to twice the amount of the value specified using this command.

Note:

- For this command to take effect, reboot the node after making the change.
- On the 7210 SAS-T, a separate route table is used for IPv6 /128-bit prefix route lookup. A limited amount of IPv6 /128-bit prefixes is supported. The software enables lookups in this table by default; no user configuration is required to enable IPv6 /128-bit route lookup.
- On the 7210 SAS-R6 and 7210 SAS-R12 with IMMv2, 7210 SAS-Sx/S 1/10GE (standalone and standalone-VC), 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp, the IPv6 /128-bit prefixes are allocated by software on boot up. The resources are taken from the IP FIB shared with IPv4 and IPv6 /64-bit route entries. That is, unlike platforms like 7210 SAS-T and others, a separate route table is not available in hardware on these platforms. This affects the scaling of IPv4 routes when IPv6 /64-bit routes are allocated. See the following bullets for more information.
- On the 7210 SAS-R6 and 7210 SAS-R12 IMMv2 card, 7210 SAS-Sx/S 1/10GE (standalone and standalone-VC), 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp, each IPv6 /128-bit route entry/address prefix requires 4 entries in the IP hardware route table, each IPv6 /64-bit address prefix requires 2 entries and each IPv4 route entry/address prefix requires 1 entry.
- The creation of IPv6 IP interfaces without allocating IPv6 route entries is allowed. However, only IPv6 hosts on the same IPv6 subnet are reachable.
- On the 7210 SAS-R6 and 7210 SAS-R12, the value configured using this command is used across all IMMs in the chassis.
- The number of available IPv4 route entries in the L3 forwarding table is equal to the total L3 forwarding entries supported for the platform subtracted by the total number of entries reserved by this command and the number of entries reserved for IP subnets using the **max-ip-subnets** command. See the following bullets for more information.
- On the 7210 SAS-T, the maximum number of IPv4 prefixes without any IPv6 interfaces configured and IPv6 /64-bit routes (that is, the **max-ipv6-routes** command is set to a value of zero) is equal to the maximum size of the route table supported for the platform. Contact a Nokia representative to learn more about the routing table scaling limits for each 7210 SAS platform.

Note:
(Continued)

- On the 7210 SAS-R6 and 7210 SAS-R12 IMMv2 card, 7210 SAS-Sx/S 1/10GE (standalone and standalone-VC), and 7210 SAS-Mxp, a pool of 4K IPv4 entries are allocated on system bootup primarily for use by about 256 /128-bit IPv6 addresses. The remaining entries can be shared with IPv4 prefix, if IPv6 is not enabled on the node. That is, without IPv6 enabled on the node, the maximum number of IPv4 prefixes possible is equal to the maximum size of the

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route table supported for the platform, reduced by 1K entries. The 1K entries correspond to those reserved by the system for allocation to IPv6 /128-bit addresses.

Note that the maximum number of IPv4 prefixes includes the amount of addresses allocated for directly connected IP subnets (the user has an option to reserve the amount required for directly connected IPv4 subnets by configuring the max-ip-subnets command) and IPv4 routes statically configured on the node or learned dynamically using a routing protocol.

For example, if the maximum size of the route table supported on the node is 32K, the total number of IPv4 prefixes (including both directly connected subnets and routes statically configured or dynamically learned using a routing protocol) is 31K (the 1K route entries are used to allocate up to 256 /128-bit IPv6 addresses). The maximum size of the route table quoted in the example is for illustration purposes only.

- On the 7210 SAS-R6 and 7210 SAS-R12 IMMv2 card, 7210 SAS-Sx/S 1/10GE (standalone and standalone-VC), and 7210 SAS-Mxp, the maximum number of IPv4 prefixes possible with IPv6 /64-bit routes configured is equal to the maximum size that the route table supports for the platform, reduced by the sum of the number of routes configured for IPv6 /64-bit prefixes and an amount of 4K entries (reserved for /128-bit IPv6 addresses). The user has an option to reserve resources used for IPv6 /64-bit prefix using the **max-ipv6-routes** command. When **max-ipv6-routes** is configured using a value greater than zero, the IPv4 prefixes can no longer use the space reserved for IPv6 /128-bit addresses. The software enforces the maximum number of IPv6 prefixes possible as less than the **max-ipv6-routes** value.

  Using the preceding example, if the maximum size of the route table supported on the node is 32K, total number of IPv4 prefixes (only dynamically learned ones using a routing protocol) is about 25K, assuming **max-ipv6-routes** is set to 1000 and **max-ip-subnets** is set to 1000. That is, 32K – (4K + 2 * 1K + 1K) = 25K (recollect each IPv6 /64-bit route entry requires twice the space of IPv4 route entry). The maximum size of the route table quoted in the example is for illustration purposes only.

- On the 7210 SAS-R6 and 7210 SAS-R12 IMMv2 card, 7210 SAS-Sx/S 1/10GE (standalone and standalone-VC), 7210 SAS-Sx 10/100GE, and 7210 SAS-Mxp, the maximum number of IPv6 /64-bit routes is equal to the number of routes configured using the **max-ipv6-routes** command.

  Using the preceding example, if the maximum size of the route table supported on the node is 32K, maximum number of IPv6 /64-bit prefixes (including only dynamically learned ones, using a routing protocol) is about 13500, assuming **max-ipv6-routes** is set to 13K and **max-ip-subnets** is set to 1000. The number of IPv4 routes allowed is zero (32K – (4K + 2 * 13500 + 1K) = 0 (recollect each IPv6 /64-bit route entry requires twice the space of IPv4 route entry). The maximum size of the route table quoted in the example is for illustration purposes only.

The following is the allocation scheme implemented for 7210 SAS-R6 and 7210 SAS-R12 IMM-c cards.

- Software partitions the hardware table into two - Partition #1 with 4k (4*1204) 32-bit entries and Partition #2 with 12k (12*1024) entries.
- Partition #1 can fit 128-bit IPv6 address and takes 4 * 32-bit entries each, 32-bit IPv4 entries taking one entry each (1*32-bit entry), and 64-bit IPv6 address taking 4 * 32-bit entries each; Lets call this L3-FIB-P1.
- Partition #2 can fit 32-bit IPv4 entries taking one entry each, and 64-bit IPv6 address taking 2 * 32-bit entries each; Lets call this L3-FIB-P2.
- Software reserves space for 256 128-bit IPv6 addresses in partition #1 (L3-FIB-P1); taking away 1024 32-bit entries and leaving around 3072 32-bit entries for use by either IPv4 prefixes or IPv6 prefixes. In

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other words, a maximum of 3072 IPv4 prefixes can fit in the remaining space if all of them were to be allocated to IPv4 or a maximum of 768 IPv6 (64-bit) prefixes can fit in the remaining space if all of them were to be allocated to IPv6.; Lets call the remaining space L3-FIB-P1-R.

- Software reserves **max-ip-subnets** 32-bit entries from partition #2 for use by directly connected IPv4 and IPv6 interfaces with IPv4/IPv6 address assigned. 'max-ip-subnets' is a configurable CLI parameter and allows user to reserve the amount of space required for directly connected IP interfaces. IPv6 directly connected interfaces are allocated space from this reserved only if the IPv6 address prefix is less than equal to 64-bit. They are allocated two entries each per IPv6 64-bit address prefix. IPv6 directly connected interfaces with IPv6 address prefix greater than 64-bit is allocated entries from partition #1. All IPv4 directly connected IP interfaces are allocated one entry each from this reserved space. The remaining space is used to store prefixes learned by the node. Lets call the remaining space L3-FIB-P2-R.
- L3-FIB-P2-R and L3-FIB-P1-R is used for allocating entries towards routes learned by the node statically or dynamically using a routing protocol. The software starts to allocate entries from L3-FIB-P2-R for both IPv4 addresses and IPv6 64-bit addresses, until all the resources are used up. It then allocates entries from L3-FIB-P1-R for both IPv4 and IPv6 addresses, until all of it is used up.
- If the user has configured max-ipv6-routes, the software reserves space for it in L3-FIB-P2-R for use by IPv6 routes. The amount of space reserved is equivalent to 2 * max-ipv6-routes. The remaining space in L3-FIB-P2-R and L3-FIB-P1-R is available for IPv4 routes. For example, if max-ipv6-routes is set to 1000, then 2000 /32-bit entries are allocated from L3-FIB-P2-R and reserved for IPv6 routes. The rest along with available entries in L3-FIB-P1-R are available for use by IPv4.

The **no** form of this command specifies that the software does not allocate any resources for use by IPv6 routes.

Default

no max-ipv6-routes

Parameters

number

Specifies the maximum amount of entries to be used for IPv6 routes. Maximum values can be achieved assuming all the resources are allocated to IPv6 routes.

Values The following table lists the parameter values.

Table 58: Number of resources available for maximum IPv6 routes

Platforms	Min value	Max value	Default values
7210 SAS-T Access-Uplink mode (per node)	1	6000	0
7210 SAS-T Network Mode (per node)	1	6000	0
7210 SAS-R12 (per IMM)	1	6900	0
7210 SAS-R6 and 7210 SAS-R12 IMM-c (per IMM)	1	14300	0

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Platforms	Min value	Max value	Default values
7210 SAS-Mxp (per node)	1	14300	0
7210 SAS-Sx 1/10GE (standalone and standalone-VC)	1	6100	0
7210 SAS-S 1/10GE (standalone and standalone-VC)	1	6100	0
7210 SAS-Sx 10/100GE	1	6100	0

sap-scale-mode

Syntax

sap-scale-mode *mode*

no sap-scale-mode

Context

config>system>resource-profile (on the 7210 SAS-Mxp, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE)

config>system>global-res-profile (on the 7210 SAS-R6 and 7210 SAS-R12)

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE (standalone), and 7210 SAS-Sx 10/100GE (standalone)

Description

This command enables or disables a higher number of SAPs and services for Epipe and VPLS services. There is no change in scaling for IES, VPRN, and RVPLS SAPs and services.

The **low** keyword is configured by default. The default SAP ingress policy ID 1 is used in this mode. On the 7210 SAS-Mxp, if the **high** keyword is configured, the default SAP ingress policy ID 65536 is used to differentiate the policy from the default SAP ingress policy ID 1. On the 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE, SAP ingress policy ID 1 is the default when **sap-scale-mode** is set to either **low** or **high**.

To switch between the **low** and **high** modes, the user must remove all SAP configurations, change the mode, reboot the node, and reconfigure the SAPs and services.

The mandatory QoS configurations required to achieve higher SAP and service scaling are as follows.

- Access port-based egress queuing and shaping must be configured on all ports, including service delivery ports and uplinks.
- On the 7210 SAS-Mxp, either access port-based ingress classification or SAP ingress table-based classification and table-based policing (service meters) can be configured on uplinks for higher SAP scaling.

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- On the 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE, access port-based ingress classification and policing must be configured for higher SAP scaling.
- On the 7210 SAS-Mxp, Epipe and VPLS SAPs must use SAP ingress table-based classification and table-based policing on service delivery ports for higher SAP scaling. The 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE do not support table-based policing (service meters) for SAP ingress policing.
- On the 7210 SAS-Mxp, 7210 SAS-R6, and 7210 SAS-R12, IES and VPRN SAPs can use table-based classification.
- R-VPLS SAPs must use CAM-based classification and policing.

Note:
See the *7210 SAS-Mxp, S, Sx, T Services Guide* and *7210 SAS-R6, R12 Services Guide* for more information about high SAP scale mode and low SAP scale mode.

The **no** form of this command disables the use of high SAP and service scaling for Epipe and VPLS services.

Default

no sap-scale-mode

Parameters

mode

Specifies the SAP scale mode.

Values **high**, **low**

high

Keyword to enable higher SAP and service scaling.

low

Keyword to disable higher SAP and service scaling.

7.18.2.1.26 Global system resource profile commands

global-res-profile

Syntax

global-res-profile

Context

config>system

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone

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Description

Commands in this context configure the CAM resources.

enable-bgp3107-frr

Syntax

enable-bgp-3107-frr

no enable-bgp3107-frr

Context

config>system>global-res-profile

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE (standalone-VC)

Description

This command enables the allocation of MPLS FIB and protection group resources required for enabling uniform FRR for BGP RFC 3107 LU routes resolved using RSVP-TE LSPs. This is a per-node configuration and enabling the command affects all BGP LU routes.

Caution:
If the command is enabled, the amount of resources required is twice the amount required without uniform FRR, and the number of BGP LU routes that can be accommodated in the MPLS FIB is therefore halved if uniform FRR is enabled. Ensure that sufficient MPLS resources are available to accommodate all required BGP LU routes before using this command.

The **no** form of this command disables the use of uniform FRR for BGP LU routes.

Default

no enable-bgp3107-frr

enable-ldporsvp-frr

Syntax

enable-ldporsvp-frr

no enable-ldporsvp-frr

Context

config>system>global-res-profile

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE (standalone-VC)

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Description

This command enables the allocation of MPLS FIB and protection group resources required for enabling uniform FRR for LDP-over-RSVP LSPs (LDP FECs resolved using RSVP-TE LSPs). This is a per-node configuration and enabling the command affects all LDP-over-RSVP LSPs.

Caution:
If the command is enabled, the amount of resources required is twice the amount required without uniform FRR, and the number of LDP-over-RSVP LSPs that can be accommodated in the MPLS FIB is therefore halved if uniform FRR is enabled. Ensure that sufficient MPLS resources are available to accommodate all required LDP-over-RSVP LSPs before using this command.

The **no** form of this command disables the use of uniform FRR for LDP-over-RSVP LSPs.

Default

no enable-ldporsvp-frr

qos

Syntax

qos

Context

config>system>glob-res-profile

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone

Description

Commands in this context configure the QoS resources.

port-scheduler-mode

Syntax

no port-scheduler-mode

port-scheduler-mode

Context

config>system>glob-res-profile

Platforms

7210 SAS-R6 and 7210 SAS-R12 (supported only on IMMv2 cards)

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Description

This command lets user select the queuing mode to be used for SAPs configured on all the ports of the node.

When port-scheduler-mode is enabled, software allocates 8 egress queues per port and all the SAPs configured on the access port or hybrid port will share the 8 egress queues for traffic sent out of that port. In this mode, SAPs configured on hybrid port shares the egress queues with network port traffic. Enabling port-scheduler-mode affects the behavior for all the SAPs configured on all the access and hybrid port. In this mode, per SAP egress queues are not available.

In this mode, resources allocated towards SAP egress queues in the ingress-internal-tcam pool are not required by this feature and can be allocated towards other features. See the qos-sap-egress-resource command for more information.

When port-scheduler-mode is disabled using the **no** form of this command, per SAP egress queues are available for use. See the *7210 SAS-Mxp, R6, R12, S, Sx, T Quality of Service Guide* for more information about the two modes.

Enabling or disabling port-scheduler-mode requires a reboot of the node.

Default

no port-scheduler-mode

sf-ingress-internal-tcam

Syntax

sf-ingress-internal-tcam

Context

config>system>glob-res-profile

Platforms

7210 SAS-R6 and 7210 SAS-R12

Description

Commands in this context configure the CAM resources available in the SF/CPM.

The **sf-ingress-internal-tcam** resource pool is shared by multiple features. The resources are allocated in chunks of fixed size. The user is provided an option to allocate the available resources based on their scaling requirements for the features. The resource usage for different features is provided in the CLI description for the feature. Resources are allocated to features in chunks of fixed size. It is not possible to for a chunk to be shared by multiple features. There are a few exceptions which are specified explicitly. The software allocates resources from the chunk to the feature to which it is allocated until it runs out of all resources in the chunk. If available, user can allocate more chunks to the feature (by taking away chunks of resources from other features which do not need to be enabled).

To free up the resources for use by other features, users need to modify the configuration such that the chunks of resources in use by other features are freed. For example, to free up a chunk of resources allocated to UP MEPs and allocate it to P2MP LSPs, user will need to remove the configuration of UP

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MEPs for all the SAPs, then change the resource profile configuration to allocate the chunk to P2MP LSPs. Another scenario would be, to free up a chunk of resources and allocate it to another feature.

The sf-ingress-internal-tcam resource pool is shared among the following features on different platforms:

- **7210 SAS-R6 and 7210 SAS-R12**

  It is global per node resource pool. It is shared among UP MEPs, G8032 Fast-flood, and NG-MVPN P2MP LSPs.

Note:

- While reassigning chunk of resources among features, in some scenarios a reboot of the node might be required. See the CLI description of the specific feature to know more.
- The number of chunks and the number of resources per chunk varies among the different platforms. Contact your ALU/Nokia representative for more information.
- On 7210 SAS-R6, the number of resources per slice/chunk varies. Hence, the number of resources allocated to a feature varies based on the order of allocation of resources among the different features. It might be necessary to allocate more slices to a feature to achieve desired scaling.
- For some features a minimum number of chunks (greater than 1) must be allocated to enable the feature functionality. If this is not done software cannot allocate the required number of resources and it will fail the command associated with the feature.

eth-cfm-upmeps

Syntax

eth-cfm-upmeps *max_slices*

no eth-cfm-upmeps

Context

config>system>glob-res-profile>sf-ingress-internal-tcam

Platforms

7210 SAS-R6 and 7210 SAS-R12

Description

This command allocates resources towards UP MEP from the sf-ingress-internal-tcam pool. The value specified here allocates a fixed number of entries for use with this feature. Entries are allocated by software from this pool whenever UP MEP is configured in a VPLS service (either on a SAP or a SDP). The number of entries required per MEP depends on the level of the MEP.

The **no** form of this command does not allocate any resources for use by CFM UP MEPs. If no resources are allocated for use, the software fails all attempts to configure an UP MEP.

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Parameters

max_slices

Specifies the number of slice to be allocated for VPLS UP MEP feature. Each slice has many resource entries which is used to identify and process VPLS UP MEP messages.

Values 0 to 6

g8032-fast-flood

Syntax

g8032-fast-flood *max_slices*

no g8032-fast-flood

Context

config>system>glob-res-profile>sf-ingress-internal-tcam

Platforms

7210 SAS-R6 and 7210 SAS-R12

Description

This command configures the amount of ingress internal CAM resources available in the SF/CPM for use by G8032 fast-flood mechanism. These are used to implement G8032 fast-flood for data services protected using G8032 ring protection mechanism. The amount of slices determines the amount of data services that can be protected by G8032 and use the fast-flood mechanism to reduce the convergence time on a ring failure and switchover.

On IMMv2, resources are used to implement the G8032 fast-flood mechanism for only RVPLS services. These resources are used only if G8032 is enabled for RVPLS services. The G8032 fast-flood mechanism is also implemented for VPLS services, but no user configuration is required and it does not need resources to be allocated from the sf-ingress-internal-tcam pool.

Parameters

max_slice

Specifies the number of slices to be allocated for the G8032 fast-flood mechanism. Each slice has many resource entries that are used to implement G8032 fast flood for multiple data services protected by G8032.

Values 1 to 7

mpls-p2mp

Syntax

mpls-p2mp *max_slices*

no mpls-p2mp

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Context

config>system>glob-res-profile>sf-ingress-internal-tcam

Platforms

7210 SAS-R6 and 7210 SAS-R12

Description

This command allows the user to configure the resources to be used for NG-MVPN P2MP LSPs. The users must allocate some resources using the command before configuring NG-MVPN. It might be necessary to free up resources allocated to other features to allocate resources for it.

On 7210 SAS-R6, the number of resources per slice/chunk varies. Hence, the number of resources allocated to a feature varies based on the order of allocation of resources among different features. It might be necessary to allocate more slices to a feature to achieve desired scaling.

The **no** form of this command does not allocate any resources for use by P2MP LSPs used with NG-MVPN feature. If no resources are allocated for use, the software will not be able to setup P2MP LSPs for use with NG-MVPN.

Parameters

max_slice

Specifies the number of slices to be allocated for NG-MVPN P2MP LSPs.

Values 0 to 3

Default 1

7.18.2.2 Show commands

7.18.2.2.1 System commands

chassis

Syntax

chassis imm-family [*imm-family*]

chassis imm-family {**active** | **configured**}

Context

show>system

Platforms

7210 SAS-R6 and 7210 SAS-R12

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Description

This command lists the IMM types allowed to be provisioned (and equipped) in the chassis for the specified type of IMM family.

With the **active** option, this command displays the current active configuration of the IMM family. In other words, it indicates the list of allowed IMMs that can be used in the chassis.

With the **configured** option, this command displays the user configured value for the IMM family, which will take effect on the next reboot.

Parameters

imm-family

Specifies the IMM family type to display the list of supported IMMs under this family.

Values imm-sas-r, imm-sas-r-b, imm-sas-r-c, all

active

Displays the current active configuration.

configured

Displays the current configured value which will take effect on next reboot.

Output

The following output is an example of IMM family information.

Sample output

```
*A:sasr_dutb>show>system# chassis imm-family all

===============================================================================
IMM FAMILY INFORMATION
===============================================================================
IMM-TYPE                      IMM-FAMILY          SUPPORTED
-------------------------------------------------------------------------------
imm-sas-10sfp+1xfp            imm-sas-r           Default
imm-sas-10sfp                 imm-sas-r           Default
imm-sas-2xfp                  imm-sas-r           Default
imm-sas-b-4sfp+               imm-sas-r-b         ----
imm-sas-b-2sfp+               imm-sas-r-b         ----
imm-sas-b-10sfp-1sfp+         imm-sas-r-b         ----
imm-sas-b-11csfp              imm-sas-r-b         ----
imm-sas-b-16tx                imm-sas-r-b         ----
===============================================================================
*A:sasr_dutb>show>system#


*A:sasr_dutb>show>system# chassis imm-family active

===============================================================================
IMM FAMILY INFORMATION
===============================================================================
IMM-TYPE                      IMM-FAMILY          SUPPORTED
-------------------------------------------------------------------------------
imm-sas-10sfp+1xfp            imm-sas-r           Supported (Default)
imm-sas-10sfp                 imm-sas-r           Supported (Default)
imm-sas-2xfp                  imm-sas-r           Supported (Default)
===============================================================================
*A:sasr_dutb>show>system#
```


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```
===============================================================================


*A:sasr_dutb>show>system# chassis imm-family configured

===============================================================================
IMM FAMILY INFORMATION
===============================================================================
IMM-TYPE                      IMM-FAMILY          SUPPORTED
-------------------------------------------------------------------------------
imm-sas-10sfp+1xfp            imm-sas-r           Default
imm-sas-10sfp                 imm-sas-r           Default
imm-sas-2xfp                  imm-sas-r           Default
===============================================================================
*A:sasr_dutb>show>system#
```

connection

Syntax

connections [**address** *ip-address* [**interface** *interface-name*]] [**port** *port-number*] [**detail**]

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays UDP and TCP connection information. If no command line options are specified, a summary of the TCP and UDP connections displays.

Parameters

ip-address

Displays only the connection information for the specified IP address.

Values *ipv4-address* — a.b.c.d (host bits must be 0)

ipv6-address — x:x:x:x:x:x:x:x (eight 16-bit pieces)

x:x:x:x:x:x:d.d.d.d

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

port-number

Displays only the connection information for the specified port number.

Values 0 to 65535

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detail

Displays TCP statistics.

Output

The following outputs are examples of system connections information, and the asspciated tables describes the output fields.

- Sample output , Table 59: Output fields: system connections
- Sample output (detail)

Sample output

```
A:ALA-12# show system connections
===============================================================================
Connections :
===============================================================================
Proto    RecvQ    TxmtQ Local Address         Remote Address        State
-------------------------------------------------------------------------------
TCP          0        0 0.0.0.0.21            0.0.0.0             LISTEN
TCP          0        0 0.0.0.0.23            0.0.0.0             LISTEN
TCP          0        0 0.0.0.0.179           0.0.0.0             LISTEN
TCP          0        0 10.0.0.xxx.51138      10.0.0.104.179      SYN_SENT
TCP          0        0 10.0.0.xxx.51139      10.0.0.91.179       SYN_SENT
TCP          0        0 10.10.10.xxx.646      0.0.0.0             LISTEN
TCP          0        0 10.10.10.xxx.646      10.10.10.104.49406  ESTABLISHED
TCP          0        0 10.1.0.1.51140        10.1.0.2.179        SYN_SENT
TCP          0        993 192.168.x.xxx.23    192.168.x.xx.xxxx   ESTABLISHED
UDP          0        0 0.0.0.0.123           0.0.0.0              ---
UDP          0        0 0.0.0.0.646           0.0.0.0              ---
UDP          0        0 0.0.0.0.17185         0.0.0.0              ---
UDP          0        0 10.10.10.xxx.646      0.0.0.0              ---
UDP          0        0 xxx.0.0.1.50130       xxx.0.0.1.17185      ---
-------------------------------------------------------------------------------
No. of Connections: 14
===============================================================================
A:ALA-12#
```

Table 59: Output fields: system connections

Label	Description
Proto	Displays the socket protocol, either TCP or UDP
RecvQ	Displays the number of input packets received by the protocol
TxmtQ	Displays the number of output packets sent by the application
Local Address	Displays the local address of the socket The socket port is separated by a period.
Remote Address	Displays the remote address of the socket The socket port is separated by a period.
State	Listen — The protocol state is in the listen mode Established — The protocol state is established

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Sample output (detail)

```
A:ALA-12# show system connections detail
-------------------------------------------------------------------------------
 TCP Statistics
-------------------------------------------------------------------------------
packets sent                                : 659635
data packets                                : 338982 (7435146 bytes)
data packet retransmitted                   : 73 (1368 bytes)
ack-only packets                            : 320548 (140960 delayed)
URG only packet                             : 0
window probe packet                         : 0
window update packet                        : 0
control packets                             : 32
packets received                            : 658893
acks                                        : 338738 for (7435123 bytes)
duplicate acks                              : 23
ack for unsent data                         : 0
packets received in-sequence                : 334705 (5568368 bytes)
completely duplicate packet                 : 2 (36 bytes)
packet with some dup. data                  : 0 (0 bytes)
out-of-order packets                        : 20 (0 bytes)
packet of data after window                 : 0 (0 bytes)
window probe                                : 0
window update packet                        : 3
packets received after close                : 0
discarded for bad checksum                  : 0
discarded for bad header offset field       : 0
discarded because packet too short          : 0
connection request                          : 4
connection accept                           : 24
connections established (including accepts) : 27
connections closed                          : 26 (including 2 drops)
embryonic connections dropped               : 0
segments updated rtt                        : 338742 (of 338747 attempts)
retransmit timeouts                         : 75
connections dropped by rexmit timeout       : 0
persist timeouts                            : 0
keepalive timeouts                          : 26
keepalive probes sent                       : 0
connections dropped by keepalive            : 1
pcb cache lookups failed                    : 0
===============================================================================
A:ALA-12#
```

cpu

Syntax

cpu [**sample-period** *seconds*]

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

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Description

This command displays CPU utilization per task over a sample period.

Parameters

sample-period *seconds*

Specifies the number of seconds over which to sample CPU task utilization.

Default 1

Values 1 to 5

Output

The following output is an example of CPU information, and Table 60: Output fields: system CPU describes the output fields.

Sample output

```
*A:cses-E11# show system cpu sample-period 2
===============================================================================
CPU Utilization (Sample period: 2 seconds)
===============================================================================
Name                                  CPU Time       CPU Usage        Capacity
                                        (uSec)                          Usage
-------------------------------------------------------------------------------
BFD                                         10          ~0.00%          ~0.00%
BGP                                          0           0.00%           0.00%
CFLOWD                                      61          ~0.00%          ~0.00%
Cards & Ports                            8,332           0.41%           0.08%
DHCP Server                                 79          ~0.00%          ~0.00%
ICC                                        408           0.02%           0.01%
IGMP/MLD                                 1,768           0.08%           0.08%
IOM                                     17,197           0.85%           0.31%
IP Stack                                 4,080           0.20%           0.09%
IS-IS                                    1,213           0.06%           0.06%
ISA                                      2,496           0.12%           0.07%
LDP                                          0           0.00%           0.00%
Logging                                     32          ~0.00%          ~0.00%
MPLS/RSVP                                2,380           0.11%           0.08%
MSDP                                         0           0.00%           0.00%
Management                               5,969           0.29%           0.15%
OAM                                        907           0.04%           0.02%
OSPF                                        25          ~0.00%          ~0.00%
PIM                                      5,600           0.27%           0.27%
RIP                                          0           0.00%           0.00%
RTM/Policies                                 0           0.00%           0.00%
Redundancy                               3,635           0.18%           0.13%
SIM                                      1,462           0.07%           0.04%
SNMP Daemon                                  0           0.00%           0.00%
Services                                 2,241           0.11%           0.05%
Stats                                        0           0.00%           0.00%
Subscriber Mgmt                          2,129           0.10%           0.04%
System                                   8,802           0.43%           0.17%
Traffic Eng                                  0           0.00%           0.00%
VRRP                                       697           0.03%           0.02%
WEB Redirect                               125          ~0.00%          ~0.00%
-------------------------------------------------------------------------------
Total                                2,014,761         100.00%
   Idle                              1,945,113          96.54%
```


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```
   Usage                                69,648           3.45%
Busiest Core Utilization                69,648           3.45%
===============================================================================
*A:cses-E11#
```

Table 60: Output fields: system CPU

Label	Description
CPU Utilization	The total amount of CPU time
Name	The process or protocol name
CPU Time (uSec)	The CPU time each process or protocol has used in the specified time
CPU Usage	The sum of CPU usage of all the processes and protocols
Capacity Usage	Displays the level the specified service is being utilized When this number hits 100%, this part of the system is busied out. There may be extra CPU cycles still left for other processes, but this service is running at capacity. This column does not reflect the true CPU utilization value; that data is still available in the **CPU Usage** column. This column is the **busiest** task in each group, where **busiest** is defined as either actually running or blocked attempting to acquire a lock.

cron

Syntax

cron

Context

show>system>cron

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command enters the show CRON context.

schedule

Syntax

schedule [*schedule-name*] [**owner** *schedule-owner*]

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Context

show>system>cron

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays cron schedule parameters.

Parameters

schedule-name

Displays information for the specified scheduler name

owner schedule-owner

Displays information for the specified scheduler owner

Output

The following output is an example of cron schedule information, and Table 61: Output fields: Cron schedule describes the output fields.

Sample output

```
A:sim1>show>system>cron schedule test
===============================================================================
CRON Schedule Information
===============================================================================
Schedule                     : test
Schedule owner               : TiMOS CLI
Description                  : none
Administrative status        : enabled
Operational status           : enabled
Script Policy                : test
Script Policy Owner          : TiMOS CLI
Script                       : test
Script Owner                 : TiMOS CLI
Script source location       : ftp://*****:******@192.168.15.1/home/testlab_bgp
                               /cron/test1.cfg
Script results location      : ftp://*****:******@192.168.15.1/home/testlab_bgp
                               /cron/res
Schedule type                : periodic
Interval                     : 0d 00:01:00 (60 seconds)
Repeat count                 : 10
Next scheduled run           : 0d 00:00:42
End time                     : none
Weekday                      : tuesday
Month                        : none
Day of month                 : none
Hour                         : none
Minute                       : none
Number of schedule runs      : 10
Last schedule run            : 2008/01/01 17:20:52
Number of schedule failures  : 0
Last schedule failure        : no error
Last failure time            : never
===============================================================================
```


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```
A:sim1>show>cron
```

Table 61: Output fields: Cron schedule

Label	Description
Schedule name	Displays the schedule name
Schedule owner	Displays the owner name of the action
Description	Displays the schedule's description
Administrative status	Enabled — The administrative status is enabled Disabled — Administratively disabled
Operational status	Enabled — The operational status is enabled Disabled — Operationally disabled
Script Policy	Displays the script policy name
Script Policy Owner	Displays the name of script policy owner
Script	Displays the name of the script
Script owner	Displays the name of the of script owner
Script source location	Displays the location of scheduled script
Script results location	Displays the location where the script results have been sent
Schedule type	Periodic — Displays a schedule which ran at a given interval Calendar — Displays a schedule which ran based on a calendar Oneshot — Displays a schedule which ran one time only
Interval	Displays the interval between runs of an event
Repeat count	Displays the total number of times a CRON "interval" schedule is run
Next scheduled run	Displays the time for the next scheduled run
End time	Displays the configured time at which the schedule ends
Weekday	Displays the configured weekday
Month	Displays the configured month
Day of Month	Displays the configured day of month
Hour	Displays the configured hour
Minute	Displays the configured minute

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Label	Description
Number of scheduled runs	Displays the number of scheduled sessions
Last scheduled run	Displays the last scheduled session
Number of scheduled failures	Displays the number of scheduled sessions that failed to execute
Last scheduled failure	Displays the last scheduled session that failed to execute
Last failure time	Displays the system time of the last failure

global-res-profile

Syntax

global-res-profile [**detail**]

global-res-profile {**active** | **configured**}

Context

show>system

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone-VC

Description

This command displays the parameters and resources configured under the global system resource-profile.

Output

The following output is an example of global system resource profile information, and Table 62: Output fields: global system resource profile describes the output fields.

Sample output

```
*7210SASR>show>system# global-res-profile

===============================================================================
System Global Resource Profile
===============================================================================

-------------------------------------------------------------------------------

G8032 Fast Flood           : 5
Eth-Cfm Vpls Upmeps        : 0
Mpls P2MP                  : 1
Max-ipv6-routes            : disable
System-max-ecmp            : 1
L3-max-ecmp-groups         : 1945
```


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```
Ldp-max-ecmp-groups        : disable
Ldp-ecmp-percent-value     : disable
Max-ip-subnets             : 2000
port-scheduler-mode        : disable
-------------------------------------------------------------------------------
*7210R>show>system#
```

Table 62: Output fields: global system resource profile

Label	Description
G8032 Fast Flood	Displays the resources configured for use by G8032 fast-flood feature
Mpls P2MP	Displays the resources configured for NG-MVPN P2MP LSPs
Max-ipv6-routes	The amount of L3 forwarding table entries configured for IPv6 / 64-bit address prefix lookups
System-max-ecmp	The maximum number of ECMP paths allowed per IP destination or LDP FEC
Max-ip-subnets	The amount of L3 forwarding entries configured for use by IP subnets of the directly connected interfaces (both IPv4 and IPv6 interfaces)
port-scheduler-mode	The scheduler mode configured for use on egress It can be either port-based (port-scheduler-mode is enabled) or SAP-based (port-scheduler-mode is disabled).

information

Syntax

information

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays general system information including the operating mode, basic system, SNMP server, last boot and DNS client information.

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Output

The following outputs are examples of system information, and Table 63: Output fields: system information describes the output fields.

- Sample output
- Sample output for 7210 SAS-Sx/S 1/10GE (standalone)
- Sample output for 7210 SAS-Sx/S 1/10GE (standalone-VC)

Sample output

```
===============================================================================
System Information
===============================================================================
System Name               : PE4-M2
System Type               :
System Version            : B-9.0.F-private
System Contact         :
System Location        :
System Coordinates     :
System Up Time            : 10 days, 06:50:01.84 (hr:min:sec)

SNMP Port                 : 161
SNMP Engine ID            : 0000197f0000c408416161a3
SNMP Engine Boots         : 571
SNMP Max Message Size     : 1500
SNMP Admin State          : Disabled
SNMP Oper State           : Disabled
SNMP Index Boot Status    : Not Persistent
SNMP Sync State           : N/A

Tel/Tel6/SSH/FTP Admin    : Disabled/Disabled/Enabled/Disabled
Tel/Tel6/SSH/FTP Oper     : Down/Down/Up/Down

BOF Source                : cf1:
Image Source              : primary
Config Source             : primary
Last Booted Config File   : cf1:\mvpn_head.cfg
Last Boot Cfg Version     : MON SEP 26 04:48:37 2016 UTC
Last Boot Config Header: N/A
Last Boot Index Version   : N/A
Last Boot Index Header : N/A
Last Saved Config         : N/A
Time Last Saved           : N/A
Changes Since Last Save   : Yes
User Last Modified        : admin
Time Last Modified        : 2016/10/25 04:07:16
Max Cfg/BOF Backup Rev    : 5
Cfg-OK Script             : ftp://dhandaym:Alcatel12#@xxx.xxx.xxx.xx/./env.cfg
Cfg-OK Script Status      : success
Cfg-Fail Script           : N/A
Cfg-Fail Script Status    : not used

Management IP Addr        : 10.135.6.77/24
Primary DNS Server        : N/A
Secondary DNS Server      : N/A
Tertiary DNS Server       : N/A
DNS Domain                : (Not Specified)
DNS Resolve Preference    : ipv4-only
DNSSEC AD Validation      : False
DNSSEC Response Control   : drop
BOF Static Routes         :
  To                   Next Hop
```


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```
  10.0.0.0/8           10.135.6.1

  10.135.25.0/24       10.135.16.1

  10.250.0.0/16       10.135.6.1

  10.254.0.0/16       10.135.6.1


ICMP Vendor Enhancement   : Disabled
EFM OAM Grace Tx Enable   : False
===============================================================================

===============================================================================
System Oper Group Information
===============================================================================
Name                            Oper   Creation Hold   Hold   Members Monitor
                                Status Origin   UpTime DnTime
                                                (secs) (secs)
-------------------------------------------------------------------------------
No Matching Entries
===============================================================================
*7210SAS>show>system#
```

Sample output for 7210 SAS-Sx/S 1/10GE (standalone)

```
*A:dut-d>show>system# information

===============================================================================
System Information
===============================================================================
System Name               : dut-d
System Type               : 7210 SAS-Sx/S 1/10GE 24Tp4SFP+ (PoE)-1
Chassis-role Config value : standalone
Host-type Config value    : standalone
Chassis Operating Mode    : standalone
System Version            : B-9.0.B1-10
System Contact         :
System Location        :
System Coordinates     :
System Up Time            : 30 days, 04:02:01.66 (hr:min:sec)

SNMP Port                 : 161
SNMP Engine ID            : 0000197f0000a47b2cc693d3
SNMP Engine Boots         : 87
SNMP Max Message Size     : 9216
SNMP Admin State          : Enabled
SNMP Oper State           : Enabled
SNMP Index Boot Status    : Not Persistent
SNMP Sync State           : N/A

Tel/Tel6/SSH/FTP Admin    : Enabled/Disabled/Enabled/Enabled
Tel/Tel6/SSH/FTP Oper     : Up/Down/Up/Up

Boot-loader Source        : cf1:
BOF Source                : cf1:
Image Source              : primary
Config Source             : primary
Last Booted Config File   : cf1:\9.0_ver_4.cfg
Last Boot Cfg Version     : TUE JAN 04 23:16:48 2000 UTC
Last Boot Config Header: # TiMOS-B-9.0.B1-7 both/hops Nokia SAS-Sx 24Tp4SFP+
                         (PoE) 7210 Copyright (c) 2000-2016 Nokia. # All
                         rights reserved. All use subject to applicable
```


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```
                          license agreements. # Built on Wed Sep 28 14:44:54
                          IST 2016 by builder in /home/builder/9.0B1/panos/
                          main # Generated TUE JAN 04 23:16:48 2000 UTC
Last Boot Index Version   : N/A
Last Boot Index Header : # TiMOS-B-9.0.B1-7 both/hops Nokia SAS-Sx 24Tp4SFP+
                          (PoE) 7210 Copyright (c) 2000-2016 Nokia. # All
                          rights reserved. All use subject to applicable
                          license agreements. # Built on Wed Sep 28 14:44:54
                          IST 2016 by builder in /home/builder/9.0B1/panos/
                          main # Generated TUE JAN 04 23:16:48 2000 UTC
Last Saved Config         : N/A
Time Last Saved           : N/A
Changes Since Last Save   : Yes
User Last Modified        : admin
Time Last Modified        : 2000/01/23 10:26:17
Max Cfg/BOF Backup Rev    : 5
Cfg-OK Script             : N/A
Cfg-OK Script Status      : not used
Cfg-Fail Script           : N/A
Cfg-Fail Script Status    : not used

Management IP Addr        : 10.135.8.152/24
Management IP Addr        : 2001:dbe::44/64
Primary DNS Server        : N/A
Secondary DNS Server      : N/A
Tertiary DNS Server       : N/A
DNS Domain                : (Not Specified)
DNS Resolve Preference    : ipv4-only
DNSSEC AD Validation      : False
DNSSEC Response Control   : drop
BOF Static Routes         :
  To                   Next Hop
  10.135.0.0/16        10.135.8.1

  10.0.0.0/8          10.135.8.1


ICMP Vendor Enhancement   : Disabled
EFM OAM Grace Tx Enable   : False
===============================================================================

===============================================================================
System Oper Group Information
===============================================================================
Name                            Oper   Creation Hold   Hold   Members Monitor
                                Status Origin   UpTime DnTime
                                                (secs) (secs)
-------------------------------------------------------------------------------
No Matching Entries
===============================================================================
*A:dut-d>show>system#
```

Sample output for 7210 SAS-Sx/S 1/10GE (standalone-VC)

```
*A:dut-d>show>system# information

===============================================================================
System Information
===============================================================================
System Name               : Dut-A
System Type               : 7210 SAS-VC
Chassis-role Config value : standalone-vc
Host-type Config value    : none
```


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```
Chassis Operating Mode    : standalone-vc
System Version            : B-10.0.S-private
System Contact         :
System Location        :
System Coordinates     :
System Active Slot        : A
System Up Time            : 0 days, 09:32:03.18 (hr:min:sec)
SNMP Port                 : 161
SNMP Engine ID            : 0000197f0000d099d5911c41
SNMP Engine Boots         : 785
SNMP Max Message Size     : 1500
SNMP Admin State          : Enabled
SNMP Oper State           : Enabled
SNMP Index Boot Status    : Not Persistent
SNMP Sync State           : OK
Tel/Tel6/SSH/FTP Admin    : Enabled/Disabled/Enabled/Enabled
Tel/Tel6/SSH/FTP Oper     : Up/Down/Up/Up
Boot-loader Source        : cf1:
BOF Source                : cf1:
Image Source              : primary
Config Source             : primary
Last Booted Config File   : cf1:\default.cfg
Last Boot Cfg Version     : SAT JAN 01 19:17:10 2000 UTC
Last Boot Config Header: # TiMOS-B-0.0.private both/hops Nokia SAS-S 24F4SFP+
                         7210 Copyright (c) 2000-2018 Nokia. # All rights
                         reserved. All use subject to applicable license
                         agreements. # Built on Thu Feb 8 21:49:20 IST 2018
                         by aalapati in /home/aalapati/Work/WsHost/HEAD/panos/
                         main # Generated SAT JAN 01 19:17:10 2000 UTC
Last Boot Index Version   : N/A
Last Boot Index Header : # TiMOS-B-0.0.private both/hops Nokia SAS-S 24F4SFP+
                         7210 Copyright (c) 2000-2018 Nokia. # All rights
                         reserved. All use subject to applicable license
                         agreements. # Built on Thu Feb 8 21:49:20 IST 2018
                         by aalapati in /home/aalapati/Work/WsHost/HEAD/panos/
                         main # Generated SAT JAN 01 19:17:10 2000 UTC
Last Saved Config         : N/A
Time Last Saved           : N/A
Changes Since Last Save   : No
Max Cfg/BOF Backup Rev    : 5
Cfg-OK Script             : ftp://*:*@192.168.36.8/./images/env.cfg
Cfg-OK Script Status      : failed
Cfg-Fail Script           : N/A
Cfg-Fail Script Status    : not used
Management IP Addr        : 10.135.17.166/24
Primary DNS Server        : N/A
Secondary DNS Server      : N/A
Tertiary DNS Server       : N/A
DNS Domain                : (Not Specified)
DNS Resolve Preference    : ipv4-only
DNSSEC AD Validation      : False
DNSSEC Response Control   : drop
BOF Static Routes         :
  To                   Next Hop
  10.250.0.0/16       10.135.17.1
ICMP Vendor Enhancement   : Disabled
EFM OAM Grace Tx Enable   : False
===============================================================================
```


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Table 63: Output fields: system information

Label	Description
System Name	The configured system name
System Type	Indicates whether or not the node is operating in a virtual chassis
Chassis-role Config value	Supported only on 7210 SAS-Sx/S 1/10GE devices. Displays the configured value for boot parameter **chassis-role**
Host-type Config value	Supported only on 7210 SAS-Sx/S 1/10GE devices. Displays the configured value for BOF parameter **host-type**
Chassis Operating Mode	The current operating mode of the node/chassis It can be in satellite mode, standalone mode, or standalone-vc mode depending on the configuration of the **chassis-role** and **host-type** parameters. Supported only on 7210 SAS-Sx 1/10GE devices
Software Version	Indicates the version of the software
System Contact	A text string that describes the system contact information
System Location	A text string that describes the system location
System Coordinates	A text string that describes the system coordinates
System Active Slot	Indicates which slot is used for the active CPM (CPM-A or CPM-B)
System Up Time	The time since the last boot
SNMP Port	The port number used by this node to receive SNMP request messages and to send replies
SNMP Engine ID	The SNMP engineID to uniquely identify the SNMPv3 node
SNMP Engine Boots	The number of time the SNMP agent has restarted It is typically equivalent to the number of times the node has rebooted.
SNMP Max Message Size	The maximum SNMP packet size generated by this node
SNMP Admin State	Enabled — SNMP is administratively enabled and running Disabled — SNMP is administratively shut down and not running
SNMP Oper State	Enabled — SNMP is operationally enabled Disabled — SNMP is operationally disabled

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Label	Description
SNMP Index Boot Status	Persistent — System indexes are saved between reboots Not Persistent — System indexes are not saved between reboots
SNMP Sync State	Indicates whether the SNMP persistence information database has been successfully synchronized between the active and standby CPM This field is available on 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone-vc platforms.
Tel/Tel6/SSH/FTP/ Admin	The administrative state of the Telnet, Telnet IPv6, SSH, and FTP sessions
Tel/Tel6/SSH/FTP/ Oper	The operational state of the Telnet, Telnet _IPv6, SSH, and FTP sessions
Boot-loader source	The location of the bootloader
BOF source	The location of the BOF
Image Source	Primary — Indicates that the directory location for runtime image file was loaded from the primary source Secondary — Indicates that the directory location for runtime image file was loaded from the secondary source. Tertiary — Indicates that the directory location for runtime image file was loaded from the tertiary source
Config Source	Primary — Indicates that the directory location for configuration file was loaded from the primary source Secondary — Indicates that the directory location for configuration file was loaded from the secondary source Tertiary — Indicates that the directory location for configuration file was loaded from the tertiary source
Last Booted Config File	The URL and filename of the last loaded configuration file
Last Boot Cfg Version	The date and time of the last boot
Last Boot Config Header	Displays header information such as image version, date built, date generated
Last Boot Index Version	The version of the persistence index file read when the card was last rebooted
Last Boot Index Header	The header of the persistence index file read when the card was last rebooted
Last Saved Config	The location and filename of the last saved configuration file

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Label	Description
Time Last Saved	The date and time of the last time configuration file was saved
Changes Since Last Save	Yes — there are unsaved configuration file changes No — there are no unsaved configuration file changes
Time Last Modified	The date and time of the last modification
Max Cfg/BOF Backup Rev	The maximum number of backup revisions maintained for a configuration file. This value also applies to the number of revisions maintained for the BOF file
Cfg-OK Script	URL — The location and name of the CLI script file executed following successful completion of the boot-up configuration file execution
Cfg-OK Script Status	Successful/Failed — The results from the execution of the CLI script file specified in the Cfg-OK Script location Not used — No CLI script file was executed
Cfg-Fail Script	URL — The location and name of the CLI script file executed following a failed boot-up configuration file execution Not used — No CLI script file was executed
Cfg-Fail Script Status	Successful/Failed — The results from the execution of the CLI script file specified in the Cfg-Fail Script location Not used — No CLI script file was executed
Management IP Addr	The management IP address and mask
Primary DNS Server	The IP address of the primary DNS server
Secondary DNS Server	The IP address of the secondary DNS server
Tertiary DNS Server	The IP address of the tertiary DNS server
DNS Domain	The DNS domain name of the node
BOF Static Routes	To — The static route destination Next — Hop The next hop IP address used to reach the destination Metric — Displays the priority of this static route versus other static routes None — No static routes are configured

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memory-pools

Syntax

memory-pools

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays system memory status.

Output

The following output is an example of memory pool information, and Table 64: Output fields: memory pool describes the output fields.

Sample output

```
A:ALA-1# show system memory-pools
===============================================================================
Memory Pools
===============================================================================
Name               Max Allowed    Current Size      Max So Far          In Use
-------------------------------------------------------------------------------
System               No limit      24,117,248      24,117,248      16,974,832
Icc                 8,388,608       1,048,576       1,048,576          85,200
RTM/Policies         No limit       5,242,912       5,242,912       3,944,104
OSPF                 No limit       3,145,728       3,145,728       2,617,384
MPLS/RSVP            No limit       9,769,480       9,769,480       8,173,760
LDP                  No limit               0               0               0
IS-IS                No limit               0               0               0
RIP                  No limit               0               0               0
VRRP                 No limit       1,048,576       1,048,576              96
Services             No limit       2,097,152       2,097,152       1,589,824
IOM                  No limit     205,226,800     205,226,800     202,962,744
SIM                  No limit       1,048,576       1,048,576             392
IGMP                 No limit               0               0               0
MMPI                 No limit               0               0               0
MFIB                 No limit               0               0               0
PIP                  No limit      79,943,024      79,943,024      78,895,248
MBUF                67,108,864       5,837,328       5,837,328       4,834,280
-------------------------------------------------------------------------------
Current Total Size :    343,495,200 bytes
Total In Use       :    324,492,768 bytes
Available Memory   :    640,178,652 bytes
===============================================================================
A:ALA-1#
```


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Table 64: Output fields: memory pool

Label	Description
Name	The name of the system or process
Max Allowed	Integer — The maximum allocated memory size No — Limit No size limit
Current Size	The current size of the memory pool
Max So Far	The largest amount of memory pool used
In Use	The current amount of the memory pool currently in use
Current Total Size	The sum of the Current Size column
Total In Use	The sum of the In Use column
Available Memory	The amount of available memory

ntp

Syntax

ntp [{**peers** | **peer** *peer-address*} | {**servers** | **server** *server-address*} |[**all**]] [**detail**]

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays NTP protocol configuration and state.

Output

The following output is an example of NTP information, and Table 65: Output fields: NTP describes the output fields.

Sample output

```
A:7210>config>system>time>ntp# show system ntp
===============================================================================
NTP Status
===============================================================================
Enabled : Yes Stratum : 3
Admin Status : up Oper Status : up
Server enabled : No Server keyId : none
System Ref Id : 192.168.15.221 Auth Check : Yes
```


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```
===============================================================================
A:7210

A:7210# show system ntp all
===============================================================================
NTP Status
===============================================================================
Configured : Yes Stratum : 1
Admin Status : up Oper Status : up
Server Enabled : Yes Server Authenticate : No
Clock Source : PTP
Auth Check : Yes
Current Date & Time: 2013/03/19 20:18:50 UTC
===============================================================================
===============================================================================
NTP Active Associations
===============================================================================
State Reference ID St Type A Poll Reach Offset(ms)
Remote
-------------------------------------------------------------------------------
chosen PTP 0 srvr - 256 YYYYYYYY 0.000
PTP
candidate GPS 1 srvr - 256 YYYYYYYY -0.054
xxx.xxx.xxx.xxx
===============================================================================
A:7210#


A:7210>config>system>time>ntp# show system ntp detail
===============================================================================
NTP Status
===============================================================================
Enabled : Yes Stratum : 3
Admin Status : up Oper Status : up
Server enabled : No Server keyId : none
System Ref Id : 192.168.15.221 Auth Check : Yes
Auth Errors : 0 Auth Errors Ignored : 0
Auth Key Id Errors : 0 Auth Key Type Errors : 0
===============================================================================
NTP Configured Broadcast/Multicast Interfaces
===============================================================================
vRouter Interface Address Type Auth Poll
-------------------------------------------------------------------------------
Base i3/1/1 Host-ones bcast yes off
management management 224.0.1.1 mcast no off
Base t2 bclnt no n/a
management management 224.0.1.1 mclnt no n/a
===============================================================================
A:7210>config>system>time>ntp#


A:7210>config>system>time>ntp# show system ntp detail all
===============================================================================
NTP Status
===============================================================================
Enabled : Yes Stratum : 3
Admin Status : up Oper Status : up
Server enabled : No Server keyId : none
System Ref Id : 192.168.15.221 Auth Check : Yes
Auth Errors : 0 Auth Errors Ignored : 0
Auth Key Id Errors : 0 Auth Key Type Errors : 0
===============================================================================
NTP Configured Broadcast/Multicast Interfaces
===============================================================================
```


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```
vRouter Interface Address Type Auth Poll
-------------------------------------------------------------------------------
Base i3/1/1 Host-ones bcast yes off
management management 224.0.1.1 mcast no off
Base t2 bclnt no n/a
management management 224.0.1.1 mclnt no n/a
===============================================================================
NTP Active Associations
===============================================================================
State Remote Reference ID St Type Auth Poll R Offset
-------------------------------------------------------------------------------
reject 192.168.15.221 192.168.14.50 2 srvr none 64 y 0.901
chosen 192.168.15.221 192.168.1.160 4 mclnt none 64 y 1.101
===============================================================================
A:7210>config>system>time>ntp#
```

Table 65: Output fields: NTP

Label	Description
Enabled	yes — NTP is enabled no — NTP is disabled
Admin Status	yes — Administrative state is enabled no — Administrative state is disabled
NTP Server	Displays NTP server state of this node
Stratum	Displays stratum level of this node
Oper Status	yes — The operational state is enabled no — The operational state is disabled
Auth Check	Displays the authentication requirement
System Ref. ID	IP address of this node or a 4-character ASCII code showing the state
Auth Error	Displays the number of authentication errors
Auth Errors Ignored	Displays the number of authentication errors ignored
Auth key ID Errors	Displays the number of key identification errors
Auth Key Type Errors	Displays the number of authentication key type errors
Reject	The peer is rejected and will not be used for synchronization The rejection reasons could be one of the following: the peer is unreachable, the peer is synchronized to this local server so synchronizing with it would create a sync loop, or the synchronization distance is too large. This is the normal startup state.
Invalid	The peer is not maintaining an accurate clock

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Label	Description
	This peer will not be used for synchronization.
Excess	The peer's synchronization distance is greater than ten other peers This peer will not be used for synchronization.
Outlyer	The peer is discarded as an outlyer This peer will not be used for synchronization.
Candidate	The peer is accepted as a possible source of synchronization
Selected	The peer is an acceptable source of synchronization, but its synchronization distance is greater than six other peers
Chosen	The peer is chosen as the source of synchronization
ChosenPPS	The peer is chosen as the source of synchronization, but the actual synchronization is occurring from a pulse-per-second (PPS) signal
Remote	The IP address of the remote NTP server or peer with which this local host is exchanging NTP packets
Reference ID	When stratum is between 0 and 15 this field shows the IP address of the remote NTP server or peer with which the remote is exchanging NTP packets For reference clocks, this field shows the identification assigned to the clock, such as, ".GPS." For an NTP server or peer, if the client has not yet synchronized to a server/peer, the status cannot be determined and displays the following codes: Peer Codes: ACST — The association belongs to any cast server AUTH — Server authentication failed. Wait while the association is restarted. AUTO — Autokey sequence failed. Wait while the association is restarted. BCST — The association belongs to a broadcast server CRPT — Cryptographic authentication or identification failed. The details should be in the system log file or the cryptostats statistics file, if configured. No further messages will be sent to the server. DENY — Access denied by remote server. No further messages will be sent to the server. DROP — Lost peer in symmetric mode. Wait while the association is restarted.

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Label	Description
	RSTR — Access denied due to local policy. No further messages will be sent to the server. INIT — The association has not yet synchronized for the first time MCST — The association belongs to a manycast server NKEY — No key found. Either the key was never installed or is not trusted. RATE — Rate exceeded. The server has temporarily denied access because the client exceeded the rate threshold. RMOT — The association from a remote host running ntpdc has had unauthorized attempted access. STEP — A step change in system time has occurred, but the association has not yet re-synchronized. System Codes: INIT — The system clock has not yet synchronized for the first time STEP — A step change in system time has occurred, but the system clock has not yet re-synchronized
St	Stratum level of this node
Auth	yes — Authentication is enabled no — Authentication is disabled
Poll	Polling interval in seconds
R	Yes — The NTP peer or server has been reached at least once in the last 8 polls No — The NTP peer or server has not been reached at least once in the last 8 polls
Offset	The time between the local and remote UTC time, in milliseconds

oper-group

Syntax

oper-group [**group-name**]

oper-group *group-name* [**detail**]

oper-group *group-name* [**monitoring**]

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Context

show>system

Platforms

Supported only on 7210 SAS platforms configured in the access-uplink operating mode

Description

This command displays oper-group information, member count, monitor-client count, and status in a single line for each of the configured oper-groups.

Output

The following output is an example of oper-group information, and Table 66: Output fields: oper-group describes the output fields.

Show Output

```
*A:7210SAS>show>system# oper-group

===============================================================================
System Oper Group Information
===============================================================================
Name                            Oper   Creation Hold   Hold   Members Monitor
                                Status Origin   UpTime DnTime
                                                (secs) (secs)
-------------------------------------------------------------------------------
test                            up     manual   4      0      1       1
-------------------------------------------------------------------------------
Entries found: 1
===============================================================================
*A:7210SAS>show>system#

*A:7210SAS>show>system# oper-group test monitoring

===============================================================================
System Oper Group Information
===============================================================================
Oper Group           : test
Creation Origin      : manual              Oper Status      : up
Hold DownTime        : 0 secs              Hold UpTime      : 4 secs
Members              : 0                   Monitoring       : 0
===============================================================================
*A:7210SAS>show>system#
```

Table 66: Output fields: oper-group

Label	Description
Name	Displays the name of the oper-group
Oper Status	The operational status of the oper-group
Creation Origin	Displays if it was created manually
Hold Up Time	The configured HOLD UP time

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Label	Description
Hold Dn Time	The configured HOLD down time
Members	Displays the number of members of the oper-group
Monitor	Displays the number of monitoring clients

rollback

Syntax

rollback [**rescue**]

Context

show>system

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp

Description

This command displays rollback configuration and state.

Parameters

rescue

Keyword to revert to the rescue checkpoint.

Output

The following output is an example of rollback configuration and state information, and Table 67: Output fields: rollback describes the output fields.

Sample output

```
A:7210SAS>show>system# rollback

===============================================================================
Rollback Information
===============================================================================
Rollback Location            : None
Max Local  Rollback Files    : 10
Max Remote Rollback Files    : 10
Save
  Last Rollback Save Result  : None
  Last Save Completion Time  : N/A
Revert
  In Progress                : No
  Last Revert Initiated User : N/A
  Last Revert Checkpoint File: N/A
  Last Revert Result         : None
  Last Revert Initiated Time : N/A
  Last Revert Completion Time: N/A
Delete
```


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```
  Last Rollback Delete Result: None

===============================================================================
Rollback Files
===============================================================================
Idx    Suffix    Creation Time            Release           User
        Comment
-------------------------------------------------------------------------------
No Matching Entries
===============================================================================
A:7210SAS>show>system#
```

Table 67: Output fields: rollback

Label	Description
Rollback Information	
Rollback Location	The location where rollback checkpoint files will be saved
Max Local Rollback Files	The maximum number of rollback checkpoint files that will be saved to a local server
Max Remote Rollback Files	The maximum number of rollback checkpoint files that will be saved to a remote server
Save	
Last Rollback Save Result	The status of the last rollback checkpoint save
Last Save Completion Time	The date and time the last rollback checkpoint file save operation was completed
Revert	
In Progress	Indicates if a system rollback reversion is in progress
Last Revert Initiated User	The username of the person who initiated the last system rollback reversion
Last Revert Checkpoint File	The location of the last rollback checkpoint file
Last Revert Result	The result of the last system rollback reversion
Last Revert Initiated Time	The date and time when the last rollback was initiated
Last Revert Completion Time	The date and time when the last rollback was completed
Delete	
Last Rollback Delete Result	The status of the last rollback checkpoint file deletion

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Label	Description
Rollback Files	
Idx	The rollback checkpoint file ID
Suffix	The rollback checkpoint file suffix
Comment	User comments about the rollback checkpoint file
Creation Time	The date and time when the file was created
Release	The software load that the checkpoint file was created in
User	The user who created the file

resource-profile

Syntax

resource-profile [**active** | **configured**]

resource-profile [**active** | **configured**] *policy-id* [**detail**]

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays the resource-profile protocol configuration and state.

Parameters

active | configure

Displays active or configured values. Active values are those in use by the system currently. Configured values are those that have been changed by the user and have not taken effect. For the system resource profile parameters that need a reboot to take effect, the active and configured values can be different. It typically requires a node reboot or a card reset for it to take effect.

policy-id

Specifies a resource profile policy. This parameter is only supported on 7210 SAS-R6 and 7210 SAS-R12.

detail

Displays detailed information. This keyword is only supported on 7210 SAS-R6 and 7210 SAS-R12.

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Output

The following outputs are examples of resource profile information, and Table 68: Output fields: system resource profile describes the output fields.

- Sample output for 7210 SAS-T
- Sample output for 7210 SAS-R6 and 7210 SAS-R12 devices
- Sample output (with 'def' configured)
- Sample output for 7210 SAS-R6 IMMv2
- Sample output for 7210 SAS-Mxp
- Sample output for 7210 SAS-Sx/S 1/10GE devices
- Sample output for 7210 SAS-Sx 10/100GE devices

Sample output for 7210 SAS-T

```
A:SAST>show>system# resource-profile
===============================================================================
Active System Resource Profile Information
===============================================================================
-------------------------------------------------------------------------------
IPv6 FIB
-------------------------------------------------------------------------------
max-ipv6-routes            : disable
-------------------------------------------------------------------------------
Router
-------------------------------------------------------------------------------
max-ip-subnets             : 384

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Ingress Internal CAM
-------------------------------------------------------------------------------
Sap Ingress Qos resource   : 4          Sap  Aggregate Meter       : 2
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 Resource         : disable

-------------------------------------------------------------------------------
Sap Ingress ACL resource   : 3
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 128 bit Resource : disable    IPv6 64 bit Resource       : disable

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Eth CFM                    : disable
-------------------------------------------------------------------------------
up-mep                     : disable

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Egress Internal CAM
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Sap Egress ACL resource    : 2
-------------------------------------------------------------------------------
Mac and IPv4 Resource      : 2          Mac-only Resource          : disable
IPv6 128 bit Resource      : disable    Mac and IPv6 64 bit Resour*: disable
```


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```
-------------------------------------------------------------------------------
MBS pool                  : Port
-------------------------------------------------------------------------------
Decommissioned Ports
-------------------------------------------------------------------------------

===============================================================================
* indicates that the corresponding row element may have been truncated.
A:SAST>show>system#
```

Sample output for 7210 SAS-R6 and 7210 SAS-R12 devices

```
*A:7210SAS>show>system# resource-profile

===========================================================================
System Resource Profile
===========================================================================
Policy-Id            Description
---------------------------------------------------------------------------
1                    Default System Resource Profile Policy
10
===========================================================================
*A:7210SAS>show>system#
```

Sample output (with 'def' configured)

```
A:dut-b>show>system# resource-profile 1 detail

===============================================================================
System Resource Profile Policy : 1
===============================================================================
Description  : Default System Resource Profile Policy
-------------------------------------------------------------------------------
G8032 Control Sap Tags     : 0-0
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Ingress Internal CAM
-------------------------------------------------------------------------------
Sap Ingress Qos resource   : def        Sap  Aggregate Meter       : def
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 Resource         : max        IPv4-Mac Resource          : max

-------------------------------------------------------------------------------
Net Ingress Qos resource   : def
-------------------------------------------------------------------------------

-------------------------------------------------------------------------------
Sap Ingress ACL resource   : def
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 128 bit Resource : max        IPv6 64 bit Resource       : max
-------------------------------------------------------------------------------
ETH-CFM                    : def
-------------------------------------------------------------------------------
ETH-CFM Down MEP           : 1          ETH-CFM Up MEP             : disable
-------------------------------------------------------------------------------
Sap Egress QoS resource    : def
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Egress Internal CAM
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
```


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```
Sap Egress ACL resource    : def
-------------------------------------------------------------------------------
IPv4 Resource              : 2          Mac  Resource              : disable
IPv4-IPv6 128 bit Resource : disable    IPv6 64 bit Resource       : disable
-------------------------------------------------------------------------------
ETH-CFM                    : disable
-------------------------------------------------------------------------------
BiDir MIP Egress           : disable
-------------------------------------------------------------------------------
Cards/Slots Associations
-------------------------------------------------------------------------------
Card/Slot No:              : 1
Card/Slot No:              : 2
Card/Slot No:              : 3
Card/Slot No:              : 4
Card/Slot No:              : 5
Card/Slot No:              : 6
-------------------------------------------------------------------------------
A:dut-b>show>system#
```

Sample output for 7210 SAS-R6 IMMv2

```
*7210SAS KT2>show>system# resource-profile active 1 detail

===============================================================================
System Resource Profile Policy : 1
===============================================================================
Description  : Default System Resource Profile Policy
-------------------------------------------------------------------------------
G8032 Control Sap Tags     : 0-0
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Ingress Internal CAM
-------------------------------------------------------------------------------
Sap Ingress Qos resource   : def        Sap  Aggregate Meter       : def
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 Resource         : max        IPv4-Mac Resource          : max

-------------------------------------------------------------------------------
Net Ingress Qos resource   : def
-------------------------------------------------------------------------------

-------------------------------------------------------------------------------
Sap Ingress ACL resource   : def
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 128 bit Resource : max        IPv6 64 bit Resource       : max
-------------------------------------------------------------------------------
ETH-CFM                    : def
-------------------------------------------------------------------------------
ETH-CFM Down MEP           : 1          ETH-CFM Up MEP             : disable
-------------------------------------------------------------------------------
Sap Egress QoS resource    : def
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Egress Internal CAM
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Sap Egress ACL resource    : def
-------------------------------------------------------------------------------
IPv4 Resource              : 2          Mac  Resource              : disable
```


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```
IPv4-IPv6 128 bit Resource : disable    IPv6 64 bit Resource       : disable
-------------------------------------------------------------------------------
ETH-CFM                    : disable
-------------------------------------------------------------------------------
BiDir MIP Egress           : disable
-------------------------------------------------------------------------------
Cards/Slots Associations
-------------------------------------------------------------------------------
Card/Slot No:              : 1
Card/Slot No:              : 2
Card/Slot No:              : 3
Card/Slot No:              : 4
Card/Slot No:              : 5
Card/Slot No:              : 6
-------------------------------------------------------------------------------
*A:7210SAS KT2>show>system#
```

Sample output for 7210 SAS-Mxp

```
*A:Mxp-1# show system resource-profile

===============================================================================
Active System Resource Profile Information
===============================================================================
-------------------------------------------------------------------------------
IPv6 FIB
-------------------------------------------------------------------------------
max-ipv6-routes            : disable

-------------------------------------------------------------------------------
Router
-------------------------------------------------------------------------------
max-ip-subnets             : 850

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Router
-------------------------------------------------------------------------------
system-max-ecmp            : 1
L3-max-ecmp-groups         : 1945

LDP-over-RSVP-uniform-frr-*: 2
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
IP-MPLS control-plane reso*: 1
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Ingress Internal CAM       : 14
-------------------------------------------------------------------------------
Sap Ingress Qos resource   : 1          Sap  Aggregate Meter (#)   : 3
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 Resource         : disable    IPv4-Mac Resource          : max
IPv4-IPv6 Resource         :            DSCP                       : max

-------------------------------------------------------------------------------
Net Ingress Qos resource   : 2
-------------------------------------------------------------------------------

DHCP6-SDP resource         : disable

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
```


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```
Sap Ingress ACL resource   : 2
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 128 bit Resource : disable    IPv6 64 bit Resource       : disable
IPv4 Port Range Resource   : 2

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Access Port Ingress Resour*: 1
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Acc Port Ing Shared Resour*: 2
-------------------------------------------------------------------------------
IPv4 Resource              : disable    Dot1p-Dscp Resource        : disable
IP Port Range Resource     : 2

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Ing MAC Auth Resource      : disable
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Eth CFM                    : 1
-------------------------------------------------------------------------------
down-mep                   : 1          up-mep                     : disable
                           :

-------------------------------------------------------------------------------
Sap Egress QoS resource    : 2
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Egress Internal CAM        : 2
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Sap Egress ACL resource    : 2
-------------------------------------------------------------------------------
Mac and IPv4 Resource      : 2          Mac-only Resource          : disable
IPv6 128 bit Resource      : disable    Mac and IPv6 64 bit Resour*: disable

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Egr MAC Auth Resource      : disable
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Port Scheduler Policy      : enable     Sap Scale Mode             : true
Acc Port Ing Shared Mode   : enable
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
===============================================================================
* indicates that the corresponding row element may have been truncated.
# indicates that the value
```

Sample output for 7210 SAS-Sx/S 1/10GE devices

```
A:7210SAS>show>system# resource-profile

===============================================================================
Active System Resource Profile Information
===============================================================================
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Router
-------------------------------------------------------------------------------
```


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```
system-max-ecmp            : 1
L3-max-ecmp-groups         : 1024
Ldp-max-ecmp-groups        : disable
Ldp-ecmp-percent-value     : disable

-------------------------------------------------------------------------------
Ingress Internal CAM       : 8
-------------------------------------------------------------------------------
Sap Ingress Qos resource   : 4          Sap  Aggregate Meter (#)   : 3
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 Resource         : disable    IPv4-Mac Resource          : max

-------------------------------------------------------------------------------
Net Ingress Qos resource   : disable
-------------------------------------------------------------------------------

-------------------------------------------------------------------------------
Sap Ingress ACL resource   : 3
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 128 bit Resource : disable    IPv6 64 bit Resource       : disable

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Eth CFM                    : 1
-------------------------------------------------------------------------------
down-mep                   : 1          up-mep                     : disable
                           :

-------------------------------------------------------------------------------
Egress Internal CAM        : 2
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Sap Egress ACL resource    : 2
-------------------------------------------------------------------------------
Mac and IPv4 Resource      : 2          Mac-only Resource          : disable
IPv6 128 bit Resource      : disable    Mac and IPv6 64 bit Resour*: disable

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Egr sap agg-meter          : disable
-------------------------------------------------------------------------------
MBS pool                   : Node
-------------------------------------------------------------------------------
Decommissioned Ports
-------------------------------------------------------------------------------

===============================================================================
* indicates that the corresponding row element may have been truncated.
# indicates that the value will take effect only after reboot or clear card.
A:7210SAS>show>system#
```

Sample output for 7210 SAS-Sx 10/100GE devices

```
*A:7210SAS>show>system# resource-profile

===============================================================================
Active System Resource Profile Information
===============================================================================
-------------------------------------------------------------------------------
IPv6 FIB
-------------------------------------------------------------------------------
```


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```
max-ipv6-routes            : disable

-------------------------------------------------------------------------------
Router
-------------------------------------------------------------------------------
max-ip-subnets             : 2000

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Router
-------------------------------------------------------------------------------
system-max-ecmp            : 1
L3-max-ecmp-groups         : 1024
Ldp-max-ecmp-groups        : disable
Ldp-ecmp-percent-value     : disable

-------------------------------------------------------------------------------
Ingress Internal CAM       : 5
-------------------------------------------------------------------------------
Sap Ingress Qos resource   : 3
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 Resource         : disable    IPv4-Mac Resource          : max

-------------------------------------------------------------------------------
Net Ingress Qos resource   : disable
-------------------------------------------------------------------------------

-------------------------------------------------------------------------------
Sap Ingress ACL resource   : 1
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 128 bit Resource : disable    IPv6 64 bit Resource       : disable

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Eth CFM                    : 1
-------------------------------------------------------------------------------
down-mep                   : 1          up-mep                     : disable
                           :

-------------------------------------------------------------------------------
Egress Internal CAM        : 2
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Sap Egress ACL resource    : 2
-------------------------------------------------------------------------------
Mac and IPv4 Resource      : 2          Mac-only Resource          : disable
IPv6 128 bit Resource      : disable    Mac and IPv6 64 bit Resour*: disable

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Egr sap agg-meter          : disable
-------------------------------------------------------------------------------
MBS pool                   : Node
-------------------------------------------------------------------------------
Decommissioned Ports
-------------------------------------------------------------------------------

===============================================================================
* indicates that the corresponding row element may have been truncated.
# indicates that the value will take effect only after reboot or clear card.
*A:7210SAS>show>system#
```


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Table 68: Output fields: system resource profile

Label	Description
Ingress Queue Mode	Enable — SAP ingress queuing is enabled Disable — SAP ingress queuing is disabled
Ingress Internal CAM	Displays the applications sharing ingress CAM resource
Sap Ingress ACL resource	Displays the resources configured for use by SAP Ingress ACL policies
IPv4 Resource	Displays the resources configured for use by ingress ACL policies that use ipv4-criteria Disable — No resources are allocated for use by this feature. Therefore, no policies of this type can be associated to a SAP.
IPv4-IPv6 Resource	Displays the resources configured for use by ingress ACL policies that use ipv6 128-bit address match-criteria Disable — No resources are allocated for use by this feature. Hence, no policies of this type can be associated to a SAP.
Mac Resource	Displays the resources configured for use by ingress ACL policies that use mac-criteria Disable — No resources are allocated for use by this feature. Hence, no policies of this type can be associated to a SAP.
IPv6-64 bit Resource	Displays the resources configured for use by ingress ACL policies that use ipv6 64-bit address match-criteria Disable — No resources are allocated for use by this feature. Therefor, no policies of this type can be associated to a SAP.
Eth CFM	Groups the context for resources consumed by Ethernet CFM applications
up-mep	Displays the resources configured for use by UP MEP Disable — No resources are allocated for use by this feature. Therefore, no UP MEPs can be created.
Sap Ingress QoS resource	The total amount of ingress internal CAM chunks configured for use by SAP ingress classification
Mac and IPv4 Resource	The total amount of egress internal CAM chunks configured for use by MAC and IPv4 egress ACL match criteria policies

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Label	Description
Mac-only Resource	The total amount of egress internal CAM chunks configured for use only by MAC egress ACL match criteria policies
IPv6 128 bit Resource	The total amount of egress internal CAM chunks configured for use only by IPv6 egress ACL match criteria policies (128-bit IPv6 address can be specified in the match criteria)
Mac and IPv6 64 bit Resource	The total amount of egress internal CAM chunks configured for use by MAC and IPv6 egress ACL match criteria policies (only 64-bit higher order bits of the IPv6 address can be specified in the match criteria)
system-max-ecmp	Displays the maximum number of routes that will be allocated per IP destination/prefix in hardware when the user enables ECMP path sharing using multiple routes
Sap Egress ACL resource	Displays the egress ACL resource allocation configured for various match criteria
Sap Ingress ACL resource	Displays the ingress ACL resource allocation configured for various match criteria
Access Port Ingress Resource	Displays the number of non-shared access port ingress resources
Acc Port Ing Shared Resoure	Displays the number of shared access port ingress resources
IPv4 Port Range Resource	Displays the number of IPv4 port range resources
Egress Internal CAM	Displays the resource allocation configured for the egress internal CAM
IPv6 FIB	Displays the amount of IPv6 FIB size configured for use by IPv6 routing
G8032-fast-flood	Displays the resources configured for use by G8032 fast-flood feature Disable — No resources are allocated for use by this feature
Decommissioned Ports	The list of ports which have been decommissioned by the user Services cannot be configured on these ports
MBS pool	Displays the value configured for mbs-pool Available only on 7210 SAS-T

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Label	Description
BiDir MIP Egress	Displays the amount of resources allocated towards Bi-dir MIP functionality in the egress-internal-tcam resource pool Available only on 7210 SAS-R6 and 7210 SAS-R12
Port Scheduler Policy	disabled — Indicates that SAP-based egress queues for access SAPs is configured per node enabled — Indicates that port-based queues are configured for access SAPs
Acc Port Ing Shared Mode	disable — Indicates that access port ingress shared mode is disabled enable — Indicates that access port ingress shared mode is enabled

ptp

Syntax

ptp

Context

show>system

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network and access-uplink)

Description

This command displays the parameters for IEEE 1588-2008/ Precision Time Protocol (PTP) information.

Output

The following output is an example of PTP information, and Table 69: Output fields: system PTP describes the output fields.

Sample output

```
A:7210SAS>show>system# ptp
===============================================================================
IEEE 1588/PTP Clock Information
===============================================================================
-------------------------------------------------------------------------------
Local Clock
-------------------------------------------------------------------------------
Clock Type        : boundary           PTP Profile        : IEEE 1588-2008
Domain            : 0                  Network Type       : sdh
Admin State       : up                 Oper State         : up
Announce Interval : 1 pkt/2 s          Announce Rx Timeout: 3 intervals
Clock Id          : 846991fffea8c8f5   Clock Class        : 248 (default)
```


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```
Clock Accuracy    : unknown            Clock Variance     : ffff (not computed)
Clock Priority1   : 128                Clock Priority2    : 128
PTP Recovery State: acquiring          Last Changed       : 01/07/2020 16:57:06
Frequency Offset  : +0.000 ppb         Frequency Source   : ssu
-------------------------------------------------------------------------------
Parent Clock
-------------------------------------------------------------------------------
IP Address        : 192.168.10.5       Router             : Base
Parent Clock Id   : 00b0aefffe02e5e5   Remote PTP Port    : 1
GM Clock Id       : 00b0aefffe02e5e5   GM Clock Class     : 6
GM Clock Accuracy : within 100 ns      GM Clock Variance  : 0x6400 (3.7E-09)
GM Clock Priority1: 128                GM Clock Priority2 : 128
-------------------------------------------------------------------------------
Time Information
-------------------------------------------------------------------------------
Timescale           : PTP
Current Time        : 2020/01/07 17:43:58.0 (UTC)
Frequency Traceable : yes
Time Traceable      : yes
Time Source         : GPS
===============================================================================

*A:Dut-F>config>system>ptp# show system ptp
========== ================================================================
IEEE 1588/PTP Clock Information
===============================================================================
-------------------------------------------------------------------------------
Local Clock
-------------------------------------------------------------------------------
Clock Type        : boundary           PTP Profile        : ITU-T G.8275.1
Domain            : 24                 Network Type       : sdh
Admin State       : up                 Oper State         : up
Announce Interval : 8 pkt/s            Announce Rx Timeout: 3 intervals
Clock Id          : 846991fffea8c8f5   Clock Class        : 248 (default)
Clock Accuracy    : unknown            Clock Variance     : ffff (not computed)
Clock Priority1   : 128                Clock Priority2    : 128
PTP Recovery State: disabled
Frequency Offset  : n/a                Frequency Source   : ssu
-------------------------------------------------------------------------------
Parent Clock
-------------------------------------------------------------------------------
Port              : 1/1/13             Remote MAC Address : a0:f3:e4:1a:7f:6e
Parent Clock Id   : a0f3e4fffe1a7f5d   Remote PTP Port    : 16
GM Clock Id       : 00b0aefffe000030   GM Clock Class     : 6
GM Clock Accuracy : within 100 ns      GM Clock Variance  : 0x4e5d (1.8E-15)
GM Clock Priority1: 128                GM Clock Priority2 : 128
-------------------------------------------------------------------------------
Time Information
-------------------------------------------------------------------------------
Timescale           : PTP
Current Time        : 2020/01/07 09:22:32.0 (UTC)
Frequency Traceable : yes
Time Traceable      : yes
Time Source         : GPS
===============================================================================

*A:Dut-F>config>system>ptp# show system ptp peer 192.168.10.5
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router            : Base
IP Address        : 192.168.10.5       Announce Direction : rx
Admin State       : up                 G.82x5.1 Priority  : n/a
Sync Interval     : 16 pkt/s
```


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```
Local PTP Port    : 1                   PTP Port State     : slave
Clock Id          : 00b0aefffe02e5e5    Remote PTP Port    : 1
GM Clock Class    : 6
GM Clock Accuracy : within 100 ns       GM Clock Variance  : 0x6400 (3.7E-09)
GM Clock Priority1: 128                 GM Clock Priority2 : 128
Steps Removed     : 0                   Parent Clock       : yes
===============================================================================
*A:Dut-F>config>system>ptp#

*A:Dut-G>config>system>ptp# show system ptp port 1/1/1
===============================================================================
IEEE 1588/PTP Ethernet Port Information
===============================================================================
Port              : 1/1/1
PTP Admin State   : up                  PTP Oper State     : up
Local MAC Addr    : d0:00:d5:e7:94:ef   Mulicast MAC Addr  : 01:1b:19:00:00:00
Cfg Sync Rate     : 16 pkt/s            Cfg Delay Req Rate : 16 pkt/s
Master-Only       : false               G.8275.1 Priority  : 128
PTP Port Number   : 1                   PTP Port State     : master
Neighbors         : 0                   Timestamp Point    : port
===============================================================================
*A:Dut-G>config>system>ptp#

show system ptp port 1/1/2 detail
===============================================================================
IEEE 1588/PTP Ethernet Port Information
===============================================================================
Port              : 1/1/2
PTP Admin State   : up                  PTP Oper State     : up
Local MAC Addr    : d0:00:d5:e7:94:ef   Mulicast MAC Addr  : 01:1b:19:00:00:00
Cfg Sync Rate     : 16 pkt/s            Cfg Delay Req Rate : 16 pkt/s
Master-Only       : false               G.8275.1 Priority  : 128
PTP Port Number   : 1                   PTP Port State     : slave
Neighbors         : 1                   Timestamp Point    : port
===============================================================================
===============================================================
IEEE 1588/PTP Ethernet Port Neighbor Clocks
===============================================================
Port     MAC Address       Clock Id           Rx Packet Rate
---------------------------------------------------------------
1/1/2    84:69:91:a8:c8:f8 846991fffea8c8f5               33
---------------------------------------------------------------
No. of Neighbor Clocks: 1
===============================================================
===============================================================================
IEEE 1588/PTP Ethernet Port Packet Statistics
===============================================================================
                                                          Input     Output
-------------------------------------------------------------------------------
PTP Packets                                                 114      15516
  Announce                                                   24       5158
  Sync                                                       47      10315
  Follow Up                                                   0          0
  Delay Request                                               0         43
  Delay Response                                             43          0
  Signaling                                                   0          0
  Other                                                       0          0
  Event Packets timestamped at port                           0          0
  Event Packets timestamped at cpm                            0          0
Discards                                                      0          0
  Bad PTP domain                                              0          0
  Alternate Master                                            0          0
  Out Of Sequence                                             0          0
  Other                                                       0          0
```


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```
===============================================================================

*A:Dut-F>config>system>ptp# show system ptp statistics
===============================================================================
IEEE 1588/PTP Packet Statistics
===============================================================================
                                                                 Input     Output
-------------------------------------------------------------------------------
PTP Packets                                                      62792      32900
  Announce                                                         972          0
  Sync                                                           30897          0
  Follow Up                                                          0          0
  Delay Request                                                      0      30883
  Delay Response                                                 30883          0
  Signaling                                                         40       2017
    Request Unicast Transmission TLVs                               0       2016
      Announce                                                      0       1990
      Sync                                                          0         13
      Delay Response                                                0         13
    Grant Unicast Transmission (Accepted) TLVs                     40          0
      Announce                                                     14          0
      Sync                                                         13          0
      Delay Response                                               13          0
    Grant Unicast Transmission (Denied) TLVs                        0          0
      Announce                                                      0          0
      Sync                                                          0          0
      Delay Response                                                0          0
    Cancel Unicast Transmission TLVs                                0          1
      Announce                                                      0          1
      Sync                                                          0          0
      Delay Response                                                0          0
    Ack Cancel Unicast Transmission TLVs                            0          0
      Announce                                                      0          0
      Sync                                                          0          0
      Delay Response                                                0          0
    Other TLVs                                                      0          0
  Other                                                             0          0
Discards                                                            0          0
  Other                                                             0          0
===============================================================================
===============================================================================
IEEE 1588/PTP Frequency Recovery State Statistics
===============================================================================
State                                                          Seconds
-------------------------------------------------------------------------------
Initial                                                              0
Acquiring                                                           12
Phase-Tracking                                                       0
Locked                                                            1928
Hold-over                                                            0
===============================================================================

===============================================================================
IEEE 1588/PTP Message Rates Per Second
===============================================================================
                                          UDP/IP             Ethernet
Packet Type                         Input    Output     Input    Output
-------------------------------------------------------------------------------
Announce                                0         0         0         0
Sync                                    0         0         0         0
Follow Up                               0         0         0         0
Delay Request                           0         0         0         0
Delay Response                          0         0         0         0
Other                                   0         0         0         0
```


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```
-------------------------------------------------------------------------------
Total                                          0         0         0         0
======================

===============================================================================
IEEE 1588/PTP Frequency Recovery State Statistics
===============================================================================
State                                                                  Seconds
-------------------------------------------------------------------------------
Initial                                                                     44
Acquiring                                                                    0
Phase-Tracking                                                               0
Locked                                                                       0
Hold-over                                                                   10
===============================================================================

===============================================================================
IEEE 1588/PTP Event Statistics
===============================================================================
Event                                                    Sync Flow Delay Flow
-------------------------------------------------------------------------------
Packet Loss                                                         2          3
Excessive Packet Loss                                               0          0
Excessive Phase Shift Detected                                      0          0
Too Much Packet Delay Variation                                     0          0
===============================================================================

===============================================================================
IEEE 1588/PTP Message Rates Per Second
===============================================================================
                                              UDP/IP             Ethernet
Packet Type                                 Input    Output     Input    Output
-------------------------------------------------------------------------------
Announce                                        0         0        16         0
Sync                                            0         0        32         0
Follow Up                                       0         0        32         0
Delay Request                                   0         0         0         4
Delay Response                                  0         0         4         0
Other                                           0         0         0         0
-------------------------------------------------------------------------------
Total                                           0         0        84         4
===============================================================================
A:7210SAS>show>system#
```

Table 69: Output fields: system PTP

Label	Description
Clock Type	Displays the local PTP clock type: • ordinarySlave — The system is always a timeReceiver clock in the PTP hierarchy. The system derives its timing from one or more timeTransmitter clocks in the network. • ordinaryMaster — The system is a grandmaster clock in the PTP hierarchy. The system provides timing to multiple time Receiver clocks in the network. • boundary — The system is a boundary clock, which may be anywhere in the PTP clock hierarchy. It can obtain timing

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Label	Description
	from a timeTransmitter clock, and provide timing to multiple timeReceiver clocks. • transparent-e2e
PTP Profile	Displays the PTP profile: ieee-1588, itu-telecom-freq, g8275dot1- 2014, or g8275dot2-2016
Domain	Displays the PTP device domain
Network Type	Indicates whether SONET or SDH values are being used for encoding synchronous status messages
Local Clock	
Admin State	Up — The local PTP clock is administratively enabled Down — The local clock is administratively shut down and not running
Oper State	Up — The local clock is operationally enabled and running Down — The local clock is operationally disabled and not running
Announce Interval	Displays the configured announce interval value
Announce Rx Timeout	Displays the configured announce Rx timeout value
Clock Id	Displays a unique 64-bit number assigned to the clock
Clock Class	Displays the local clock class
Clock Accuracy	Displays the local clock accuracy designation
Clock Variance	Displays the local clock variance
Clock Priority1	Displays the first priority value of the local clock, used by the Best timTransmitter Clock Algorithm (BTCA) to determine which clock should provide timing for the network
Clock Priority2	Displays the second priority value of the local clock This value is used by the BTCA to determine which clock should provide timing for the network.
Last Changed	Displays the time the PTP port state last changed
PTP Recovery State	Displays the clock recovery state: disabled, initial, acquiring, phase-tracking, or locked
Frequency Offset	Displays the frequency offset of the PTP clock in parts per billion
Frequency Source	Displays the configured clock frequency source

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Label	Description
Parent Clock	
IP Address	Displays the IP address
Base	Displays the router ID that the parent clock IP address belongs to
Parent Clock Id	Displays the parent clock identification
Remote PTP Port	Displays the PTP port number at the remote end
GM Clock Id	Displays the grandmaster clock ID
GM Clock Class	Displays the grandmaster clock class
GM Clock Accuracy	Displays the grandmaster clock accuracy designation
GM Clock Variance	Displays the grandmaster clock variance
GM Clock Priority1	Displays the grandmaster clock priority1 designation
GM Clock Priority2	Displays the grandmaster clock priority2 designation
Time Information	
Timescale	Displays the PTP timescale flag sent in the 1588 announce message
Current Time	Displays the last date and time recovered by the PTP time recovery algorithm
Frequency Traceable	Displays the frequency-traceable flag sent in the 1588 announce message
Time Traceable	Displays the time-traceable flag sent in the 1588 announce message
Time Source	Displays the time-source parameter sent in the 1588 announce message

peer

Syntax

peer *ip-address* [**router** *router-instance* | **service-name** *service-name*] [**detail**]

Context

show>system>ptp

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Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network and access-uplink)

Description

This command displays information for a specific peer.

Parameters

ip-address

Specifies the IP address of the peer.

Values a.b.c.d

router-instance

Displays only the information for a specific router instance.

Values *router-name*: Base

vprn-svc-id: 1 to 2147483647

service-name

Specifies the service name to identify the router instance, up to 64 characters.

detail

Displays detailed information.

Output

The following output is an example of PTP information for a single peer, and Table 70: Output fields: PTP peer describes the output fields.

Sample output

```
*A:Dut-F>config>system>ptp# show system ptp  peer 192.168.10.5
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router            : Base
IP Address        : 192.168.10.5       Announce Direction : rx
Admin State       : up                 G.82x5.1 Priority  : n/a
Sync Interval     : 16 pkt/s
Local PTP Port    : 1                  PTP Port State     : slave
Clock Id          : 00b0aefffe02e5e5   Remote PTP Port    : 1
GM Clock Class    : 6
GM Clock Accuracy : within 100 ns      GM Clock Variance  : 0x6400 (3.7E-09)
GM Clock Priority1: 128                GM Clock Priority2 : 128
Steps Removed     : 0                  Parent Clock       : yes
===============================================================================
*A:Dut-F>config>system>ptp#

*A:bksim1618# show system ptp peers
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
```


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```
Base
  1.4.1.21                  tx        n/a         master         no
1
  1.2.1.20                  rx+tx     up          master         no
  1.3.1.19                  rx        up          slave          yes
2
  1.1.1.21                  tx        n/a         master         no
-------------------------------------------------------------------------------
No. of PTP Peers: 4
===============================================================================
```

```
*A:bksim1618# show system ptp peers router Base
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
Base
  1.4.1.21                  tx        n/a         master         no
-------------------------------------------------------------------------------
No. of PTP Peers: 1
===============================================================================
*A:bksim1618# show system ptp peers router 1
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
1
  1.2.1.20                  rx+tx     up          master         no
  1.3.1.19                  rx        up          slave          yes
-------------------------------------------------------------------------------
No. of PTP Peers: 2
===============================================================================
```

Table 70: Output fields: PTP peer

Label	Description
Router	Displays the router
IP Address	Displays the IP address
Announce Direction	Displays the direction of flow of announce packets
Admin State	Up — the PTP peer clock is administratively enabled Down — the PTP peer clock is administratively shut down and not running
Sync Interval	Displays the configured sync interval value
Local PTP Port	Displays the local PTP port
PTP Port State	Displays the PTP port state: initializing, listening, uncalibrated, slave, master, or passive

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Label	Description
Remote PTP Port	Displays the PTP port number at the remote end
Clock ID	Displays the clock identity value of the local PTP clock
GM Clock Class	Displays the grandmaster clock class
GM Clock Accuracy	Displays the grandmaster clock accuracy designation
GM Clock Variance	Displays the grandmaster clock variance
GM Clock Priority1	Displays the grandmaster clock priority1 designation
GM Clock Priority2	Displays the grandmaster clock priority2 designation
Steps Removed	Displays the number of hops from GM
Parent Clock	yes — if the peer is the chosen parent clock no — if the peer is not the chosen parent clock

peers

Syntax

peers [**router** *router-instance* | **service-name** *service-name*] [**detail**]

Context

show>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network and access-uplink)

Description

This command displays summary information for all the PTP peers.

Parameters

router-instance

Displays only the information for a specific router instance.

Values *router-name*: Base

vprn-svc-id: 1 to 2147483647

service-name

Specifies the service name to identify the router instance, up to 64 characters.

detail

Displays detailed information.

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Output

The following output is an example of PTP information for all peers, and Table 71: Output fields: PTP peers describes the output fields.

Sample output

```
*A:bksim1618# show system ptp peers
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
Base
  10.4.1.21                 tx        n/a         master         no
1
  10.2.1.20                 rx+tx     up          master         no
  10.3.1.19                 rx        up          slave          yes
2
  10.1.1.21                 tx        n/a         master         no
-------------------------------------------------------------------------------
No. of PTP Peers: 4
===============================================================================


*A:bksim1618# show system ptp peers router Base
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
Base
  10.4.1.21                 tx        n/a         master         no
-------------------------------------------------------------------------------
No. of PTP Peers: 1
===============================================================================


*A:bksim1618# show system ptp peers router 1
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
1
  10.2.1.20                 rx+tx     up          master         no
  10.3.1.19                 rx        up          slave          yes
-------------------------------------------------------------------------------
No. of PTP Peers: 2
===============================================================================


*A:bksim1618# show system ptp peers detail
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router            : Base
IP Address        : 10.4.1.21          Announce Direction : tx
Admin State       : n/a                G.8275.1 Priority  : 128
Local PTP Port    : 3                  PTP Port State     : master
```


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```
Clock Id          : ac65fffffe000000   Remote PTP Port    : 1
-------------------------------------------------------------------------------
Router            : 1
IP Address        : 10.2.1.20          Announce Direction : rx+tx
Admin State       : up                 G.8275.1 Priority  : 128
Local PTP Port    : 2                  PTP Port State     : master
Clock Id          : ac5effffe000000    Remote PTP Port    : 1
Locked Out        : no                 Time Remaining     : n/a
-------------------------------------------------------------------------------
Router            : 1
IP Address        : 10.3.1.19          Announce Direction : rx
Admin State       : up                 G.8275.1 Priority  : 128
Local PTP Port    : 1                  PTP Port State     : slave
Clock Id          : ac5dfffffe000000   Remote PTP Port    : 1
GM Clock Id       : ac5dfffffe000000   GM Clock Class     : 13
GM Clock Accuracy : unknown            GM Clock Variance  : ffff (not computed)
GM Clock Priority1: 0                  GM Clock Priority2 : 128
Steps Removed     : 0                  Parent Clock       : yes
Locked Out        : no                 Time Remaining     : n/a
-------------------------------------------------------------------------------
Router            : 2
IP Address        : 10.1.1.21          Announce Direction : tx
Admin State       : n/a                G.8275.1 Priority  : 128
Local PTP Port    : 4                  PTP Port State     : master
Clock Id          : ac65fffffe000000   Remote PTP Port    : 1
===============================================================================


*A:bksim1618# show system ptp peers router 1 detail
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router            : 1
IP Address        : 10.2.1.20          Announce Direction : rx+tx
Admin State       : up                 G.8275.1 Priority  : 128
Local PTP Port    : 2                  PTP Port State     : master
Clock Id          : ac5effffe000000    Remote PTP Port    : 1
-------------------------------------------------------------------------------
Router            : 1
IP Address        : 10.3.1.19          Announce Direction : rx
Admin State       : up                 G.8275.1 Priority  : 128
Local PTP Port    : 1                  PTP Port State     : slave
Clock Id          : ac5dfffffe000000   Remote PTP Port    : 1
GM Clock Id       : ac5dfffffe000000   GM Clock Class     : 13
GM Clock Accuracy : unknown            GM Clock Variance  : ffff (not computed)
GM Clock Priority1: 0                  GM Clock Priority2 : 128
Steps Removed     : 0                  Parent Clock       : yes
===============================================================================
```

Table 71: Output fields: PTP peers

Label	Description
Router	Displays the router
IP Address	Displays the IP address
Announce Direction	Displays the configured announce direction
Admin State	Up — The PTP peer clock is administratively enabled

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Label	Description
	Down — The PTP peer clock is administratively shut down and not running
G.8275.1 Priority	Displays the g.8275.1 priority value
Sync Interval	Displays the configured sync interval value
Local PTP Port	Displays the local PTP port
PTP Port State	Displays the PTP port state
Remote PTP Port	Displays the PTP port number at the remote end
Clock ID	Displays the clock identity value of the local PTP clock
GM Clock Class	Displays the grandmaster clock class
GM Clock Accuracy	Displays the grandmaster clock accuracy designation
GM Clock Variance	Displays the grandmaster clock variance
GM Clock Priority1	Displays the grandmaster clock priority1 designation
GM Clock Priority2	Displays the grandmaster clock priority2 designation
Steps Removed	Displays the number of hops from GM
Parent Clock	yes — if the peer is the chosen parent clock no — if the peer is not the chosen parent clock

port

Syntax

port *port-id* [**detail**]

Context

show>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network and access-uplink)

Description

This command displays PTP port information.

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Parameters

port-id

Specifies the port ID.

Values slot/mda/port

detail

Displays detailed information.

Output

The following output is an example of PTP port information, and Table 72: Output fields: PTP port describes the output fields.

Sample output

```
A:bksim1618# show system ptp port
===============================================================================
IEEE 1588/PTP Ethernet Port Summary Information
===============================================================================
Port       PTP Adm/Opr   PTP State    Neighbors   Tx Rate     Rx Rate
-------------------------------------------------------------------------------
10/2/16       up/up         passive         5          12312       4400
1/1/1         up/up         slave           1          12312       4400
1/1/2         up/up         master         61          12312       4400
1/1/3         up/down       disabled        0              0          0
1/1/4         up/up         listening       0              0          0
-------------------------------------------------------------------------------
No. of PTP Ports : 5                            Total  99999     999999

show system ptp port 1/1/2 detail
===============================================================================
IEEE 1588/PTP Ethernet Port Information
===============================================================================
Port              : 1/1/2
PTP Admin State   : up                 PTP Oper State     : up
Local MAC Addr    : d0:00:d5:e7:94:ef  Mulicast MAC Addr  : 01:1b:19:00:00:00
Cfg Sync Rate     : 16 pkt/s           Cfg Delay Req Rate : 16 pkt/s
Master-Only       : false              G.8275.1 Priority  : 128
PTP Port Number   : 1                  PTP Port State     : slave
Neighbors         : 1                  Timestamp Point    : port
===============================================================================
============================================================
IEEE 1588/PTP Ethernet Port Neighbor Clocks
============================================================
Port     MAC Address       Clock Id           Rx Packet Rate
------------------------------------------------------------
1/1/2    84:69:91:a8:c8:f8 846991fffea8c8f5               33
------------------------------------------------------------
No. of Neighbor Clocks: 1
============================================================
===============================================================================
IEEE 1588/PTP Ethernet Port Packet Statistics
===============================================================================
                                                                  Input     Output
-------------------------------------------------------------------------------
PTP Packets                                                         114      15516
  Announce                                                           24       5158
  Sync                                                               47      10315
  Follow Up                                                           0          0
  Delay Request                                                       0         43
```


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```
  Delay Response                                                  43          0
  Signaling                                                        0          0
  Other                                                            0          0
  Event Packets timestamped at port                                0          0
  Event Packets timestamped at cpm                                 0          0
Discards                                                           0          0
  Bad PTP domain                                                   0          0
  Alternate Master                                                 0          0
  Out Of Sequence                                                  0          0
  Other                                                            0          0
===============================================================================
```

Table 72: Output fields: PTP port

Label	Description
Port Summary	
Port	Displays the port numbers
PTP Adm/Opr	Displays the admin and oper state
PTP State	Displays the PTP state for each port: initializing, listening, uncalibrated, slave, master, or passive
Tx Rate	Displays the Tx rate for each port
Rx Rate	Displays the Rx rate for each port
Port Information	
Port	Displays the PTP port number
PTP Admin State	Displays the PTP administrative state of the port
PTP Oper State	Displays the PTP operational state of the port
Local MAC Addr	Displays the local MAC address of the port
Multicast MAC Addr	Displays the multicast MAC address of the port
Cfg Sync Rate	Displays the configured sync packet rate
Cfg Delay Req Rate	Displays the configure delay request packet rate
Master-Only	Displays the **master-only** command value: true or false
G.8275.1 Priority	Displays the configured priority value
PTP Port Number	Displays the internal port number associated with this port
PTP Port State	Displays the PTP port state: disabled, listening, slave, master, passive, or faulty
Neighbors	Displays the number of neighbors
Timestamp Point	Displays the point at which time-stamping is done

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statistics

Syntax

statistics

Context

show>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network and access-uplink)

Description

This command displays the message and error statistics for the node.

Output

The following output is an example of PTP statistics information, and Table 73: Output fields: PTP statistics describes the output fields.

Sample output

```
*A:Dut-F>config>system>ptp# show system ptp statistics
===============================================================================
IEEE 1588/PTP Packet Statistics
===============================================================================
                                                                 Input     Output
-------------------------------------------------------------------------------
PTP Packets                                                     104674      53958
  Announce                                                        1616          0
  Sync                                                           51502          0
  Follow Up                                                          0          0
  Delay Request                                                      0      51489
  Delay Response                                                 51489          0
  Signaling                                                         67       2469
    Request Unicast Transmission TLVs                               0       2469
      Announce                                                      0       2425
      Sync                                                          0         22
      Delay Response                                                0         22
    Grant Unicast Transmission (Accepted) TLVs                     67          0
      Announce                                                     23          0
      Sync                                                         22          0
      Delay Response                                               22          0
    Grant Unicast Transmission (Denied) TLVs                        0          0
      Announce                                                      0          0
      Sync                                                          0          0
      Delay Response                                                0          0
    Cancel Unicast Transmission TLVs                                0          1
      Announce                                                      0          1
      Sync                                                          0          0
      Delay Response                                                0          0
    Ack Cancel Unicast Transmission TLVs                            0          0
      Announce                                                      0          0
      Sync                                                          0          0
      Delay Response                                                0          0
```


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```
    Other TLVs                                                      0          0
  Other                                                             0          0
Discards                                                            0          0
  Other                                                             0          0
===============================================================================
===============================================================================
IEEE 1588/PTP Frequency Recovery State Statistics
===============================================================================
State                                                             Seconds
-------------------------------------------------------------------------------
Initial                                                                 0
Acquiring                                                              12
Phase-Tracking                                                          0
Locked                                                               3219
Hold-over                                                               0
===============================================================================

===============================================================================
IEEE 1588/PTP Message Rates Per Second
===============================================================================
                                            UDP/IP             Ethernet
Packet Type                              Input    Output     Input    Output
-------------------------------------------------------------------------------
Announce                                    0         0         0         0
Sync                                        0         0         0         0
Follow Up                                   0         0         0         0
Delay Request                               0         0         0         0
Delay Response                              0         0         0         0
Other                                       0         0         0         0
-------------------------------------------------------------------------------
Total                                       0         0         0         0
================================
```

Table 73: Output fields: PTP statistics

Label	Description
PTP Packet Statistics	
	The following input/output statistics are provided for PTP packets: • Announce • Sync • Follow Up • Delay Request • Delay Response • Signaling • Other

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unicast

Syntax

unicast [**router** *router-instance* | **service-name** *service-name*]

Context

show>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network and access-uplink)

Description

This command displays unicast negotiation information.

Parameters

router-instance

Displays only the information for a specific router instance.

Values *router-name*: Base

vprn-svc-id: 1 to 2147483647

service-name

Specifies the service name to identify the router instance, up to 64 characters.

Output

The following output is an example of PTP unicast information, and Table 74: Output fields: PTP unicast describes the output fields.

Sample output

```
*A:Dut-C# show system ptp unicast
===============================================================================
IEEE 1588/PTP Unicast Negotiation Information
===============================================================================
Router
  IP Address      Dir Type     Rate       Duration State    Time
-------------------------------------------------------------------------------
100
  10.0.0.1        Rx  Announce 1 pkt/2 s  300      Granted  02/07/2014 16:52:35
  10.0.0.1        Rx  Sync     64 pkt/s   300      Granted  02/07/2014 16:52:39
  10.0.0.1        Tx  DelayReq 64 pkt/s   300      Granted  02/07/2014 16:52:39
  10.0.0.1        Rx  DelayRsp 64 pkt/s   300      Granted  02/07/2014 16:52:39
200
  192.168.0.2     Tx  Announce 1 pkt/2 s  300      Granted  02/07/2014 16:50:47
  192.168.0.2     Tx  Sync     64 pkt/s   300      Granted  02/07/2014 16:50:52
  192.168.0.2     Rx  DelayReq 64 pkt/s   300      Granted  02/07/2014 16:50:52
  192.168.0.2     Tx  DelayRsp 64 pkt/s   300      Granted  02/07/2014 16:50:52
-------------------------------------------------------------------------------
PTP Peers               : 2
Total Packet Rate       : 385 packets/second
```


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```
===============================================================================


A:bksim1618# show system ptp router 1 unicast
===============================================================================
IEEE 1588/PTP Unicast Negotiation Information
===============================================================================
Router
  IP Address      Dir Type     Rate       Duration State    Time
-------------------------------------------------------------------------------
1
  10.2.1.20       Rx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:14:19
  10.2.1.20       Tx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:13:25
  10.2.1.20       Tx  Sync     64 pkt/s   300      Granted  04/21/2013 19:13:30
  10.2.1.20       Rx  DelayReq 64 pkt/s   300      Granted  04/21/2013 19:13:30
  10.2.1.20       Tx  DelayRsp 64 pkt/s   300      Granted  04/21/2013 19:13:30
  10.3.1.19       Rx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:13:16
  10.3.1.19       Rx  Sync     64 pkt/s   300      Granted  04/21/2013 19:13:21
  10.3.1.19       Tx  DelayReq 64 pkt/s   300      Granted  04/21/2013 19:13:21
  10.3.1.19       Rx  DelayRsp 64 pkt/s   300      Granted  04/21/2013 19:13:21
-------------------------------------------------------------------------------
PTP Peers               : 2
Total Packet Rate       : 385 packets/second
===============================================================================
*A:bksim1618#
```

Table 74: Output fields: PTP unicast

Label	Description
Router IP Address	Displays the IP address of the router
Dir	Displays the direction of the unicast information: either Rx or Tx
Type	Displays the message type
Rate	Displays the rate of the unicast information, in packets per second
Duration	Displays the lease duration for the session
State	Displays the state
Time	Displays the time the unicast information was received
PTP Peers	Displays the number of PTP peers
Total Packet Rate	Displays the total packet rate, in packets per second

sntp

Syntax

sntp

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Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays SNTP protocol configuration and state.

Output

The following output is an example of SNTP information, and Table 75: Output fields: system SNTP describes SNTP output fields.

Sample output

```
*A:pc-4.0# show system sntp
===============================================================================
SNTP Status
===============================================================================
Admin Status : up           Oper Status : up           Mode : broadcast
===============================================================================
===============================================================================
SNTP Servers
===============================================================================
SNTP Server            Version            Preference         Interval
-------------------------------------------------------------------------------
10.135.16.90           3                  Preferred          64
-------------------------------------------------------------------------------
No. of SNTP Servers: 1
===============================================================================
*A:pc-4.0#
```

Table 75: Output fields: system SNTP

Label	Description
SNTP Server	The SNTP server address for SNTP unicast client mode
Version	The SNTP version number, expressed as an integer
Preference	Normal — Indicates that this server does not have preference over another Preferred — Indicates that this server has preference over another
Interval	The frequency, in seconds, that the server is queried

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thresholds

Syntax

thresholds

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command display system monitoring thresholds.

Output

The following output is an example of system thresholds information, and Table 76: Output fields: system threshold describes the output fields.

Sample output

```
A:ALA-48# show system thresholds
===============================================================
Threshold Alarms
===============================================================
Variable: tmnxCpmFlashUsed.1.11.1
Alarm Id         : 1        Last Value : 835
Rising Event Id  : 1        Threshold  : 5000
Falling Event Id : 2        Threshold  : 2500
Sample Interval  : 2147483* SampleType : absolute
Startup Alarm    : either   Owner      : TiMOS CLI
Variable: tmnxCpmFlashUsed.1.11.1
Alarm Id         : 2        Last Value : 835
Rising Event Id  : 3        Threshold  : 10000
Falling Event Id : 4        Threshold  : 5000
Sample Interval  : 2147483* SampleType : absolute
Startup Alarm    : rising   Owner      : TiMOS CLI
Variable: sgiMemoryUsed.0
Alarm Id         : 3        Last Value : 42841056
Rising Event Id  : 5        Threshold  : 4000
Falling Event Id : 6        Threshold  : 2000
Sample Interval  : 2147836  SampleType : absolute
Startup Alarm    : either   Owner      : TiMOS CLI
===============================================================
* indicates that the corresponding row element may have been truncated.
===============================================================
Threshold Events
===============================================================
Description: TiMOS CLI - cflash capacity alarm rising event
Event Id         : 1        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - cflash capacity alarm falling event
Event Id         : 2        Last Sent  : 10/31/2006 08:48:00
Action Type      : both     Owner      : TiMOS CLI
```


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```
Description: TiMOS CLI - cflash capacity warning rising event
Event Id         : 3        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - cflash capacity warning falling event
Event Id         : 4        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - memory usage alarm rising event
Event Id         : 5        Last Sent  : 10/31/2006 08:48:00
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - memory usage alarm falling event
Event Id         : 6        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI
===============================================================
Threshold Events Log
===============================================================
Description      : TiMOS CLI - cflash capacity alarm falling eve
                   nt : value=835, <=2500 : alarm-index 1, event
                   -index 2 alarm-variable OID tmnxCpmFlashUsed.
                   1.11.1
Event Id         : 2        Time Sent  : 10/31/2006 08:48:00
Description      : TiMOS CLI - memory usage alarm rising event :
                    value=42841056, >=4000 : alarm-index 3, even
                   t-index 5 alarm-variable OID sgiMemoryUsed.0
Event Id         : 5        Time Sent  : 10/31/2006 08:48:00
```

Table 76: Output fields: system threshold

Label	Description
Variable	Displays the variable OID
Alarm Id	Displays the numerical identifier for the alarm
Last Value	Displays the last threshold value
Rising Event Id	Displays the identifier of the RMON rising event
Threshold	Displays the identifier of the RMON rising threshold
Falling Event Id	Displays the identifier of the RMON falling event
Threshold	Displays the identifier of the RMON falling threshold
Sample Interval	Displays the polling interval, in seconds, over which the data is sampled and compared with the rising and falling thresholds
Sample Type	Displays the method of sampling the selected variable and calculating the value to be compared against the thresholds
Startup Alarm	Displays the alarm that may be sent when this alarm is first created
Owner	Displays the owner of this alarm
Description	Displays the event cause
Event Id	Displays the identifier of the threshold event

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Label	Description
Last Sent	Displays the date and time the alarm was sent
Action Type	log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** command. trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs. both — Both a entry in the RMON-MIB logTable and a TiMOS logger event are generated none — No action is taken
Owner	Displays the owner of the event

time

Syntax

time

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays the system time and zone configuration parameters.

Output

The following output is an example of system time information, and Table 77: Output fields: system time describes the output fields.

Sample output

```
A:ALA-1# show system time
===============================================================================
Date & Time
===============================================================================
Current Date & Time : 2006/05/05 23:03:13    DST Active           : yes
Current Zone        : PDT                    Offset from UTC      : -7:00
-------------------------------------------------------------------------------
Non-DST Zone        : PST                    Offset from UTC      : -8:00
```


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```
Zone type           : standard
------------------------------------------------------------------------------
DST Zone            : PDT                   Offset from Non-DST   : 0:60
Starts              : first sunday in april 02:00
Ends                : last sunday in october 02:00
==============================================================================
A:ALA-1#


A:ALA-1# show system time (with no DST zone configured)
==============================================================================
Date & Time
==============================================================================
Current Date & Time : 2006/05/12 11:12:05       DST Active      :     no
Current Zone    : APA       Offset from UTC :  -8:00
------------------------------------------------------------------------------
Non-DST Zone    : APA       Offset from UTC :  -8:00
Zone Type           : non-standard
------------------------------------------------------------------------------
No DST zone configured
==============================================================================
A:ALA-1#
```

Table 77: Output fields: system time

Label	Description
Date & Time	The system date and time using the current time zone
DST Active	Yes — Daylight Savings Time is currently in effect No — Daylight Savings Time is not currently in effect
Zone	The zone names for the current zone, the non-DST zone, and the DST zone if configured
Zone type	Non-standard — The zone is user-defined Standard — The zone is system defined
Offset from UTC	The number of hours and minutes added to universal time for the zone, including the DST offset for a DST zone
Offset from Non-DST	The number of hours (always 0) and minutes (0—60) added to the time at the beginning of Daylight Saving Time and subtracted at the end Daylight Saving Time
Starts	The date and time Daylight Saving Time begins
Ends	The date and time Daylight Saving Time ends

time

Syntax

time

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Context

show

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays the current day, date, time and time zone.

The time is displayed either in the local time zone or in UTC depending on the setting of the root level **time-display** command for the console session.

Output

The following output is an example of time information.

Sample output

```
A:ALA-49# show time
Tue Oct 31 12:17:15 GMT 2006
```

tod-suite

Syntax

tod-suite [**detail**]

tod-suite associations

tod-suite failed-associations

Context

show>system>cron

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays information on the configured time-of-day suite.

Output

The output samples are examples of TOD suite information.

- Sample output
- Sample output (associations)
- Sample output (failed associations)
- Sample output (failed SAP)

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- Sample output (filter associations)

Sample output

```
A:7210SAS# show cron tod-suite suite_sixteen detail
===============================================================================
Cron tod-suite details
===============================================================================
Name        : suite_sixteen
Type / Id                       Time-range                      Prio  State
-------------------------------------------------------------------------------
Ingress Qos Policy
  1160                          day                             5     Inact
  1190                          night                           6     Activ
Ingress Scheduler Policy
  SchedPolCust1_Day             day                             5     Inact
  SchedPolCust1_Night           night                           6     Activ
Egress Qos Policy
  1160                          day                             5     Inact
  1190                          night                           6     Activ
Egress Scheduler Policy
  SchedPolCust1Egress_Day       day                             5     Inact
===============================================================================
A:kerckhot_4#
```

Sample output (associations)
The following example shows output for TOD suite associations.

```
A:kerckhot_4# show cron tod-suite suite_sixteen associations
===============================================================================
Cron tod-suite associations for suite suite_sixteen
===============================================================================
Service associations
-------------------------------------------------------------------------------
Service Id  : 1                         Type   : VPLS
 SAP 1/1/1:1
 SAP 1/1/1:2
 SAP 1/1/1:3
 SAP 1/1/1:4
 SAP 1/1/1:5
 SAP 1/1/1:6
 SAP 1/1/1:20
-------------------------------------------------------------------------------
Number of SAP's : 7
Customer Multi-Service Site associations
-------------------------------------------------------------------------------
Multi Service Site: mss_1_1
-------------------------------------------------------------------------------
Number of MSS's: 1
===============================================================================
A:kerckhot_4#
```

Sample output (failed associations)
The following example shows output for TOD suite failed-associations.

```
A:kerckhot_4# show cron tod-suite suite_sixteen failed-associations
===============================================================================
Cron tod-suite associations failed
===============================================================================
tod-suite suite_sixteen : failed association for SAP
-------------------------------------------------------------------------------
Service Id  : 1                         Type   : VPLS
```


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```
  SAP 1/1/1:2
  SAP 1/1/1:3
  SAP 1/1/1:4
  SAP 1/1/1:5
  SAP 1/1/1:6
  SAP 1/1/1:20
-------------------------------------------------------------------------------
tod-suite suite_sixteen : failed association for Customer MSS
-------------------------------------------------------------------------------
None
-------------------------------------------------------------------------------
Number of tod-suites failed/total : 1/1
===============================================================================
A:kerckhot_4#
```

Sample output (failed SAP)

Zooming in on one of the failed SAPs, the assignments of QoS and scheduler policies are shown as not as intended.

```
A:kerckhot_4# show service id 1 sap 1/1/1:2
===============================================================================
Service Access Points(SAP)
===============================================================================
Service Id         : 1
SAP                : 1/1/1:2                 Encap             : q-tag
Dot1Q Ethertype    : 0x8100                  QinQ Ethertype    : 0x8100
Admin State        : Up                      Oper State        : Up
Flags              : None
Last Status Change : 10/05/2006 18:11:34
Last Mgmt Change   : 10/05/2006 22:27:48
Max Nbr of MAC Addr: No Limit                Total MAC Addr    : 0
Learned MAC Addr   : 0                       Static MAC Addr   : 0
Admin MTU          : 1518                    Oper MTU          : 1518
Ingress qos-policy : 1130                    Egress qos-policy : 1130
Intend Ing qos-pol*: 1190 Intend Egr qos-po*: 1190
Shared Q plcy      : n/a                     Multipoint shared : Disabled
Ingr IP Fltr-Id    : n/a                     Egr IP Fltr-Id    : n/a
Ingr Mac Fltr-Id   : n/a                     Egr Mac Fltr-Id   : n/a
tod-suite          : suite_sixteen           qinq-pbit-marking : both
Egr Agg Rate Limit : max
ARP Reply Agent    : Unknown                 Host Conn Verify  : Disabled
Mac Learning       : Enabled                 Discard Unkwn Srce: Disabled
Mac Aging          : Enabled                 Mac Pinning       : Disabled
L2PT Termination   : Disabled                BPDU Translation  : Disabled

Multi Svc Site     : None
I. Sched Pol       : SchedPolCust1
Intend I Sched Pol : SchedPolCust1_Night
E. Sched Pol       : SchedPolCust1Egress
Intend E Sched Pol : SchedPolCust1Egress_Night
Acct. Pol          : None                    Collect Stats     : Disabled
Anti Spoofing      : None                    Nbr Static Hosts  : 0
===============================================================================
A:kerckhot_4#

If a time-
range is specified for a filter entry, use the show filter command to view results:
A:kerckhot_4# show filter ip  10
===============================================================================
IP Filter
===============================================================================
Filter Id    : 10                              Applied        : No
Scope        : Template                        Def. Action    : Drop
```


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```
Entries      : 2
-------------------------------------------------------------------------------
Filter Match Criteria : IP
-------------------------------------------------------------------------------
Entry        : 1010
time-range   : day                              Cur. Status    : Inactive
Log Id       : n/a
Src. IP      : 0.0.0.0/0                        Src. Port      : None
Dest. IP     : 10.10.100.1/24                   Dest. Port     : None
Protocol     : Undefined                        Dscp           : Undefined
ICMP Type    : Undefined                        ICMP Code      : Undefined
Fragment     : Off                              Option-present : Off
Sampling     : Off                              Int. Sampling  : On
IP-Option    : 0/0                              Multiple Option: Off
TCP-syn      : Off                              TCP-ack        : Off
Match action : Forward
Next Hop     : 172.22.228.28
Ing. Matches : 0                                Egr. Matches   : 0
Entry        : 1020
time-range   : night                            Cur. Status    : Active
Log Id       : n/a
Src. IP      : 0.0.0.0/0                        Src. Port      : None
Dest. IP     : 10.10.1.1/16                     Dest. Port     : None
Protocol     : Undefined                        Dscp           : Undefined
ICMP Type    : Undefined                        ICMP Code      : Undefined
Fragment     : Off                              Option-present : Off
Sampling     : Off                              Int. Sampling  : On
IP-Option    : 0/0                              Multiple Option: Off
TCP-syn      : Off                              TCP-ack        : Off
Match action : Forward
Next Hop     : 172.22.184.101
Ing. Matches : 0                                Egr. Matches   : 0
===============================================================================
A:kerckhot_4#
```

Sample output (filter associations)
If a filter is referred to in a TOD Suite assignment, use the **show filter associations** command to view the output.

```
A:kerckhot_4# show filter ip 160 associations
===============================================================================
IP Filter
===============================================================================
Filter Id    : 160                              Applied        : No
Scope        : Template                         Def. Action    : Drop
Entries      : 0
-------------------------------------------------------------------------------
Filter Association : IP
-------------------------------------------------------------------------------
Tod-suite "english_suite"
 - ingress, time-range "day" (priority 5)
===============================================================================
A:kerckhot_4#
```

time-range

Syntax

time-range *name* **associations** [**detail**]

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Context

show>system>cron

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays information on the configured time ranges.

Output

The following output samples are examples of system time range information, and Table 78: Output fields: system time range describes the output fields

Sample output

```
A:ala# show system cron time-range time-range2 detail
===============================================================================
Cron time-range
===============================================================================
Name     : time-range1
Periodic    : Start * * * * End * * * *
Absolute     : Start * * * * End * * * *
```

The following example shows output for time-range associations with previously created IP and MAC filters.

```
A:ala# show system cron time-range day associations
===============================================================================
Cron time-range associations
===============================================================================
Name          : day                              State  : Inactive
-------------------------------------------------------------------------------
IP Filter associations
-------------------------------------------------------------------------------
IP filter Id  : 10, entry 1010
-------------------------------------------------------------------------------
MAC Filter associations
-------------------------------------------------------------------------------
None
-------------------------------------------------------------------------------
Tod-suite associations
-------------------------------------------------------------------------------
Tod-suite : suite_sixteen, for Ingress Qos Policy "1160"
Tod-suite : suite_sixteen, for Ingress Scheduler Policy "SchedPolCust1_Day"
Tod-suite : suite_sixteen, for Egress Qos Policy "1160"
Tod-suite : suite_sixteen, for Egress Scheduler Policy "SchedPolCust1Egress_Day
===============================================================================
```


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Table 78: Output fields: system time range

Label	Description
Associations	Shows the time-range as it is associated with the TOD suites and ACL entries as well as the SAPs using them
Detail	Shows the details of this time-range

redundancy

Syntax

redundancy

Context

show

Platforms

7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE

Description

Commands in this context display redundancy information.

multi-chassis

Syntax

multi-chassis

Context

show>redundancy

Platforms

7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE

Description

Commands in this context display multi-chassis redundancy information.

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all

Syntax

all [**detail**]

Context

show>redundancy>multi-chassis

Platforms

7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE

Description

This command displays brief multi-chassis redundancy information.

Parameters

detail

Displays detailed multi-chassis redundancy information.

Output

The following output is an example of redundancy multi-chassis information, and Table 79: Output fields: redundancy multi-chassis all describes the output fields.

Sample output

```
B:Dut-B# show redundancy multi-chassis all
===============================================================================
Multi-chassis Peer Table
===============================================================================
Peer
-------------------------------------------------------------------------------
Peer IP Address         : 10.10.10.2
Description             : Mc-Lag peer 10.10.10.2
Authentication          : Disabled
Source IP Address       : 0.0.0.0
Admin State             : Enabled
===============================================================================
B:Dut-B#

B:Dut-B# show lag detail
===============================================================================
LAG Details
===============================================================================
LAG 1
-------------------------------------------------------------------------------
Description: Description For LAG Number 1
-------------------------------------------------------------------------------
Details
-------------------------------------------------------------------------------
Lag-id              : 1                   Mode                : access
Adm                 : up                  Opr                 : up
Thres. Exceeded Cnt : 9                   Port Threshold      : 0
```


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```
Thres. Last Cleared : 05/20/2006 00:12:35   Threshold Action     : down
Dynamic Cost        : false                 Encap Type           : null
Configured Address  : 1c:71:ff:00:01:41     Lag-IfIndex          : 1342177281
Hardware Address    : 1c:71:ff:00:01:41     Adapt Qos            : distribute
Hold-time Down      : 0.0 sec
LACP                : enabled               Mode                 : active
LACP Transmit Intvl : fast                  LACP xmit stdby      : enabled
Selection Criteria  : highest-count         Slave-to-partner     : disabled
Number of sub-groups: 1                     Forced               : -
System Id           : 1c:71:ff:00:00:00     System Priority      : 32768
Admin Key           : 32768                 Oper Key             : 32666
Prtr System Id      : 20:f4:ff:00:00:00     Prtr System Priority : 32768
Prtr Oper Key       : 32768

MC Peer Address     : 10.10.10.2            MC Peer Lag-id       : 1
MC System Id        : 00:00:00:33:33:33     MC System Priority   : 32888
MC Admin Key        : 32666                 MC Active/Standby    : active
MC Lacp ID in use   : true                  MC extended timeout  : false
MC Selection Logic  : peer decided
MC Config Mismatch  : no mismatch
-------------------------------------------------------------------------------
Port-id        Adm    Act/Stdby Opr    Primary   Sub-group     Forced   Prio
-------------------------------------------------------------------------------
331/2/1          up     active    up     yes       1             -        32768
331/2/2          up     active    up               1             -        32768
331/2/3          up     active    up               1             -        32768
331/2/4          up     active    up               1             -        32768
-------------------------------------------------------------------------------
Port-id        Role      Exp   Def   Dist  Col   Syn   Aggr  Timeout  Activity
-------------------------------------------------------------------------------
331/2/1          actor     No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/1          partner   No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/2          actor     No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/2          partner   No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/3          actor     No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/3          partner   No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/4          actor     No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/4          partner   No    No    Yes   Yes   Yes   Yes   Yes      Yes
===============================================================================
B:Dut-B#
```

Table 79: Output fields: redundancy multi-chassis all

Label	Description
Peer IP Address	Displays the multi-chassis redundancy peer
Description	The text string describing the peer
Authentication	If configured, displays the authentication key used between this node and the MC peer
Source IP Address	Displays the source address used to communicate with the MC peer.
Admin State	Displays the administrative state of the peer

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mc-lag

Syntax

mc-lag [**lag** *lag-id*]

mc-lag peer *ip-address* [**lag** *lag-id*]] **statistics**

Context

show>redundancy>multi-chassis

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays multi-chassis LAG information.

Parameters

lag *lag-id*

Displays information for the specified LAG identifier.

Values 1 to 20020064

sync

Syntax

sync [**peer** *ip-address*]

sync peer *ip-address* **detail**

sync [**peer** *ip-address*] **statistics**

Context

show>redundancy>multi-chassis

Platforms

7210 SAS-T, 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, and 7210 SAS-Sx 10/100GE

Description

This command displays synchronization information.

Parameters

peer *ip-address*

Displays the synchronization information of the specified multi-chassis redundancy peer.

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Output

The following output is an example of redundancy multi-chassis synchronization information, and Table 80: Output fields: multi-chassis sync describes the output fields.

Sample output

```
*A:subscr_mgt_2# show redundancy multi-chassis sync
===============================================================================
Multi-chassis Peer Table
===============================================================================
Peer
-------------------------------------------------------------------------------
Peer IP Address         : 10.10.10.20
Description             : Mc-Lag peer 10.10.10.20
Authentication          : Disabled
Source IP Address       : 0.0.0.0
Admin State             : Enabled
-------------------------------------------------------------------------------
Sync-status
-------------------------------------------------------------------------------
Client Applications     : SUBMGMT
Sync Admin State        : Up
Sync Oper State         : Up
DB Sync State           : inSync
Num Entries             : 1
Lcl Deleted Entries     : 0
Alarm Entries           : 0
Rem Num Entries         : 1
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
===============================================================================
A:subscr_mgt_2#
```

Table 80: Output fields: multi-chassis sync

Label	Description
Peer IP Address	Displays the multi-chassis redundancy peer
Description	The text string describing the peer
Authentication	If configured, displays the authentication key used between this node and the multi-chassis peer
Source IP Address	Displays the source address used to communicate with the multi-chassis peer
Admin State	Displays the administrative state of the peer
Client Applications	Displays the list of client applications synchronized between 7210 SAS devices
Sync Admin State	Displays the administrative state of the synchronization
Sync Oper State	Displays the operation state of the synchronization
DB Sync State	Displays the database state of the synchronization

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Label	Description
Num Entries	Displays the number of entries on local router
Lcl Deleted Entries	Displays the number of deleted entries made at the local router
Alarm Entries	Displays the alarm entries on the local router
Rem Num Entries	Displays the number of entries on the remote router
Rem Lcl Deleted Entries	Displays the number of locally deleting entries made by the remote router
Rem Alarm Entries	Displays alarm entries on the remote router

synchronization

Syntax

synchronization

Context

show>redundancy

Platforms

7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Sx/S 1/10GE: standalone-VC

Description

This command displays redundancy synchronization times.

Output

The following output is an example of redundancy synchronization information, and Table 81: Output fields: synchronization describes the output fields.

Sample output

```
A:ALA-48>show>redundancy# synchronization
===============================================================================
Synchronization Information
===============================================================================
Standby Status               : disabled
Last Standby Failure         : N/A
Standby Up Time              : N/A
Failover Time                : N/A
Failover Reason              : N/A
Boot/Config Sync Mode        : None
Boot/Config Sync Status      : No synchronization
Last Config File Sync Time   : Never
Last Boot Env Sync Time      : Never
===============================================================================
A:ALA-48>show>redundancy#
```


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Table 81: Output fields: synchronization

Label	Description
Standby Status	Displays the status of the standby CSM
Last Standby Failure	Displays the timestamp of the last standby failure
Standby Up Time	Displays the length of time the standby CSM has been up
Failover Time	Displays the timestamp when the last redundancy failover occurred causing a switchover from active to standby CSM If there is no redundant CSM card in this system or no failover has occurred since the system last booted, the value will be 0.
Failover Reason	Displays a text string giving an explanation of the cause of the last redundancy failover If no failover has occurred, an empty string displays.
Boot/Config Sync Mode	Displays the type of synchronization operation to perform between the primary and secondary CSMs after a change has been made to the configuration files or the boot environment information contained in the boot options file (BOF)
Boot/Config Sync Status	Displays the results of the last synchronization operation between the primary and secondary CSMs
Last Config File Sync Time	Displays the timestamp of the last successful synchronization of the configuration files
Last Boot Env Sync Time	Displays the timestamp of the last successful synchronization of the boot environment files

uptime

Syntax

uptime

Context

show

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays the time since the system started.

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Output

The following output is an example of uptime information, and Table 82: Output fields: system timing describes the output fields.

Sample output

```
A:ALA-1# show uptime
System Up Time         : 11 days, 18:32:02.22 (hr:min:sec)
A:ALA-1#
```

Table 82: Output fields: system timing

Label	Description
System Up Time	Displays the length of time the system has been up in days, hr:min:sec format

sync-if-timing

Syntax

sync-if-timing

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode; not supported on 7210 SAS platforms configured in the standalone-VC operating mode

Description

This command displays synchronous interface timing information.

Output

The following outputs are examples of synchronous interface timing information, and Table 83: Output fields: sync interface timing describes the output fields.

- Sample output for 7210 SAS-R6 and 7210 SAS-R12
- Sample output for 7210 SAS-T and 7210 SAS-Mxp
- Sample output for 7210 SAS-Sx/S 1/10GE
- Sample output for 7210 SAS-Sx 10/100GE

Sample output for 7210 SAS-R6 and 7210 SAS-R12

```
*A:sasr_dutb>show>system# sync-if-timing

===============================================================================
System Interface Timing Operational Info
```


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```
===============================================================================
System Status CPM A                : Master Free Run
    Reference Input Mode           : Non-revertive
    Quality Level Selection        : Disabled
    Reference Selected             : none
    System Quality Level           : st3

Reference Order                    : bits1 ref1 ref2 ptp

Reference Mate CPM
    Qualified For Use              : No
        Not Qualified Due To       :     LOS
    Selected For Use               : No
        Not Selected Due To        :     not qualified

Reference Input 1
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
    Source Port                    : None

Reference Input 2
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
    Source Port                    : None

Reference BITS 1A
    Input Admin Status             : down
    Rx Quality Level               : stu
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
    Interface Type                 : DS1
    Framing                        : ESF
    Line Coding                    : B8ZS
    Line Length                    : 0-110ft
    Output Admin Status            : down
    Output Source                  : internal clock
    Output Reference Selected      : none
    Tx Quality Level               : N/A

Reference PTP
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
===============================================================================
*A:sasr_dutb>show>system#
```


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Sample output for 7210 SAS-T and 7210 SAS-Mxp

```
*A:7210SAS>show>system# sync-if-timing

===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM A               : Master Free Run
    Reference Input Mode          : Non-revertive
    Quality Level Selection       : Disabled
    Reference Selected            : none
    System Quality Level          : st3

Reference Order                   : bits1 bits2 ref1 ref2 ptp

Reference Input 1
    Admin Status                  : down
    Rx Quality Level              : unknown
    Quality Level Override        : none
    Qualified For Use             : No
        Not Qualified Due To      :     disabled
    Selected For Use              : No
        Not Selected Due To       :     disabled
    Source Port                   : None

Reference Input 2
    Admin Status                  : down
    Rx Quality Level              : unknown
    Quality Level Override        : none
    Qualified For Use             : No
        Not Qualified Due To      :     disabled
    Selected For Use              : No
        Not Selected Due To       :     disabled
    Source Port                   : None

Reference BITS 1
    Input Admin Status            : down
    Rx Quality Level              : stu
    Quality Level Override        : none
    Qualified For Use             : No
        Not Qualified Due To      :     disabled
    Selected For Use              : No
        Not Selected Due To       :     disabled
    Interface Type                : DS1
    Framing                       : ESF
    Line Coding                   : B8ZS
    Line Length                   : 0-110ft
    Output Admin Status           : down
    Output Source                 : internal clock
    Output Reference Selected     : none
    Tx Quality Level              : N/A

Reference BITS 2
    Input Admin Status            : down
    Rx Quality Level              : stu
    Quality Level Override        : none
    Qualified For Use             : No
        Not Qualified Due To      :     disabled
    Selected For Use              : No
        Not Selected Due To       :     disabled
    Interface Type                : DS1
    Framing                       : ESF
    Line Coding                   : B8ZS
    Line Length                   : 0-110ft
```


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```
    Output Admin Status            : down
    Output Source                  : internal clock
    Output Reference Selected      : none
    Tx Quality Level               : N/A

Reference PTP
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
===============================================================================
*A:7210SAS>show>system#
```

Sample output for 7210 SAS-Sx/S 1/10GE

```
A:7210Sx>show>system# sync-if-timing

===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM A                : Master Free Run
    Reference Input Mode           : Non-revertive
    Quality Level Selection        : Disabled
    Reference Selected             : none
    System Quality Level           : st3

Reference Order                    : ref1 ref2

Reference Input 1
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
    Source Port                    : None

Reference Input 2
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
    Source Port                    : None
===============================================================================
A:7210Sx>show>system#
```

Sample output for 7210 SAS-Sx 10/100GE

```
*A:7210SAS>show>system# sync-if-timing

===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM A                : Master Free Run
    Reference Input Mode           : Non-revertive
    Quality Level Selection        : Disabled
```


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```
    Reference Selected             : none
    System Quality Level           : st3

Reference Order                    : ref1 ref2

Reference Input 1
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
    Source Port                    : None

Reference Input 2
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
    Source Port                    : None
===============================================================================
*A:7210SAS>show>system#
```

Table 83: Output fields: sync interface timing

Label	Description
System Status CPM A	Indicates the system status of CPM A
Reference Input Mode	Indicates the reference input mode
Reference Order	Indicates the reference order
Reference Input 1	Displays information about reference input 1
Admin Status	Indicates the Admin status of reference input 1 down — Indicates the **ref1** or **ref2** configuration is administratively shutdown up — Indicates the **ref1** or **ref2** configuration is administratively enabled diag — Indicates the reference has been forced using the **force-reference** command
Qualified For Use	Indicates if the reference input 1 is qualified for use
Selected For Use	Indicates if reference input 1 is selected for use
Source Port	Displays the source port information
Reference Input 2	Displays information about reference input 2
Admin Status	Indicates the Admin status of reference input 2

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Label	Description
	down — Indicates the **ref1** or **ref2** configuration is administratively shutdown up — Indicates the **ref1** or **ref2** configuration is administratively enabled diag — Indicates the reference has been forced using the **force-reference** command
Qualified For Use	Indicates if the reference input 2 is qualified for use
Selected For Use	Indicates if reference input 2 is selected for use
Not Selected Due To	Indicates the reason if reference input 2 is not selected
Source Port	Displays the source port information
Interface Type	The interface type configured for the BITS port
Framing	The framing configured for the BITS port
Line Coding	The line coding configured for the BITS port
Line Length	The line length value of the BITS output
Output Admin Status	down — The BITS output is administratively shutdown up — The BITS output is administratively enabled diag — Indicates the BITS output has been forced using the **force-reference** command
Output Reference Selected	The reference selected as the source for the BITS output signal (**ref1** or **ref2**)
TX Quality Level	QL value for BITS output signal
Quality Level Selection	Indicates whether the ql-selection command has been enabled or disabled If this command is enabled, the reference is selected first using the QL value, then by the priority reference order. If this command is not enabled, the reference is selected by the priority reference order.
System Quality Level	Indicates the quality level being generated by the system clock
Rx Quality Level	Indicates the QL value received on the interface inv — SSM received on the interface indicates an invalid code for the interface type unknown — No QL value was received on the interface

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script-control

Syntax

script-control

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context display script information.

script

Syntax

script [*script-name*] [**owner** *script-owner*]

Context

show>system>script-control

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays script parameters.

Parameters

script-name

Displays information for the specified script.

script-owner

Displays information for the specified script owner.

Output

The following output is an example of script information, and Table 84: Output fields: script describes the output fields.

Sample output

```
7210SAS>show>system>script-control# script
```


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```
===============================================================================
Script Information
===============================================================================
Script                       : test
Owner name                   : TiMOS CLI
Description                  : asd
Administrative status        : enabled
Operational status           : enabled
Script source location       : ftp://*****:******@xxx.xxx.xxx.x/home/testlab_bgp
                               /test1.cfg
Last script error            : none
Last change                  : 2015/01/07 17:10:03
===============================================================================
7210SAS>show>cron#
```

Table 84: Output fields: script

Label	Description
Script	Displays the name of the script
Owner name	Displays the owner name of the script
Description	Displays the description of the script
Administrative status	Enabled — Administrative status is enabled Disabled — Administrative status is disabled
Operational status	Enabled — Operational status is enabled Disabled — Operational status is disabled
Script source location	Displays the location of the scheduled script
Last script error	Displays the system time of the last error
Last change	Displays the system time of the last change

script-policy

Syntax

script-policy *script-policy-name* [**owner** *owner-name*]

script-policy run-history [*run-state*]

Context

show>system>script-control

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

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Description

This command displays script policy information.

Parameters

script-policy-name

Displays policy information for the specified script.

owner-name

Displays information for the specified script owner.

Default "TiMOS CLI"

run-state

Displays information for script policies in the specified state.

Values executing, initializing, terminated

Output

The following output is an example of script policy information, and Table 85: Output fields: script policy describes the output fields.

Sample output

```
show system script-control script-policy run-history terminated
===============================================================================
Script-policy Run History
===============================================================================
Script policy "test"
Owner "TiMOS CLI"
-------------------------------------------------------------------------------
Script Run #17
-------------------------------------------------------------------------------
Start time : 2006/11/06 20:30:09 End time : 2006/11/06 20:35:24
Elapsed time : 0d 00:05:15 Lifetime : 0d 00:00:00
State : terminated Run exit code : noError
Result time : 2006/11/06 20:35:24 Keep history : 0d 00:49:57
Error time : never
Results file : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-203008.
out
Run exit : Success
-------------------------------------------------------------------------------
Script Run #18
-------------------------------------------------------------------------------
Start time : 2006/11/06 20:35:24 End time : 2006/11/06 20:40:40
Elapsed time : 0d 00:05:16 Lifetime : 0d 00:00:00
State : terminated Run exit code : noError
Result time : 2006/11/06 20:40:40 Keep history : 0d 00:55:13
Error time : never
Results file : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-203523.
out
Run exit : Success
-------------------------------------------------------------------------------
*A:Redundancy#

*A:Redundancy# show system script-control script-policy run-history executing
===============================================================================
Script-policy Run History
===============================================================================
```


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```
Script policy "test"
Owner "TiMOS CLI"
-------------------------------------------------------------------------------
Script Run #20
-------------------------------------------------------------------------------
Start time : 2006/11/06 20:46:00 End time : never
Elapsed time : 0d 00:00:56 Lifetime : 0d 00:59:04
State : executing Run exit code : noError
Result time : never Keep history : 0d 01:00:00
Error time : never
Results file : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-204559.
out
===============================================================================
*A:show#

*A:# show system script-control script-policy run-history initializing
===============================================================================
Script-policy Run History
===============================================================================
Script policy "test"
Owner "TiMOS CLI"
-------------------------------------------------------------------------------
Script Run #21
-------------------------------------------------------------------------------
Start time : never End time : never
Elapsed time : 0d 00:00:00 Lifetime : 0d 01:00:00
State : initializing Run exit code : noError
Result time : never Keep history : 0d 01:00:00
Error time : never
Results file : none
-------------------------------------------------------------------------------
Script Run #22
-------------------------------------------------------------------------------
Start time : never End time : never
Elapsed time : 0d 00:00:00 Lifetime : 0d 01:00:00
State : initializing Run exit code : noError
Result time : never Keep history : 0d 01:00:00
Error time : never
Results file : none
-------------------------------------------------------------------------------
Script Run #23
-------------------------------------------------------------------------------
Start time : never End time : never
Elapsed time : 0d 00:00:00 Lifetime : 0d 01:00:00
State : initializing Run exit code : noError
Result time : never Keep history : 0d 01:00:00
Error time : never
Results file : none
===============================================================================
*A:show#
```

Table 85: Output fields: script policy

Label	Description
Script policy	Displays the name of the script policy
Script policy owner	Displays the name of the script policy owner
Administrative status	Enabled — Administrative status is enabled Disabled — Administrative status is disabled

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Label	Description
Script	Displays the name of the script
Script owner	Displays the name of the script owner
Script source location	Displays the location of the scheduled script
Max running allowed	Displays the maximum number of allowed sessions
Max completed run histories	Displays the maximum number of sessions previously run
Max lifetime allowed	Displays the maximum length of time the script may run
Completed run histories	Displays the number of completed sessions
Executing run histories	Displays the number of sessions in the process of executin.
Initializing run histories	Displays the number of sessions ready to run/queued but not executed
Max time run history saved	Displays the maximum length of time to keep the results from a script run
Last change	Displays the system time that a change was made to the configuration

chassis

Syntax

chassis [**environment**] [**power-supply**]

Context

show

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays general chassis status information.

For a virtual chassis (VC), this command displays information about the entire VC. Hardware information can be displayed for individual CPMs, IMMs, power supplies, and fans.

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Parameters

environment

Displays chassis environmental status information.

Default all chassis information

power-supply

Displays only power-supply information.

Output

The following outputs are examples of chassis information, and Table 86: Output fields: chassis describes the output fields.

- Sample output for 7210 SAS-T
- Sample output for 7210 SAS-Sx/S 1/10GE
- Sample output for 7210 SAS-Sx 10/100GE
- Sample output for a 7210 SAS Virtual Chassis
- Sample output for 7210 SAS-Sx/S 1/10GE in standalone VC mode

Sample output for 7210 SAS-T

```
*A:SAST>show# chassis

===============================================================================
Chassis Information
===============================================================================
  Name                              : SAST
  Type                              : 7210 SAS-T 12F10T 4XFP ETR-1
  Location                          :
  Coordinates                       :
  CLLI code                         :
  Number of slots                   : 2
  Number of ports                   : 26
  Critical LED state                : Red
  Major LED state                   : Off
  Over Temperature state            : OK
  Low Temperature state             : OK
  Base MAC address                  : 4c:5f:d2:7d:13:f6
  Number of MAC addresses           : 16
  Hardware Data
    Part number                     : 3HE08117AAAA01
    CLEI code                       :
    Serial number                   : NS1310C2056
    Manufacture date                : 03252013
    Manufacturing string            : (Not Specified)
    Manufacturing deviations        : (Not Specified)
    Manufacturing assembly number   :
    Temperature                     : 39C
    Time of last boot               : 2000/05/31 23:24:58
    Current alarm state             : alarm active
-------------------------------------------------------------------------------
Environment Information

  Number of fan trays               : 1
  Number of fans                    : 3

  Fan tray number                   : 1
```


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```
    Speed                          : unknown
    Status                         : failed
-------------------------------------------------------------------------------
Power Supply Information
  Number of power supplies         : 2

  Power supply number              : 1
    Configured power supply type   : ac single
    Status                         : up
    AC power                       : within range

  Power supply number              : 2
    Configured power supply type   : none
    Status                         : not equipped
===============================================================================
*A:SAST>show#
```

Sample output for 7210 SAS-Sx/S 1/10GE

```
A:7210Sx>show# chassis

===============================================================================
Chassis Information
===============================================================================
  Name                             : hw_sass_duth
  Type                             : 7210 SAS-Sx/S 1/10GE 48Tp4SFP+ (PoE)-1
  Location                         :
  Coordinates                      :
  CLLI code                        :
  Number of slots                  : 2
  Number of ports                  : 52
      System LED state             : Green
  Over Temperature state           : OK
  Base MAC address                 : a4:7b:2c:c6:69:d3
  Number of MAC addresses          : 512
  Hardware Data
    Part number                    : 1160400046
    CLEI code                      :
    Serial number                  : 01160400046
    Manufacture date               :
    Manufacturing deviations       : (Not Specified)
    Manufacturing assembly number  : 82-0827-01
    Temperature                    : 59C
    Time of last boot              : 2000/01/01 01:32:34
    Current alarm state            : alarm cleared
-------------------------------------------------------------------------------
Environment Information

  Number of fan trays              : 1
  Number of fans                   : 1

  Fan tray number                  : 1
    Speed                          : half speed
    Status                         : up
-------------------------------------------------------------------------------
Power Supply Information
  Number of power supplies         : 2

  Power supply number              : 1
    Configured power supply type   : ac single
    Status                         : up
    AC power                       : within range
```


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```
  Power supply number               : 2
    Configured power supply type    : none
    Status                          : failed
    DC power                        : out of range
===============================================================================
A:7210Sx>show#
```

Sample output for 7210 SAS-Sx 10/100GE

```
*A:7210SAS>show# chassis

===============================================================================
Chassis Information
===============================================================================
  Name                              : NS1633T0067
  Type                              : 7210 SAS-Sx 64SFP+4QSFP28
  Location                          :
  Coordinates                       :
  CLLI code                         :
  Number of slots                   : 2
  Number of ports                   : 68
      System LED state              : Red
  Over Temperature state            : OK
  Base MAC address                  : d0:99:d5:8f:5e:41
  Number of MAC addresses           : 16
  Hardware Data
    Part number                     : AABBCCDD-11
    CLEI code                       :
    Serial number                   : NS1633T0067
    Manufacture date                :
    Manufacturing deviations        : (Not Specified)
    Manufacturing assembly number   :
    Temperature                     : 60C
    Time of last boot               : 2000/01/01 00:29:06
    Current alarm state             : alarm active
-------------------------------------------------------------------------------
Environment Information

  Number of fan trays               : 1
  Number of fans                    : 3

  Fan tray number                   : 1
    Speed                           : unknown
    Status                          : failed
-------------------------------------------------------------------------------
Power Supply Information
  Number of power supplies          : 2

  Power supply number               : 1
    Configured power supply type    : none
    Status                          : failed
    DC power                        : out of range

  Power supply number               : 2
    Configured power supply type    : ac single
    Status                          : up
    AC power                        : within range
===============================================================================
*A:7210SAS>show#
```

Sample output for a 7210 SAS Virtual Chassis

```
A:NS1653T0051# show chassis
```


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```
===============================================================================
Chassis Information
===============================================================================
  Name                              : NS1653T0051
  Type                              : 7210 SAS-VC
  Location                          :
  Coordinates                       :
  CLLI code                         :
  Number of slots                   : 16
  Number of ports                   : 136
  System LED state                  : Red
  Over Temperature state            : OK
  Base MAC address                  : d0:99:d5:92:70:41
  Number of MAC addresses           : 512
  VC-NAME                           : ABCDEFGHIJK
  Number of VC nodes                : 1-8
  Number of IMM-only nodes          : 2-8
  Number of CPM-IMM nodes           : 1-2
  VC Oper Status                    : OK
    Time of last boot               : 2000/01/01 00:51:31
    Power Status (all nodes)        : OK
    Fan Status (all nodes)          : OK
    Current alarm state             : alarm active
===============================================================================
```

Sample output for 7210 SAS-Sx/S 1/10GE in standalone VC mode

```
A:NS1# show chassis
===============================================================================
Chassis Information
===============================================================================
  Name                              : NS1
  Type                              : 7210 SAS-VC
  HW Type                           : SAS-S 48F4SFP+
  Location                          :
  Coordinates                       :
  CLLI code                         :
  Number of slots                   : 10
  Number of ports                   : 216
      System LED state              : Red
  Over Temperature state            : OK
  VC Stack name                     : VCmix
  Number of VC Nodes                : 6
  Number of IMM-only Nodes          : 5
  Number of CPM-IMM Nodes           : 1
  VC Chassis MAC address (active)   : ab:cd:ef:ab:cd:ef
  Number of MAC addresses (active)  : 10
  VC Chassis MAC address (config)   : ab:cd:ef:ab:cd:ef
  Number of MAC addresses (config)  : 10
  Temperature                       : 67C
  Current alarm state               : alarm active
  Fan Status                        : Ok
  Power Status                      : Failed(Slots:7)
===============================================================================
```

Table 86: Output fields: chassis

Label	Description
Name	The system name for the router

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Label	Description
Type	The router series model number
Location	The system location for the device
Coordinates	A user-configurable string that indicates the Global Positioning System (GPS) coordinates for the location of the chassis For example: N 45 58 23, W 34 56 12 N37 37' 00 latitude, W122 22' 00 longitude N36*39.246' W121*40.121'
CLLI Code	The Common Language Location Identifier (CLLI) that uniquely identifies the geographic location of places and certain functional categories of equipment unique to the telecommunications industry
Number of slots	The number of slots in this chassis that are available for plug-in cards The total number includes card slots
Number of ports	The total number of ports currently installed in this chassis
Critical LED state	The current state of the Critical LED in this chassis
Major LED state	The current state of the Major LED in this chassis
Minor LED state	The current state of the Minor LED in this chassis
Base MAC address	The base chassis Ethernet MAC address
Hardware Data	
Part number	The part number
CLEI code	The code used to identify the router
Serial number	The part number Not user modifiable
Manufacture date	The chassis manufacture date Not user modifiable
Manufacturing string	Factory-inputted manufacturing text string Not user modifiable
Time of last boot	The date and time the most recent boot occurred
Current alarm state	Displays the alarm conditions for the specific board

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Label	Description
Environment Information	
Number of fan trays	The total number of fan trays installed in this chassis
Number of fans	The total number of fans installed in this chassis
Operational status	Current status of the fan tray
Fan speed	Half speed — The fans are operating at half speed Full speed — The fans are operating at full speed
Power Supply Information	
Number of power supplies	The number of power supplies installed in the chassis
Power supply number	The ID for each power supply installed in the chassis
Configured power supply type	The power supply type that is configured
AC power	Within range — AC voltage is within range Out of range — AC voltage is out of range
DC power	Within range — DC voltage is within range Out of range — DC voltage is out of range
Over temp	Within range — The current temperature is within the acceptable range Out of range — The current temperature is above the acceptable range
Status	Up — The specified power supply is up Down — The specified power supply is down

alarm-contact-input

Syntax

alarm-contact-input all

Context

show>alarm-contact-input

Platforms

7210 SAS-T (network and access-uplink), 7210 SAS-Mxp, 7210 SAS-R6, and, 7210 SAS-R12

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Description

This command displays information of all the alarm contact input pins.

Output

The following output is an example of alarm contact input information, and Table 87: Output fields: alarm contact input describes the output fields.

Sample output

```
*A:7210-2# show alarm-contact-input 1
===============================================================================
Alarm Contact Input
===============================================================================
    Alarm Input Pin Number        : 1
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
===============================================================================
*A:7210-2#


*A:7210-2# show alarm-contact-input 1 detail
===============================================================================
Alarm Contact Input
===============================================================================
    Alarm Input Pin Number        : 1
    Alarm Input Pin Description   :
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
    Last State Change             : 05/19/2010 11:28:09
===============================================================================
*A:7210-2#


*A:7210-2# show alarm-contact-input all
===============================================================================
Alarm Contact Input
===============================================================================
    Alarm Input Pin Number        : 1
    Alarm Input Pin Description   :
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
    Last State Change             : 05/19/2010 11:28:09
    Alarm Input Pin Number        : 2
    Alarm Input Pin Description   :
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
    Last State Change             : 05/19/2010 11:28:09
    Alarm Input Pin Number        : 3
    Alarm Input Pin Description   :
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
    Last State Change             : 05/19/2010 11:28:09
    Alarm Input Pin Number        : 4
    Alarm Input Pin Description   :
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
    Last State Change             : 05/19/2010 11:28:09
===============================================================================
*A:7210-2#
```


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Table 87: Output fields: alarm contact input

Label	Description
Alarm input pin Number	Indicates the pin alarm input pin number
Alarm input pin Description	Describes the alarm indicating its usage or attribute
Alarm input pin current state	Indicates the current state of the alarm contact input pin
Alarm output pin used	Indicates the alarm output pin used
Last state change time	Indicates the previous state change time

pools

Syntax

pools

Context

show

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays information on the buffer allocation and buffer usage per port.

Output

The following output is an example of pools information, and Table 88: Output fields: pools describes the output fields.

Sample output

```
A:7210SAS# show pools 1/1/2 access-egress

===============================================================================
Pool Information
===============================================================================
Port                 : 1/1/2
Application          : Acc-Egr           Slope Policy       : default
Resv CBS             : Sum
MMU Pool Total In Use: 1256 KB           MMU Pool Shared In*: 1236 KB

Pool Total           : 910 KB
Pool Shared          : 842 KB            Pool Resv          : 68 KB

Pool Total In Use    : 579 KB
Pool Shared In Use   : 570 KB            Pool Resv In Use   : 9 KB

-------------------------------------------------------------------------------
```


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```
ID                          FC-MAPS/      CBS (B)     Depth  A.CIR     A.PIR
                                                             O.CIR     O.PIR
-------------------------------------------------------------------------------
1/1/2                            be       8698      573      0         1000000
                                                             0         Max
1/1/2                            l2       8698      0        0         1000000
                                                             0         Max
1/1/2                            af       8698      0        0         1000000
                                                             0         Max
1/1/2                            l1       8698      0        0         1000000
                                                             0         Max
1/1/2                            h2       8698      0        0         1000000
                                                             0         Max
1/1/2                            ef       8698      0        0         1000000
                                                             0         Max
1/1/2                            h1       8698      0        0         1000000
                                                             0         Max
1/1/2                            nc       8698      0        0         1000000
                                                             0         Max
===============================================================================
* indicates that the corresponding row element may have been truncated.
```

Table 88: Output fields: pools

Label	Description
Port	Displays the Port ID of the port
Application	Indicates whether its access, network or access-uplink buffer pool
Resv CBS	The amount of CBS reserved per port Sum — Indicates it is the sum of the CBS allocated to each queue on this port
MMU Pool Total In Use	Number of system wide buffers in use This includes the shared buffers as well as the per queue committed buffers.
Pool Total	The total amount of buffer allocated to this pool
Pool Shared	The total amount of buffers allocated towards MBS portion, which is shared by all the queues
Pool Total In Use	The total amount of buffers in use
Pool Shared In Use	The total amount of shared buffers in use
Slope Policy	The slope policy ID in use
MMU Pool Shared In	Number of system wide shared buffers currently in use This does not include the committed buffers allocated to each queue.

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Label	Description
Pool Resv	The total amount of buffers allocated towards CBS for all the queues
Pool Resv In Use	Total amount of CBS buffers in use
ID	Identifies the port
FC-MAPS	Identifies the FC
Depth	The current depth of the queue
CBS	The CBS portion allocated to the queue
A.CIR/PIR	Configured values of CIR and PIR rates (that is, value before adaptation rule is applied)
O.CIR/PIR	Operational value of CIR/PIR after applying the adaptation rule

7.18.2.3 Clear commands

screen

Syntax

screen

Context

clear

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command allows an operator to clear the Telnet or console screen.

ptp

Syntax

ptp inactive-peers

ptp statistics

ptp peer *ip-address* **statistics**

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Context

clear>system

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network and access-uplink)

Description

This command clears PTP statistics.

Parameters

inactive-peers

Keyword to remove PTP peers which are not currently exchanging PTP packets with the router

peer *ip-address* statistics

Clears statistics for the specified peer.

statistics

Clears all PTP statistics.

port

Syntax

port *port-id* **statistics**

Context

clear>system>ptp

Platforms

7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx 1/10GE, 7210 SAS-Sx 10/100GE, 7210 SAS-T (network and access-uplink)

Description

This command clears PTP port information.

Parameters

port-id

Clears information for the specified port.

statistics

Clears statistics information for the specified port.

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script-control

Syntax

script-control

Context

clear>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context clear script information.

script-policy

Syntax

script-policy

Context

clear>system>script-control

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context clear script policy information.

completed

Syntax

completed [*script-policy-name*] [**owner** *owner-name*]

Context

clear>system>script-control>script-policy

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

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Description

This command clears completed script run history entries.

Parameters

script-policy-name

Clears history entries only for the specified script-policy.

owner-name

Clears history entries only for script-policies with the specified owner.

Default "TiMOS CLI"

sync-if-timing

Syntax

sync-if-timing {**ref1** | **ref2** | **bits1** | **bits2**}

Context

clear>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode; not supported on platforms configured in the standalone-VC operating mode

Description

This command individually clears (re-enable) a previously failed reference. As long as the reference is one of the valid options, this command is always executed. An inherent behavior enables the reverted mode which causes a re-evaluation of all available references.

Parameters

ref1

Clears the first timing reference.

ref2

Clears the second timing reference.

bits1

Clears the BITS1 port reference. This keyword is only supported on 7210 SAS-Mxp, 7210 SAS-T, 7210 SAS-R6 and 7210 SAS-R12 platforms.

bits2

Clears the BITS2 port reference. This keyword is only supported on 7210 SAS-T and 7210 SAS-Mxp platforms.

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trace

Syntax

trace log

Context

clear

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command allows an operator to clear the trace log.

7.18.2.4 Debug commands

sync-if-timing

Syntax

sync-if-timing

Context

debug

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

Commands in this context debug synchronous interface timing references.

force-reference

Syntax

force-reference {**ref1** | **ref2** | **bits1** | **bits2** | **ptp**}

no force-reference

Context

debug>sync-if-timing

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Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode; not supported on platforms configured in the satndalone-VC operating mode

Description

This command forces the system synchronous timing output to use a specific reference.

Note:
This command should be used for testing and debugging purposes only. After the system timing reference input has been forced, it will not revert back to another reference at any time. The state of this command is not persistent between system boots.

When the **debug force-reference** command is executed, the current system synchronous timing output is immediately referenced from the specified reference input. If the specified input is not available (shutdown), or in a disqualified state, the timing output will enter the holdover state based on the previous input reference.

Parameters

ref1

Specifies that the clock will use the first timing reference.

ref2

Specifies that the clock will use the second timing reference.

ptp

Specifies that the clock will use PTP as a timing reference. This keyword is only supported on 7210 SAS-T, 7210 SAS-Sx 1/10GE, 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS-Mxp platforms.

bits1

Specifies that the clock will use the BITS1 port as timing reference. This keyword is only supported on 7210 SAS-Mxp, 7210 SAS-T, 7210 SAS-R6 and 7210 SAS-R12 platforms.

bits2

Specifies that the clock will use BITS2 port as the timing reference. This keyword is only supported on the 7210 SAS-T.

system

Syntax

[**no**] **system**

Context

debug

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Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command displays system debug information.

ntp

Syntax

ntp [**router** *router-name*] [**interface** *ip-int-name*]

Context

debug>system

Platforms

Supported on all 7210 SAS platforms as described in this document, including platforms configured in the access-uplink operating mode

Description

This command enables and configures debugging for NTP.

The **no** form of this command disables debugging for NTP.

Parameters

router-name

Base, management

Default Base

ip-int-name

Specifies the name of the IP interface. The name can be up to 32 characters and must begin with a letter. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

7.18.2.5 Tools commands

ssh

Syntax

ssh

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Context

tools>perform>system

Platforms

7210 SAS-Sx/S 1/10GE (standalone mode)

Description

Commands in this context perform SSH operations.

gen-keypair

Syntax

gen-keypair *url-string* **curve** {**secp256r1** | **secp384r1** | **secp521r1**} [**secure-download-type**]

gen-keypair *url-string* **ed25519** [**secure-download-type**]

gen-keypair *url-string* **rsa** *key-size* [**secure-download-type**]

Context

tools>perform>system>ssh

Platforms

7210 SAS-Sx/S 1/10GE (standalone mode)

Description

This command generates the SFTP client key files in the specified location. The key files are used by the SFTP client when downloading files securely from the SFTP server (for example, during secure download of files during auto-init).

Parameters

url-string

Specifies the location on the local CF card where the generated key files are stored.

Values url-string: <local-url> [up to 99 characters]
local-url: <cflash-id>/<file-path>
cflash-id: cf1: | uf1:

curve

Keyword to specify the elliptic curve algorithm to use for key generation.

Values secp256r1, secp384r1, secp521r1

key-size

Specifies the key size when RSA is used for key generation.

Values 2048 to 4096

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Default 3072

secure-download-type

Keyword to specify the type of secure download.

Values autoinit-secure-download - Keyword to specify that the generated SFTP client key files are used for first-time bootup during auto-init.

boot-secure-download - Keyword to specify that the generated SFTP client key files are used for a subsequent reboot of the node.

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8 Appendix: 7210 SAS boot procedures

This chapter describes the booting procedures for 7210 SAS devices.

This chapter provides information about booting a factory-shipped 7210 SAS device for the first time. It also includes information to boot the 7210 SAS device after subsequent reboots that are initiated by issuing the **admin reboot** command. For subsequent reboots, the BOF and the TiMOS image are stored on the local flash.

The 7210 SAS supports two modes for a first-time boot of a factory-shipped node or to boot the node after the **admin>reboot auto-init** command is executed. The supported boot modes are:

- **auto-init mode**

  In this mode, the boot procedure uses an external DHCP server to provide the IP address and other IP parameters, and the BOF configuration, which contains the image location and the configuration file location. This mode does not require user intervention and provides an option for zero-touch provisioning of the node.

  This method also provides an option to modify the default values of the BOF parameters used for auto-init and customize a specific set of BOF parameters so that auto-init is supported in the customer network environment. See Auto-init mode for a list of BOF parameters that the user can modify.

  The user requires console access to modify BOF parameters. After the partial BOF is saved, the system continues using the auto-init mode procedure to boot, with auto-init using the modified values of the BOF parameters that the user has provided.

- **manual mode**

  In this mode, the boot procedure requires user intervention to complete the process. During the boot process, the user must log in to the console on the node and configure the IP address, other IP parameters, and the location of the image file and configuration file. The following options are supported to boot the 7210 SAS device in manual mode:

  – boot from the image on flash

  – boot from the network using uplink ports

  – boot from the network using the OOB Ethernet management port

The following table lists the supported boot procedures for 7210 SAS devices.

Table 89: 7210 SAS boot procedure overview

Section	Description
Procedure to boot using auto-init mode	• Procedure to boot with auto-init mode using SFTP for secure download of files This procedure uses auto-init mode with SFTP for the secure download of files to boot the 7210 SAS device.
Procedures to boot using manual mode	This procedure uses the manual mode to boot the 7210 SAS device. In manual mode, the device can be booted from the local flash or it can be booted from

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Section	Description
	the network using an uplink port or the OOB Ethernet management port. The following procedures apply: • Procedure to boot from the image on flash in manual mode This procedure uses the manual mode to boot the 7210 SAS device from the local flash. • Procedure to boot from the network in manual mode using uplink ports This procedure uses the manual mode to boot the 7210 SAS device from the network using an uplink port. • Procedure to boot from the network in manual mode using the OOB Ethernet management port This procedure uses the manual mode to boot from the 7210 SAS device from the network using the OOB Ethernet management port.
Procedure to boot when the BOF is present locally	This procedure uses the BOF that is present locally to boot the 7210 SAS device.
Procedure to boot in the satellite mode	This procedure boots the 7210 SAS device in the satellite mode.
Procedure to boot in the standalone-VC mode	This procedure boots the 7210 SAS device in the standalone-VC mode.
Procedure to boot in standalone-VC mode for factory-default units using an SD card	This procedure boots the 7210 SAS factory-default units in the standalone-VC mode of operation using an SD card.

Note:
Console outputs shown in this chapter are examples only; actual displays may differ depending on the 7210 SAS platform, supported functionality, and user configuration.

8.1 Procedure to boot using auto-init mode

About this task

Note:
The auto-init mode is supported on all 7210 SAS platforms, except the 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS platforms that are configured in the standalone-VC or satellite modes of operation.

This section describes the procedure to boot the 7210 SAS using the auto-init mode.

The auto-init mode is used to boot the 7210 SAS device in the following scenarios:

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- user boots the device for the first time
- user boots the device after a reset to the factory default settings
- user boots the device after the execution of the **admin**>**reboot auto-init** command

To boot using the auto-init mode requires a DHCP server to be configured in the network and reachable by the system. The 7210 SAS device uses the auto-init mode to obtain the BOF from the network using the IP address and file location provided by the DHCP server, and uses the parameters specified in the BOF to download the TiMOS image file and configuration file required to boot the node. See Auto-init mode for more information about the auto-init procedure and the DHCP parameters used.

Perform the following steps to boot the 7210 SAS device using the auto-init mode:

Procedure

Step 1. Optional: Connect the console port to the serial port of the PC and power on the 7210 SAS device to display log messages generated on the screen.

Note:
This is an optional step. Perform this step only if you need to diagnose issues with the auto-init procedure, if any.

The system starts booting and the following console output is displayed.

Example

```
Nokia 7xxx Boot ROM. Copyright 2000-2020 Nokia.
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Build: X-20.3.B1-1 on Wed Feb 12 15:29:52 IST 2020 by sasbuild
Version: 0x38
Processor core is CN66xx
COLD boot on processor #1
?Preparing for jump to RAM...
Starting bootrom RAM code...
Boot rom version is v56
CPU #1 booted from working sector
CPU Control FPGA version is 0x3D
FPGA A version is 0x3D. FPGA B version is 0x3D. FPGA C version is 0x3D.
Restart type = 0x01
>>>Validate SDRAM from 0x000000007fdfff80 to 0x0000000080000000 (decrementing)
>>>Testing  SDRAM from 0x0000000002200000 to 0x000000007fdfff80
>>>Testing  SDRAM from 0xffffffffe0000000 to 0xffffffffe2000000
Power on Diagnostics passed
Board Serial Number is 'NS1715T0019'

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-V-20.3.B1-1 bootrom/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
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Built on Wed Feb 12 15:28:49 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/m
Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Version L-20.3.B1-1, Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(13818400-->40990080) + data:(3162656-->19580220)
Starting at 0x18000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-L-20.3.B1-1 boot/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
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All rights reserved. All use subject to applicable license agreements.
Built on Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/
```


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```
main

TiMOS BOOT LOADER
Time from clock is WED MAR 04 09:23:22 2020 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : factory-default
```

Step 2. The system lists the default settings and the following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading

Contents of Boot Options File on cf1:
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/65
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/66
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled

Hit a key within 1 second to change boot parameters...
```

Step 3. At the prompt, wait until the specified wait time has elapsed. The system will direct DHCP requests from the uplink ports to reach a DHCP server.

The following console output is displayed.

Example

```
Trying DHCP on Port 1/1/65 (Priority tagged)
Chassis MAC Address: D0:99:D5:97:02:41
DHCP failed on Port 1/1/65
Failure reason: SFP not present on port

Trying DHCP on Port 1/1/65 (Untagged)
Chassis MAC Address: D0:99:D5:97:02:41
DHCP failed on Port 1/1/65
Failure reason: SFP not present on port

Trying DHCP on Port 1/1/66 (Priority tagged)
Chassis MAC Address: D0:99:D5:97:02:41
DHCP failed on Port 1/1/66
Failure reason: SFP not present on port

Trying DHCP on Port 1/1/66 (Untagged)
Chassis MAC Address: D0:99:D5:97:02:41
DHCP failed on Port 1/1/66
Failure reason: SFP not present on port
```


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```
Trying DHCP on Port 1/1/67 (Priority tagged)
Chassis MAC Address: D0:99:D5:97:02:41
Port 1/1/67, Speed:100000, Duplex:Full, Link:Up.
DHCP failed on Port 1/1/67

Trying DHCP on Port 1/1/67 (Untagged)
Chassis MAC Address: D0:99:D5:97:02:41
Port 1/1/67, Speed:100000, Duplex:Full, Link:Up.

DHCP Server:192.168.2.8
    Boot device addr: 192.168.2.9
    Subnet mask: 24
    Boot host: 192.168.2.8
    Url from Boot file: tftp://192.168.2.8/images-pf/SASS/voy/bof.cfg
Initial DNS resolving preference is ipv4-only
```

Step 4. The DHCP server responds to the system request and supplies an IP address, default gateway information, and a BOF location.

The following console output is displayed.

```
Looking for tftp://192.168.2.8/images-pf/SASS/voy/bof.cfg ... OK, reading
Successfully saved the new settings in cf1:/bof.cfg
```

Step 5. The system applies the IP configuration and downloads the BOF from the location specified by the DHCP server. The BOF is saved on the flash drive.

The 7210 SAS device initiates the boot using the BOF, and the following console output is displayed.

Example

```
My New Settings
------------
    primary-image      ftp://*:*@192.168.2.8/./images-pf/SASS/voy/hops-both.tim
    primary-config     ftp://*:*@192.168.2.8/./images-pf/SASS/voy/dut-h.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   192.168.2.9/24 active
    eth-mgmt-route     192.250.0.0/16 next-hop 192.168.2.8
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
    host-type        standalone
Setting the chassis role to standalone.

Configuring Network with eth-mgmt Port Setting.....
Primary config file location: ftp://*:*@192.168.2.8/./images-pf/SASS/voy/dut-h.cfg
Initial DNS resolving preference is ipv4-only
Downloading 'ftp://*:*@192.168.2.8/./images-pf/SASS/voy/dut-h.cfg'...OK

Sap Index file location: ftp://*:*@192.168.2.8/./images-pf/SASS/voy/dut-h.sdx
Downloading 'ftp://*:*@192.168.2.8/./images-pf/SASS/voy/dut-h.sdx'...OK

Primary image location: ftp://*:*@192.168.2.8/./images-pf/SASS/voy/hops-both.tim
Initial DNS resolving preference is ipv4-only
Loading image ftp://*:*@192.168.2.8/./images-pf/SASS/voy/hops-both.tim
```


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```
Version B-20.3.B1-1, Wed Feb 12 15:33:08 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(41664192-->183719312)
```

Step 6. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
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Built on Wed Apr 20 14:32:04 IST 2011 by builder in /builder/3.0B5/panos/main
Login:
```

Step 7. At the prompt, enter **admin** for the default username and password, and log in to the 7210 SAS device.

8.1.1 Procedure to boot with auto-init mode using SFTP for secure download of files

About this task

Note:
This feature is only supported on the 7210 SAS-Sx/S 1/10GE (standalone mode).

This section describes the procedure to boot the 7210 SAS with auto-init mode using SFTP for the secure download of files.

Procedure

Step 1. Connect the console port to the serial port of the PC and power on the 7210 SAS device to display log messages generated on the screen.

Note:
This is an optional step. Perform this step only if you need to diagnose issues with the auto-init procedure, if any.

The system starts booting and the following console output is displayed.

Example

```
Nokia SAS 7210 Boot ROM. Copyright 2000-2025 Nokia.
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Build: X-25.9.B1-6 on Wed Oct 29 16:10:53 IST 2025 by sasbuild
Version: 0xC
SAS-DR16
Shmoo tuning data in flash is valid, load it
DDR Tuning Complete.
Hit any key to abort auto boot...
Passed!
Copying code from FLASH to RAM....
Done
Board CPLD Version: 0x0b
Reboot Reason: 0x05
Boot rom version is v12
>>> RAM: Testing DDR Passed!
Board Serial Number is 'NK221410012'
DDR Tuning Complete.

Tuning values already saved. Skip saving to flash.
Memory Test Passed!
```


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```
Jumping to vxrom at 0x61400000 now.................

Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Unlocking all the sectors
Locking all the sectors
Version L-26.9.B1-4, Fri Sep 11 11:17:15 IST 2026 by sasbuild in /home/sasbuild/
26.9B1/panos/main
text:(17920256-->59502752) + data:(5540160-->26035508)
Starting at 0x6f000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x68
TiMOS-L-26.9.B1-4 boot/ARMiproc Nokia SAS-Dxp16p 10T4F2SFP+ ETR 7210 Copyright (c)
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All rights reserved. All use subject to applicable license agreements.
Built on Fri Sep 11 11:17:15 IST 2026 by sasbuild in /home/sasbuild/26.9B1

TiMOS BOOT LOADER
Time from clock is THU JAN 01 00:02:53 2026 UTC
Switching serial output to sync mode...   done
```

Step 2. The system lists the default settings and the following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading

Contents of Boot Options File on cf1:
#uplinkA Port Settings:
    uplinkA-port       1/1/11
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/12
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled

Hit a key within 1 second to change boot parameters...
```

Step 3. At the prompt, wait until the specified wait time has elapsed. The system will direct DHCP requests from the uplink ports to reach a DHCP server.

The following console output is displayed.

Example

```
Trying DHCP on Port 1/1/11 (Priority tagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/11
Failure reason: Port link down

Trying DHCP on Port 1/1/11 (Untagged)
```


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```
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/11
Failure reason: Port link down

Trying DHCP on Port 1/1/12 (Priority tagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/12
Failure reason: Port link down

Trying DHCP on Port 1/1/12 (Untagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/12
Failure reason: Port link down

Trying DHCP on Port 1/1/13 (Priority tagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/13
Failure reason: Port link down

Trying DHCP on Port 1/1/13 (Untagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/13
Failure reason: Port link down

Trying DHCP on Port 1/1/14 (Priority tagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
Port 1/1/14-->Mode:GIGE-SX, Speed:1000, Duplex:Full Autoneg: On, Link:Up.
DHCP failed on Port 1/1/14


Trying DHCP on Port 1/1/14 (Untagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
Port 1/1/14-->Mode:GIGE-SX, Speed:1000, Duplex:Full Autoneg: On, Link:Up.

DHCP Server:xxx.xxx.xx.y
    Boot device addr: xxx.xxx.xx.x
    Subnet mask: 24
    Boot host: xxx.xxx.xx.y
    Boot Url Path: sftp://*@xxx.xxx.xx.y:10001/home/user31/secAutoInitFiles/bof-ipv4-
a-1-1-14-1g-user.cfg
Initial DNS resolving preference is ipv4-only
```

Step 4. The DHCP server responds to the system request and supplies an IP address, default gateway information, and a BOF location (using the SFTP URL).

The following console output is displayed.

Example

```
Looking for sftp://*@xxx.xxx.xx.y:10001/home/user31/secAutoInitFiles/bof-ipv4-a-1-1-
14-1g-user.cfg ... OK, reading
Successfully saved the new settings in cf1:/bof.cfg
```

Step 5. The system applies the IP configuration and downloads the BOF from the location specified by the DHCP server using the SFTP client and PKI files provisioned in the node using the procedure detailed in Secure download of image and configuration files using SFTP. The BOF is saved on the flash drive.

The 7210 SAS device initiates the boot using the BOF, and the following console output is displayed.

In the following BOF output, SFTP is used to specify the URL and location for the image and configuration file using the `primary-image` and `primary-config` BOF parameters.

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Example

```
My New Settings
------------
    primary-image      sftp://*@xxx.xxx.xx.y:10001/./images/bcmiproc-both.tim
    primary-config     sftp://*@xxx.xxx.xx.y:10001/./secAutoInitFiles/Router-1-1-1-14-
1g-cfg.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/14
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100
    uplinkA-address    xxx.xxx.xx.x/24
    uplinkA-vlan       null
    uplinkA-route      xxx.xxx.0.0/16 next-hop xxx.xxx.xx.y
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled
```

Step 6. The bootloader applies the uplink port configuration (such as IP address, IP route, port speed, Port VLAN, and so on) provided in the BOF file and then attempts to down the TiMOS image and configuration file from the location specified in the SFTP URL. In this case, the SFTP client is used to download the image and configuration file as shown below.

Example

```
Configuring Network with uplinkA Port Setting.....
Primary config file location: sftp://*@xxx.xxx.xx.y:10001/./secAutoInitFiles/Router-1-
1-1-14-1g-cfg.cfg
Port 1/1/14-->Mode:GIGE-SX, Speed:1000, Duplex:Full Autoneg: On, Link:Up.
Initial DNS resolving preference is ipv4-only
Downloading 'sftp://*@xxx.xxx.xx.y:10001/./secAutoInitFiles/Router-1-1-1-14-1g-
cfg.cfg'...OK

Sap Index file location: sftp://*@xxx.xxx.xx.y:10001/./secAutoInitFiles/Router-1-1-1-
14-1g-cfg.sdx
Downloading 'sftp://*@xxx.xxx.xx.y:10001/./secAutoInitFiles/Router-1-1-1-14-1g-
cfg.sdx'...OK

Primary image location: sftp://*@xxx.xxx.xx.y:10001/./images/bcmiproc-both.tim
Port 1/1/14-->Mode:GIGE-SX, Speed:1000, Duplex:Full Autoneg: On, Link:Up.
Initial DNS resolving preference is ipv4-only
Loading image sftp://*@xxx.xxx.xx.y:10001/./images/bcmiproc-both.tim
Version B-26.9.B1-4, Fri Sep 11 11:27:16 IST 2026 by sasbuild in /home/sasbuild/
26.9B1/panos/main
text:(44382560-->245613185) + data:(7270112-->49646452)
Executing TiMOS image at 0x60100000
```

Step 7. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x68
TiMOS-B-26.9.B1-4 both/ARMiproc Nokia SAS-Dxp16p 10T4F2SFP+ ETR 7210 Copyright (c)
 2000-2026 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Fri Sep 11 11:27:16 IST 2026 by sasbuild in /home/sasbuild/26.9B1
```


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```
  ___                  ___          ___          ___
 /\  \                /\__\        /\  \        /\  \
 \:\  \       ___     /::|  |      /::\  \       /::\  \
  \:\  \     /\__\   /:|:|  |     /:/\:\  \     /:/\:\  \
  /::\  \   _\/__/  /:/|:|__|__   /:/  \:\  \   _\:\~\:\  \
 /:/\:\__\ /\__\   /:/ |::::\__\ /:/__/ \:\__\ /\ \:\ \:\__\
 \/__\/__/ \:/  /   \/__/~~/:/  / \:\  \ /:/  / \:\ \:\ \/__/
      /:/  /          /:/  /   \:\  /:/  /   \:\ \:\__\
     /:/  /          /:/  /     \:\/:/  /     \:\/:/  /
    /:/  /          /:/  /       \::/  /       \::/  /
    \/__/           \/__/         \/__/         \/__/

Running 32 bit architecture
Time from clock is THU JAN 01 00:11:06 2026 UTC
lldpInit done

Attempting to exec primary configuration file:
   'cf1:/default.cfg' ...

MAJOR: CLI #1013 The system will be reconfigured without persistent indexes because
 there is a mismatch between configuration and SDX files.
System Configuration
System Security Configuration
Log Configuration
Port Configuration
Service Configuration
Static Route Configuration
Executed 124 lines in 0.2 seconds from file cf1:\default.cfg


Attempting to exec successful configuration extension file:
    'cf1:/env.cfg' ...

Further access may require a token with the following parameters
Current Time:  THU JAN 01 00:00:02 UTC 2026
Token version: 1
System nonce:  Nm0wYk6bDSKkH51oz5/CJabmfrcBn/99+zlSKChUSiQ=
Session info:  BbFad0ey+byfljkMoWkyTeZ8KLfB548F93nx7MKKwJU=
OLD PASSWORDS EXECUTED

Further access may require a token with the following parameters
Current Time:  THU JAN 01 00:00:02 UTC 2026
Token version: 1
System nonce:  Nm0wYk6bDSKkH51oz5/CJabmfrcBn/99+zlSKChUSiQ=
Session info:  BbFad0ey+byfljkMoWkyTeZ8KLfB548F93nx7MKKwJU=
NEW TOKEN PASSWORDS EXECUTED
Result of 'StartNetLog' = 0 = 0x0
Reboot on Crash : OFF
Result of 'CrashReboot' = 0 = 0x0
Executed 129 lines in 0.7 seconds from file cf1:\env.cfg
user31 -  Router-1
Login: admin
Password:
A:Router-1#
```

Step 8. At the prompt, enter “admin” for the default username and password, and log in to the 7210 SAS device.

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8.2 Procedures to boot using manual mode

Note:
The manual mode is supported on all 7210 SAS platforms, except those operating in satellite mode.

This section describes the procedures to boot the 7210 SAS from the network or flash using the manual mode.

The manual mode can be used to boot the 7210 SAS device in the following scenarios:

- user boots the device for the first time
- user boots the device after a reset to the factory default settings, or after executing the **admin>reboot auto-init** command (this command is not supported on the 7210 SAS-R6 and 7210 SAS-R12, and 7210 SAS platforms configured in the standalone-VC mode of operation)

In all scenarios, the user must create a local BOF by connecting a console to the node and interrupting the boot process to configure the BOF parameters. The following sections provide the details for configuring the BOF parameters under different scenarios.

The manual mode has two options:

- 7210 SAS device is booted from the local image on flash; see section Procedure to boot from the image on flash in manual mode (supported on all 7210 SAS platforms, except those operating in the satellite mode)
- 7210 SAS device is booted from the network using an uplink port (section Procedure to boot from the network in manual mode using uplink ports; supported on all 7210 SAS platforms, except the 7210 SAS-R6 and 7210 SAS-R12) or the Ethernet management port (section Procedure to boot from the network in manual mode using the OOB Ethernet management port; supported on all 7210 SAS platforms when the Ethernet management port is available)

8.2.1 Procedure to boot from the image on flash in manual mode

About this task

Note:
This procedure is not supported for 7210 SAS platforms configured in the satellite mode of operation.

7210 SAS platforms that are factory-shipped with the `boot.tim` and `both.tim` (TiMOS image) on the internal flash attempt to boot using the auto-init mode when they are booted for the first time from factory. If the auto-init mode fails, the node loads with the image on the flash. If the user wants to continue using this image, they must connect to a console and execute the **admin auto-init stop** command in the TiMOS prompt. If the user does not execute this command, the device reboots and attempts the auto-init mode procedure again.

For the 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C, 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-T, the user must buy a software license that is factory-shipped with the TiMOS image on a flash or SD card device. The user must plug the flash or SD card device in the designated slot for the external flash or SD card device and power on the unit.

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Note:
See the corresponding 7210 SAS chassis installation guide for information about equipment required to setup the device.

Perform the following steps to boot the system in the manual mode from the local image on the flash:

Procedure

Step 1. Connect the 7210 SAS console port to the serial port of the PC, and power on the 7210 SAS device. The system starts booting and the following console output is displayed.

Example

```
Nokia 7xxx Boot ROM. Copyright 2000-2020 Nokia.
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Build: X-20.3.B1-1 on Wed Feb 12 15:29:52 IST 2020 by sasbuild
Version: 0x38
Processor core is CN66xx
COLD boot on processor #1
?Preparing for jump to RAM...
Starting bootrom RAM code...
Boot rom version is v56
CPU #1 booted from working sector
CPU Control FPGA version is 0x3D
FPGA A version is 0x3D. FPGA B version is 0x3D. FPGA C version is 0x3D.
Restart type = 0x01
>>>Validate SDRAM from 0x000000007fdfff80 to 0x0000000080000000 (decrementing)
>>>Testing  SDRAM from 0x0000000002200000 to 0x000000007fdfff80
>>>Testing  SDRAM from 0xffffffffe0000000 to 0xffffffffe2000000
Power on Diagnostics passed
Board Serial Number is 'NS1720T0009'

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-V-20.3.B1-1 bootrom/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
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Built on Wed Feb 12 15:28:49 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/m

Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Version L-20.3.B1-1, Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(13818400-->40990080) + data:(3162656-->19580220)
Starting at 0x18000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-L-20.3.B1-1 boot/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
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Built on Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/
main

TiMOS BOOT LOADER
Time from clock is SUN MAR 15 15:19:08 2020 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : factory-default
```

Step 2. The system lists the default settings and the following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading
Contents of Boot Options File on cf1:
```


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```
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/65
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/66
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
Hit a key within 3 seconds to change boot parameters...
```

Step 3. At the prompt, press any key to initiate boot parameter updates. The following console output is displayed.

Example

```
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Waiting for 30 seconds to enter password
Password:
```

Step 4. At the prompt, enter the default password `password`, and initiate the BOF edit.

The system accepts the password and the following console output is displayed.

Example

```
You must supply some required Boot Options. At any prompt, you can type:
"restart" - restart the query mode.
"reboot" - reboot.
"exit" - boot with with existing values.
"diag" - enter the diag shell.
"reset" - reset the bof and reboot.

Press ENTER to begin, or 'flash' to enter firmware update...
```

Step 5. At the prompt, press **Enter** to edit the BOF. The following console output is displayed.

Example

```
Chassis-Role
-------------
Current chassis-role is : factory-default
You can change it to { satellite | standalone }.
Press ENTER to continue OR "edit" to change the chassis-role :
Chassis-role is set to factory-default, Do you wish to continue with this (yes/no) :
```

Step 6. At the prompt, enter `yes`. The following console output is displayed.

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Example

```
Software Location
-----------------
   You must enter the URL of the TiMOS software.
   The location can be on a Compact Flash device,
   a USB flash drive, or on the network.

   Here are some examples
      cf1:/timos1.0R1
      uf1:/timos1.0R1
      ftp://user:passwd@192.168.1.150/./timos1.0R1
      ftp://user:passwd@[3FFE::1]/./timos1.0R1

or Type 'auto' to retrieve BOF configuration through DHCP.

Software Image URL:
```

Step 7. At the prompt, enter the location of the image.

In factory-shipped 7210 SAS devices, the image is typically available at `cf1:\both.tim` or `cf2:\both.tim`.

The following console output is displayed.

Example

```
Configuration File Location
---------------------------
   You must enter the location of configuration
   file to be used by TiMOS.  The file can be on
   a Compact Flash device, a USB flash drive, or
   on the network.

   Here are some examples
      uf1:/config.cfg
      cf1:/config.cfg
      ftp://user:passwd@192.168.1.150/./config.cfg
      ftp://user:passwd@[3FFE::1]/./config.cfg
      tftp://192.168.1.150/./config.cfg
      tftp://[3FFE::1]/./config.cfg

Config File URL:
```

Step 8. Enter the location of the configuration file, or press **Enter** to skip this step.

The following console output is displayed.

Example

```
Current configuration enables use of console (setting is "no console-disabled")
Press ENTER to proceed with existing setting  or 'disable' to disable console access
:
```

Step 9. At the prompt, press **Enter**. The following console output is displayed.

Example

```
New Settings
------------
    primary-image      cf2:/both.tim
    primary-config     uf1:/sassx64.cfg
#eth-mgmt Port Settings:
```


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```
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/65
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/66
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
Do you want to overwrite cf1:/bof.cfg with the new settings? (yes/no):
```

Step 10. At the prompt, enter `yes`. The 7210 SAS device begins to boot with the new settings. The following console output is displayed.

Example

```
Successfully saved the new settings in cf1:/bof.cfg

Configuring Network with uplinkA Port Setting.....
Primary config file present at: uf1:/sassx64.cfg

Skipping missing or bad Sap index file 'uf1:/sassx64.sdx'

Primary image location: cf2:/both.tim
Loading image cf2:\both.tim
Version B-20.3.B1-1, Wed Feb 12 15:33:08 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(41664192-->183719312) + data:(7133216-->49945144)
Executing TiMOS image at 0x2800000
```

Step 11. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
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Built on Wed Apr 20 14:32:04 IST 2011 by builder in /builder/3.0B5/panos/main
Login:
```

Step 12. At the prompt, enter `admin` for the default username and password, and log into the 7210 SAS device.

Note:
The SYS LED is green after the device has successfully completed the boot process and is running normally.

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8.2.2 Procedure to boot from the network in manual mode using uplink ports

About this task

Note:
This procedure is supported on all 7210 SAS platforms, except the 7210 SAS-R6 and 7210 SAS-R12, and all platforms configured in the satellite mode of operation.

Perform this procedure to boot a 7210 SAS device from the network without using the auto-init mode.

Note:
See the corresponding 7210 SAS chassis installation guide for information about equipment required to setup the device.

The front panel ports (referred to as uplinkA and uplinkB in the sample output used in this procedure) are used to boot the device from the network.

Note:
Nokia recommends that the TiMOS image should be stored on the internal flash so that it is available for use in the case where booting the system from the flash is required later on subsequent reboot.

Perform the following steps to boot from the network in the manual mode using uplink ports.

Procedure

Step 1. Power on the 7210 SAS device.

Step 2. Use the uplink ports to boot from the network.

Example

```
Nokia SASDxp 7210 Boot ROM. Copyright 2000-2020 Nokia.
All rights reserved. All use is subject to applicable license agreements.
Build: X-20.3.B1-1 on Wed Feb 12 15:29:18 IST 2020 by sasbuild
Version: 0x8
SASDxp-DC Board
Shmoo tuning data in flash is valid, load it
DDR Tuning Complete.
Passed!
Copying code from FLASH to RAM....
Done
Board CPLD Version: 0x0e
Reboot Reason: 0x05
Boot rom version is v8
>>> RAM: Testing DDR Passed!
Board Serial Number is 'NS1917T0023'
DDR Tuning Complete.

Tuning values already saved. Skip saving to flash.
Memory Test Passed!
Jumping to vxrom at 0x61400000 now.................

^[[6~^[[6~
Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Version L-20.3.B1-1, Wed Feb 12 15:30:14 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(12972416-->39659312) + data:(4504352-->20039220)
```


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```
Starting at 0x6f000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x4e
TiMOS-L-20.3.B1-1 boot/ARMiproc Nokia SAS-Dxp 6T4F2SFP+ 7210 Copyright (c) 2000-
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Built on Wed Feb 12 15:30:14 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/m

TiMOS BOOT LOADER
Time from clock is SUN MAR 15 05:09:48 2020 UTC
Switching serial output to sync mode...   done
```

Step 3. The system lists the default settings and the following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading
Contents of Boot Options File on cf1:
#uplinkA Port Settings:
    uplinkA-port       1/1/11
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/12
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled
Hit a key within 1 second to change boot parameters...
```

Step 4. At the prompt, press any key to initiate boot parameter updates. The following console output is displayed.

Example

```
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Waiting for 30 seconds to enter password
Password:
```

Step 5. At the prompt, enter the default password `password`. The system accepts the password and the following console output is displayed.

Example

```
You must supply some required Boot Options. At any prompt, you can type:
"restart" - restart the query mode.
"reboot"  - reboot.
"exit"    - boot with with existing values.
"diag"    - enter the diag shell.
"reset"   - reset the bof and reboot.
```


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```
Press ENTER to begin, or 'flash' to enter firmware update...
```

Step 6. At the prompt, press **Enter** to initiate the update. The following console output is displayed.

Example

```
Software Location
-----------------
   You must enter the URL of the TiMOS software.
   The location can be on a Compact Flash device,
 or on the network.

   Here are some examples
      cf1:/timos1.0R1
      ftp://user:passwd@192.168.1.150/./timos1.0R1
      ftp://user:passwd@[3FFE::1]/./timos1.0R1

or Type 'auto' to retrieve BOF configuration through DHCP.

Software Image URL:
```

Step 7. At the prompt, enter the URL location of the software; for example, `ftp://<user>:<password>@10.10.170.22/./images/both.tim`. The following console output is displayed.

Example

```
Configuration File Location
---------------------------
   You must enter the location of configuration
   file to be used by TiMOS.  The file can be on
   a Compact Flash device, or on the network.

   Here are some examples
      cf1:/config.cfg
      ftp://user:passwd@192.168.1.150/./config.cfg
      ftp://user:passwd@[3FFE::1]/./config.cfg
      tftp://192.168.1.150/./config.cfg
      tftp://[3FFE::1]/./config.cfg

Config File URL:
```

Step 8. At the prompt, enter the URL location of the configuration file. The following console output is displayed.

Example

```
Boot Interface Management
-------------------------
   You specified a network location for either the
   software or the configuration file. You need to
   configure either eth-mgmt or uplinkA or uplinkB ports.
   You will be asked to configure the port number, IP(v6) address,
   static routes, and VLAN Id in case of uplink ports.

Existing uplinkA port settings are:

   uplinkA-port       1/1/11
   no uplinkA-autoneg
   uplinkA-duplex     full
   uplinkA-speed      10000
```


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```
   uplinkA-address    0
   uplinkA-address    0
   uplinkA-vlan       0

   uplinkA port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:
```

Step 9. At the prompt, enter `edit` to change the port settings. The following console output is displayed.

Example

```
Existing uplinkA port for Boot Interface Management is port 1/1/11.
Press ENTER to keep it.
Enter the new uplinkA port number for Boot Interface Management:
```

Step 10. At the prompt, enter the front-panel port that is connected to the network (for example, 1/1/10). The following console output is displayed.

Example

```
Enter uplinkA speed and duplex settings:
```

Step 11. At the prompt, enter uplink port speed and duplex settings The following console output is displayed.

Example

```
Auto-Negotiation is currently disabled.
Press ENTER to proceed with existing setting or 'auto' to enable auto-negotiation.
auto
Auto-negotiation will be enabled on uplinkA port.

   You need to configure the VLAN Id for this port
   VLAN Id can be between 0 to 4094. To send out
   packets with out any VLAN tags, type "null".

Existing VLAN Id for uplinkA port is VLAN Id 0.
Press ENTER to keep it.
Enter the new VLAN Id for uplinkA port:
```

Step 12. At the prompt, perform one of the following.

- Enter `null` to send out packets without VLAN tags.
- Enter the a VLAN tag ID for the uplink port.

The following console output is displayed.

Example

```
Using port 1/1/1 as uplinkA port for Boot Interface Management

   You need to assign an IP address for this port.
   The IP address should be entered in standard
   dotted-decimal form with a network length.
   example:   192.168.1.169/24
   Or type "0" to obtain IP address and static route
   through DHCP. Existing IP address and static routes
   will be deleted.
```


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```
Enter uplinkA  IP Address (Type 0 if none desired):
```

Step 13. At the prompt, enter the port IP address and mask that the device should use (for example, 10.135.4.172/10).

Step 14. Because the FTP server is on a different subnet, enter the IP routing information. The following console output is displayed.

Example

```
You specified network locations which might require
static routes to reach. You will be asked to
enter static routes until all the locations become
reachable.
Static routes should be entered in the following format:
prefix/mask next-hop ip-address
example:     192.168.0.0/16 next-hop 192.168.1.254

Would you like to add a static route? (yes/no)
```

Step 15. At the prompt, type `yes` and press **Enter** to add a static route.

Example

```
Enter route:
```

Step 16. Enter a static route to the FTP server subnet (for example, 10.10.170.0/10 next-hop 10.135.4.1). The following console output is displayed.

Example

```
Existing uplinkB port settings are:

   uplinkB-port       1/1/12
   no uplinkB-autoneg
   uplinkB-duplex     full
   uplinkB-speed      10000
   uplinkB-address    0
   uplinkB-address    0
   uplinkB-vlan       0

   uplinkB port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:
```

Step 17. At the prompt, press **Enter** to proceed existing port settings. The following console output is displayed.

Example

```
Current configuration enables use of console (setting is "no console-disabled")
Press ENTER to proceed with existing setting  or 'disable' to disable console access
:
```

Step 18. At the prompt, press **Enter** to proceed with the existing settings. The following console output is displayed.

Example

```
New Settings
```


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```
------------
    primary-image      ftp://*:*@192.254.173.17/usr/global/images/20.3/B1-1/7xxx/
bcmiproc-both.tim
    primary-config     ftp://*:*@192.254.173.5/tmp/dxp/dxp2537.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    10.135.25.37/24
    uplinkA-vlan       null
    uplinkA-route      192.0.0.0/8 next-hop 10.135.25.1
#uplinkB Port Settings:
    uplinkB-port       1/1/12
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled

Do you want to overwrite cf1:/bof.cfg with the new settings? (yes/no):
```

Step 19. Enter `yes` to overwrite the `bof.cfg` file. The 7210 SAS device starts booting. The following console output is displayed.

Example

```
Successfully saved the new settings in cf1:/bof.cfg

Configuring Network with uplinkA Port Setting.....
Primary config file location: ftp://*:*@192.254.173.5/tmp/dxp/dxp2537.cfg
Initializing uplinkA port using IP addr 10.135.25.37.
Port 1/1/1-->Mode:Fix-Cu, Speed:100, Duplex:Full Autoneg: On, Link:Up.
Initial DNS resolving preference is ipv4-only
Downloading 'ftp://*:*@192.254.173.5/tmp/dxp/dxp2537.cfg'...OK

Sap Index file location: ftp://*:*@192.254.173.5/tmp/dxp/dxp2537.sdx
Downloading 'ftp://*:*@192.254.173.5/tmp/dxp/dxp2537.sdx'...OK

Primary image location: ftp://*:*@192.254.173.17/usr/global/images/20.3/B1-1/7xxx/
bcmiproc-both.tim
Port 1/1/1-->Mode:Fix-Cu, Speed:100, Duplex:Full Autoneg: On, Link:Up.
Initial DNS resolving preference is ipv4-only
Loading image ftp://*:*@192.254.173.17/usr/global/images/20.3/B1-1/7xxx/bcmiproc-
both.tim
Version B-20.3.B1-1, Wed Feb 12 15:32:56 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(41388544-->175510640) + data:(6606080-->43372008)
Executing TiMOS image at 0x60100000
```

Step 20. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
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Built on Wed Apr 20 22:44:35 IST 2011 by builder in /builder/3.0B5/R4/panos/main
```


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```
Login:
```

Step 21. At the prompt, enter `admin` for the default username and password, and log into the 7210 SAS device.

Example

Note:
The Sys LED is green when the device has successfully completed the boot process and is running normally.

8.2.3 Procedure to boot from the network in manual mode using the OOB Ethernet management port

About this task

Note:
This procedure is not supported for 7210 SAS platforms configured in the satellite mode of operation. This procedure is supported on all 7210 SAS platforms that are equipped with an OOB Ethernet management port.

Perform the following steps to boot from the network using the OOB Ethernet management port without using the auto-init mode.

Procedure

Step 1. Power on the 7210 SAS device.

Step 2. Use the OOB Ethernet Management port to boot from the network.

Example

```
Nokia 7xxx Boot ROM. Copyright 2000-2020 Nokia.
All rights reserved. All use is subject to applicable license agreements.
Build: X-20.3.B1-1 on Wed Feb 12 15:29:52 IST 2020 by sasbuild
Version: 0x38
Processor core is CN66xx
COLD boot on processor #1
?Preparing for jump to RAM...
Starting bootrom RAM code...
Boot rom version is v56
CPU #1 booted from working sector
CPU Control FPGA version is 0x3D
FPGA A version is 0x3D. FPGA B version is 0x3D. FPGA C version is 0x3D.
Restart type = 0x01
>>>Validate SDRAM from 0x000000007fdfff80 to 0x0000000080000000 (decrementing)
>>>Testing  SDRAM from 0x0000000002200000 to 0x000000007fdfff80
>>>Testing  SDRAM from 0xffffffffe0000000 to 0xffffffffe2000000
Power on Diagnostics passed
Board Serial Number is 'NS1720T0009'

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-V-20.3.B1-1 bootrom/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
2020 Nokia.
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Built on Wed Feb 12 15:28:49 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/m

Searching for boot.tim on local drives:
```


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```
Attempting to load file cf1:/boot.tim
Version L-20.3.B1-1, Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(13818400-->40990080) + data:(3162656-->19580220)
Starting at 0x18000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-L-20.3.B1-1 boot/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
2020 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/
main

TiMOS BOOT LOADER
Time from clock is THU MAR 12 17:12:50 2020 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : factory-default
```

Step 3. The system lists the default settings and the following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading
Contents of Boot Options File on cf1:
    primary-image      ftp://*:*@192.254.173.3/tmp/sass/b/both.tim
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   10.135.25.36/24 active
    eth-mgmt-route     192.0.0.0/8 next-hop 10.135.25.1
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#uplinkA Port Settings:
    uplinkA-port       1/1/65
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/66
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
Hit a key within 3 seconds to change boot parameters...
```

Step 4. At the prompt, press any key to initiate boot parameter updates.

Example

The following console output is displayed.

```
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Waiting for 30 seconds to enter password
```


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```
Password:
```

Step 5. At the prompt, enter the default password `password`.

The system accepts the password and the following console output is displayed.

Example

```
You must supply some required Boot Options. At any prompt, you can type:
"restart" - restart the query mode.
"reboot"  - reboot.
"exit"    - boot with with existing values.
"diag"    - enter the diag shell.
"reset"   - reset the bof and reboot.

Press ENTER to begin, or 'flash' to enter firmware update...
```

Step 6. At the prompt, press **Enter** to initiate the update. The following console output is displayed.

Example

```
Chassis-Role
------------
Current chassis-role is : factory-default
You can change it to { satellite | standalone }.
Press ENTER to continue OR "edit" to change the chassis-role :
Chassis-role is set to factory-default, Do you wish to continue with this (yes/no) :
```

Step 7. At the prompt, enter `yes`. The following console output is displayed.

Example

```
Software Location
-----------------
You must enter the URL of the TiMOS software.
The location can be on a Compact Flash device,
or on the network.

Here are some examples
cf1:/timos1.0R1
ftp://user:passwd@192.168.1.150/./timos1.0R1
tftp://192.168.1.150/./timos1.0R1

Software Image URL:
```

Step 8. At the prompt, enter the URL location of the software; for example, `ftp://<user>:<password>@10.10.170.22/./images/both.tim`.

The following console output is displayed.

Example

```
Configuration File Location
---------------------------
You must enter the location of configuration
file to be used by TiMOS.  The file can be on
a Compact Flash device, or on the network.

Here are some examples
cf1:/config.cfg
ftp://user:passwd@192.168.1.150/./config.cfg
tftp://192.168.1.150/./config.cfg
```


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```
No existing Config URL
Press ENTER, or type 'none' for no Config URL.
Config File URL:
```

Step 9. At the prompt, enter `none`. The following console output is displayed.

Example

```
Boot Interface Management
-------------------------
   You specified a network location for either the
   software or the configuration file. You need to
   configure either eth-mgmt or uplinkA or uplinkB ports.
   You will be asked to configure the port number, IP(v6) address,
   static routes, and VLAN Id in case of uplink ports.

Existing eth-mgmt port settings are:
   eth-mgmt-port
   eth-mgmt-address    10.135.25.36/24
   eth-mgmt-address    0
   eth-mgmt-route      192.0.0.0/8 next-hop 10.135.25.1

   eth-mgmt port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:
```

Step 10. At the prompt, enter `edit` to change the port settings. The following console output is displayed.

Example

```
You need to assign an IP address for this port.
   The IP address should be entered in standard
   dotted-decimal form with a network length.
   example:   192.168.1.169/24
The existing eth-mgmt  IP address is 10.135.25.36/24. Press ENTER to keep it.
Enter eth-mgmt  IP Address (Type 0 if none desired):
```

Step 11. At the prompt, enter the port IP address and mask that the device should use (for example, 10.135.4.172/10). The following console output is displayed.

Example

```
In case of an IPv6, the IPv6 address should be
   entered in standard colon hexadecimal notation
   with a prefix length.
       example:   3FFE::1/112

Enter eth-mgmt  IPv6 Address (Type 0 if none desired):
```

Step 12. At the prompt, enter 0. The following console output is displayed.

Example

```
No eth-mgmt IPv6 Address configured

   You specified network locations which might require
   static routes to reach. You will be asked to
   enter static routes until all the locations become
   reachable.
   Static routes should be entered in the following format:
   prefix/mask next-hop ip-address
```


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```
   example:     192.168.0.0/16 next-hop 192.168.1.254

A static route to the Primary Image exists: 192.0.0.0/8 next-hop 10.135.25.1
Do you want to keep it? (yes/no)
```

Step 13. At the prompt, enter no. The following console output is displayed.

Example

```
Enter route to Primary Image at 192.254.173.3:
```

Step 14. At the prompt, enter the static route for the specified primary image location. The following console output is displayed.

Example

```
A static route to the Primary Config exists: 192.0.0.0/8 next-hop 10.135.25.1
Do you want to keep it? (yes/no)
```

Step 15. At the prompt, enter yes. The following console output is displayed.

Example

```
Enter route to Primary Config at 192.254.173.3 192.0.0.0/8 next-hop 10.135.25.1
```

Step 16. At the prompt, enter a static route for the specified primary configuration location. The following console output is displayed.

Example

```
Would you like to add a static route? (yes/no)
```

Step 17. At the prompt, enter yes. The following console output is displayed.

Example

```
Enter ip route:
```

Step 18. At the prompt, enter a static route to the FTP server subnet (for example, 10.10.170.0/10 next-hop 10.135.4.1). The following console output is displayed.

Example

```
Would you like to add another static route? (yes/no)
```

Step 19. At the prompt, enter no. The following console output is displayed.

Example

```
Would you like to add another static IPv6 route?
```

Step 20. At the prompt, enter no. The following console output is displayed.

Example

```
Existing uplinkA port settings are:

   uplinkA-port       1/1/65
   no uplinkA-autoneg
   uplinkA-duplex     full
```


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```
   uplinkA-speed      100000
   uplinkA-address    0
   uplinkA-address    0
   uplinkA-vlan       0

   uplinkA port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:
```

Step 21. At the prompt, enter `disable` to proceed with no backup link. The following console output is displayed.

Example

```
Existing uplinkB port settings are:

   uplinkB-port       1/1/66
   no uplinkB-autoneg
   uplinkB-duplex     full
   uplinkB-speed      100000
   uplinkB-address    0
   uplinkB-address    0
   uplinkB-vlan       0

   uplinkB port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:
```

Step 22. At the prompt, enter `disable` to proceed with no backup link. The following console output is displayed.

Example

```
Current configuration enables use of console (setting is "no console-disabled")
Press ENTER to proceed with existing setting  or 'disable' to disable console access
:
```

Step 23. At the prompt, press **Enter**. The following console output is displayed.

Example

```
New Settings
------------
    primary-image      ftp://*:*@192.254.173.3/tmp/sass/b/both.tim
    primary-config     ftp://*:*@192.254.173.3/tmp/sass/sassx64.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   10.135.25.36/24 active
    eth-mgmt-route     10.135.0.0/16 next-hop 10.135.25.1
    eth-mgmt-route     192.0.0.0/8 next-hop 10.135.25.1
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#uplinkA Port Settings:
    uplinkA-port       1/1/65
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
```


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```
#uplinkB Port Settings:
    uplinkB-port       1/1/66
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled

Do you want to overwrite cf1:/bof.cfg with the new settings? (yes/no):
```

Step 24. At the prompt, enter `yes`. The following console output is displayed.

Example

```
Successfully saved the new settings in cf1:/bof.cfg

Configuring Network with eth-mgmt Port Setting.....
Primary config file location: ftp://*:*@192.254.173.3/tmp/sass/sassx64.cfg
Initial DNS resolving preference is ipv4-only
Downloading 'ftp://*:*@192.254.173.3/tmp/sass/sassx64.cfg'...OK

Sap Index file location: ftp://*:*@192.254.173.3/tmp/sass/sassx64.sdx
Downloading 'ftp://*:*@192.254.173.3/tmp/sass/
sassx64.sdx'...Cannot open input file ftp://*:*@192.254.173.3/tmp/sass/sassx64.sdx
0 files copied
Failed

Primary image location: ftp://*:*@192.254.173.3/tmp/sass/b/both.tim
Initial DNS resolving preference is ipv4-only
Loading image ftp://*:*@192.254.173.3/tmp/sass/b/both.tim
Version B-20.3.B1-1, Wed Feb 12 15:33:08 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(41664192-->183719312) + data:(7133216-->49945144)
Executing TiMOS image at 0x2800000
=================================================
```

Step 25. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
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Built on Wed Apr 20 22:44:35 IST 2011 by builder in /builder/3.0B5/R4/panos/main
Login:
```

Step 26. At the prompt, enter `admin` for the default username and password, and log into the 7210 SAS device.

Note:
The Sys LED is green when the device has successfully completed the boot process and is running normally.

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8.3 Procedure to boot when the BOF is present locally

About this task

This section describes the procedure to boot the 7210 SAS after a reboot, when the BOF and image files are present locally, or when the node is shipped from factory with a BOF and an image on the flash.

See Table 19: Contents shipped with the system on 7210 SAS for a list of factory-shipped contents for each 7210 SAS device.

Procedure

Step 1. Execute a reboot of the 7210 SAS device. The system starts booting and the following console output is displayed.

Example

```
Resetting...OK

Nokia 7xxx Boot ROM. Copyright 2000-2020 Nokia.
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Build: X-20.3.B1-1 on Wed Feb 12 15:29:52 IST 2020 by sasbuild
Version: 0x38
Processor core is CN66xx
COLD boot on processor #1
?Preparing for jump to RAM...
Starting bootrom RAM code...
Boot rom version is v56
CPU #1 booted from working sector
CPU Control FPGA version is 0x3D
FPGA A version is 0x3D. FPGA B version is 0x3D. FPGA C version is 0x3D.
Restart type = 0x01
>>>Validate SDRAM from 0x000000007fdfff80 to 0x0000000080000000 (decrementing)
>>>Testing  SDRAM from 0x0000000002200000 to 0x000000007fdfff80
>>>Testing  SDRAM from 0xffffffffe0000000 to 0xffffffffe2000000
Power on Diagnostics passed
Board Serial Number is 'NS1715T0019'

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-V-20.3.B1-1 bootrom/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
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Built on Wed Feb 12 15:28:49 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/m

Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Cannot open "cf1:/boot.tim".
Attempting to load file cf2:/boot.tim
Cannot open "cf2:/boot.tim".
Attempting to load file uf1:/boot.tim
Version L-20.3.B1-1, Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(13818400-->40990080) + data:(3162656-->19580220)
Starting at 0x18000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-L-20.3.B1-1 boot/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
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Built on Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/
main
```


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```
TiMOS BOOT LOADER
Time from clock is WED MAR 04 11:18:16 2020 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : standalone

Looking for uf1:/bof.cfg ... OK, reading
```

Step 2. The system locates the BOF on a local drive. The system reads the contents of the BOF and displays it on the console.

The following console output is displayed.

Example

```
Contents of Boot Options File on uf1:
    primary-image      uf1:\both.tim
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/67
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/68
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled

Hit a key within 1 second to change boot parameters...
```

Step 3. At the prompt, wait until the specified wait time has elapsed. The boot process can be interrupted at the prompt if necessary to change the boot parameters (for example, the image location). In this example, it is assumed that changes to the BOF are not required.

The following console output is displayed.

Example

```
Configuring Network with uplinkA Port Setting.....
No existing config file URL

Primary image location: uf1:\both.tim
Loading image uf1:\both.tim
Version B-20.3.B1-1, Wed Feb 12 15:33:08 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(41664192-->183719312) + data:(7133216-->49945144)
Executing TiMOS image at 0x2800000
```

Step 4. The system loads the TiMOS image and the 7210 SAS device boots up. The following console output is displayed.

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Example

```
Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-B-20.3.B1-1 both/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
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All rights reserved. All use subject to applicable license agreements.
Built on Wed Feb 12 15:33:08 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/
main
Running 32 bit architecture
Time from clock is WED MAR 04 11:19:24 2020 UTC
Login:
```

Step 5. At the prompt, enter `admin` for the default username and password, and log in to the 7210 SAS device.

8.4 Procedure to boot in the satellite mode

About this task

Note:
See Table 1: Supported modes of operation and configuration methods for the list of 7210 SAS platforms that support the satellite mode of operation.

See System boot options for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE in satellite mode for information about the satellite mode on 7210 SAS devices.

See the specific 7210 SAS chassis installation guide for more information about prerequisites to boot the system in the satellite mode of operation.

Perform the following steps to boot the 7210 SAS device in the satellite mode of operation.

Procedure

Step 1. Configure the 7750 SR host with the 7210 SAS `both.tim` image location (the software repository).

a. Create the software repository to store the images by using the **software-repository** command:

Example

```
*A:dut-h# configure system software-repository “7210-SAS-Sx-9.0R7-Images” create
```

b. Provide a description for the software repository by using the **description** command:

Example

```
*A:dut-h>config>system>sw-repos# description "7210-SAS-Sx-Release-9.0R7-Images"
```

c. Manually copy the `boot.tim` and `both.tim` files to the repository created in step 1.a.

Do not copy the files to a sub-folder in the repository.

d. Configure the location of the 7210 SAS `both.tim` and `boot.tim` by using the **primary-location** command:

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Example

```
*A:dut-h>config>system>sw-repos# primary-location "cf1:/7210-SAS-Sx-9.0R7/images/"
```

e. From the **config**>**system**>**software-repository** context, issue the **info** command to verify the configuration of the image location. The following output is displayed.

Example

```
*A:dut-h>config>system>sw-repos# info
----------------------------------------------------------------
            description "7210-SAS-Sx-Release-9.0R7-Images"
            primary-location "cf1:/7210-SAS-Sx-9.0R7/images/"
----------------------------------------------------------------
*A:dut-h>config>system>sw-repos#
```

Step 2. Configure the Ethernet satellite on the 7750 SR host.

See Table 20: Uplink ports used for 7210 SAS platforms and variants in satellite mode for information about uplink ports used on 7210 SAS platforms operating in the satellite mode.

Note:
In this example, the 7210 SAS device is identified by satellite ID 1 and its type is set to es64-10gb-sfpp+4-100gb-qsfp28. The satellite identifier (that is, esat-1, in this example) is used to refer to the entire satellite node when configuring services on the 7750 SR host.

a. Configure the Ethernet satellite with ID 1 by using the **eth-sat** command:

Example

```
*A:dut-h#configure system satellite eth-sat 1 create
```

b. Configure the Ethernet satellite description by using the **description** command:

Example

```
A:dut-h>config>system>eth-sat# description “Ethernet Satellite 1”
```

c. Configure the 7210 SAS device MAC address connected to the 7750 SR host by using the **mac-address** command:

Example

```
A:dut-h>config>system>eth-sat#mac-address a4:7b:2c:13:bc:48
```

The MAC address is used by the 7750 SR host to provide the correct configuration to the system. If the MAC address is not configured, the 7750 SR host will not respond to DHCP requests from the system.

d. Configure the software repository by using the **software-repository** command:

Example

```
*A:dut-h>config>system>eth-sat# software-repository “7210-SAS-Sx-9.0R7-Images”
```

The software repository provides the system with the correct image (both.tim). The software repository name must match the software repository created in step 1.

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e. Configure the satellite type by using the **sat-type** command:

Example

```
*A:dut-h>config>system>eth-sat# sat-type es64-10gb-sfpp+4-100gb-qsfp28
```

The satellite type allows the 7750 SR host to correctly initialize the satellite and set up the appropriate resources on the 7750 SR host to manage the satellite.

f. From the **config>system>eth-sat** context, issue the **info** CLI command to verify the configuration of the Ethernet satellite. The following output is displayed.

Example

```
*A:dut-h>config>system>eth-sat# info
----------------------------------------------
                shutdown
                description "ESat1OnPort1/1/1"
                mac-address a4:7b:2c:13:bc:48
                software-repository "7210-SAS-Sx-9.0R7-Images"
----------------------------------------------
*A:dut-h>config>system>eth-sat#
```

g. From the **config>system>eth-sat** context, issue the **no shutdown** command:

Example

```
*A:dut-h>config>system>eth-sat# no shutdown
```

h. On the 7750 host, for a 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 variant, configure the breakout connection on **esat-1/1/c65** (and any other uplink ports) by using the **config>port>esat-1/1/c65/1>connector>breakout c1-100g** command.

i. Power on the satellite.

Step 3. On the 7750 SR host, configure the port connected to the 7210 SAS device:

Note: See System boot options for 7210 SAS-Mxp, 7210 SAS-Sx 1/10GE, 7210 SAS-S 1/10GE, and 7210 SAS-Sx 10/100GE in satellite mode for more information about port numbers for the 7210 SAS-Sx 10/100GE operating in satellite mode.

a. On the 7750 SR host, configure the port to which the satellite is connected by using the **port** command:

Example

```
*A:dut-h# configure system port-topology port 1/1/1 to esat-1/1/c65/u1 create
```

b. Issue the **show system port-topology** command to display the 7750 SR host ports associated with the Ethernet satellite ports. The following output is displayed.

Example

```
*A:dut-h# show system port-topology
===============================================================================
Port Topology
===============================================================================
Port              Far-end
Id                Port Id
-------------------------------------------------------------------------------
```


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```
esat-1/1/c65/u1   1/1/1
-------------------------------------------------------------------------------
No. of Number of port-topology associations: 1
===============================================================================
```

c. Issue the **show system satellite** command to display the status of the satellite. The following output is displayed.

Example

```
*A:dut-h# show system satellite
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                        Admin         Oper
              Equipped Type (if different)        State         State
-------------------------------------------------------------------------------
esat-1    es64-10gb-sfpp+4-100gb-qsfp28           up            provisioned
              (not equipped)
-------------------------------------------------------------------------------
No. of Satellites: 1
===============================================================================
*A:dut-h#
```

Step 4. Power on the Ethernet satellite:

a. Power on the 7210 SAS device.

The satellite will use the bootloader on the SD card inserted in cf2:\ (SD card slot on the rear of the chassis) and initiate the boot procedure.

The 7210 SAS device sends DHCP requests out of its uplink ports.

The 7750 SR host uses the MAC address in the received packets and matches it against MAC addresses provided in the Ethernet satellite configuration on the 7750 SR host.

After finding a match, the 7750 SR host uses the configured image and an appropriate configuration file, generates a BOF, and sends it to the system (the **host-type** parameter in the BOF generated by the 7750 SR host is set to **satellite**).

The 7210 SAS boot loader uses the BOF to retrieve the images and the configuration file, and uses them to boot the platform in the satellite mode (because the **host-type** is set to **satellite**).

The satellite transitions through the following states: provisioned, booting, and up.

b. Issue the **show system satellite** command to determine the boot status of the satellite. The following output is displayed.

Example

```
*A:dut-h# show system satellite
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                        Admin         Oper
              Equipped Type (if different)        State         State
-------------------------------------------------------------------------------
esat-1    es64-10gb-sfpp+4-100gb-qsfp28           up            provisioned
              (not equipped)
-------------------------------------------------------------------------------
No. of Satellites: 1
===============================================================================
```


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```
*A:dut-h#
*A:dut-h# show system satellite
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                          Admin         Oper
              Equipped Type (if different)          State         State
-------------------------------------------------------------------------------
esat-1    es64-10gb-sfpp+4-100gb-qsfp28             up            booting
-------------------------------------------------------------------------------
No. of Satellites: 1
===============================================================================
*A:dut-h# show system satellite
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                          Admin         Oper
              Equipped Type (if different)          State         State
-------------------------------------------------------------------------------
esat-1    es64-10gb-sfpp+4-100gb-qsfp28             up            booting
-------------------------------------------------------------------------------
No. of Satellites: 1
===============================================================================
*A:dut-h# show system satellite
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                          Admin         Oper
              Equipped Type (if different)          State         State
-------------------------------------------------------------------------------
esat-1    es64-10gb-sfpp+4-100gb-qsfp28             up            up
-------------------------------------------------------------------------------
No. of Satellites: 1
===============================================================================
```

c. After the device has booted successfully, issue the **show system satellite eth-sat** command on the 7750 SR host to display detailed information about the 7210 SAS device connected in satellite mode.

The following output is displayed.

Example

```
*A:SR7# show system satellite eth-sat 15
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                          Admin         Oper
              Equipped Type (if different)          State         State
-------------------------------------------------------------------------------
esat-15   es64-10gb-sfpp+4-100gb-qsfp28             up            up
Description         : SASSx Mariner 100G QSFP28
MAC Address         : d0:99:d5:a6:34:41
Software Repository : SASS-HW64
SyncE               : Enabled
PTP-TC              : Disabled
Client-Down-Delay   : Disabled
Console Access      : Enabled
Hardware Data
    Platform type                : N/A
    Part number                  : 3HE11597AARA01
    CLEI code                    : INM3110ARA
    Serial number                : NS1734T0028
    Manufacture date             : 09182017
```


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```
    Manufacturing deviations      : (Not Specified)
    Manufacturing assembly number :
    Administrative state          : up
    Operational state             : up
    Temperature                   : 48C
    Temperature threshold         : 85C
    Software boot (rom) version   : X-11.0.R4 on Wed Jul 10 13:44:15 IST 2019
                                    by sasbuild
    Software version              : TiMOS-B-20.3.B1-3 both/hops Nokia SAS-Sx
                                    64SFP+4QSFP28 7210 Copyright (c) 2000-2020
                                    Nokia.
                                    All rights reserved. All use subject to
                                    applicable license agreements.
                                    Built on Fri Mar 20 16:50:24 IST 2020 by
                                    sasbuild in /home/sasbuild/20.3B1/panos/ma
    Time of last boot             : 2019/11/14 13:16:39
    Current alarm state           : alarm cleared
    Base MAC address              : d0:99:d5:a6:34:41
```

8.5 Procedure to boot in the standalone-VC mode

About this task

Note:

- This procedure is only supported on the 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and their variants.
- See Provisioning and booting up the VC in standalone mode for more information.

Perform the following steps to boot the 7210 SAS device in the standalone-VC mode of operation:

Procedure

Step 1. Power on the 7210 SAS device.

Step 2. Use the OOB Ethernet management port to boot form the network.

Example

```
A:NS1722T0086# admin reboot now

Resetting...OK

Nokia SAS-S 7210 Boot ROM. Copyright 2000-2018 Nokia.
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Build: X-11.0.B1-6 on Thu Dec 6 15:22:31 IST 2018 by sasbuild
Version: 0x1F

DRAM test first stage
?Boot rom version is v31
CPLD Version: 0x0C
Board Serial Number is 'NS1722T0086'
DRAM test second stage
>>>Testing  SDRAM from 0x0000000002200000 to 0x0000000080000000
>>>Testing  SDRAM from 0xffffffffe0000000 to 0xffffffffe2000000

Loading VxRom image .......

Board Serial Number is 'NS1722T0086'
```


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```
Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x14
TiMOS-V-11.0.B1-6 bootrom/hops Nokia SAS-S 24T4SFP+ 7210 Copyright (c) 2000-
2018 Nokia.
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Built on Thu Dec 6 15:21:48 IST 2018 by sasbuild in /home/sasbuild/11.0B1/panos/main

Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Version L-11.0.B1-21, Wed Feb 27 12:30:02 IST 2019 by sasbuild in /home/sasbuild/
11.0B1/panos/main
text:(13790784-->40910320) + data:(3160736-->19576100)
Starting at 0x18000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x14
TiMOS-L-11.0.B1-21 boot/hops Nokia SAS-S 24T4SFP+ 7210 Copyright (c) 2000-
2019 Nokia.
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Built on Wed Feb 27 12:30:02 IST 2019 by sasbuild in /home/sasbuild/11.0B1/panos/
main

TiMOS BOOT LOADER
Time from clock is SAT JAN 01 00:15:24 2000 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : standalone
```

Step 3. The system lists the default settings and the following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading

Contents of Boot Options File on cf1:
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/27
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled

Hit a key within 3 seconds to change boot parameters...
```

Step 4. At the prompt, press any key to initiate boot parameter updates.

The following console output is displayed.

Example

```
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Waiting for 30 seconds to enter password
Password:
```

Step 5. At the prompt, enter the default password `password`, and initiate the BOF edit.

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The system accepts the password and the following console output is displayed.

Example

```
You must supply some required Boot Options. At any prompt, you can type:
"restart" - restart the query mode.
"reboot" - reboot.
"exit" - boot with with existing values.
"diag" - enter the diag shell.
"reset" - reset the bof and reboot.

Press ENTER to begin, or 'flash' to enter firmware update...
```

Step 6. At the prompt, press **Enter** to edit the BOF. The following console output is displayed.

```
Chassis-Role
------------
Current chassis-role is : standalone
You can change it to { satellite | standalone-vc | factory-default }.
Press ENTER to continue OR "edit" to change the chassis-role : standalone-vc
Press "edit" to change OR ENTER to continue :
```

Step 7. At the prompt, enter `edit`. The following console output is displayed.

Example

```
Enter the new chassis-role { satellite | standalone-vc | factory-
default } :
```

Step 8. At the prompt, enter `standalone-vc` for the chassis-role. The following output is displayed.

Example

```
Are you sure you want to set the chassis-role as standalone-vc? (yes/no) :
```

Step 9. At the prompt, enter `yes`. The following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading
Contents of Boot Options File on cf1:
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
    vc-stack-node-type imm-only

Hit a key within 2 seconds to change boot parameters...
```

Step 10. At the prompt, press any key to initiate boot parameter updates.
The following console output is displayed.

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Example

```
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Waiting for 30 seconds to enter password
Password:
```

Step 11. At the prompt, enter the default password `password`, and initiate the BOF edit.

The system accepts the password and the following console output is displayed.

Example

```
You must supply some required Boot Options. At any prompt, you can type:
"restart" - restart the query mode.
"reboot" - reboot.
"exit" - boot with with existing values.
"diag" - enter the diag shell.
"reset" - reset the bof and reboot.

Press ENTER to begin, or 'flash' to enter firmware update...
```

Step 12. At the prompt, press **Enter** to edit the BOF. The following console output is displayed.

Example

```
Chassis-Role
-------------
Current chassis-role is : standalone-vc
you can change it to { satellite | standalone | factory-default }.
Press ENTER to continue OR "edit" to change the chassis-role : standalone
Press "edit" to change OR ENTER to continue :
```

Step 13. At the prompt, press **Enter**. The following output is displayed.

Example

```
Chassis-role is set to standalone-vc, Do you wish to continue with this (yes/
no) :
```

Step 14. At the prompt, enter `yes`. The following console output is displayed.

Example

```
VC Stack Node Type
--------------------
Current Vc Stack Node type of this card is : imm-only
Press ENTER to retain this,
 or { cpm-imm } to change it to cpm-imm :
```

Step 15. At the prompt, enter `cpm-imm`. The following output is displayed.

Example

```
Setting the Card role to 'cpm-imm'.

VC Stack Name
-------------
Current VC Stack Name in Bof is :
Enter the VC Stack name (max 32 characters) you wish to use : VC123
```


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Step 16. At the prompt, enter the name of the VC stack. The following output is displayed.

Example

```
Changing the VC Stack Name to VC123
Setting the VC name to 'VC123'.
Mac Address of this node is d0:99:d5:9a:6a:41

vc-stack-node field of First cpm-imm Node (cpmA)
-----------------------------------------------
   You must enter the VC Stack Slot Num that you intend to use
   and the node's mac address seperated by a space.

Example, to use slot-num '1' and mac address 'aa:bb:cc:dd:ee:ff'
Type - '1 aa:bb:cc:dd:ee:ff'

Accepted VC Stack Slot Num values are - [1 to 8]
The existing vc-stack-node and mac field in bof is 'none'

vc-stack-node entry of cpmA [1 to 8] [mac address] : 1 d0:99:d5:9a:6a:41
```

Step 17. At the prompt, enter the VC stack slot number and MAC address for CPM-A. The following output is displayed.

Example

```
Using 1 as Vc Stack Slot Id of Node with mac d0:99:d5:9a:6a:41

VC Stack Slot Num of Second cpm-imm Node (cpmB)
-----------------------------------------------
   You must enter the VC Stack Slot Num that you intend to use.
   type 'none' if you do not have the details of second cpm-imm node.

Accepted VC Stack Slot num values are - [1 to 8]
The existing vc-stack-node and mac field in bof is 'none'

vc-stack-node entry of cpmB [1 to 8] [mac address] :
```

Step 18. At the prompt, enter the VC stack slot number and MAC address for CPM-B. The following output is displayed.

Example

```
Using 2 as Vc Stack Slot Id of Node with mac d0:99:d5:94:de:41

Software Location
-----------------
   You must enter the URL of the TiMOS software.
   The location can be on a Compact Flash device,
   a USB flash drive, or on the network.

   Here are some examples
      cf1:/timos1.0R1
      uf1:/timos1.0R1
      ftp://user:passwd@192.168.1.150/./timos1.0R1
      ftp://user:passwd@[3FFE::1]/./timos1.0R1

or Type 'auto' to retrieve BOF configuration through DHCP.

Software Image URL:
```


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Step 19. At the prompt, enter the URL location of the software image; for example, ftp://<user>:<password>@10.10.170.22/./images/both.tim.

The following console output is displayed.

Example

```
Configuration File Location
---------------------------
   You must enter the location of configuration
   file to be used by TiMOS.  The file can be on
   a Compact Flash device, a USB flash drive, or
   on the network.

   Here are some examples
      uf1:/config.cfg
      cf1:/config.cfg
      ftp://user:passwd@192.168.1.150/./config.cfg
      ftp://user:passwd@[3FFE::1]/./config.cfg
      tftp://192.168.1.150/./config.cfg
      tftp://[3FFE::1]/./config.cfg

Config File URL:
```

Step 20. At the prompt, enter the URL location of the configuration file. The following console output is displayed.

Example

```
Network Configuration
---------------------

Boot Interface Management
-------------------------
   You specified a network location for either the
   software or the configuration file. You need to
   configure either eth-mgmt or uplinkA or uplinkB ports.
   You will be asked to configure the port number, IP(v6) address,
   static routes, and VLAN Id in case of uplink ports.

Existing eth-mgmt port settings are:

   eth-mgmt-port
   eth-mgmt-address    0 active
   eth-mgmt-address    0 standby
   eth-mgmt-address    0 active
   eth-mgmt-address    0 standby

   eth-mgmt port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:
```

Step 21. At the prompt, enter `edit`. The following output is displayed.

Example

```
   You need to assign an IP address for this port.
   The IP address should be entered in standard
   dotted-decimal form with a network length.
   example:   192.168.1.169/24
```


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```
Enter eth-mgmt Active IP Address :
```

Step 22. At the prompt, enter the active port IP address and mask that the device should use (for example, 10.135.4.172/10). The following console output is displayed.

Example

```
   In case of an IPv6, the IPv6 address should be
   entered in standard colon hexadecimal notation
   with a prefix length.
       example:   3FFE::1/112

Enter eth-mgmt Active IPv6 Address (Type 0 if none desired):
```

Step 23. At the prompt, enter 0. The following console output is displayed.

Example

```
Enter eth-mgmt Standby IP Address (Type 0 if none desired):
```

Step 24. At the prompt, enter the standby port IP address and mask that the device should use. The following output is displayed.

Example

```
   In case of an IPv6, the IPv6 address should be
   entered in standard colon hexadecimal notation
   with a prefix length.
       example:   3FFE::1/112

Enter eth-mgmt Standby IPv6 Address (Type 0 if none desired):
```

Step 25. At the prompt, enter 0. The following output is displayed.

Example

```
   You specified network locations which might require
   static routes to reach. You will be asked to
   enter static routes until all the locations become
   reachable.
   Static routes should be entered in the following format:
   prefix/mask next-hop ip-address
   example:     192.168.0.0/16 next-hop 192.168.1.254

Would you like to add a static route? (yes/no)
```

Step 26. At the prompt, enter `yes`. The following output is displayed.

Example

```
Enter ip route:
```

Step 27. At the prompt, enter the static IP route. The following output is displayed.

Example

```
OK

Would you like to add another static route? (yes/no)
```


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Step 28. At the prompt, enter no. The following output is displayed.

Example

```
Would you like to add another static IPv6 route? (yes/no)
```

Step 29. At the prompt, enter no. The following console output is displayed.

Example

```
Current configuration enables use of console (setting is "no console-disabled")
Press ENTER to proceed with existing setting  or 'disable' to disable console access
:
```

Step 30. At the prompt, press **Enter**. The following console output is displayed.

Example

```
New Settings
------------
    primary-image      ftp://*:*@10.135.24.85/./img/sass/both.tim
    primary-config     ftp://*:*@10.135.24.85/./cfg/sass/dutE_vcCfg.txt
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   10.135.24.94/24 active
    eth-mgmt-address   10.135.24.95/24 standby
    eth-mgmt-route     135.0.0.0/8 next-hop 10.135.24.1
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
    vc-stack-name      VC123
    vc-stack-node-type cpm-imm
    vc-stack-node cpmA slot-num 1 mac-addr d0:99:d5:9a:6a:41
    vc-stack-node cpmB slot-num 2 mac-addr d0:99:d5:94:de:41

Do you want to overwrite cf1:/bof.cfg with the new settings? (yes/no):
```

Step 31. At the prompt, enter yes. The 7210 SAS device begins to boot with the new settings. The following console output is displayed.

Example

```
Successfully saved the new settings in cf1:/bof.cfg

****************** VC Mode ********************
Configuring Network with eth-mgmt Port Setting.....
Primary config file location: ftp://*:*@10.135.24.85/./cfg/sass/dutE_vcCfg.txt
Initial DNS resolving preference is ipv4-only
Downloading 'ftp://*:*@10.135.24.85/./cfg/sass/dutE_vcCfg.txt'...OK

Sap Index file location: ftp://*:*@10.135.24.85/./cfg/sass/dutE_vcCfg.sdx
Downloading 'ftp://*:*@10.135.24.85/./cfg/sass/dutE_vcCfg.sdx'...OK

Primary image location: ftp://*:*@10.135.24.85/./img/sass/both.tim
Initial DNS resolving preference is ipv4-only
Loading image ftp://*:*@10.135.24.85/./img/sass/both.tim
Version B-11.0.S127b, Tue May  7 04:46:24 IST 2019 by sasbuild in /home/sasbuild/
```


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```
11.0S/panos/main
text:(41482848-->183530192) + data:(7134144-->49884044)
Executing TiMOS image at 0x2800000
```

Step 32. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
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Built on Wed Apr 20 14:32:04 IST 2011 by builder in /builder/3.0B5/panos/main
Login:
```

Step 33. At the prompt, enter `admin` for the default username and password, and log into the 7210 SAS device.

8.6 Procedure to boot in standalone-VC mode for factory-default units using an SD card

About this task

Note:

- This procedure is only supported on the 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and their variants.
- See Provisioning and booting up the VC in standalone mode for more information.

Perform the following steps to boot the 7210 SAS factory-default units in the standalone-VC mode of operation using an SD card:

Procedure

Step 1. Prepare the SD card for the CPM-IMM and IMM-only nodes. The bof.cfg file must be edited offline and stored on the SD card. The following output provides the minimum configuration for CPM-IMM and IMM-only nodes. A separate SD card must be used for each node in the VC, with each card containing an appropriate bof.cfg file based on the role of the node (CPM-IMM or IMM-only) in the VC.

a. Prepare the SD card for the CPM-A node.

The following sample displays the minimum bof.cfg file configuration required for the CPM-IMM CPM-A node (whose chassis MAC address matches the value specified for CPM-A below).

Example

```
------------------------------------------------------------
   primary-image      cf2:/both.tim
    primary-config     cf2:/dut-a.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   192.168.7.1/24 active
    eth-mgmt-address   192.168.7.2/24 standby
    eth-mgmt-route     192.168.0.0/16 next-hop 192.168.7.8
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
```


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```
    wait              3
    persist           off
    console-speed     115200
    no  console-disabled
    host-type         standalone-vc
    vc-stack-name     rev3hcs
    vc-stack-node-type cpm-imm
    vc-stack-node cpmA slot-num 1 mac-addr 8c:f7:73:89:4a:b5
    vc-stack-node cpmB slot-num 2 mac-addr 8c:f7:73:fb:cd:a2
-------------------------------------------------------------------------------
```

b. Prepare the SD card for the CPM-B node. The following output displays the minimum configuration required for bof.cfg for the CPM-IMM CPM-B node (whose chassis MAC address matches the value specified for CPM-B below).

Example

```
-------------------------------------------------------------------------------
    primary-image     cf2:/both.tim
    primary-config    cf2:/dut-a.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address  192.168.7.1/24 active
    eth-mgmt-address  192.168.7.2/24 standby
    eth-mgmt-route    192.168.0.0/16 next-hop 192.168.7.8
    eth-mgmt-autoneg
    eth-mgmt-duplex   full
    eth-mgmt-speed    100
#System Settings:
    wait              3
    persist           off
    console-speed     115200
    no  console-disabled
    host-type         standalone-vc
    vc-stack-name     rev3hcs
    vc-stack-node-type cpm-imm
    vc-stack-node cpmA slot-num 1 mac-addr 8c:f7:73:fb:cd:a2
    vc-stack-node cpmB slot-num 2 mac-addr 8c:f7:73:89:4a:b5
-------------------------------------------------------------------------------
```

Note:

- Change the OOB management IP address and IP route values appropriately to match their network addressing scheme. Additionally, change the MAC address of the CPM-A and CPM-B nodes to match the chassis MAC address of the nodes used (the chassis MAC address can be obtained from the node and is typically available on the label pasted on the back plate of the node).
- Label the SD card for quick identification of the SD card with the CPM-IMM and IMM-only node BOF file. The BOF cannot be interchanged. For example, the CPM-IMM BOf file configured with a specific MAC address must be used on the platform whose MAC address matches the configured MAC address in the BOF. Additionally, the CPM-IMM BOF file cannot be used to boot an IMM-only node, or an IMM-only node be used to boot a CPM-IMM node. The node does not boot up in standalone-VC mode correctly if the SD cards are interchanged.

c. Prepare the SD card for the IMM-only node.

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Note:
The IMM-only node gathers image files and configurations from the CPM-IMM CPM-A node of the VC. Therefore, users do not need to provide the image location and management IP configuration in the bof.cfg file for an IMM-only node.

The following output displays the minimum configuration required for bof.cfg file for an IMM-only node.

Example

```
------------------------------------------------------------
#eth-mgmt Port Settings:
no  eth-mgmt-disabled
eth-mgmt-autoneg
eth-mgmt-duplex    full
eth-mgmt-speed     100
#System Settings:
wait               3
persist            off
console-speed      115200
no  console-disabled
host-type          standalone-vc
vc-stack-node-type imm-only
------------------------------------------------------------
```

Step 2. Insert the SD card into the SD card slot of the chassis. Ensure the SD cards are used with the correct nodes based on the role of the node.

Step 3. Power on the 7210 SAS system.

Note:
It is recommended to start with the CPM-IMM CPM-A node first, and then power on all other 7210 SAS nodes in the VC.

Step 4. If a console is attached, the following boot logs are displayed for the CPM-IMM nodes. Further user input is not required during the boot process and users can ignore the displayed prompts.

Example

```
-------------------------------------------------------------------------------

Boot log started on CPU#0
  Build: X-23.9.S76b on Wed Sep 11 23:01:33 IST 2024 by sasbuild
Boot rom version is v32
CPLD Version: 0x07
Board Serial Number is 'NS1823C2814'
DRAM test second stage
>>>Validate SDRAM from 0x000000007fdfff80 to 0x0000000080000000 (decrementing)
>>>Testing  SDRAM from 0x0000000002200000 to 0x000000007fdfff80
>>>Testing  SDRAM from 0xfffffffe0000000 to 0xfffffffe2000000

Loading VxRom image .......

Board Serial Number is 'NS1823C2814'

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x51
TiMOS-V-23.9.S76b bootrom/hops Nokia SAS-Sx 46F2C4SFP+ 7210 Copyright (c) 2000-2024
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```


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```
Built on Wed Sep 11 23:00:43 IST 2024 by sasbuild in /home/sasbuild/23.9S/panos/mai



Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Cannot open "cf1:/boot.tim".
Attempting to load file cf2:/boot.tim
Version L-24.9.S10b, Sat Aug 24 01:04:23 IST 2024 by sasbuild in /home/sasbuild/24.9S/
panos/main
text:(16745312-->53543216) + data:(4041600-->25378272)
Starting at 0x18000000...




Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x51
TiMOS-L-24.9.S10b boot/hops Nokia SAS-Sx 46F2C4SFP+ 7210 Copyright (c) 2000-2024
 Nokia.
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Built on Sat Aug 24 01:04:23 IST 2024 by sasbuild in /home/sasbuild/24.9S/panos/main

TiMOS BOOT LOADER
Time from clock is MON SEP 16 10:22:36 2024 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : factory-default

Looking for cf2:/bof.cfg ... OK, reading
Setting the chassis role to standalone-vc.

Contents of Boot Options File on cf2:
    primary-image      cf2:/both.tim
    primary-config     cf2:/dut-a.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   192.168.7.1/24 active
    eth-mgmt-address   192.168.7.2/24 standby
    eth-mgmt-route     135.250.0.0/16 next-hop 192.168.7.8
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
    host-type          standalone-vc
    vc-stack-name      rev3hcs
    vc-stack-node-type cpm-imm
    vc-stack-node cpmA slot-num 1 mac-addr 8c:f7:73:89:4a:b5
    vc-stack-node cpmB slot-num 2 mac-addr 8c:f7:73:fb:cd:a2

Hit a key within 3 seconds to change boot parameters...   Hit a key within 2 seconds
to change boot parameters...   Hit a key within 1 second to change boot parameters...


****************** VC Mode ********************
CPM-IMM Vc Node, Stack name - rev3hcs, VC Slot - 1, Mate VC Slot - 2



Configuring Network with eth-mgmt Port Setting.....
Primary config file present at: cf2:/dut-a.cfg
Sap Index file present at: cf2:/dut-a.sdx
```


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```
Primary image location: cf2:/both.tim
Loading image cf2:\both.tim
Version B-23.9.S76b, Wed Sep 11 23:15:10 IST 2024 by sasbuild in /home/sasbuild/23.9S/
panos/main
text:(43035584-->195820304) + data:(7693280-->56580708)
Executing TiMOS image at 0x2800000



Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x51
TiMOS-B-23.9.S76b both/hops Nokia SAS-Sx 46F2C4SFP+ 7210 Copyright (c) 2000-2024
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Built on Wed Sep 11 23:15:10 IST 2024 by sasbuild in /home/sasbuild/23.9S/panos/main


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Running 32 bit architecture
hwDetectVCSlot: Setting STARTUP-->hwChassisType to SAS_VC
Time from clock is MON SEP 16 10:24:18 2024 UTC
******************** VC Mode ********************
CPM-IMM Vc Node, Stack name - rev3hcs, VC Slot - 1, Mate VC Slot - 2
Initial DNS resolving preference is ipv4-only
lldpInit done
opensslInit usrSsecureInit done

Attempting to exec primary configuration file:
   'cf2:\dut-a.cfg' ...
System Configuration
System Security Configuration

------------------------------------------------------------------------------
```

Step 5. The following login prompt is displayed after the 7210 SAS device boots up.

Example

```
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Built on Wed Apr 20 14:32:04 IST 2011 by builder in /builder/3.0B5/panos/main
Login:
```

Step 6. At the prompt, enter `admin` for the default username and password, and log into the 7210 SAS device.

Step 7. The following boot logs are displayed for the IMM-only nodes if a console is attached. Further user input is not required during the boot process and users can ignore the displayed prompts. Users are not required to log into IMM-only nodes.

Example

```
------------------------------------------------------------------------------
```


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```
Nokia SAS-S 7210 Boot ROM. Copyright 2000-2024 Nokia.
All rights reserved. All use is subject to applicable license agreements.
Build: X-23.9.S76b on Wed Sep 11 23:01:33 IST 2024 by sasbuild
Version: 0x20

DRAM test first stage
?Boot rom version is v32
CPLD Version: 0x0C
Board Serial Number is 'NS1815T0033'
DRAM test second stage
>>>Validate SDRAM from 0x000000007fdfff80 to 0x0000000080000000 (decrementing)
>>>Testing  SDRAM from 0x0000000002200000 to 0x000000007fdfff80
>>>Testing  SDRAM from 0xfffffffe0000000 to 0xfffffffe2000000

Loading VxRom image .......

Board Serial Number is 'NS1815T0033'

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x14
TiMOS-V-23.9.S76b bootrom/hops Nokia SAS-S 48Tp4SFP+ (PoE) 7210 Copyright (c) 2000-
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Built on Wed Sep 11 23:00:43 IST 2024 by sasbuild in /home/sasbuild/23.9S/panos



Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Cannot open "cf1:/boot.tim".
Attempting to load file cf2:/boot.tim
Version L-23.9.S76b, Wed Sep 11 23:04:29 IST 2024 by sasbuild in /home/sasbuild/23.9S/
panos/main
text:(16716608-->53455904) + data:(4039648-->25376640)
Starting at 0x18000000...




Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x14
TiMOS-L-23.9.S76b boot/hops Nokia SAS-S 48Tp4SFP+ (PoE) 7210 Copyright (c) 2000-2024
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Built on Wed Sep 11 23:04:29 IST 2024 by sasbuild in /home/sasbuild/23.9S/panos/ma

TiMOS BOOT LOADER
Time from clock is MON SEP 16 10:22:33 2024 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : factory-default

Looking for cf2:/bof.cfg ... OK, reading
Setting the chassis role to standalone-vc.

Contents of Boot Options File on cf2:
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
```


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```
    host-type          standalone-vc
    vc-stack-node-type imm-only

Hit a key within 3 seconds to change boot parameters...   Hit a key
within 2 seconds to change boot parameters...   Hit a key within 1 second to change
 boot parameters...

****************** VC Mode ********************
Proceeding as IMM Only VC Node.

Setting vc Slot id to 3.
vchmSetVCSlot/596: MY_VCINFO_SLOT=31->3

Waiting for card to be provisioned...
Active 31 is Unreachable. Waiting...
Active CPM 9 is *NOT* reachable...

Primary image location: ftp://*:*@127.1.0.9/VC:rev3hcs/p/
Loading image ftp://*:*@127.1.0.9/VC:rev3hcs/p/both.tim/both.tim
Version B-23.9.S76b, Wed Sep 11 23:15:10 IST 2024 by sasbuild in /home/sasbuild/23.9S/
panos/main
text:(43035584-->195820304) + data:(7693280-->56580708)
Executing TiMOS image at 0x2800000



Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x14
TiMOS-B-23.9.S76b both/hops Nokia SAS-S 48Tp4SFP+ (PoE) 7210 Copyright (c) 2000-2024
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Built on Wed Sep 11 23:15:10 IST 2024 by sasbuild in /home/sasbuild/23.9S/panos/ma



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Running 32 bit architecture
hwDetectVCSlot: Setting STARTUP-->hwChassisType to SAS_VC
Time from clock is MON SEP 16 10:27:35 2024 UTC
****************** VC Mode ********************
Proceeding as IMM Only VC Node.
lldpInit done



--------------------------------------------------------------------------------
```


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9 Standards and protocol support

Note:
The information provided in this chapter is subject to change without notice and may not apply to all platforms.

Nokia assumes no responsibility for inaccuracies.

The following conventions are used in this section:

- T(A,N) indicates 7210 SAS-T in both Access-uplink mode and Network mode. Similarly, T(N) indicates 7210 SAS-T in network mode only.
- K5 indicates 7210 SAS-K 2F2T1C.
- K12 indicates 7210 SAS-K 2F4T6C.
- K30 indicates 7210 SAS-K 3SFP+ 8C.
- Sx/S-1/10GE indicates all variants of 7210 SAS-Sx 1/10GE and 7210 SAS-S 1/10GE platforms.
- Sx-10/100GE indicates only the variants of 7210 SAS-Sx 10/100GE. Sx-10/100GE QSFP28 indicates the 7210 SAS-Sx 10/100GE 64 SFP+ 4QSFP28 variant.
- Sx/S-1/10GE-VC indicates 7210 SAS-Sx 1/10GE and 7210 SAS-S 1/10GE platforms in standalone VC mode.
- R6 indicates 7210 SAS-R6.
- R12 indicates 7210 SAS-R12.
- D indicates 7210 SAS-D and 7210 SAS-D ETR. If a line item applies only to 7210 SAS-D ETR, then it is indicated as D-ETR.
- Dxp indicates 7210 SAS-Dxp-12p (2SFP+ 4F6T) 7210 SAS-Dxp-12p ETR (2SFP+ 4F6T), 7210 SAS-Dxp 16p (2SFP+ 4F10T), and 7210 SAS-Dxp-24p (2SFP+ 6F16T). If a line item applies only to a particular variant, the variant name will be called out explicitly against that item.
- This standards list is not applicable to platforms in the satellite mode of operation, as most of the features are supported on 7x50 SR platforms. For this reason, the host platforms standards compliance must be consulted for the satellite mode of operation.

9.1 BGP

draft-ietf-idr-add-paths-04, Advertisement of Multiple Paths in BGP is supported on T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

draft-ietf-sidr-origin-validation-signaling-04, BGP Prefix Origin Validation State Extended Community is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1772, Application of the Border Gateway Protocol in the Internet is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1997, BGP Communities Attribute is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 2385, Protection of BGP Sessions via the TCP MD5 Signature Option is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2439, BGP Route Flap Damping is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2545, Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing is supported on K12, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2858, Multiprotocol Extensions for BGP-4 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2918, Route Refresh Capability for BGP-4 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3107, Carrying Label Information in BGP-4 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3392, Capabilities Advertisement with BGP-4 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4271, A Border Gateway Protocol 4 (BGP-4) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4360, BGP Extended Communities Attribute is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4364, BGP/MPLS IP Virtual Private Networks (VPNs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4456, BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only R6 and R12 supports RR server functionality. Rest of the platforms support only client function.

RFC 4659, BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4684, Constrained Route Distribution for Border Gateway Protocol/MultiProtocol Label Switching (BGP/MPLS) Internet Protocol (IP) Virtual Private Networks (VPNs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4760, Multiprotocol Extensions for BGP-4 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4798, Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4893, BGP Support for Four-octet AS Number Space is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5004, Avoid BGP Best Path Transitions from One External to Another is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5291, Outbound Route Filtering Capability for BGP-4 is supported on K12, K30, T(N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5668, 4-Octet AS Specific BGP Extended Community is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 6811, Prefix Origin Validation is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

9.2 Certificate Management

RFC 5280, Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 7468, Textual Encodings of PKIX, PKCS, and CMS Structures is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only PKIX and PKCS is supported.

9.3 Ethernet

IEEE 802.1AB, Station and Media Access Control Connectivity Discovery is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

TIA-1057, LLDP for Media endpoint devices is supported on Dxp, Sx/S-1/10GE, and Sx/S-1/10GE-VC

IEEE 802.1ad, Provider Bridges is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1ag, Connectivity Fault Management is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1ah, Provider Backbone Bridges is supported on T(N)

IEEE 802.1ax, Link Aggregation is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1D, MAC Bridges is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1p, Traffic Class Expediting is supported on D, E, Dxp, K5, K12, K30, T(A,N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1Q, Virtual LANs is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1s, Multiple Spanning Trees is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1w, Rapid Reconfiguration of Spanning Tree is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1X, Port Based Network Access Control is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3ab, 1000BASE-T is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3ac, VLAN Tag is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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IEEE 802.3ad, Link Aggregation is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3ae, 10 Gb/s Ethernet is supported on Dxp, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3ah, Ethernet in the First Mile is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3ba, 40 Gb/s and 100 Gb/s Ethernet is supported on R6, R12, and Sx-10/100GE

IEEE 802.3i, Ethernet is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3u, Fast Ethernet is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3z, Gigabit Ethernet is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3af, Power Over Ethernet (PoE) is supported on Dxp, T-ETR, Mxp-ETR, Sx/S-1/10GE, and Sx/S-1/10GE-VC

Note:
Sx/S-1/10GE only on PoE variant and Sx-1/10GE fiber variant with two fixed copper ports. Only on Dxp-16p and Dxp-24p.

IEEE 802.3at, Power Over Ethernet (PoE+) is supported on Dxp, T-ETR, Mxp-ETR, Sx/S-1/10GE, and Sx/S-1/10GE-VC

Note:
Sx/S-1/10GE only on PoE variant and Sx-1/10GE fiber variant with two fixed copper ports. Only on Dxp-16p and Dxp-24p.

IEEE 802.3bt, Power Over Ethernet (PoE++/HPoE) is supported on Dxp

Note:
Only on Dxp-16p and Dxp-24p.

ITU-T G.8032, Ethernet Ring Protection Switching is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

ITU-T Y.1731, OAM functions and mechanisms for Ethernet based networks is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

9.4 EVPN

draft-snr-bess-evpn-proxy-arp-nd-00, Proxy-ARP/ND function in EVPN networks is supported on K12, K30, Mxp, Sx/S-1/10GE, R6, and R12

Note:
Sx/S-/10GE standalone mode only.

RFC 7432, BGP MPLS-Based Ethernet VPN is supported on K12, K30, Mxp, Sx/S-1/10GE, R6, and R12

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Note:
Sx/S-/10GE standalone mode only.

draft-ietf-bess-evpn-vpws-14, Virtual Private Wire Service support in Ethernet VPN is supported on Mxp

9.5 Fast Reroute

draft-ietf-rtgwg-lfa-manageability-08, Operational management of Loop Free Alternates is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
With Segment Routing.

RFC 5286, Basic Specification for IP Fast Reroute: Loop-Free Alternates is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
With Segment Routing.

RFC 7490, Remote Loop-Free Alternate (LFA) Fast Reroute (FRR) is supported on K12, K30, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
With Segment Routing.

9.6 Internet Protocol (IP) — General

draft-grant-tacacs-02, The TACACS+ Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-vrrp-unified-spec-02, Virtual Router Redundancy Protocol Version 3 for IPv4 and IPv6 is supported on Mxp

RFC 768, User Datagram Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 793, Transmission Control Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 854, TELNET Protocol Specifications is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 951, Bootstrap Protocol (BOOTP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1034, Domain Names - Concepts and Facilities is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1035, Domain Names - Implementation and Specification is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1350, The TFTP Protocol (revision 2) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 1534, Interoperation between DHCP and BOOTP is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1542, Clarifications and Extensions for the Bootstrap Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2131, Dynamic Host Configuration Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2132, DHCP Options and BOOTP Vendor Extensions is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2347, TFTP Option Extension is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2348, TFTP Blocksize Option is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2349, TFTP Timeout Interval and Transfer Size Options is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2428, FTP Extensions for IPv6 and NATs is supported on D, Dxp, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2865, Remote Authentication Dial In User Service (RADIUS) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2866, RADIUS Accounting is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3046, DHCP Relay Agent Information Option (Option 82) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3596, DNS Extensions to Support IP version 6 is supported on D, Dxp, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3768, Virtual Router Redundancy Protocol (VRRP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4250, The Secure Shell (SSH) Protocol Assigned Numbers is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4251, The Secure Shell (SSH) Protocol Architecture is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4252, The Secure Shell (SSH) Authentication Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
All 7210 platforms support password and public key based user authentication. 7210 SAS-D support only password based authentication.

RFC 4253, The Secure Shell (SSH) Transport Layer Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4254, The Secure Shell (SSH) Connection Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5246, The Transport Layer Security (TLS) Protocol Version 1.2 – TLS client, RSA public key is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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Note:
Only TLS client.

RFC 5425, Transport Layer Security (TLS) Transport Mapping for Syslog – RFC 3164 with TLS is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only TLS client.

RFC 5656, Elliptic Curve Algorithm Integration in the Secure Shell Transport Layer – ECDSA is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 7301, Transport Layer Security (TLS) Application Layer Protocol Negotiation Extension is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only TLS client.

RFC 8446, The Transport Layer Security (TLS) Protocol Version 1.3 is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only TLS client.

RFC 4632, Classless Inter-domain Routing (CIDR): The Internet Address Assignment and Aggregation Plan is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5880, Bidirectional Forwarding Detection (BFD) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
IPv4 only on all platforms listed. IPv4 and IPv6 only on Mxp.

RFC 5881, Bidirectional Forwarding Detection (BFD) IPv4 and IPv6 (Single Hop) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
IPv4 only on all platforms listed. IPv4 and IPv6 only on Mxp.

RFC 5883, Bidirectional Forwarding Detection (BFD) for Multihop Paths is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
IPv4 only on all platforms listed. IPv4 and IPv6 only on Mxp.

RFC 6528, Defending against Sequence Number Attacks is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 7130, Bidirectional Forwarding Detection (BFD) on Link Aggregation Group (LAG) Interfaces is supported on T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

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9.7 IP — Multicast

RFC 1112, Host Extensions for IP Multicasting is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
IGMP v1, v2, v3 is supported.

RFC 2236, Internet Group Management Protocol, Version 2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3306, Unicast-Prefix-based IPv6 Multicast Addresses is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3376, Internet Group Management Protocol, Version 3 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3446, Anycast Rendevous Point (RP) mechanism using Protocol Independent Multicast (PIM) and Multicast Source Discovery Protocol (MSDP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
MSDP supported only on Sx/S-1/10GE standalone.

RFC 3618, Multicast Source Discovery Protocol (MSDP) is supported on Sx/S-1/10GE

Note:
Only in standalone mode.

RFC 4601, Protocol Independent Multicast - Sparse Mode (PIM-SM): Protocol Specification (Revised) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4604, Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
MLD is not supported.

RFC 4607, Source-Specific Multicast for IP is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4608, Source-Specific Protocol Independent Multicast in 232/8 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4610, Anycast-RP Using Protocol Independent Multicast (PIM) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5059, Bootstrap Router (BSR) Mechanism for Protocol Independent Multicast (PIM) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5384, The Protocol Independent Multicast (PIM) Join Attribute Format is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6513, Multicast in MPLS/BGP IP VPNs is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

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Note:
Only IPv4.

RFC 6514, BGP Encodings and Procedures for Multicast in MPLS/IP VPNs is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

RFC 6515, IPv4 and IPv6 Infrastructure Addresses in BGP Updates for Multicast VPNs is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

RFC 6625, Wildcards in Multicast VPN Auto-Discover Routes is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

RFC 6826, Multipoint LDP In-Band Signaling for Point-to-Multipoint and Multipoint-to-Multipoint Label Switched Path is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

RFC 7246, Multipoint Label Distribution Protocol In-Band Signaling in a Virtual Routing and Forwarding (VRF) Table Context is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

RFC 7385, IANA Registry for P-Multicast Service Interface (PMSI) Tunnel Type Code Points is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

9.8 IP — Version 4

RFC 791, Internet Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 792, Internet Control Message Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 826, An Ethernet Address Resolution Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1519, Classless Inter-Domain Routing (CIDR): an Address Assignment and Aggregation Strategy is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 1812, Requirements for IPv4 Routers is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1981, Path MTU Discovery for IP version 6 is supported on K12, K30, T(N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2401, Security Architecture for Internet Protocol is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Supported only for OSPFv3 authentication. Not supported for services.

RFC 2460, Internet Protocol, Version 6 (IPv6) Specification is supported on D, Dxp, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, and T(A) for Management only.

9.9 IP — Version 6

RFC 2464, Transmission of IPv6 Packets over Ethernet Networks is supported on D, Dxp, K5 K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 3021, Using 31-Bit Prefixes on IPv4 Point-to-Point Links is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3122, Extensions to IPv6 Neighbor Discovery for Inverse Discovery Specification is supported on K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3587, IPv6 Global Unicast Address Format is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4007, IPv6 Scoped Address Architecture is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4193, Unique Local IPv6 Unicast Addresses is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4291, Internet Protocol Version 6 (IPv6) Addressing Architecture is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4443, Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4861, Neighbor Discovery for IP version 6 (IPv6) is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4862, IPv6 Stateless Address Autoconfiguration (Router Only) is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 5095, Deprecation of Type 0 Routing Headers in IPv6 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5952, A Recommendation for IPv6 Address Text Representation is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 6106, IPv6 Router Advertisement Options for DNS Configuration is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6164, Using 127-Bit IPv6 Prefixes on Inter-Router Links is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

9.10 IPsec

RFC 2401, Security Architecture for the Internet Protocol is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only for use with OSPFv3 authentication. Not supported for services.

RFC 2406, IP Encapsulating Security Payload (ESP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only for use with OSPFv3 authentication. Not supported for services.

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9.11 IS-IS

draft-ietf-isis-mi-02, IS-IS Multi-Instance is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-isis-segment-routing-extensions-04, IS-IS Extensions for Segment Routing is supported on K12, K30, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

draft-kaplan-isis-ext-eth-02, Extended Ethernet Frame Size Support is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

ISO/IEC 10589:2002, Second Edition, Nov. 2002, Intermediate system to Intermediate system intra-domain routeing information exchange protocol for use in conjunction with the protocol for providing the connectionless-mode Network Service (ISO 8473) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1195, Use of OSI IS-IS for Routing in TCP/IP and Dual Environments is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3359, Reserved Type, Length and Value (TLV) Codepoints in Intermediate System to Intermediate System is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3719, Recommendations for Interoperable Networks using Intermediate System to Intermediate System (IS-IS) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3787, Recommendations for Interoperable IP Networks using Intermediate System to Intermediate System (IS-IS) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4971, Intermediate System to Intermediate System (IS-IS) Extensions for Advertising Router Information is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5120, M-ISIS: Multi Topology (MT) Routing in IS-IS is supported on K12, T(N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 5130, A Policy Control Mechanism in IS-IS Using Administrative Tags is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5301, Dynamic Hostname Exchange Mechanism for IS-IS is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5302, Domain-wide Prefix Distribution with Two-Level IS-IS is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5303, Three-Way Handshake for IS-IS Point-to-Point Adjacencies is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5304, IS-IS Cryptographic Authentication is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5305, IS-IS Extensions for Traffic Engineering TE is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5306, Restart Signaling for IS-IS (Helper Mode) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5308, Routing IPv6 with IS-IS is supported on K12, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

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RFC 5309, Point-to-Point Operation over LAN in Link State Routing Protocols is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5310, IS-IS Generic Cryptographic Authentication is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6232, Purge Originator Identification TLV for IS-IS is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6233, IS-IS Registry Extension for Purges is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-isis-mi-02, IS-IS Multi-Instance is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
K12, K30 support only a single instance and can operate in multi-instance deployment as it supports the processing of TLVs for multi-instance support.

draft-ietf-isis-segment-routing-extensions-04, IS-IS Extensions for Segment Routing is supported on K12, K30, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

9.12 Management

draft-ieft-snmpv3-update-mib-05, Management Information Base (MIB) for the Simple Network Management Protocol (SNMP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-idr-bgp4-mib-05, Definitions of Managed Objects for the Fourth Version of Border Gateway Protocol (BGP-4) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-isis-wg-mib-06, Management Information Base for Intermediate System to Intermediate System (IS-IS) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-mboned-msdp-mib-01, Multicast Source Discovery protocol MIB is supported on Sx/S-1/10GE

Note:
Only in standalone mode.

draft-ietf-mpls-ldp-mib-07, Definitions of Managed Objects for the Multiprotocol Label Switching, Label Distribution Protocol (LDP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-mpls-lsr-mib-06, Multiprotocol Label Switching (MPLS) Label Switching Router (LSR) Management Information Base Using SMIv2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-mpls-te-mib-04, Multiprotocol Label Switching (MPLS) Traffic Engineering Management Information Base is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-ospf-mib-update-08, OSPF Version 2 Management Information Base is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

ianaaddressfamilynumbers-mib, IANA-ADDRESS-FAMILY-NUMBERS-MIB is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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ianaiftype-mib, IANAifType-MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

ianaiprouteprotocol-mib, IANA-RTPROTO-MIB is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE8021-CFM-MIB, IEEE P802.1ag(TM) CFM MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE8021-PAE-MIB, IEEE 802.1X MIB is supported on D, Dxp, K5, K12, K30, T(A,N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE8023-LAG-MIB, IEEE 802.3ad MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

LLDP-MIB, IEEE P802.1AB(TM) LLDP MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1157, A Simple Network Management Protocol (SNMP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1215, A Convention for Defining Traps for use with the SNMP is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1724, RIP Version 2 MIB Extension is supported on Mxp and Sx/S-1/10GE

Note:
Only in standalone mode.

RFC 2021, Remote Network Monitoring Management Information Base Version 2 using SMIv2 is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2138, Remote Authentication Dial In User Service (RADIUS) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2206, RSVP Management Information Base using SMIv2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2213, Integrated Services Management Information Base using SMIv2 is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2571, An Architecture for Describing SNMP Management Frameworks is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2572, Message Processing and Dispatching for the Simple Network Management Protocol (SNMP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2573, SNMP Applications is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2575, View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP) is supported on D, E, Dxp, K5, K12, K30, T(A,N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2578, Structure of Management Information Version 2 (SMIv2) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2579, Textual Conventions for SMIv2 is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 2787, Definitions of Managed Objects for the Virtual Router Redundancy Protocol is supported on K12, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2819, Remote Network Monitoring Management Information Base is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2856, Textual Conventions for Additional High Capacity Data Types is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2863, The Interfaces Group MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2864, The Inverted Stack Table Extension to the Interfaces Group MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2933, Internet Group Management Protocol MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3014, Notification Log MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3164, The BSD syslog Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3165, Definitions of Managed Objects for the Delegation of Management Scripts is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3231, Definitions of Managed Objects for Scheduling Management Operations is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3273, Remote Network Monitoring Management Information Base for High Capacity Networks is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3414, User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3416. Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3417, Transport Mappings for the Simple Network Management Protocol (SNMP) (SNMP over UDP over IPv4) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3419, Textual Conventions for Transport Addresses is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3584, Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3593, Textual Conventions for MIB Modules Using Performance History Based on 15 Minute Intervals is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3635, Definitions of Managed Objects for the Ethernet-like Interface Types is supported on D, E, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 3826, The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3877, Alarm Management Information Base (MIB) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4001, Textual Conventions for Internet Network Addresses is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4022, Management Information Base for the Transmission Control Protocol (TCP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4113, Management Information Base for the User Datagram Protocol (UDP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4220, Traffic Engineering Link Management Information Base is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4292, IP Forwarding Table MIB is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4293, Management Information Base for the Internet Protocol (IP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5101, Specification of the IP Flow Information Export (IPFIX) Protocol for the Exchange of IP Traffic Flow Information is supported on Mxp, Sx/S-1/10GE, and R6

RFC 6241, Network Configuration Protocol (NETCONF) is supported on K5, K12, T(N), Mxp, Sx/S-1/10GE, R6, and R12

RFC 6242, Using the NETCONF Protocol over Secure Shell (SSH) is supported on K5, K12, T(N), Mxp, Sx/S-1/10GE, R6, and R12

9.13 MPLS — General

RFC 3031, Multiprotocol Label Switching Architecture is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3032, MPLS Label Stack Encoding is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3443, Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4182, Removing a Restriction on the use of MPLS Explicit NULL is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5332, MPLS Multicast Encapsulations is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

9.14 MPLS — GMPLS

draft-ietf-ccamp-rsvp-te-srlg-collect-04, RSVP-TE Extensions for Collecting SRLG Information is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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9.15 MPLS — LDP

draft-ietf-mpls-ldp-ipv6-15, Updates to LDP for IPv6 is supported on Mxp

draft-pdutta-mpls-ldp-adj-capability-00, LDP Adjacency Capabilities is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-pdutta-mpls-ldp-v2-00, LDP Version 2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-pdutta-mpls-tldp-hello-reduce-04, Targeted LDP Hello Reduction is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3037, LDP Applicability is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3478, Graceful Restart Mechanism for Label Distribution Protocol (Helper Mode) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5036, LDP Specification is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5283, LDP Extension for Inter-Area Label Switched Paths (LSPs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5443, LDP IGP Synchronization is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5561, LDP Capabilities is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6388, Label Distribution Protocol Extensions for Point-to-Multipoint and Multipoint-to-Multipoint Label Switched Paths is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
P2MP LSPs only.

9.16 MPLS — MPLS-TP

RFC 5586, MPLS Generic Associated Channel is supported on T(N), R6, and R12

RFC 5921, A Framework for MPLS in Transport Networks is supported on T(N), R6, and R12

RFC 5960, MPLS Transport Profile Data Plane Architecture is supported on T(N), R6, and R12

RFC 6370, MPLS Transport Profile (MPLS-TP) Identifiers is supported on T(N), R6, and R12

RFC 6378, MPLS Transport Profile (MPLS-TP) Linear Protection is supported on T(N), R6, and R12

RFC 6426, MPLS On-Demand Connectivity and Route Tracing is supported on T(N), R6, and R12

RFC 6428, Proactive Connectivity Verification, Continuity Check and Remote Defect indication for MPLS Transport Profile is supported on T(N), R6, and R12

RFC 6478, Pseudowire Status for Static Pseudowires is supported on T(N), R6, and R12

RFC 7213, MPLS Transport Profile (MPLS-TP) Next-Hop Ethernet Addressing is supported on T(N), R6, and R12

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9.17 MPLS — OAM

RFC 6424, Mechanism for Performing Label Switched Path Ping (LSP Ping) over MPLS Tunnels is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6425, Detecting Data Plane Failures in Point-to-Multipoint Multiprotocol Label Switching (MPLS) - Extensions to LSP Ping is supported on T(N), Mxp, R6, and R12

9.18 MPLS — RSVP-TE

RFC 2702, Requirements for Traffic Engineering over MPLS is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2747, RSVP Cryptographic Authentication is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2961, RSVP Refresh Overhead Reduction Extensions is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3097, RSVP Cryptographic Authentication -- Updated Message Type Value is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3209, RSVP-TE: Extensions to RSVP for LSP Tunnels is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3477, Signalling Unnumbered Links in Resource ReSerVation Protocol - Traffic Engineering (RSVP-TE) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4090, Fast Reroute Extensions to RSVP-TE for LSP Tunnels is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4561, Definition of a Record Route Object (RRO) Node-Id Sub-Object is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4875, Extensions to Resource Reservation Protocol - Traffic Engineering (RSVP-TE) for Point-to-Multipoint TE Label Switched Paths (LSPs) is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4950, ICMP Extensions for Multiprotocol Label Switching is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5817, Graceful Shutdown in MPLS and Generalized MPLS Traffic Engineering Networks is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

9.19 OSPF

draft-ietf-ospf-prefix-link-attr-06, OSPFv2 Prefix/Link Attribute Advertisement is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-ospf-segment-routing-extensions-04, OSPF Extensions for Segment Routing is supported on K12, K30, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 1765, OSPF Database Overflow is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 2328, OSPF Version 2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3101, The OSPF Not-So-Stubby Area (NSSA) Option is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3509, Alternative Implementations of OSPF Area Border Routers is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3623, Graceful OSPF Restart Graceful OSPF Restart (Helper Mode) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3630, Traffic Engineering (TE) Extensions to OSPF Version 2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4222, Prioritized Treatment of Specific OSPF Version 2 Packets and Congestion Avoidance is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4552, Authentication/Confidentiality for OSPFv3 is supported on K12, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4576, Using a Link State Advertisement (LSA) Options Bit to Prevent Looping in BGP/MPLS IP Virtual Private Networks (VPNs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4577, OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4970, Extensions to OSPF for Advertising Optional Router Capabilities is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5185, OSPF Multi-Area Adjacency is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5187, OSPFv3 Graceful Restart (Helper Mode) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 5243, OSPF Database Exchange Summary List Optimization is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5250, The OSPF Opaque LSA Option is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5309, Point-to-Point Operation over LAN in Link State Routing Protocols is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5340, OSPF for IPv6 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5838, Support of Address Families in OSPFv3 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6987, OSPF Stub Router Advertisement is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-ospf-prefix-link-attr-06, OSPFv2 Prefix/Link Attribute Advertisement is supported on K12, K30, Mxp, Sx/S-1/10GE, R6, and R12

draft-ietf-ospf-segment-routing-extensions-04, OSPF Extensions for Segment Routing is supported on K12, K30, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

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9.20 Pseudowire

draft-ietf-l2vpn-vpws-iw-oam-04, OAM Procedures for VPWS Interworking is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3916, Requirements for Pseudo- Wire Emulation Edge-to-Edge (PWE3) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3985, Pseudo Wire Emulation Edge-to-Edge (PWE3) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4385, Pseudo Wire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4446, IANA Allocations for Pseudowire Edge to Edge Emulation (PWE3) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4447, Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4448, Encapsulation Methods for Transport of Ethernet over MPLS Networks is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5659, An Architecture for Multi-Segment Pseudowire Emulation Edge-to-Edge is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6073, Segmented Pseudowire is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6310, Pseudowire (PW) Operations, Administration, and Maintenance (OAM) Message Mapping is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6391, Flow-Aware Transport of Pseudowires over an MPLS Packet Switched Network is supported on K12, K30, Mxp, R6, and R12

RFC 6718, Pseudowire Redundancy is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6870, Pseudowire Preferential Forwarding Status bit is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 7023, MPLS and Ethernet Operations, Administration, and Maintenance (OAM) Interworking is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 7267, Dynamic Placement of Multi-Segment Pseudowires is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

9.21 Quality of Service

RFC 2430, A Provider Architecture for Differentiated Services and Traffic Engineering (PASTE) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2474, Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 2598, An Expedited Forwarding PHB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3140, Per Hop Behavior Identification Codes is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3260, New Terminology and Clarifications for Diffserv is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

9.22 RIP

RFC 1058, Routing Information Protocol is supported on Mxp and Sx/S-1/10GE

Note:
Only in standalone mode.

RFC 2082, RIP-2 MD5 Authentication is supported on Mxp and Sx/S-1/10GE

Note:
Only in standalone mode.

RFC 2453, RIP Version 2 is supported on Mxp and Sx/S-1/10GE

Note:
Only in standalone mode.

9.23 Timing

GR-1244-CORE, Clocks for the Synchronized Network: Common Generic Criteria, Issue 3, May 2005 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

GR-253-CORE, SONET Transport Systems: Common Generic Criteria. Issue 3, September 2000 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

IEEE 1588-2008, IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, IEEE default profile is supported only includes the Dxp-12p ETR, Dxp-16p, Dxp-24p. Sx-10/100GE does not support IEEE default profile.

ITU-T G.781, Synchronization layer functions, issued 09/2008 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

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Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

ITU-T G.813, Timing characteristics of SDH equipment slave clocks (SEC), issued 03/2003 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

ITU-T G.8261, Timing and synchronization aspects in packet networks, issued 04/2008 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

ITU-T G.8262, Timing characteristics of synchronous Ethernet equipment slave clock (EEC), issued 08/2007 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

ITU-T G.8264, Distribution of timing information through packet networks, issued 10/2008 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

ITU-T G.8265.1, Precision time protocol telecom profile for frequency synchronization, issued 10/2010 is supported on D-ETR, K5, K12, K30, T(A,N), Mxp, Sx-1/10GE, R6, and R12

ITU-T G.8275.1, Precision time protocol telecom profile for phase/time synchronization with full timing support from the network, issued 07/2014 is supported on Dxp, K12, K30, T(A,N), Mxp, Sx-1/10GE, Sx-10/100GE, R6, and R12

Note:
For 7210 SAS-Sx 10/100GE, the support only includes the Sx 10/100GE QSFP28 variant. For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, Dxp-24p.

IEC/IEEE 61850-9-3-2016, Communication networks and systems for power utility automation - Part 9-3: Precision time protocol profile for power utility automation is supported on Dxp-16p and Dxp-24p

IEEE C37.238-2017 - IEEE Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Applications is supported on Dxp-16p and Dxp-24p

RFC 5905, Network Time Protocol Version 4: Protocol and Algorithms Specification is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

9.24 VPLS

RFC 4761, Virtual Private LAN Service (VPLS) Using BGP for Auto-Discovery and Signaling is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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Note:
On 7210 platforms, only BGP-AD is supported with TLDP signalling for PW. No BGP signalling is supported for PW establishment.

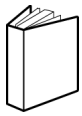
RFC 4762, Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5501, Requirements for Multicast Support in Virtual Private LAN Services is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6074, Provisioning, Auto-Discovery, and Signaling in Layer 2 Virtual Private Networks (L2VPNs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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