



**7450 ETHERNET SERVICE SWITCH  
7750 SERVICE ROUTER  
7950 EXTENSIBLE ROUTING SYSTEM  
VIRTUALIZED SERVICE ROUTER**

**BASIC SYSTEM CONFIGURATION GUIDE  
RELEASE 20.2.R1**

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# 1 Getting Started

## 1.1 About This Guide

This guide describes system concepts and provides configuration explanations and examples to configure SR OS boot option file (BOF), file system and system management functions. Also provided are concepts and descriptions of the Command Line Interface (CLI) syntax and command usage.

This guide is organized into functional chapters and provides concepts and descriptions of the implementation flow, as well as Command Line Interface (CLI) syntax and command usage.

The topics and commands described in this document apply to the:

- 7450 ESS
- 7750 SR
- 7950 XRS
- VSR

[Table 1](#) lists the available chassis types for each SR OS router.

**Table 1 Supported SR OS Router Chassis Types**

7450 ESS	7750 SR	7950 XRS
<ul style="list-style-type: none"><li>• 7450 ESS-7/12</li></ul>	<ul style="list-style-type: none"><li>• 7750 SR-a4/a8</li><li>• 7750 SR-1e/2e/3e</li><li>• 7750 SR-7/12</li><li>• 7750 SR-12e</li><li>• 7750 SR-7s/14-s</li><li>• 7750 SR-1</li></ul>	<ul style="list-style-type: none"><li>• 7950 XRS-16c</li><li>• 7950 XRS-20/40</li></ul>

For a list of unsupported features by platform and chassis, refer to the SR OS 20.x.Rx Software Release Notes, part number 3HE 16194 000x TQZZA.

Command outputs shown in this guide are examples only; actual displays may differ depending on supported functionality and user configuration.



**Note:** This guide generically covers Release 20.x.Rx content and may contain some content that will be released in later maintenance loads. Refer to the SR OS 20.x.Rx Software Release Notes, part number 3HE 16194 000x TQZZA, for information about features supported in each load of the Release 20.x.Rx software.

## 1.2 Router System Configuration Process

[Table 2](#) 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 router configuration tasks in the following order:

**Table 2 Configuration Process**

Area	Task	Section
CLI Usage	Navigate in the CLI	<a href="#">Navigating in the CLI</a>
	Get help in the CLI	<a href="#">Getting Help in the CLI</a>
	Configure environment commands	<a href="#">CLI Environment Commands</a>
	Configure monitor commands	<a href="#">CLI Monitor Commands</a>
	Enter CLI commands	<a href="#">Entering CLI Commands</a>
	Use the vi commands	<a href="#">Using the vi Commands</a>
	Undo configurations	<a href="#">Configuration Rollback</a>
	Edit candidate configurations	<a href="#">Transactional Configuration</a>
Operational functions	Directory and file management	<a href="#">File Management Tasks</a>
Boot options	Configure boot option files (BOF)	<a href="#">Configuring Boot Options File with CLI</a>
	Service management	<a href="#">Service Management Tasks</a>
Zero touch provisioning	ZTP Overview	<a href="#">ZTP Overview</a>
	ZTP Processes	<a href="#">ZTP Processes</a>

**Table 2 Configuration Process (Continued)**

Area	Task	Section (Continued)
System configuration	Perform administrative tasks	<a href="#">Administrative Tasks</a>
	Configure system management features	<a href="#">Configuring System Management with CLI</a>
	Configure system parameters	<a href="#">Common Configuration Tasks</a>
	Configure system timing	<a href="#">System Timing</a>
	Configure system monitoring thresholds	<a href="#">Configuring System Monitoring Thresholds</a>
	Configure LLDP	<a href="#">Configuring LLDP</a>
	Configure satellite parameters	<a href="#">Satellite Configuration</a>

---

## 2 CLI Usage

### 2.1 CLI Structure

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

The SR OS 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.



**Note:** The CLI engine used to execute scripts is the primary CLI engine configured with `config>system>management-interface>cli>cli-engine {classic-cli | md-cli} [{classic-cli | md-cli}...(up to 2 max)]`.

## 2.2 Navigating in the CLI

The command outputs in the following sections are examples only; actual displays may differ depending on supported functionality and user configuration.

### 2.2.1 CLI Contexts

Use the CLI to access, configure, and manage Nokia's routers. 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:ALA-12# config
A:ALA-12>config#
```

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

The following example shows two methods to navigate to a service SDP ingress level.

#### Method 1:

```
A:ALA-12# configure service epipe 6 spoke-sdp 2:6 ingress
*A:ALA-12>config>service>epipe>spoke-sdp>ingress#
```

#### Method 2:

```
A:ALA-12>config# service
A:ALA-12>config>service# epipe 6
*A:ALA-12>config>service>epipe# spoke-sdp 2:6
*A:ALA-12>config>service>epipe>spoke-sdp# ingress
*A:ALA-12>config>service>epipe>spoke-sdp>ingress#
```

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

```
*A:ALA-12>config# rooter
Error: Bad command.
```



## 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 listed in [Table 3](#).

**Table 3 Console Control Commands**

Command	Description
<Ctrl-c>	Aborts the pending command.
<Ctrl-z>	Terminates the pending command line and returns to the ROOT context.
<a href="#">back</a>	Navigates the user to the parent context.
<a href="#">echo</a>	Echoes the text that is typed in. Primary use is to display messages to the screen within an exec file.
<a href="#">exec</a>	Executes the contents of a text file as if they were CLI commands entered at the console.
<a href="#">exit</a>	Returns the user to the previous higher context.
<a href="#">exit all</a>	Returns the user to the ROOT context.
<a href="#">help</a> <a href="#">?</a>	Displays help in the CLI.
<a href="#">history</a>	Displays a list of the most recently entered commands.
<a href="#">info</a>	Displays the running configuration for a configuration context.
<a href="#">logout</a>	Terminates the CLI session.
<a href="#">oam</a>	Provides OAM test suite options. Refer to “OAM” in the <i>7450 ESS, 7750 SR, 7950 XRS, and VSR OAM and Diagnostics Guide</i> .
<a href="#">password</a>	Changes the user CLI login password. The password can only be changed at the ROOT level.
<a href="#">ping</a>	Verifies the reachability of a remote host.
<a href="#">pwc</a>	Displays the present or previous working context of the CLI session.
<a href="#">sleep</a>	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.
<a href="#">ssh</a>	Opens a secure shell connection to a host.

**Table 3 Console Control Commands (Continued)**

Command	Description
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.

Display the list of all system global commands by entering **help globals** in the CLI:

```
*A:ALA-12# help globals
  back          - Go back a level in the command tree
  candidate     + Commands used for editing candidate configurations
  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
  logout        - Log off this system
  mrinfo        - Request multicast router information
  mstat         - Trace multicast path from a source to a receiver and
                 display multicast packet rate and loss information (IGMP
                 based)
  mstat2        - Trace multicast path from a source to a receiver and
                 display multicast packet rate and loss information (UDP
                 based)
  mtrace        - Trace multicast path from a source to a receiver (IGMP
                 based)
  mtrace2       - Trace multicast path from a source to a receiver (UDP
                 based)
  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:ALA-12#
```

Table 4 describes command syntax symbols.

**Table 4 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]
{ }	Braces indicate that one of the parameters must be selected. default-action {drop   forward}
[{ }]	Braces within square brackets indicate that the parameters are optional, but if one is selected, the information within the braces is required. • sdp sdp-id [{gre   mpls}]
Bold	Commands in <b>bold</b> indicate commands and keywords.
Italic	Commands in <i>italics</i> indicate that you must enter text based on the parameter. interface <i>interface-name</i>

## 2.2.3 CLI Environment Commands

The CLI **environment** commands are found in the **root>environment** context of the CLI tree and control session preferences for a single CLI session. The CLI **environment** commands are listed in [Table 5](#).

**Table 5 CLI Environment Commands**

Command	Description
<a href="#">alias</a>	Enables the substitution of a command line by an alias.
<a href="#">create</a>	Enables or disables the use of a create parameter check.
<a href="#">kernel</a>	Enables or disables the kernel.
<a href="#">more</a>	Configures whether CLI output should be displayed one screen at a time awaiting user input to continue.
<a href="#">reduced-prompt</a>	Configures the maximum number of higher-level CLI context nodes to display by name in the CLI prompt for the current CLI session.
<a href="#">saved-ind-prompt</a>	Saves the indicator in the prompt.
<a href="#">shell</a>	Enables or disables the shell.

**Table 5** CLI Environment Commands (Continued)

Command	Description
<a href="#">suggest-internal-objects</a>	Enables the suggestion of internally created objects while auto completing.
<a href="#">terminal</a>	Configures the terminal screen length for the current CLI session.
<a href="#">time-display</a>	Specifies whether time should be displayed in local time or UTC.
<a href="#">time-stamp</a>	Specifies whether the time-stamp should be displayed before the prompt.

## 2.2.4 CLI Monitor Commands

Monitor commands display specified statistical information related to the monitor subject (such as filter, port, QoS, router, service, and VRRP) 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. 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 contexts are listed in [Table 6](#).

**Table 6** CLI Monitor Command Contexts

Command	Description
<a href="#">card</a>	Enables monitoring of ingress FP queue groups.
<a href="#">ccag</a>	Enables CCAG port monitoring for traffic statistics. This command is supported on the 7450 ESS and 7750 SR; additional restrictions may apply.
<a href="#">cpm-filter</a>	Monitor command output for CPM filters.
<a href="#">filter</a>	Enables IP and MAC filter monitoring at a configurable interval until that count is reached.

**Table 6 CLI Monitor Command Contexts (Continued)**

Command	Description
lag	Enables Link Aggregation Group (LAG) monitoring to display statistics for individual port members and the LAG.
management-access-filter	Enables management access filter monitoring.
port	Enables port traffic monitoring. The specified port(s) statistical information displays at the configured interval until the configured count is reached.
qos	Enables arbiter and scheduler statistics monitoring.
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. [Table 7](#) lists the different help commands.

**Table 7** 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 <i>string</i> .
command ?	Displays the command's syntax and associated keywords.
command keyword ?	List the associated arguments for <i>keyword</i> in <i>command</i> .
string<Tab>	Complete a partial command name (auto-completion) or list available commands that match <i>string</i> .

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

The following example shows a partial list of the **tree** and **tree detail** command output on a 7750 SR.

```
*A:cses-E11>config# tree

+---router
| +---aggregate
| +---allow-icmp-redirect
| +---allow-icmp6-redirect
| +---autonomous-system
| +---bfd
| | +---abort
| | +---begin
| | +---bfd-template
| | | +---echo-receive
| | | +---multiplier
| | | +---receive-interval
| | | +---transmit-interval
| | | +---type
| | +---commit
| +---bgp
| | +---add-paths
| | | +---ipv4
| | | +---ipv6
| | | +---label-ipv4
| | | +---label-ipv6
| | | +---vpn-ipv4
| | | +---vpn-ipv6
```

```

| | +---advertise-external
| | +---advertise-inactive
| | +---aggregator-id-zero
| | +---auth-keychain
| | +---authentication-key
| | +---backup-path
| | +---best-path-selection
| | | +---always-compare-med
| | | +---as-path-ignore
| | | +---deterministic-med
| | | +---ignore-nh-metric
| | | +---ignore-router-id
| | +---bfd-enable
| | +---cluster

*A:cses-E11>config# tree detail
...
+---router [<router-name>]
| +---no aggregate <ip-prefix/ip-prefix-length>
| | aggregate <ip-prefix/ip-prefix-length> [summary-only] [as-set]
| | [aggregator <as-number:ip-address>] [black-hole [generate-icmp]]
| | [community <comm-id>]
| | aggregate <ip-prefix/ip-prefix-length> [summary-only] [as-set]
| | [aggregator <as-number:ip-address>] [community <comm-id>] [indirect
| | <ip-address>]
| +---allow-icmp-redirect
| | no allow-icmp-redirect
| +---allow-icmp6-redirect
| | no allow-icmp6-redirect
+---autonomous-system <autonomous-system>
| no autonomous-system
+---bfd
| +---abort
| +---begin
| +---bfd-template <[32 chars max]>
| | no bfd-template <[32 chars max]>
| | +---echo-receive <milli-seconds>
| | | no echo-receive
| | +---multiplier <[3..20]>
| | | no multiplier
| | +---no receive-interval
| | | receive-interval <milli-seconds>
| | +---no transmit-interval
| | | transmit-interval <milli-seconds>
| | +---no type
| | | type {cpm-np}
| +---commit
+---bgp
| no bgp
| +---add-paths
| | no add-paths
| | +---ipv4 send <send-limit>
| | | ipv4 send <send-limit> receive [none]
| | | no ipv4
| | +---no ipv6
| | | ipv6 send <send-limit>
| | | ipv6 send <send-limit> receive [none]
| | +---label-ipv4 send <send-limit>
| | | label-ipv4 send <send-limit> receive [none]

```

---

```
| | | no label-ipv4
| | +---label-ipv6 send <send-limit>
| | | label-ipv6 send <send-limit> receive [none]
| | | no label-ipv6
| | +---no vpn-ipv4
| | | vpn-ipv4 send <send-limit>
| | | vpn-ipv4 send <send-limit> receive [none]
| | +---no vpn-ipv6
| | | vpn-ipv6 send <send-limit>
| | | vpn-ipv6 send <send-limit> receive [none]
| | +---advertise-external [ipv4] [ipv6] [label-ipv4] [label-ipv6]
| | | no advertise-external [ipv4] [ipv6] [label-ipv4] [label-ipv6]
| | +---advertise-inactive
| | | no advertise-inactive
| | +---aggregator-id-zero
| | | no aggregator-id-zero
| | +---auth-keychain <name>
| | +---authentication-key <authentication-key|hash-key> [hash|hash2|custom]
```



---

## 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, and the user is on the device with hostname ALA-1 in the **config>router>interface** context. In the prompt, the separator used between contexts is the ">" symbol. The first letter in the prompt indicates the active CPM slot, in this case A. The active CPM can be A or B on 7750 SR, and A, B, C, or D on 7950 XRS.

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.

Since 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. For example:

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

When changes are made to the configuration file a "\*" appears in the prompt string (\*A:ALA-1), 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**, **info detail** and **objective** commands display configuration for the current level. The **info** command shows non-default configurations. The **info detail** command shows the entire configuration for the current level, including defaults. The **info [objective]** command provides an output objective that controls the configuration parameters to be displayed.

The following example displays the output from the **info** command and the **info detail** command.

```
*A:ALA-1>config>router# interface system
*A:ALA-1>config>router>if# info
-----
                address 10.10.0.1/32
-----
*A:ALA-1>config>router>if#

*A:ALA-1>config>router>if# info detail
-----
                address 10.10.10.103/32 broadcast host-ones
                no description
                no arp-timeout
                no allow-directed-broadcasts
                tos-marking-state trusted
                no local-proxy-arp
                no proxy-arp
                icmp
                    mask-reply
                    redirects 100 10
                    unreachablees 100 10
                    ttl-expired 100 10
                exit
                no mac
                no cflowd
                no shutdown
-----
*A:ALA-1>config>router>if#
```

---

## 2.6 EXEC Files

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

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.

Arguments can be specified with the **exec** command. These arguments are passed in to be used inside the text file which includes the CLI commands. The passing of arguments with the **exec** command only works in classic CLI. The passing of arguments with the **exec** command cannot be used in Model-Driven CLI.

For example, if the contents of the file, cf3/Test.txt contained the following set of CLI commands:

```
echo $(1)
echo $(2)
echo $(3)
```

Then executing the following commands:

```
# exec cf3:/Test.txt -arguments var1=10 var2=20 var3=30
```

or

```
# exec cf3:/Test.txt -arguments 10 20 30
```

Produces the following output:

```
10
20
30
```

---

## 2.7 CLI Script Control

The SR OS provides centralized script management for CLI scripts that are used by CRON and the Event Handling System (EHS). A set of script policies and script objects can be configured to control the following items and more:

- where scripts are located (local compact flash, remote FTP server)
- where to store the output of the results
- how long to keep historical script result records
- how long a script may run

If the scripts are located on local compact flash devices, then the user must ensure that the scripts are on the compact flash devices of both CPMs so that operation of EHS continues as expected if a CPM switchover occurs.

A single script can be executing at one time. A table (SNMP smRunTable in the DISMAN-SCRIPT-MIB) is used as both an input queue of scripts waiting to be executed as well as for storage of records for completed scripts. If the input queue is full, then the script request is discarded.

## 2.8 Entering CLI Commands

The command outputs in the following sections are examples only; actual displays may differ depending on supported functionality and user configuration.

### 2.8.1 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 completes the command. If the letters are not sufficient to identify a specific command, pressing the <Tab> key or space bar displays commands matching the letters entered.

System commands are available in all CLI context levels.

### 2.8.2 Unordered and Unnamed Parameters

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

The following output shows the command syntax for **static-route-entry**.

```
*A:ALA-12>config>router# static-route-entry ?
- no static-route-entry <ip-prefix/prefix-length> [mcast]
- static-route-entry <ip-prefix/prefix-length> [mcast]

<ip-prefix/prefix-*> : ipv4-prefix      - a.b.c.d (host bits must be 0)
                       ipv4-prefix-le - [0..32]
                       ipv6-prefix    - 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

                               ipv6-prefix-le - [0..128]
<mcast>                      : keyword - Indicates that static-
route being configured is used                                for mcast table only

[no] black-hole               + Create/Configure or Delete/
Deconfigure blackhole nexthop for                                static-route-entry
[no] indirect                 + Create/Configure or Delete/Deconfigure indirect next-
hop for                                                                static-route-entry
```

```
[no] next-hop          + Create/Configure or Delete/Deconfigure next-
hop for                static-route-entry
```

Some SR OS CLI commands have multiple unnamed parameters. For example, the **substrate** *csu-mode rate-step* command has both a *csu-mode* parameter and a *rate-step* parameter that do not have leading keywords. SR OS uses a best-match algorithm to select which parts of the user input are intended to be used for each unnamed parameter. This best-match algorithm depends on the specific command.

In some cases, it is not possible for the algorithm to be 100% accurate, and the SR OS may assign a value to an unintended parameter when two unnamed parameters have similar constraints and syntax. For example, the **environment** *alias alias-name alias-command-name* command may reverse the *alias-name* and *alias-command-name* parameters if the first parameter entered is larger than 80 characters.

## 2.8.3 Editing Keystrokes

When entering a command, special keystrokes allow for editing of the command. [Table 8](#) lists the command editing keystrokes.

**Table 8** 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>
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>

**Table 8 Command Editing Keystrokes (Continued)**

Editing Action	Keystrokes
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>

## 2.8.4 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 commands are interpreted as an absolute path. The forward slash “/” or backward slash “\” cannot be used as an absolute path at the beginning of the command-string of the **environment alias** command. Spaces between the slash and the first command returns an error.

```
*A:ALA-12# configure router
*A:ALA-12>config>router# interface system address 10.2.3.4
*A:ALA-12>config>router# /admin save
*A:ALA-12>config>router# \clear router interface
*A:ALA-12>config>router#
```

The command may 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, for example:

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

or

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

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

For example, beginning in an IES context service ID 4 (IES 4):

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

behaves 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
```

If the command takes you to a different context, the following occurs:

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

becomes:

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

## 2.8.5 History

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

```
*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 1/1/2
 8 con port 1/1/2
 9 \con port 1/1/2
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:ALA-42# show version
TiMOS-B-0.0.I2016 both/i386 Nokia 7450 ESS Copyright (c) 2000-2016 Nokia
All rights reserved. All use subject to applicable license agreements.
Built on Sun Oct 12 20:01:13 PDT 2008 by builder in /rel0.0/I2016/panos/main
A:ALA-42#
```



## 2.8.6 Entering Numerical Ranges

The SR OS CLI allows the use of a single numerical range as an argument in the command line. This range can be a set or a sequence of numbers, or a combination of both.

A set is a range of numerical values, from a minimum to a maximum, incremented by 1. For example:

```
configure service vpls [1..10] create customer 1
```

A sequence is a list of discrete integer elements, in any order. For example:

```
configure service vpls [1,2,3] no shutdown
```

A sequence can contain sets as well as integer elements. For example:

```
configure service vpls [4..6,7,8..10] no shutdown
```

For example, it is possible to shut down ports 1 through 10 in Slot 1 on XMA/MDA 1. A port can be denoted with “*slot/mda/port*”, where *slot* is the slot number, *mda* is the XMA/MDA number and *port* is the port number. To shut down ports 1 through 10 on Slot 1 and XMA/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.

CLI commands can contain ranges of hexadecimal values. This allows ranges to be used when working with data normally expressed in hexadecimal instead of decimal, such as IPv6 or MAC addresses. For example:

```
#config>service>vpls>sap$ static-mac aa:bb:[0x19..0x21]:dd:ee:ff create  
#config>service>vpls>sap$ info
```

```
-----  
static-mac aa:bb:19:dd:ee:ff create  
static-mac aa:bb:1a:dd:ee:ff create  
static-mac aa:bb:1b:dd:ee:ff create  
static-mac aa:bb:1c:dd:ee:ff create  
static-mac aa:bb:1d:dd:ee:ff create  
static-mac aa:bb:1e:dd:ee:ff create  
static-mac aa:bb:1f:dd:ee:ff create  
static-mac aa:bb:20:dd:ee:ff create  
static-mac aa:bb:21:dd:ee:ff create  
-----
```

A range can also be a reference to a previous range in the same command. This reference takes the form “*[\$x]*”, where *x* is an integer between 0 and 5. For example:

```
configure service vprn [11..20] router-id 10.20.[0].1
```

This gives vprn 11 the router-id "10.20.11.1", vprn 12 the router-id "10.20.12.1", and so on.

Specifying a range in the CLI does have limitations. These limitations are summarized in [Table 9](#).

**Table 9 CLI Range Use Limitations**

Limitation	Description
Up to 6 ranges (including references) may be specified in a single command, and they may not combine to more than 1000 iterations of the command.	It is possible to shut down ports 1 through 10 on XMA/MDA 1 and XMA/MDA 2: configure port 1/[1..2]/[1..10]
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.
Command completion ceases to work when entering a range.	After entering a range in a CLI command, command and key completion, which normally occurs by pressing the <Tab> or spacebar, ceases to work. If the command line entered is correct and unambiguous, the command works properly; otherwise, an error is returned.

## 2.8.7 Pipe/Match

SR OS supports the pipe feature to search one or more files for a given character string or pattern.

When using the pipe or match command, the variables and attributes must be spelled correctly. The attributes follow the command and must come before the expression or pattern. The following are examples of how to use 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” > cf1:\test\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**

- Task: Display a count of the total number of lines of output instead of displaying the output itself.

**admin display-config | match interface | count**

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

For example:

```
A:Dut-C# show log log-id 98 | match ignore-case "sdp bind"
>Status of SDP Bind 101:1002 in service 1001 (customer 1) changed to admin=up oper=u
p flags="
"Processing of a SDP state change event is finished and the status of all affected S
DP Bindings on SDP 101 has been updated."
```

```

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,
operational state: up"

A:Dut-C# admin display-config | match post-lines 5 max-
count 2 expression "OSPF.*Config"
echo "OSPFv2 Configuration"
#-----
        ospf
            timers
                spf-wait 1000 1000 1000
            exit
echo "OSPFv2 (Inst: 1) Configuration"
#-----
        ospf 1
            asbr
            router-id 10.0.0.1
            export "testall"
*A:Dut# admin display-config | match debug_mirror
        profile "debug_mirror"

*A:Dut# admin display-config | match context parent debug_mirror
#-----
        system
            security
                profile "debug_mirror"

*A:Dut# admin display-config | match context all debug_mirror
#-----
        system
            security
                profile "debug_mirror"
                default-action deny-all
                entry 10
            exit

*A:Dut# show log event-control | match ignore-case pre-lines 10 SyncStatus
L 2016 tmnxLogOnlyEventThrottled      MA gen      0      0
MCPATH:
  2005 tmnxMcPathSrcGrpBlackHole      MI thr      0      0
  2006 tmnxMcPathSrcGrpBlackHoleCleared MI thr      0      0
  2007 tmnxMcPathAvailBwLimitExceeded MI thr      0      0
  2008 tmnxMcPathAvailBwLimitCleared  MI thr      0      0
MC_REDUNDANCY:
  2001 tmnxMcRedundancyPeerStateChanged WA gen      0      0
  2002 tmnxMcRedundancyMismatchDetected WA gen      0      0
  2003 tmnxMcRedundancyMismatchResolved WA gen      0      0
  2004 tmnxMcPeerSyncStatusChanged    WA gen      0      0

```

**Table 10** describes regular expression symbols and their interpretation (similar to what is used for route policy regexp matching). **Table 11** describes special characters.

**Table 10 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". 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 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 11 Special Characters**

Options	Similar to	Description
[:upper:]	[A-Z]	uppercase letters
[:lower:]	[a-z]	lowercase letters
[:alpha:]	[A-Za-z]	upper- and lowercase letters

**Table 11 Special Characters (Continued)**

Options	Similar to	Description
\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

## 2.8.8 Pipe/Count

The SR OS supports a pipe/**count** command (...| **count**) that provides a count of the number of lines that would have otherwise been displayed. The pipe/**count** command is particularly useful when used in conjunction with the pipe/**match** command in order to count the number of output lines that match a specified pattern.

For example:

```
*A:dut-c# show service service-using vprn

=====
Services [vprn]
=====
ServiceId      Type      Adm  Opr  CustomerId  Service Name
-----
1              VPRN     Down Down 1
44             VPRN     Up   Up   1
100            VPRN     Down Down 1
102            VPRN     Up   Up   1
235            VPRN     Down Down 1
1000           VPRN     Down Down 1000
-----
Matching Services : 6
-----

*A:dut-c# show service service-using vprn | match Down | count
Count: 4 lines
*A:dut-c#
```

## 2.8.9 Range Operator Support of Regular Expression Match

The user can include a regular expression inside the range operator, of any **clear**, **config**, **show**, or **tools** CLI command. The beginning and ending of the regular expression must be delimited with the forward slash "/" symbol.

SR OS performs the following steps:

- auto-completes the command to get all the possible names
- performs a match of the regular expression against all the names
- executes the command for the names for which the match was successful



**Note:** The order of the execution is the same as the order in which the names are listed in output display of the CLI info command or in the output display when you invoke the auto-complete function using the TAB key.

If the execution of the command fails for one of the matching object names, the execution is aborted and the remaining matching object names are not processed.

For example (assume the following SR-TE LSP names are configured on the router):

```
*A:bkvm35# show router mpls sr-te-lsp
=====
MPLS SR-TE LSPs (Originating)
=====
LSP Name                               To           Tun      Protect   Adm   Opr
                               Id           Path
-----
sr-te-pce                               192.0.2.198  1        N/A       Up    Dwn
RENO194_DET190_LSP1_Profile10          192.0.2.190  2        N/A       Up    Dwn
RENO194_DET190_LSP3                     192.0.2.190  3        N/A       Up    Dwn
RENO194_ATL224_LSP1                     192.0.2.224  4        N/A       Up    Dwn
-----
LSPs : 4
=====
```

The following command displays the subset of all SR-TE LSPs with names that include the expression "LSP":

**show router mpls sr-te-lsp [/LSP/]**

The SR OS expands this command into the following individual commands:

**show router mpls sr-te-lsp RENO194\_DET190\_LSP1\_Profile10**

**show router mpls sr-te-lsp RENO194\_DET190\_LSP3**

### show router mpls sr-te-lsp RENO194\_ATL224\_LSP1

The output of the three show commands is displayed in the following example:

```
*A:bkvm35# show router mpls sr-te-lsp [/LSP/]
=====
MPLS SR-TE LSPs (Originating)
=====
LSP Name                               To                Tun   Protect  Adm  Opr
                               Id                Id    Path
-----
RENO194_DET190_LSP1_Profile10         192.0.2.190      2     N/A      Up   Dwn
-----
LSPs : 1
=====
MPLS SR-TE LSPs (Originating)
=====
LSP Name                               To                Tun   Protect  Adm  Opr
                               Id                Id    Path
-----
RENO194_DET190_LSP3                   192.0.2.190      3     N/A      Up   Dwn
-----
LSPs : 1
=====
MPLS SR-TE LSPs (Originating)
=====
LSP Name                               To                Tun   Protect  Adm  Opr
                               Id                Id    Path
-----
RENO194_ATL224_LSP1                   192.0.2.224      4     N/A      Up   Dwn
-----
```

## 2.8.9.1 Regular Expression Symbols in a Regular Expression Match Operation

The user can use all the regular expression symbols listed in [Table 10](#) and [Table 11](#) inside the regular expression to match.

For example, the user can list all LSP names that begin with the string "RENO194\_" followed by the string "ATL" as follows:

```
*A:bkvm35# show router mpls sr-te-lsp [/^RENO194_\['ATL'\]/]
=====
MPLS SR-TE LSPs (Originating)
=====
LSP Name                               To                Tun   Protect  Adm  Opr
                               Id                Id    Path
-----
RENO194_ATL224_LSP1                   38.120.48.224    4     N/A      Up   Dwn
-----
LSPs : 1
```



=====



**Note:** The following conventions are used in the previous example.

- Use the character "^", which matches the start of the string, directly inside the regular expression to indicate a match at the start of the string. However, if you want to match it as character, enter it as "\\^".
- Use the range delimiter with the escape symbol in front "\" inside the regular expression because the range delimiter encloses the regular expression itself.

Table 12 summarizes special rules governing the use of some of the regular expression symbols inside a regular expression match operation. Any symbol from Table 10 and Table 11 that is not listed in Table 12 can be used directly inside a regular expression match operation.

**Table 12 Rules Governing Regular Expression Symbols**

String	Description
?	[^?/] if using as a regular expression and [\\?/] if using to match the character ?
[ ]	[^\\[]] if using as a regular expression and [\\[\\]] if using to match the characters [ ]
\$	[^\$/] if using as a regular expression and [\\\$/] if using to match the character \$
\	[^\\] if using to match the character \
/	[^/] if using to match the character /
'	[^'] if using to match the character '
*	[^*] if using to match the character *
.	[^.] if using as a regular expression and [\\.] if using to match the character .
+	[^+] if using to match the character +
,	[^,] if using to match the character ,
^	[\\^] if using to match the character ^
(	[\\(] if using to match the character (
)	[\\)] if using to match the character )
space	[^ ] if using to match the character space

The SR OS does not support a combination of a partial string with a regular expression match operation.

For example, to display the SR-TE LSP names that begin with the string "RENO194\_ATL" with part of the string entered directly and the rest of the string entered inside a regular expression, the command returns no match. The following example demonstrates incorrect syntax:

```
*A:bkvm35# show router mpls sr-te-lsp RENO194_[/ATL/]
```

Include the entire string inside the regular expression itself to obtain a match. The following example demonstrates the correct syntax for finding a match:

```
*A:bkvm35# show router mpls sr-te-lsp [/^RENO194_ATL/]
=====
MPLS SR-TE LSPs (Originating)
=====
LSP Name                               To                Tun      Protect  Adm  Opr
                               Id                Id       Path
-----
RENO194_ATL224_LSP1                  38.120.48.224    4        N/A      Up   Dwn
-----
LSPs : 1
=====
```

## 2.8.10 Redirection

The 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).

For example:

```
`ping <customer_ip> > cf3cf1:/ping/result.txt'
`ping <customer_ip> > ftp://ron@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:

```
ping 10.0.0.1 | match expression "time.\d+" > cf3cf1:/ping/time.txt
```

This records only the RTT portion (including the word "time").

---

## 2.9 VI Editor

The “vi”sual editor (vi) is a file editor that can edit any ASCII file. This includes configuration, exec files, BOF, and any other ASCII file on the system.

VT100 terminal mode is supported. However, if a different terminal mode is configured, there is no noticeable negative effect.

When a configuration file is changed, a validation check is executed to see if the user is allowed to view or perform configuration changes. When a user modifies the configuration file using the vi editor, these checks do not occur. Because of this, the vi editor is only available to a user with administrator privileges. Should others require access to the vi editor, their profile must be modified to allow the access. Access permission for the file directory where the file resides must be performed before a user can open, read, or write a file processing command. If a user does not have permission to access the directory, the operation is denied.

When opening a file, a resource check verifies that sufficient resources are available to process the file. If there are insufficient resources, the operation is denied and the operator is informed of that event.

Multiple sessions are allowed and are limited only by the memory resources available on the node.

### 2.9.1 Summary of vi Commands

The vi editor operates in two modes:

- Command mode — This mode causes actions to be taken on the file.  
In this mode, each character entered is a command that does something to the text file being edited; a character typed in the command mode may even cause the vi editor to enter the insert mode.
- Insert mode — Entered text is inserted into the file.  
In the insert mode, every character typed is added to the text in the file. Pressing ESC turns off the insert mode.

## 2.9.2 Using the vi Commands

Use the following commands to start and end vi edit sessions, move around in a file, enter new text, modify, move, and delete existing text, as well as read from and write to other files. The following tables list vi commands.

[Table 13](#) describes the commands to cut, paste, and delete text.

**Table 13 Cutting and Pasting or Deleting Text in vi**

vi Command	Description
"	Specify a buffer to be used with any of the commands using buffers. Follow the " character with a letter or a number, which corresponds to a buffer.
d	Delete text. The "dd" command deletes the current line. A count specifies the number of lines to delete. Whatever is deleted is placed into the buffer specified with the " command. If no buffer is specified, then the general buffer is used.
D	Delete to the end of the line from the current cursor position.
p	Paste the specified buffer after the current cursor position or line. If no buffer is specified (with the " command), then 'p' uses the general buffer.
P	Paste the specified buffer before the current cursor position or line. If no buffer is specified (with the " command), then "P" uses the general buffer.
x	Delete the character under the cursor. A count specifies how many characters to delete. The characters will be deleted after the cursor.
X	Delete the character before the cursor.
y	Yank text, putting the result into a buffer. The "yy" command yanks the current line. Entering a number yanks that many lines. The buffer can be specified with the " command. If no buffer is specified, then the general buffer is used.
Y	Yank the current line into the specified buffer. If no buffer is specified, then the general buffer is used.

[Table 14](#) describes the commands to insert new text.

**Table 14 Inserting New Text**

vi Command	Description
A	Append at the end of the current line.

**Table 14 Inserting New Text (Continued)**

vi Command	Description
I	Insert from the beginning of a line.
O	Enter insert mode in a new line above the current cursor position.
a	Enter insert mode, the characters typed in are inserted after the current cursor position. A count inserts all the text that was inserted that many times.
i	Enter insert mode, the characters typed in are inserted before the current cursor position. A count inserts all the text that was inserted that many times.
o	Enter insert mode in a new line below the current cursor position.

Table 15 describes the commands to move the cursor within the file.

**Table 15 Moving the Cursor Within the File**

vi Command	Description
^B	Scroll backwards one page. A count scrolls that many pages.
^D	Scroll forwards half a window. A count scrolls that many lines.
^F	Scroll forwards one page. A count scrolls that many pages.
^H	Move the cursor one space to the left. A count moves that many spaces.
^J	Move the cursor down one line in the same column. A count moves that many lines down.
^M	Move to the first character on the next line.
^N	Move the cursor down one line in the same column. A count moves that many lines down.
^P	Move the cursor up one line in the same column. A count moves that many lines up.
^U	Scroll backwards half a window. A count scrolls that many lines.
\$	Move the cursor to the end of the current line. A count moves to the end of the following lines.
%	Move the cursor to the matching parenthesis or brace.
^	Move the cursor to the first non-whitespace character.
(	Move the cursor to the beginning of a sentence.

**Table 15** Moving the Cursor Within the File (Continued)

vi Command	Description
)	Move the cursor to the beginning of the next sentence.
{	Move the cursor to the preceding paragraph.
}	Move the cursor to the next paragraph.
	Move the cursor to the column specified by the count.
+	Move the cursor to the first non-whitespace character in the next line.
-	Move the cursor to the first non-whitespace character in the previous line.
_	Move the cursor to the first non-whitespace character in the current line.
0	Move the cursor to the first column of the current line.
B	Move the cursor back one word, skipping over punctuation.
E	Move forward to the end of a word, skipping over punctuation.
G	Go to the line number specified as the count. If no count is given, then go to the end of the file.
H	Move the cursor to the first non-whitespace character on the top of the screen.
L	Move the cursor to the first non-whitespace character on the bottom of the screen.
M	Move the cursor to the first non-whitespace character on the middle of the screen.
W	Move forward to the beginning of a word, skipping over punctuation.
b	Move the cursor back one word. If the cursor is in the middle of a word, move the cursor to the first character of that word.
e	Move the cursor forward one word. If the cursor is in the middle of a word, move the cursor to the last character of that word.
h	Move the cursor one character position to the left.
j	Move the cursor down one line.
k	Move the cursor up one line.
l	Move the cursor one character position to the right.
w	Move the cursor forward one word. If the cursor is in the middle of a word, move the cursor to the first character of the next word.

[Table 16](#) describes the commands to move the cursor around the screen.

**Table 16 Moving the Cursor Around the Screen**

vi Command	Description
^E	Scroll forwards one line. A count scrolls that many lines.
^Y	Scroll backwards one line. A count scrolls that many lines.
z	Redraw the screen with the following options. z<return> puts the current line on the top of the screen; z. puts the current line on the center of the screen; and z- puts the current line on the bottom of the screen. If you specify a count before the z command, it changes the current line to the line specified. For example, 16z. puts line 16 on the center of the screen.

Table 17 describes the commands to replace text.

**Table 17 Replacing Text**

vi Command	Description
C	Change to the end of the line from the current cursor position.
R	Replace characters on the screen with a set of characters entered, ending with ESC.
S	Change an entire line.
c	Change until cc changes the current line. A count changes that many lines.
r	Replace one character under the cursor. Specify a count to replace a number of characters.
s	Substitute one character under the cursor, and go into insert mode. Specify a count to substitute a number of characters. A dollar sign (\$) is placed at the last character to be substituted.

Table 18 describes the commands to search for text or characters in the file.

**Table 18 Searching for Text or Characters**

vi Command	Description
,	Repeat the last f, F, t or T command in the reverse direction.
/	Search the file downwards for the string specified after the /.
;	Repeat the last f, F, t or T command.

**Table 18 Searching for Text or Characters (Continued)**

vi Command	Description (Continued)
?	Search the file upwards for the string specified after the ?.
F	Search the current line backwards for the character specified after the 'F' command. If found, move the cursor to the position.
N	Repeat the last search given by / or ?, except in the reverse direction.
T	Search the current line backwards for the character specified after the T command, and move to the column after the if it's found.
f	Search the current line for the character specified after the f command. If found, move the cursor to the position.
n	Repeat last search given by / or ?.
t	Search the current line for the character specified after the t command, and move to the column before the character if it is found.

Table 19 describes the commands to manipulate character and line formatting.

**Table 19 Manipulating Character/Line Formatting**

vi Command	Description
~	Switch the case of the character under the cursor.
<	Shift the lines up to where to the left by one shiftwidth. << shifts the current line to the left, and can be specified with a count.
>	Shift the lines up to where to the right by one shiftwidth. >> shifts the current line to the right, and can be specified with a count.
J	Join the current line with the next one. A count joins that many lines.

Table 20 describes the commands to save and quit.

**Table 20 Saving and Quitting**

vi Command	Description
ZZ	Exit the editor, saving if any changes were made.

Table 21 describes miscellaneous commands.



**Table 21**      **Miscellaneous**

<b>vi Command</b>	<b>Description</b>
^G	Show the current filename and the status.
^L	Clear and redraw the screen.
^R	Redraw the screen removing false lines.
^[	Escape key. Cancels partially formed command.
^^	Go back to the last file edited.
!	Execute a shell. Not supported
&	Repeat the previous :s command.
.	Repeat the last command that modified the file.
:	Begin typing an EX editor command. The command is executed once the user types return.
@	Type the command stored in the specified buffer.
U	Restore the current line to the previous state before the cursor entered the line.
m	Mark the current position with the character specified after the 'm' command.
u	Undo the last change to the file. Typing 'u' again will re-do the change.

### 2.9.3 EX Commands

The vi editor is built upon another editor, called the EX. The EX editor only edits by line. From the vi editor you use the : command to start entering an EX command. The following list is not complete, however, it includes the most commonly used commands. If more than one line is to be modified by certain commands (such as :s and :w ), the range must be specified before the command. For example, to substitute lines 3 through 15, the command is :3,15s/from/this/g.

[Table 22](#) describes the EX commands.

**Table 22** EX commands

vi Command	Description
:ab string strings	Abbreviation. If a word is typed in vi corresponding to string1, the editor automatically inserts the corresponding words. For example, the abbreviation :ab usa United States of America would insert the words, United States of America whenever the word usa is typed in.
:map keys new_seq	Mapping. This lets you map a key or a sequence of keys to another key or a sequence of keys.
:q	Quit vi. If there have been changes made, the editor issues a warning message.
:q!	Quit vi without saving changes.
:s/pattern/ to_pattern/ options	Substitute. This substitutes the specified pattern with the string in the to_pattern. Without options, it only substitutes the first occurrence of the pattern. If a 'g' is specified, then all occurrences are substituted.
:set [all]	Sets some customizing options to vi and EX. The :set all command gives all the possible options.
:una string	Removes the abbreviation previously defined by :ab.
:unm keys	Removes the remove mapping defined by :map.
:vi filename	Starts editing a new file. If changes have not been saved, the editor displays a warning.
:w	Write out the current file.
:w filename	Write the buffer to the filename specified.
:w >> filename	Append the contents of the buffer to the filename.
:wq	Write the buffer and quit.

---

## 2.10 Configuration Rollback

The Configuration Rollback feature provides the ability to undo configuration and reverts back to previous router configuration states while minimizing impacts to services.

This feature gives the operator better control and visibility over the 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, experimentation or when problems are identified in the configuration during actual network operation).

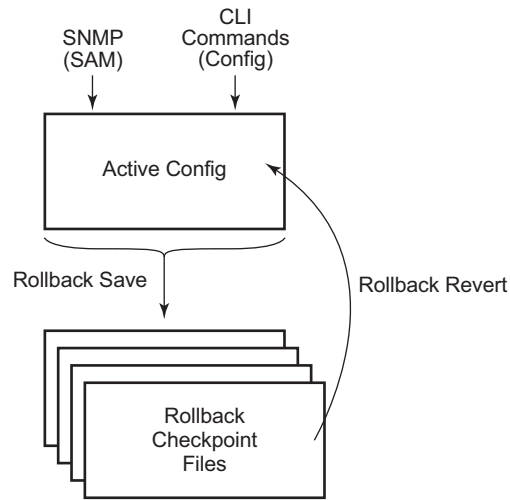
The advantages of this feature include the following:

- Changes made to router configuration are performed with minimal impact on services being provided by the SR by not being required to reboot the router.
- No impact in areas of configuration that did not change.

With the rollback feature, the operator can smoothly revert to previous configurations.

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

A history of changes is preserved (checkpoint IDs) that allows rollback to different points, as well as examination of changes made, as shown in [Figure 1](#).

**Figure 1 Rollback Operation**

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## 2.10.1 Feature Behavior

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

- The user can create a rollback checkpoint, and later, revert to this checkpoint with minimal impacts to services.

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

*comment-string*: an 255 char 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 configurations. The BOF file (and bof config) 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 feature can be automatically executed (for example, scheduled monthly) using the CRON facility of SR OS.
- 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
```

- When a **rollback save** 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 then the last checkpoint file is deleted.
- The maximum number of rollback checkpoints is configurable and defaults to 10 (“latest” and 1 through 9, where checkpoint file 9 is deleted during the next rollback-save).
- The location and name of the rollback checkpoint files is configurable to be local (on compact flash) or remote. The *file-url* must not contain a suffix (just a path/directory + 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 one is not specified (or it is cleared using **no rollback-location**) and a **rollback save** is attempted, the **rollback save** fails and returns an error message.
- The entire set of rollback checkpoint files can be copied from the active CPM CF to the standby CPM CF. This synchronization is done via the following command:

```
admin>redundancy# rollback-sync
```

- The operator can enable an automatic synchronization of rollback checkpoint files between the active CPM and standby CPM. When this automatic synchronization is enabled, a **rollback save** causes 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 incremented.

The automatic sync only causes the 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 redundancy rollback-sync**).

```
config>redundancy# [no] rollback-sync
```

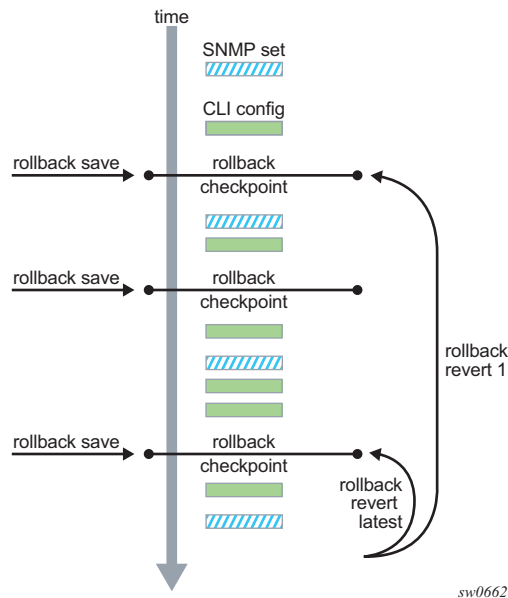
- **config>redundancy>synchronize {boot-env | config}** and **admin>redundancy>synchronize {boot-env | config}** do not apply to rollback checkpoint files. These commands do not manually or automatically sync rollback checkpoint files. The dedicated **rollback-sync** commands must be used to synchronize 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 **config>redundancy>rollback-sync** is enabled, a rollback delete also deletes 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) 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.
- As shown in [Figure 2](#), support for rolling back to a previous configuration (a saved rollback checkpoint) with minimal impact on services. The previous configuration is loaded and take operational effect.

```
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 the command **rollback revert 3** and then issues the **rollback save** command, the resulting rollback checkpoint files “file-url.rb” and “file-url.rb.4” contains the same rollback state/configuration.

- The **boot-good-exec** or **bad-exec** are not automatically executed after a rollback.
- Impacts to the running services are minimized during a rollback:
  - no impact in areas of configuration that did not change
  - Configuration parameters that changed (or items that changed config have dependencies on) are first removed (revert to default) and the previous values are then restored (can be briefly service impacting in changed areas). Some examples are the following:
    - If the currently active configuration contains **configure port 5/1/1 dwdm tdc dispersion -1000** and the rollback checkpoint contains **configure port 5/1/1 dwdm tdc dispersion -1010**, then the operational dispersion transitions from -1000, to 0 and then back to -1010 for port 5/1/1, which causes a traffic interruption.
    - Changing the neighbor of an MC-APS port starts with neighbor 1, then be configured as **no neighbor**, and then configured with neighbor 2. Moving through the **no neighbor** intermediate state requires the working and protect circuits to be torn down and rebuilt. This impacts the 7450 ESS and 7750 SR.
- A rollback undoes 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**, both CLI commands (from other users) and SNMP commands 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 in 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 executable scripts. A normal configuration file (from an **admin save**) cannot be renamed as a rollback checkpoint and then referenced for a **rollback revert** operation. Only rollback checkpoint files generated with **rollback save** can be used to rollback revert.
- If a hardware change is made after a **rollback save**, then:
  - a rollback can be executed as long as the hardware change was an addition of hardware to the node (for example, added a new card or IOM into a previously empty slot).
  - a rollback is not guaranteed to work if hardware was removed or changed (for example, XCM/IOM was removed, or XMA/MDA was swapped for a different XMA/MDA type).
- Rollback across a change to the following parameters is not supported:
  - chassis-mode

- **configure isa application-assurance-group minimum-isa-generation**
- 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.
- Lawful Intercept configuration under the **config>li** branch is not affected by a rollback or rescue. LI configuration is not saved in the rollback checkpoint or rescue file, and a rollback revert does not affect any configuration under the **config>li** branch.
- Any configuration or state change performed under the debug branch of CLI is not saved in the rollback checkpoint file or impacted by a rollback.
- Rollbacks to a checkpoint created in a more recent release is not supported (for example, node running in 9.0r5 cannot rollback to a checkpoint created in 9.0r7).
- 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, are stopped. If the SAA job is a continuous type, then it is 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 would need to be manually restarted if they need to be run again.
  - If **max-nbr-mac-addr** is reduced as part of the revert and the number of MAC addresses in the forwarding database is greater than the **max-nbr-mac-addr**, then 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 if they wish to proceed with the rollback.
  - If active subscribers or subscriber hosts or DHCP lease states are present, some associated configuration changes may be blocked (just as those same changes would be blocked if an operator tried to make them via CLI).
  - Trying to delete a SLA profile being used by active subscriber hosts, or trying to change a NAT policy in a subscriber profile. If certain configuration changes associated with the hosts or lease states are required as part of the rollback but those changes are blocked, then for each blocked configuration item, a warning is printed, that particular configuration item is not changed and the rollback continues. This is supported on the 7450 ESS and 7750 SR.



- 
- After multi-chassis peer shutdown or configuration changes have occurred that affect the contents of the distributed database (for example, sync tag creation or deletion), further configuration changes related to that peer may be temporarily refused. The duration of the temporary configuration freeze depends on the size of the distributed database. A rollback attempting to make those refused configuration changes fails and an error message is provided to the CLI user.
  - If a **force-switchover** command (for example, **tools perform service id 1 endpoint "x" force-switchover spoke-sdp-fec 1**) has been applied to a spoke-sdp-fec of a dynamic multi-segment pseudo wire, 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 the admin state), then the rollback revert automatically removes the force-switchover and the node reverts 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. Some examples include:
    - Configuration changes that require a **shutdown** and then **no-shutdown** to be done by an operator in order to take operational effect also need this manual shut/no-shut to be performed by the operator in order to take operational effect after a rollback if the rollback changes those configuration items. Some examples include:
      - Changes to Autonomous System or Confederation value require a BGP **shut** and **no shut** command.
      - Changes to VPRN Max-routes require a shut/no-shut on the VPRN service.
      - Changes to OSPF or ISIS export-limit require a shut/no-shut on OSPF or ISIS.
      - Configuration changes to an MSAP policy that normally require a **tools perform subscriber-mgmt eval-msap** command to take operational effect on subscribers that are already active. Rollback changes the MSAP policy configuration, but if it is required to have the configuration changes applied to the active subscribers, then the operator must run the **eval-msap** tools command.
  - Any uncommitted changes (for example, the **begin** command was entered, some changes made, but the **commit** command was never entered) in the following areas are lost or cleared when a rollback revert is initiated:
    - **config>app-assure>group policy**
    - **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 and MDAs are listed in a warning and the operator is prompted with a single y/n prompt to decide whether to proceed. This prompting will not occur for a rollback initiated via SNMP, or 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:
  - **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 (via CLI or 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, as the 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.
- An HA CPM switchover during a rollback revert causes the rollback operation to abort. The newly active CPM has 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.
- A rollback revert operation does not check authorization of each command that is applied during the revert. Permission to execute the revert operation (authorization for the “**admin rollback revert**” command itself) should only be given to users who are allowed to initiate a rollback revert. It is generally advised to only allow system administrators access to the file system where the rollback files are stored so that they cannot be manually edited.

## 2.10.2 Rollback and SNMP

The SR OS has SNMP support for rollback status and control. See the TIMETRA-SYSTEM-MIB for details (for example, items such as `tmnxSysRollbackStarted`).

When the router is doing a rollback revert, SNMP managers see a `tmnxSysRollbackStarted` trap, then a rapid set of “config change” traps, and then finally, the `tmnxSysRollbackStatusChange` trap.

During the period when a router is processing a rollback revert, both CLI commands (from other users) and SNMP commands continue to be processed.

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## 2.10.3 Rescue Configuration

A special rescue configuration checkpoint can be created that an operator can revert to at any time. The rescue configuration has its own keyword (**rescue**) and does not use the same rolling suffix indices 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 (and 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 SR OS appends an ".rc" suffix to the specified rescue filename.

## 2.10.4 Operational Guidelines

The following points offer some operational guidance on the usage of rollback.

- The **admin save** and **admin rollback save** commands should be performed periodically:
- The **admin save** command can be used to backup a complete configuration file that can be used during router reboot, with the following considerations:
  - used with a reboot as a last resort
  - performed after any major hardware changes or major service changes
  - performed after any software upgrade
- The **admin rollback save** command can be used to create a rollback checkpoint as follows:
  - to be used for intermediate checkpoints that can be recovered with minimal impacts to services
  - to be performed each time that a moderate amount of configuration changes have been made
  - to be performed after any hardware changes
  - to be performed after any software upgrade
  - to be scheduled with CRON (for example, once every one or two weeks)
- A new **admin rollback save rescue** must be created when hardware is changed.
- Rollback checkpoint files are not editable, or compatible or interchangeable with configuration files (generated with **admin save**).

- 
- The repeated use of the **admin rollback save**, **admin rollback delete**, and **admin rollback revert** commands over the course of weeks or months is not recommended without also executing an occasional **admin save**. In a serious situation, use one of the saved configurations as the primary configuration for an **admin reboot**.
  - For a software upgrade, it is recommended to create a Rollback Checkpoint (**admin rollback save**), in addition to saving the configuration (**admin save**), after an upgrade has been performed and the system is operating as expected. This ensures a good checkpoint that is fully compatible with the new release is available at a point shortly after the upgrade.
  - An operator could create a set of rollback checkpoints to support busy or quiet days or weekends or weekdays and use CRON to shift between them.
  - It is beneficial to create a rollback checkpoint before a rollback revert is initiated (especially if significant configuration changes have been applied since the last checkpoint was created). If the rollback is especially significant (a lot of major changes), it is also a good practice to perform an **admin save** 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 (for example, `rollback revert 5`) fails during execution, it should be attempted again. The second attempt typically completes the remaining configuration changes required to fully revert to the desired checkpoint.
  - When a new backup CPM is commissioned, the user executes the **admin redundancy rollback-sync** command to copy the entire set of rollback files from the active CPM CF to the new standby CPM CF. If the operator wants the system to automatically copy new rollback checkpoints to both CFs whenever a new checkpoint is created, then the **configure redundancy rollback-sync** should be configured.
  - An HA CPM switchover during a rollback revert causes the rollback operation to abort. The newly active CPM has an indeterminate configuration. A log event is created in this case to warn the operator. 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.
  - A rollback checkpoint stores the rollback location and the local- and remote-max-checkpoint values, and it is possible that a rollback revert operation can change those values. If an operator changes the local- or remote-max-checkpoint values, it is recommended to delete all the existing checkpoints to prevent a subsequent rollback revert from changing the maximum values to any of the previous values.

- 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, execute the revert again, and respond **yes**. If the rollback encounters problems, then a revert to the saved checkpoint can be used to return to the initial configuration state.

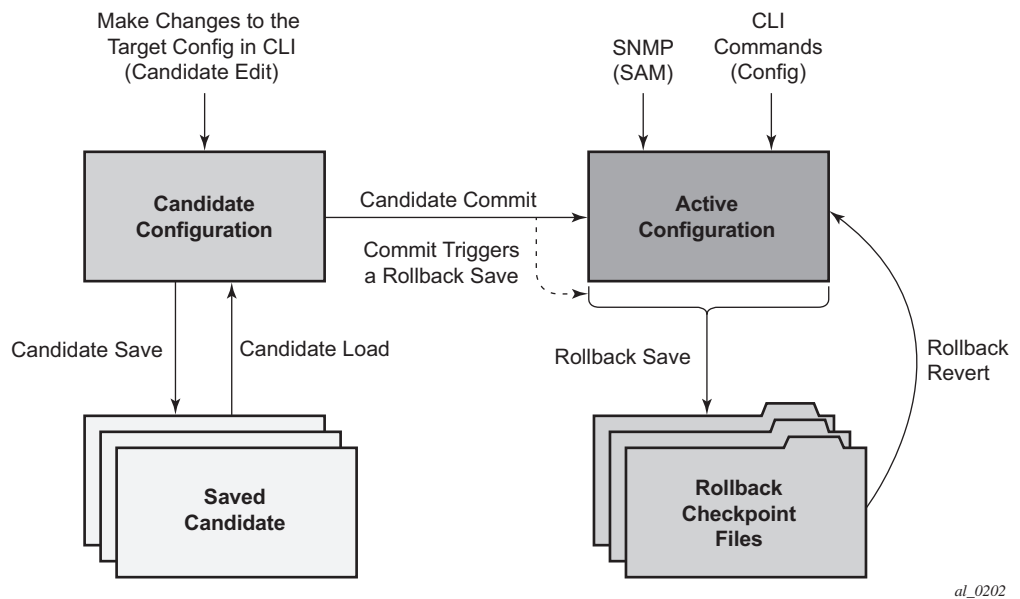
## 2.11 Transactional Configuration

Transactional configuration allows an operator to edit a candidate configuration (a set of configuration changes) without actually causing operational changes in the router (the active or operational configuration). Once the candidate configuration is complete, the operator can explicitly commit the changes and cause the entire new configuration to become active.

Transactional configuration gives the operator better control and visibility over their router configurations and reduce operational risk while increasing flexibility.

Transactional Configuration and Configuration Rollback support combine to provide the operational model depicted in [Figure 3](#).

**Figure 3 Router Configuration with Rollback and Transactions**



al\_0202

### 2.11.1 Basic Operation

In order to edit the candidate configuration, the operator must first enter the candidate edit mode (`edit-cfg`). The operator can enter and quit the configuration mode as many times as they wish before finally committing the candidate.

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In edit-cfg mode, the operator builds a set of candidate configuration changes using the same CLI tree as the standard (line-by-line non-transactional) configuration. Tab completion and keyword syntax checking is available.

Just as there is a single operational active configuration that can be modified simultaneously by multiple users in the SR OS, there is also a single global candidate configuration instance. All users make changes in the same global candidate configuration and a commit operation by any user commits the changes made by all users.

Users have the ability to exclusively create a candidate configuration by blocking other users (and sessions of the same user) from entering edit-cfg mode.

If a commit operation is successful, then all of the candidate changes takes operational effect and the candidate is cleared. If there is an error in the processing of the commit, or a 'commit confirmed' is not confirmed and an auto-revert occurs, then the router returns to a configuration state with none of the candidate changes applied. The operator can then continue editing the candidate and try a commit later.

All commands in the candidate configuration must be in the correct order for a commit to be successful. Configuration that depends on other candidate objects must be placed after those objects in the candidate. A set of candidate editing commands (**copy**, **insert**, and so on) are available to correct and reorder the candidate configuration.

The edit-cfg mode is primarily intended for building a candidate configuration while navigating the **configure** branch of CLI. Many CLI commands in branches other than **configure** are supported while in edit-cfg mode, but access to some CLI branches and command are blocked including:

- **exec** command
- **enable-admin** command
- **enable-dynamic-services-config** command
- **admin** branch
- **bof** branch
- **debug** branch
- **tools** branch

The candidate configuration can be saved to a file and subsequently loaded into a candidate configuration. A saved candidate is similar to, but not the same as an SR OS configuration file generated with an **admin save** command. The saved candidate cannot be used in general as a configuration file and may not **exec** without failures.

---

There is no SNMP access to the candidate configuration and no SNMP management of candidates, although any configuration changes done via a transaction are reported via the standard SR OS SNMP change traps and basic candidate status information is available via SNMP.

Failure of a commit may be due to one or more of several reasons including:

- **Misordering:** The candidate configuration has changes that are not in the correct order (an object is referred to before it is actually created).
- **Invalid options and combinations:** Although many syntax errors are eliminated during the candidate editing process, the candidate configuration may contain combinations of configuration and options that are not valid and are rejected when the SR OS attempts to have them take operational effect.
- **Out of resources:** The application of the candidate may exhaust various system resources, such as queue resources.

Error messages that help the operator to take necessary actions to correct the candidate are provided for commit failures.

Standard line-by-line (immediate operational effect upon pressing Enter) non-transactional CLI and SNMP commands are not blocked during the creation or editing of a candidate or the processing of a commit. These commands take immediate effect as normal.

## 2.11.2 Transactions and Rollback

By default, the SR OS automatically creates a new rollback checkpoint after a commit operation. The rollback checkpoint includes the new configuration changes made by the commit. An optional **no-checkpoint** keyword can be used to avoid the auto-creation of a rollback checkpoint after a commit. If the commit fails, then no new rollback checkpoint is created.

When the **commit confirmed** option is used then a rollback checkpoint is created after the processing of the commit and exists whether the commit is automatically reverted or not.

Transactional configuration relies on the rollback mechanism to operate. Any commands and configurations that are not supported in a rollback revert are also not supported in edit-cfg mode; for example, changes to chassis-mode.



## 2.11.3 Authorization

Authorization works transparently in edit-cfg mode and no unique or new local profile or TACACS+ permissions rules are required (other than allowing access to the **candidate** branch). For example: if an operator has permissions to access the **configure filter** context, then they automatically also have access to the **configure filter** context when in edit-cfg mode.

The candidate **load** and **save** operations (if the operator's profile allows access to these commands) loads and saves only those items that the user is authorized to access.

The candidate view only displays the items that the user is authorized to access.

The various candidate editing commands (such as adding lines, removing lines, delete, and so on) only allow operations on items that the user is authorized to access.

The candidate **commit** and **discard** operations (along with **admin rollback revert**) operate on the entire candidate and impact all items (authorization does not apply).



## 2.12 Basic CLI Command Reference

### 2.12.1 Command Hierarchies

- [Global Commands](#)
- [Monitor Commands](#)
- [Environment Commands](#)
- [Candidate Commands](#)
- [Rollback Commands](#)

#### 2.12.1.1 Global Commands

- **back**
- **echo** [*text-to-echo*] [*extra-text-to-echo*] [*more-text*]
- **enable-admin**
- **exec** [-**echo**] [-**syntax**] [*filename* | *eof-marker-string*] [-**arguments** [*arguments*] [*arguments*]]
- **exit** [**all**]
- **help**
- **help** **edit**
- **help** **globals**
- **history**
- **info** [**detail**] [**objective**]
- **logout**
- **password**
- **ping** [*ip-address* | *dns-name*] [**bypass-routing**] | {**interface** *interface-name*} | {**next-hop** *ip-address*}
- **ping** [*ipv4-address*] **subscriber-id** [*sub-ident-string*]
- **options common to both ping cases:** [**count** *requests*] [**detail** | **rapid**] [**do-not-fragment** [*fc fc-name*] [**interval** *centisecs* | *secs*] [**pattern** *pattern*] [{**router** *router-or-service*} | {**router-instance** *router-instance*} | {**service-name** *service-name*}] [**size** *bytes*] [**source** *ip-address*] [**timeout** *timeout*] [**tos** *type-of-service*] [**tll** *time-to-live*]
- **pwc** [**previous**]
- **sleep** [*seconds*]
- **ssh** *host* [-**l** *username*] [-**v** *ssh-version*] [{**router** *router-instance* | **service-name** *service-name*}] [**re-exchange-min** *minutes*] [**re-exchange-mbyte** *megabytes*]
- **telnet** {*ip-address* | *dns-name*} [*port*] **service-name** *service-name*
- **telnet** {*ip-address* | *dns-name*} [*port*] [**router** *router-instance*]
- **traceroute** [*ip-address* | *dns-name*] [**detail**] [**no-dns**] [{**router** *router-or-service*} | {**router-instance** *router-instance*} | {**service-name** *service-name*}] [**source** *ip-address*] [**tos** *type-of-service*] [**tll** *tll*] [**wait** *milliseconds*]
- **tree** [**detail**] [**flat**]
- **write** {*user-name* | *broadcast*} *message*

## 2.12.1.2 Monitor Commands

### monitor

- **card** *slot-number* **fp** *fp-number* **ingress** {**access** | **network**} **queue-group** *queue-group-name* **instance** *instance-id* [**interval** *seconds*] [**repeat** *repeat*] **policer** *policer-id* [{**absolute** | **percent-rate** | *reference-rate*}]
- **ccag** *ccag-id* [**path** *path-id*] [**type** *type*] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
- **cpm-filter**
  - **ip** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
  - **ipv6** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
  - **mac** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
- **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*] [{**bytes** | **packets** | **errors** | **utilization**] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
- **management-access-filter**
  - **ip** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
  - **ipv6** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
  - **mac** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
- **port** *port-id* [*port-id*] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}] [**multiclass**]
- **port** *port-id* [*port-id*] **atm**
- **port** **all-ethernet-rates** [**interval** *seconds*] [**repeat** *repeat*]
- **qos**
  - **arbiter-stats**
    - **card** *slot-number* **fp** *fp-number* **queue-group** *queue-group-name* **instance** *instance-id* [**ingress**] [**access** | **network**] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **percent-rate** | *reference-rate*}] [**arbiter** {**root** | *name*}]
    - **customer** *customer-id* **site** *customer-site-name* [**arbiter** {**root** | *name*}] [{**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
    - **port** *port-id* **egress** *network* **queue-group** *queue-group-name* **instance** *instance-id* [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}] [**arbiter** {**root** | *name*}]
    - **sap** *sap-id* [**arbiter** {*name* | *root*}] [{**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
    - **subscriber** *sub-ident-string* [**arbiter** {*name* | *root*}] [{**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
  - **port** *port-id* **vport** *name* [**interval** *seconds*] [**repeat** *repeat*]
  - **scheduler-stats**
    - **customer** *customer-id* **site** *customer-site-name* [**scheduler** *scheduler-name*] [{**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
    - **port** *port-id* **queue-group** *queue-group-name* [{**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}] [{**access** | **network**] [**instance** *instance-id*]
    - **sap** *sap-id* [**scheduler** *scheduler-name*] [{**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
    - **sap** *sap-id* **encap-group** *group-name* [**member** *encap-id*] [**scheduler** *scheduler-name*] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
    - **subscriber** *sub-ident-string* [**scheduler** *scheduler-name*] [{**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}]
    - **subscriber** *sub-ident-string* [**interval** *seconds*] [**repeat** *repeat*] [{**absolute** | **rate**}] **sap** *sap-id* **sla-profile** *sla-profile-name*

- 
- **router** [*router-instance*]
  - **router service-name** *service-name*
    - **bgp**
      - **neighbor** *ip-addr* [*ip-addr*] [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
    - **isis** [*isis-instance*]
      - **statistics** [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
    - **ldp**
      - **fec-egress-stats** *ip-prefix/mask* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
      - **session** *ldp-id* [*ldp-id*] [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
      - **statistics** [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
    - **mpls**
      - **interface** *interface* [*interface*] [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}] [*aux-stats*]
      - **lsp-egress-stats** **lsp** *lsp-name* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}] [*bits*]
      - **lsp-ingress-stats** **lsp** *lsp-name* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}] [*ip-address*] [*bits*]
      - **tp-lsp-egress-stats** **lsp** *lsp-name* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
      - **tp-lsp-ingress-stats** **lsp** *lsp-name* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
    - **ospf** [*ospf-instance*]
      - **interface** *interface* [*interface*] [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
      - **neighbor** *ip-addr* [*ip-addr*] [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
      - **virtual-link** *nbr-rtr-id* **transit-area** *transit-area* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
      - **virtual-neighbor** *nbr-rtr-id* **area** *area-id* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
    - **ospf3** [*ospf-instance*]
      - **interface** *interface* [*interface*] [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
      - **neighbor** *router-id* *interface-name* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}] **area** *area-id*
      - **virtual-link** *nbr-rtr-id* **area** *area-id* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
      - **virtual-neighbor** *nbr-rtr-id* **area** *area-id* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
  - **pim**
    - **group** *grp-ip-address* [**source** *ip-address*] [*interval interval*] [*repeat repeat*] [{*absolute* | *rate*}]
  - **rip**
    - **neighbor** *neighbor* [*neighbor*] [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
  - **ripng**
    - **neighbor** *neighbor* [*neighbor*] [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
  - **rsvp**
    - **interface** *interface* [*interface*] [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
  - **vrrp**
    - **instance** **interface** *interface-name* **vr-id** *virtual-router-id* [**ipv6**] [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]

- **service**
  - **id** *service-id*
    - **sap** *sap-id* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
    - **sap** *sap-id* **encap-group** *group-name* [*member encap-id*] [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}]
    - **sdp** {*sdp-id* [*:vc-id*] | *far-end ip-address*} [*interval seconds*] [*repeat repeat*] [*absolute* | *rate*]
  - **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}] [*base*]
  - **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}] **egress-policer-id** *egress-policer-id*
  - **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [*interval seconds*] [*repeat repeat*] [{*absolute* | *rate*}] **egress-queue-id** *egress-queue-id*
  - **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* **interval** [*seconds*] [*repeat repeat*] [{*absolute* | *rate*}] **ingress-policer-id** *ingress-policer-id*
  - **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* **interval** [*seconds*] [*repeat repeat*] [{*absolute* | *rate*}] **ingress-queue-id** *ingress-queue-id*

### 2.12.1.3 Environment Commands

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

### 2.12.1.4 Candidate Commands

- **candidate**
  - **edit** [*exclusive*]
  - **commit** [*confirmed timeout*] [*comment comment*]
  - **commit** **no-checkpoint** [*confirmed timeout*]
  - **confirm**
  - **copy** [*line*]
  - **delete** [*line*]

- **discard** [*now*]
- **goto** *line*
- **insert** [*line*]
- **load** *file-url* [{**overwrite** | **insert** | **append**}]
- **quit**
- **redo** [*count*]
- **replace** [*line*]
- **save** *file-url*
- **undo** [*count*]
- **view** [*line*]
- **info** [**operational**]

**show**

- **system**
  - **candidate**

## 2.12.1.5 Rollback Commands

- **admin**
  - **rollback**
    - **compare** [**to** *checkpoint2*]
    - **compare** *checkpoint1* **to** *checkpoint2*
    - **delete** [{*checkpoint-id* | **rescue** | **latest-rb**}]
    - **revert** [*checkpoint-id* | **rescue** | **latest-rb**] [**now**]
    - **save** [**comment** *comment!*] [**rescue**]
    - **view** [{*checkpoint-id* | **rescue** | **latest-rb**}]
  - **view** {*source*}

**config**

- **system**
  - **rollback**
    - **local-max-checkpoints** [*number-of-files*]
    - **no local-max-checkpoints**
    - **remote-max-checkpoints** [*number-of-files*]
    - **no remote-max-checkpoints**
    - **rescue-location** [{*file-url* | *rollback-filename*}]
    - **no rescue-location**
    - **rollback-location** [{*file-url* | *rollback-filename*}]
    - **no rollback-location**

---

## 2.12.2 Command Descriptions

### 2.12.2.1 Global Commands

#### back

<b>Syntax</b>	<b>back</b>
<b>Context</b>	<global>
<b>Description</b>	This command moves the context back one level of the command hierarchy. For example, if the current level is the <b>config router ospf</b> context, the <b>back</b> command moves the cursor to the <b>config router</b> context level.

#### echo

<b>Syntax</b>	<b>echo</b> [ <i>text-to-echo</i> ] [ <i>extra-text-to-echo</i> ] [ <i>more-text</i> ]
<b>Context</b>	<global>
<b>Description</b>	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 <b>exec</b> command.
<b>Parameters</b>	<i>text-to-echo</i> — Specifies a text string to be echoed, up to 256 characters. <i>extra-text-to-echo</i> — Specifies more text to be echoed, up to 256 characters. <i>more-text</i> — Specifies more text to be echoed, up to 256 characters.

#### enable-admin

<b>Syntax</b>	<b>enable-admin</b>
<b>Context</b>	<global>
<b>Description</b>	See the description for the <b>admin-password</b> command. If the <b>admin-password</b> is configured in the <b>config&gt;system&gt;security&gt;password</b> context, then any user can enter a special administrative mode by entering the <b>enable-admin</b> command.  <b>enable-admin</b> is in the default profile. By default, all users are given access to this command.  Once the <b>enable-admin</b> command is entered, the user is prompted for a password. If the password matches, the user is given unrestricted access to all the commands.



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

The following shows a password configuration example:

```
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#
```

There are two ways to verify that a user is in the enable-admin mode:

- show users — administrator can know which users are in this mode
- Enter the **enable-admin** command again at the root prompt and an error message will be returned.

```
*A:node-1# show users
=====
User                               Type      Login time      Idle time
  Session ID   From
=====
      6          --          Console          --          3d 10:16:12 --
admin
#83          192.168.255.255  SSHv2      12OCT2018 20:44:15  0d 00:00:00 A-
admin
84          192.168.255.255  SSHv2      12OCT2018 21:09:25  0d 00:05:10 --
=====
Number of users: 2
'#' indicates the current active session
'A' indicates user is in admin mode
=====
*A:node-1# enable-admin
MINOR: CLI Already in admin mode.
*A:node-1#
```

## exec

<b>Syntax</b>	<b>exec [-echo] [-syntax] {file-name   eof-marker-string} [-argument [256 chars max] [[256 chars max]]</b>
<b>Context</b>	<global>
<b>Description</b>	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.

**Related Commands:**

**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.

**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.

Example:

Assume the *test.cfg* file has the following commands:

```
echo $(1)
```

```
echo $(2)
```

```
echo $(3)
```

Enter the following command:

```
exec test.cfg -arguments 10 20 30
```

The output from this command will be:

```
10
20
30
```

**Parameters** **-echo** — Echoes the contents of the **exec** file to the session screen as it executes.

**Default** echo disabled

**-syntax** — Performs a syntax check of the file without executing the commands. Syntax checking will be able to find invalid commands and keywords, but it will not be able to validate erroneous user-supplied parameters.

**Default** execute file commands

*file-name* — Specifies the text file with CLI commands to execute, up to 256 characters.

*eof-marker-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** up to 254 characters.

**Default** EOF

---

**-argument** — Specifies up to five arguments, each up to 256 characters.

## exit

<b>Syntax</b>	<b>exit [all]</b>
<b>Context</b>	<global>
<b>Description</b>	This command returns to the context from which the current level was entered. For example, to navigate to the current level on a context by context basis, then the <b>exit</b> command only moves the cursor back one level.

```
A:ALA-1# configure
A:ALA-1>config# router
A:ALA-1>config>router# ospf
A:ALA-1>config>router>ospf# exit
A:ALA-1>config>router# exit
A:ALA-1>config# exit
```

When navigating to the current level by entering a command string, the **exit** command returns the cursor to the context in which the command was initially entered.

```
A:ALA-1# configure router ospf
A:ALA-1>config>router>ospf# exit
A:ALA-1#
```

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

```
A:ALA-1# configure
A:ALA-1>config# router
A:ALA-1>config>router# ospf
A:ALA-1>config>router>ospf# exit all
A:ALA-1#
```

<b>Parameters</b>	<b>all</b> — Exits back to the root CLI context.
-------------------	--

## help

<b>Syntax</b>	<b>help</b> <b>help edit</b> <b>help global</b> <b>help special-characters</b>
<b>Context</b>	<global>
<b>Description</b>	This command provides a brief description of the help system. The following information is shown:

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**    **help** — Displays a brief description of the help system.

**edit** — Displays help on editing.

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** — Displays help on global commands.

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
               execution
write         - Write text to another user
```

**special-characters** — Displays 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's syntax and associated keywords.
- string<Tab>** or **string<Space>** — Completes a partial command name (auto-completion) or lists available commands that match the string.

## history

<b>Syntax</b>	<b>history</b>
<b>Context</b>	<global>
<b>Description</b>	<p>This command lists the last 30 commands entered in this session.</p> <p>Re-execute a command in the history with the <b>!n</b> command, where <b>n</b> is the line number associated with the command in the history output.</p>

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
80 interface "test"
81 icmp unreachable 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

<b>Syntax</b>	<b>info [detail] [objective]</b>
<b>Context</b>	<global>
<b>Description</b>	This command displays the running configuration for the configuration context.

The output of this command is similar to the output of the **admin display-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. The “include-dynamic” **objective** keyword includes configuration parameters from dynamic sources such as VSD or dynamic data service Python scripts. These dynamic configuration parameters are not saved in the configuration file.

### Example:

```
A:ALA-48>config>router>if-attr# info
-----
admin-group "green" value 15
admin-group "red" value 25
admin-group "yellow" value 20
A:ALA-48>config>router>mpls# info
-----
interface "system"
exit
interface "to-104"
admin-group "green"
admin-group "red"
admin-group "yellow"
label-map 35
swap 36 nexthop 10.10.10.91
no shutdown
exit
exit
path "secondary-path"
hop 1 10.10.0.111 strict
hop 2 10.10.0.222 strict
hop 3 10.10.0.123 strict
no shutdown
exit
path "to-NYC"
hop 1 10.10.10.104 strict
hop 2 10.10.0.210 strict
no shutdown
exit
path "to-104"
no shutdown
```

```
exit
lsp "to-104"
  to 10.10.10.104
  from 10.10.10.103
  rsvp-resv-style ff
  cspf
...
-----
A:ALA-48>config>router>mpls#
A:ALA-48>config>router>mpls# info detail
-----

  frr-object
  no resignal-timer
  interface "system"
    no admin-group
    no shutdown
  exit
  interface "to-104"
    admin-group "green"
    admin-group "red"
    admin-group "yellow"
    label-map 35
      swap 36 nexthop 10.10.10.91
    no shutdown
  exit
  no shutdown
  exit
  path "secondary-path"
    hop 1 10.10.0.111 strict
    hop 2 10.10.0.222 strict
    hop 3 10.10.0.123 strict
    no shutdown
  exit
  path "to-NYC"
    hop 1 10.10.10.104 strict
    hop 2 10.10.0.210 strict
    no shutdown
  exit
  path "to-104"
    no shutdown
  exit
  lsp "to-104"
    to 10.10.10.104
    from 10.10.10.103
    rsvp-resv-style ff
    adaptive
    cspf
    include "red"
    exclude "green"
    adspec
    fast-reroute one-to-one
      no bandwidth
      no hop-limit
      node-protect
    exit
    hop-limit 10
    retry-limit 0
    retry-timer 30
    secondary "secondary-path"
```

```

        no standby
        no hop-limit
        adaptive
        no include
        no exclude
        record
        record-label
        bandwidth 50000
        no shutdown
    exit
    primary "to-NYC"
        hop-limit 50
        adaptive
        no include
        no exclude
        record
        record-label
        no bandwidth
        no shutdown
    exit
    no shutdown
exit
...
-----
A:ALA-48>config>router>mpls#

```

- Parameters**
- detail** — Displays all configuration parameters including parameters at their default values.
  - objective** — Provides an output objective that controls the configuration parameters to be displayed.
  - Values** *include-dynamic* — Includes configuration parameters from dynamic sources such as **vsd** or dynamic data service Python scripts.

## logout

- Syntax** **logout**
- Context** <global>
- 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 re-created.



## password

<b>Syntax</b>	<b>password</b>
<b>Context</b>	<root>
<b>Description</b>	<p>This command changes a user's CLI login password.</p> <p>When a user logs in after the administrator forces a <b>new-password-at-login</b>, or the password has expired (<b>aging</b>), then this command is automatically invoked.</p> <p>When invoked, the user is prompted to enter the old password, the new password, and then the new password again to verify the correct input.</p> <p>If a user fails to create a new password after the administrator forces a <b>new-password-at-login</b> or after the password has expired, the user is not allowed to access the CLI.</p> <p>A user cannot configure a non-conformant password for themselves using the global <b>password</b> command. A password value that does not conform to the minimum-length or other password complexity rules can be configured using the <b>config&gt;system&gt;security&gt;user&gt;password</b> command (for example, by an administrator), but a warning is provided in the CLI. This allows, for example, an administrator to configure a non-conformant password for a user.</p>

## ping

<b>Syntax</b>	<p><b>ping</b> [<i>ip-address</i>   <i>dns-name</i>] [<b>bypass-routing</b>   {<b>interface</b> <i>interface-name</i>}   {<b>next-hop</b> <i>ip-address</i>}]</p> <p><b>ping</b> [<i>ipv4-address</i>] <b>subscriber-id</b> [<i>sub-ident-string</i>]</p> <p><b>options common to both ping cases:</b> [<b>count</b> <i>requests</i>] [<b>detail</b>   <b>rapid</b>] [<b>do-not-fragment</b>] [<b>fc</b> <i>fc-name</i>] [<b>interval</b> <i>centisecs</i>   <i>secs</i>] [<b>pattern</b> <i>pattern</i>] [{<b>router</b> <i>router-or-service</i>}   {<b>router-instance</b> <i>router-instance</i>}   {<b>service-name</b> <i>service-name</i>}] [<b>size</b> <i>bytes</i>] [<b>source</b> <i>ip-address</i>] [<b>timeout</b> <i>timeout</i>] [<b>tos</b> <i>type-of-service</i>] [<b>tll</b> <i>time-to-live</i>]</p>
<b>Context</b>	<global>
<b>Description</b>	This command is the TCP/IP utility that is used to verify IP reachability.
<b>Parameters</b>	<p><i>ip-address</i>   <i>dns-name</i> — Specifies the remote host to ping. The IP address or the DNS name (if DNS name resolution is configured) can be specified.</p> <p><b>Values</b></p> <p>ipv4-address: a.b.c.d</p> <p>ipv6-address:</p> <ul style="list-style-type: none"> <li>• x:x:x:x:x:x[-interface]</li> <li>• x:x:x:x:x:d.d.d.d[-interface]</li> <li>• x: [0 to FFFF] H</li> <li>• d: [0 to 255] D</li> </ul> <p>dns-name: up to 128 characters</p>

**bypass-routing** — Sends 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.

*interface-name* — Specifies the interface name, up to 32 characters.

**next-hop ip-address** — 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.

**Values**    ipv4-address: a.b.c.d  
              ipv6-address:  
                  • x:x:x:x:x:x:x (eight 16-bit pieces)  
                  • x:x:x:x:x:d.d.d.d  
                  • x: [0 to FFFF] H  
                  • d: [0 to 255] D

**Default**    Per the routing table.

*sub-ident-string* — Specifies an existing subscriber-id.

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

**Values**    1 to 10000

**Default**    5

**detail | rapid** — 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** parameter includes in the output the interface on which the ping reply was received.

Example output:

```
A:ALA-1# ping 192.168.25.114 detail
PING 192.168.25.114: 56 data bytes
64 bytes from 192.168.25.114 via fei0: icmp_seq=0 ttl=64 time=0.000 ms.
64 bytes from 192.168.25.114 via fei0: icmp_seq=1 ttl=64 time=0.000 ms.
64 bytes from 192.168.25.114 via fei0: icmp_seq=2 ttl=64 time=0.000 ms.
64 bytes from 192.168.25.114 via fei0: icmp_seq=3 ttl=64 time=0.000 ms.
64 bytes from 192.168.25.xx1144 via fei0: icmp_seq=4 ttl=64 time=0.000 ms.

---- 192.168.xx.xx4 PING Statistics ----
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max/stddev = 0.000/0.000/0.000/0.000 ms
A:ALA-1#
```

**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 (does not apply to ICMPv6).

---

*fc-name* — Specifies the forwarding class.

**Values** be, l2, af, l1, h2, ef, h1, nc

**Default** nc

*centisecs* | *secs* — Specifies the interval between consecutive ping requests, expressed as a decimal integer.

**Values** 1 to 10000 seconds; if **rapid** is selected, 1 to 10000 centiseconds

**Default** 1 second; if **rapid** is selected, 1 centisecond

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

**Values** 0 to 65535

**Default** system-generated sequential pattern

*router-or-service* — Specifies the router name or service ID.

**Values** <router-name>|<vprn-svc-id>

router-name: Base, management, vpls-management

Default: Base

vprn-svc-id: 1 to 2147483647

router-instance is the preferred parameter for specifying the router or service.

*router-instance* — Specifies the router name, CPM router instance, or service ID.

**Values**

*router-instance*: *router name* or *service-id*

*router-name* "Base" | "management" | *cpm-vr-name* | "vpls-management"

*cpm-vr-name* up to 32 characters

*vprn-service-id* 1 to 2147483647

**Default** Base

*service-name* — Specifies the service name, up to 64 characters.

*bytes* — Specifies the size in bytes of the ping request packets.

**Values** 0 to 16384

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

**source** *ip-address* — Specifies the source IP address to use in the ping requests, in dotted decimal notation.

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

ipv6-address:

• x:x:x:x:x:x:x (eight 16-bit pieces)

- x:x:x:x:x:d.d.d.d
- x: [0 to FFFF] H
- d: [0 to 255] D

**Default** The IP address of the egress IP interface.

*timeout* — Specifies the timeout in seconds.

**Values** 1 to 10

**Default** 5

*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

**Default** 0

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

**Values** 0 to 128

**Default** 64

## pwc

<b>Syntax</b>	<b>pwc [previous]</b>
<b>Context</b>	<global>
<b>Description</b>	This command displays the present or previous working context of the CLI session. The <b>pwc</b> 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 <b>pwc</b> command displays a list of the CLI nodes that hierarchically define the current context of the CLI instance of the user.

The following example is from a 7750 SR:

```
A:ALA-1>config>router>bgp>group# pwc
-----
Present Working Context :
-----
<root>
  configure
  router Base
  bgp
  group test
  ospf
  area 1
-----
A:ALA-1>config>router>bgp>group#
```

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.

The following example is from a 7450 ESS:

```
*A:ALA-1>config>router>ospf>area>if# pwc previous
-----
Previous Working Context :
-----
<root>
  configure
  router "Base"
  ospf
  area "0.0.0.0"
-----
*A:ALA-1config>router>ospf>area>if#
```

**Parameters**    **previous** — Displays the previous present working context.

## sleep

**Syntax**        **sleep** [*seconds*]

**Context**        <global>

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

**Default**        sleep 1

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

**Values**        1 to 100

**Default**        1

## ssh

**Syntax**        **ssh** *host* [-*l* *username*] [-*v* *ssh-version*] [{**router** *router-instance* | **service-name** *service-name*}] [**re-exchange-min** *minutes*] [**re-exchange-mbyte** *megabytes*]

**Context**        <global>

**Description** This command initiates a client 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. This command also allows the user to initiate a SSH session, with a key re-exchange, based on maximum megabytes or minutes, whichever occurs first. If the re-exchange options are not set, the default behavior will not perform a key re-exchange.

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** *host* — Specifies the remote host for the SSH session.

**Values**

*host*: *user@hostname* - [up to 255 characters]  
*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[-interface]*  
*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, mandatory for link local addresses  
*dns-name* up to 128 characters

*username* — Specifies the user name to use when opening the SSH session, up to 32 characters.

*router-instance* — Specifies the router name or service ID.

**Values**

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

**Default** Base

*service-name* — Specifies the service name, up to 64 characters.

*minutes* — Specifies the time interval after which the SSH client will initiate the key-re-exchange.

**Values** 1 to 1440 minutes

*megabytes* — Specifies the number of megabytes, on a SSH session, after which the SSH client will initiate the key re-exchange.

**Values** 1 to 64000 megabytes

## telnet

- Syntax** `telnet {ip-address | dns-name} [port] service-name service-name`  
`telnet {ip-address | dns-name} [port] [router router-instance]`
- Context** <global>
- Description** This command opens a Telnet session to a remote host. Telnet servers in SR-series networks limit Telnet clients to three attempts to login; this number is not user configurable. The Telnet server disconnects the Telnet client session after three attempts.
- Parameters** *ip-address* — Specifies the IP address or the DNS name (providing DNS name resolution is configured).

**Values**

<i>ipv4-address</i>	<i>a.b.c.d</i>	
<i>ipv6-address</i>	<i>x:x:x:x:x:x:x[-interface]</i>	<i>x</i> : [0 to FFFF]H
	<i>x:x:x:x:x:d.d.d.d[-interface]</i>	<i>d</i> : [0 to 255]D <i>ipv6-address</i> interface: up to 32 characters, mandatory for link local addresses
<i>dns-name</i>	up to 128 characters	



**Note:** IPv6 applies to the 7750 SR and 7950 XRS.

*dns-name* — Specifies the DNS name (if DNS name resolution is configured) up to 128 characters.

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

**Values** 1 to 65535

**Default** 23

*router-instance* — Specifies the router name or service ID used to identify the router instance.

**Values**

*router-instance*: *router-name* or *vprn-svc-id*

*router-name* "Base", "management", vpls-management"

*vprn-svc-id* 1 to 2147483647

**Default** Base

*service-name* — Specifies the service name, up to 64 characters.

## tracert

<b>Syntax</b>	<b>tracert</b> [ <i>ip-address</i>   <i>dns-name</i> ] [ <b>detail</b> ] [ <b>no-dns</b> ] [{ <b>router</b> <i>router-or-service</i> }   { <b>router-instance</b> <i>router-instance</i> }]   { <b>service-name</b> <i>service-name</i> }] [ <b>source</b> <i>ip-address</i> ] [ <b>tos</b> <i>type-of-service</i> ] [ <b>ttl</b> <i>ttl</i> ] [ <b>wait</b> <i>milliseconds</i> ]
<b>Context</b>	<global>
<b>Description</b>	The TCP/IP tracert utility determines the route to a destination address. Note that aborting a tracert with the <Ctrl-C> command could require issuing a second <Ctrl-C> command before the prompt is returned.
	<pre>A:ALA-1# tracert 192.168.25.114 tracert to 192.168.25.114, 30 hops max, 40 byte packets  1 192.168.25.114 0.000 ms 0.000 ms 0.000 ms A:ALA-1#</pre>
<b>Parameters</b>	<i>ip-address</i>   <i>dns-name</i> — Specifies the remote address to tracert. The IP address or the DNS name (if DNS name resolution is configured) can be specified.
	<b>Values</b>
	<i>ipv4-address</i> a.b.c.d
	<i>ipv6-address</i> x:x:x:x:x:x[x[-interface]        x: [0 to FFFF]H x:x:x:x:x:d.d.d.d[-interface]    d: [0 to 255]D
	<i>dns-name</i> up to 63 characters



**Note:** IPv6 applies to the 7750 SR and 7950 XRS.

**detail** — Displays MPLS label stack information (if available).

**no-dns** — Specifies that a DNS lookup for the specified host name will not be performed.

**Default**    DNS lookups are performed

*router-or-service* — Specifies the router name or service ID.

**Values**    <router-name>|<vprn-svc-id>

router-name: Base, management, vpls-management

Default: Base

vprn-svc-id: 1 to 2147483647

router-instance is the preferred parameter for specifying the router or service.

*router-instance* — Specifies the router name, CPM router instance, or service ID.

**Values**



*router-instance*: *router-name* or *service-id*

*router-name* Base, management, *cpm-vr-name*, *vpls-management*  
*cpm-vr-name* up to 32 characters  
*vprn-service-id* 1 to 2147483647

**Default** Base

*service-name* — Specifies the service name, up to 64 characters.

**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's interfaces, an error is returned.

**Values**

*ipv4-address* a.b.c.d  
*ipv6-address* x:x:x:x:x:x:x (eight 16-bit pieces) x: [0 to FFFF]H  
x:x:x:x:x:d.d.d.d d: [0 to 255]D

*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

**Default** 0

*ttl* — Specifies the maximum time-to-live (TTL) value to include in the traceroute request, expressed as a decimal integer.

**Values** 1 to 255

**Default** 30 hops

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

**Values** 10 to 60000

**Default** 5000 milliseconds

## tree

**Syntax** tree [**detail**] [**flat**]

**Context** <global>

**Description** This command displays the command hierarchy structure of the current working context.

**Parameters** **detail** — Displays parameter information for each command shown in the tree output.

**flat** — Displays the full context on each line.

---

## write

<b>Syntax</b>	<b>write</b> { <i>user-name</i>   <i>broadcast</i> } <i>message</i>
<b>Context</b>	<global>
<b>Description</b>	This command sends a console message to a specific user or to all users with active console sessions.
<b>Parameters</b>	<p><i>user-name</i> — Specifies the name of a user, up to 32 characters, with an active console session to which to send a console message.</p> <p><b>Values</b> any valid CLI username</p> <p><i>broadcast</i> — Sends the <i>message-string</i> to all users logged into the router.</p> <p><i>message</i> — Specifies the message string to send. Allowed values are any string, up to 256 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.</p>

### 2.12.2.2 Monitor CLI Commands

## card

<b>Syntax</b>	<b>card</b> <i>slot-number</i> <b>fp</b> <i>fp-number</i> <b>ingress</b> { <b>access</b>   <b>network</b> } <b>queue-group</b> <i>queue-group-name</i> <b>instance</b> <i>instance-id</i> [ <b>interval</b> <i>seconds</i> ] [ <b>repeat</b> <i>repeat</i> ] <b>policer</b> <i>policer-id</i> [ <b>absolute</b>   <b>percent-rate</b>   <i>reference-rate</i> ]
<b>Context</b>	monitor
<b>Description</b>	This command monitors policer statistics in an ingress FP queue group.
<b>Parameters</b>	<p><i>slot-number</i> — Specifies the slot number associated with the queue group, expressed as an integer.</p> <p><b>Values</b> 1 to 10</p> <p><i>fp-number</i> — Specifies the FP number associated with the queue group, expressed as an integer.</p> <p><b>Values</b> 1 to 8</p> <p><b>ingress</b> — Displays policer statistics applied on the ingress FP.</p> <p><b>access</b> — Displays policer statistics on the FP access.</p> <p><b>network</b> — Displays policer statistics on the FP network.</p> <p><i>queue-group-name</i> — Specifies the name of the queue group up, to 32 characters.</p>

*instance-id* — Specifies the identification of a specific instance of the queue-group.

**Values** 1 to 65535

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

*policer-id* — Specifies the policer ID; must exist within the queue-group template applied to the ingress context of the forwarding plane.

**Values** 1 to 32

**absolute** — Displays Raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**percent-rate** — Displays rate-per-second for each statistic based on the reference rate of 10G.

**Values** 1 to 999

**Default** 10

*reference-rate* — Displays rate-per-second for each statistic as a percentage based on the reference rate specified.

**Values** 100M, 1G, 10G, 40G, 100G, 400G

**Default** 10G

## ccag

<b>Syntax</b>	<b>ccag</b> <i>ccag-id</i> [ <b>path</b> <i>path-id</i> ] [ <b>type</b> <i>type</i> ] [ <b>interval</b> <i>seconds</i> ] [ <b>repeat</b> <i>repeat</i> ] [ <b>absolute</b>   <b>rate</b> ]
<b>Context</b>	monitor
<b>Description</b>	This command displays monitor command output of traffic statistics for Cross Connect Aggregation Groups (CCAGs) ports.
<b>Parameters</b>	<i>ccag-id</i> — Specifies the CCAG instance to monitor. <b>Values</b> 1 to 8 <i>path-id</i> — Specifies the CCA path nodal context where the CCA path bandwidth, buffer and accounting parameters are maintained. The path context must be specified with either the <b>a</b> or <b>b</b> keyword specifying the CCA path context to be entered. <b>Values</b> a, b <i>type</i> — Specifies cross connect type. <b>Values</b> sap-sap, sap-net, net-sap

*seconds* — Configures the interval for each display in seconds.

**Values** 3 to 60

**Default** 10 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

## cpm-filter

**Syntax** **cpm-filter**

**Context** monitor

**Description** This command displays monitor command output for CPM filters.

## ip

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

**Context** monitor>cpm-filter

**Description** This command displays monitor command statistics for IP filter entries.

**Parameters** *entry-id* — Displays information on the specified filter entry ID for the specified filter ID only.

**Values** 1 to 2048

*seconds* — Configures the interval for each display in seconds.

**Values** 3 to 60

**Default** 10 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

---

## ipv6

- Syntax** `ipv6 entry entry-id [interval seconds] [repeat repeat] [absolute | rate]`
- Context** monitor>cpm-filter
- Description** This command displays monitor command statistics for IPv6 filter entries.
- Parameters** *entry-id* — Displays information on the specified filter entry ID for the specified filter ID only.
- Values** 1 to 2048
- seconds* — Configures the interval for each display in seconds.
- Values** 3 to 60
- Default** 10 seconds
- repeat* — Configures how many times the command is repeated.
- Values** 1 to 999
- Default** 10
- absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
- rate** — Displays rate-per-second for each statistic instead of the delta.

## mac

- Syntax** `mac entry entry-id [interval seconds] [repeat repeat] [absolute | rate]`
- Context** monitor>cpm-filter
- Description** This command displays monitor command statistics for MAC filter entries.
- Parameters** *entry-id* — Displays information on the specified filter entry ID for the specified filter ID only.
- Values** 1 to 2048
- seconds* — Configures the interval for each display in seconds.
- Values** 3 to 60
- Default** 10 seconds
- repeat* — Configures how many times the command is repeated.
- Values** 1 to 999
- Default** 10
- absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

## filter

<b>Syntax</b>	<b>filter</b>
<b>Context</b>	monitor
<b>Description</b>	This command enables the context to configure criteria to monitor IP and MAC filter statistics.

## ip

<b>Syntax</b>	<b>ip</b> <i>ip-filter-id</i> <b>entry</b> <i>entry-id</i> [ <b>interval</b> <i>seconds</i> ] [ <b>repeat</b> <i>repeat</i> ] [ <b>absolute</b>   <b>rate</b> ]
<b>Context</b>	monitor>filter
<b>Description</b>	<p>This command enables IP filter monitoring. The statistical information for the specified IP filter entry displays at the configured interval until the configured count is reached.</p> <p>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 display.</p> <p>When the keyword <b>rate</b> is specified, the rate-per-second for each statistic is displayed instead of the delta.</p> <p>Monitor commands are similar to <b>show</b> commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.</p>
<b>Parameters</b>	<p><i>ip-filter-id</i> — Displays detailed information for the specified filter ID and its filter entries.</p> <p><b>Values</b> [1 to 65535]   fSpec-[0 to 2147483647]   [1 to 65535 to 8192]   [1 to 65535:P1 to 4096]   <i>_tmnx_tms_egr-mda-id-F</i>   <i>_tmnx_tms-ing-mda-id-F</i>   <i>_tmnx_ofs_ofs-name</i>   <i>_tmnx_vsd</i>_[1 to 65535]   <i>name</i>: 64 chars max</p> <p><i>entry-id</i> — Displays information on the specified filter entry ID for the specified filter ID only.</p> <p><b>Values</b> [1 to 65535], fSpec-[0 to 2147483647]-[1 to 65353]</p> <p><i>seconds</i> — Configures the interval for each display in seconds.</p> <p><b>Values</b> 3 to 60</p> <p><b>Default</b> 10 seconds</p> <p><i>repeat</i> — Configures how many times the command is repeated.</p> <p><b>Values</b> 1 to 999</p> <p><b>Default</b> 10</p>

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

**Output** The following output is an example of filter IP information.

**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
-----
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
- 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**
- ipv6-filter-id* — Displays detailed information for the specified IPv6 filter ID and its filter entries.
- Values** [1 to 65535] | fSpec-[0 to 2147483647] | [1 to 65535 to 8192] | [1 to 65535:P1 to 4096] | \_tmnx\_tms\_egr-*mda-id*-F | \_tmnx\_tms-ing-*mda-id*-F | \_tmnx\_ofs\_ofs-*name* | \_tmnx\_vsd\_[1 to 65535] | *name*: 64 chars max
- entry-id* — Displays information on the specified filter entry ID for the specified filter ID only.
- Values** 1 to 65535
- seconds* — Configures the interval for each display in seconds.
- Values** 3 to 60
- Default** 10 seconds
- repeat* — Configures how many times the command is repeated.
- Default** 10
- Values** 1 to 999
- absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
- rate** — Displays rate-per-second for each statistic instead of the delta.
- Output** The following output is an example of filter IPv6 information.

**Sample Output**

```
A:ALA-48# monitor filter ipv6 100 entry 10 interval 3 repeat 3 absolute
=====
```



```
Monitor statistics for IPv6 filter 100 entry 10
-----
At time t = 0 sec (Base Statistics)
-----
Ing. Matches : 0                               Egr. Matches : 1
-----
At time t = 3 sec (Mode: Absolute)
-----
Ing. Matches : 0                               Egr. Matches : 1
-----
At time t = 6 sec (Mode: Absolute)
-----
Ing. Matches : 0                               Egr. Matches : 1
-----
At time t = 9 sec (Mode: Absolute)
-----
Ing. Matches : 0                               Egr. Matches : 01
=====
A:ALA-48#

A:ALA-48# monitor filter ipv6 100 entry 10 interval 3 repeat 3 rate
=====
Monitor statistics for IPv6 filter 100 entry 10
-----
At time t = 0 sec (Base Statistics)
-----
Ing. Matches : 0                               Egr. Matches : 1
-----
At time t = 3 sec (Mode: Rate)
-----
Ing. Matches : 0                               Egr. Matches : 1
-----
At time t = 6 sec (Mode: Rate)
-----
Ing. Matches : 0                               Egr. Matches : 1
-----
At time t = 9 sec (Mode: Rate)
-----
Ing. Matches : 0                               Egr. Matches : 1
=====
A:ALA-48#
```

## mac

- Syntax** `mac mac-filter-id entry entry-id [interval seconds] [repeat repeat] [absolute | rate]`
- Context** monitor>filter
- 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**     *filter-id* | *filter-name*  
                   filter-id: 1 to 65535  
                   filter-name: 64 chars max

*entry-id* — Displays information on the specified filter entry ID for the specified filter ID only.

**Values**     1 to 65535

*seconds* — Configures the interval for each display in seconds.

**Values**     3 to 60  
**Default**    10 seconds

*repeat* — Configures how many times the command is repeated.

**Values**     1 to 999  
**Default**     10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

**Output**

The following output is an example of filter mac information.

**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#

```

## lag

- Syntax** `lag lag-id [lag-id] [bytes | packets | errors | utilization] [interval seconds] [repeat repeat] [absolute | rate]`
- Context** monitor
- Description** This command monitors traffic statistics for Link Aggregation Group (LAG) ports. Statistical information for the specified LAG ID(s) displays 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 **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** *lag-id* — Specifies the number of the LAG, with a maximum of five LAG numbers specified in a single statement.
- Values** 1 to 200
- bytes** — Displays the statistics in bytes only.

- packets** — Displays the statistics in packets only.
- errors** — Displays the statistics for errors only.
- utilization** — Displays the statistics in percentage utilization only.
- seconds** — Configures the interval for each display in seconds.

**Values** 3 to 60  
**Default** 10 seconds

**repeat** — Configures how many times the command is repeated.

**Values** 1 to 999  
**Default** 10

**absolute** — Specifies raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

**Output** The following output is an example of monitor lag command information.

**Sample Output**

```
A:Dut-B# monitor lag 1 interval 3 repeat 1
=====
Monitor statistics for LAG ID 1
=====
Port-id      Input packets      Output packets
             Input bytes        Output bytes
             Input errors [Input util %]  Output errors [Output util %]
-----
At time t = 0 sec (Base Statistics)
-----
1/2/1        24                 25
             2224              2294
             0                 0
1/2/2        25                 8
             2170              776
             0                 0
-----
Totals       49                 33
             4394              3070
             0                 0
-----
At time t = 3 sec (Mode: Delta)
-----
1/2/1        3                  3
             306              306
             0                 0
1/2/2        0                  0
             0                 0
             0                 0
-----
Totals       3                  3
             306              306
```

```

                                0                                0
=====
A:Dut-B# monitor lag 1 interval 3 repeat 1 bytes
=====
Monitor statistics for LAG ID 1
=====
Port-id      Input bytes      Output bytes
-----
At time t = 0 sec (Base Statistics)
-----
1/2/1        6100              6170
1/2/2        2514              1120
-----
Totals       8614              7290
-----
At time t = 3 sec (Mode: Delta)
-----
1/2/1        306               306
1/2/2        0                 0
-----
Totals       306               306
=====

```

## management-access-filter

- Syntax**    **management-access-filter**
- Context**    monitor
- Description**    This command enables the context to monitor management-access filters. These filters are configured in the **config>system>security>mgmt-access-filter** context.

## ip

- Syntax**    **ip entry entry-id [interval seconds] [repeat repeat] [absolute | rate]**
- Context**    monitor>management-access-filter
- Description**    This command monitors statistics for the MAF IP filter entry.
- Parameters**    *entry-id* — Specifies an existing IP MAF entry ID.
  - Values**    1 to 9999*seconds* — Configures the interval for each display in seconds.
  - Values**    3 to 60
  - Default**    10

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

## ipv6

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

**Context** monitor>management-access-filter

**Description** This command monitors statistics for the MAF IPv6 filter entry.

**Parameters** *entry-id* — Specifies an existing IP MAF entry ID.

**Values** 1 to 9999

*interval seconds* — Configures the interval for each display in seconds.

**Values** 3 to 60

**Default** 10

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

## mac

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

**Context** monitor>management-access-filter

**Description** This command monitors statistics for the MAF MAC filter entry.

**Parameters** *entry-id* — Specifies an existing IP MAF entry ID.

**Values** 1 to 9999

*seconds* — Configures the interval for each display in seconds.

**Values** 3 to 60

**Default** 10

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

## port

**Syntax** **port** *port-id* [*port-id*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] [**multiclass**]  
**port** *port-id* [*port-id*] **atm** . . .  
**port all-ethernet-rates** [**interval** *seconds*] [**repeat** *repeat*]

**Context** monitor

**Description** This command enables port traffic monitoring. The specified port(s) statistical information displays at the configured interval until the configured count is reached.

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

When the **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** *port-id* — Specifies up to five port IDs. Port-IDs are only MLPPP bundles or bundle protection groups when the multiclass is specified.

<i>port-id</i>	<i>slot/mdal/port</i> [ <i>.channel</i> ]		
eth-sat-id	<b>esat-id</b> / <i>slot/port</i>		
	<b>esat</b>		keyword
	<i>id</i>		1 to 20
pxc-id	<b>pxc-id</b> . <i>sub-port</i>		
	<b>pxc</b>		keyword
	<i>id</i>		1 to 64
	<i>sub-port</i>		a, b
aps-id	<b>aps-group-id</b> [ <i>.channel</i> ]		

	<b>aps</b>	keyword
	<i>group-id</i>	1 to 64
bundle-id	<b>bundle-type-slot/mda.bundle-num</b>	
	<b>bundle</b>	keyword
	<i>type</i>	ima, ppp
	<i>bundle-num</i>	1 to 128

*seconds* — Configures the interval for each display in seconds.

**Default** 10 seconds  
**Values** 3 to 60

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999  
**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

**multiclass** — Displays multiclass information.

**atm** — Displays ATM information.

**all-ethernet-rates** — Displays all Ethernet rate information.

**Output** The following output is an example of monitor port information.

**Sample Output**

```
A:ALA-12>monitor# port 2/1/4 interval 3 repeat 3 absolute
=====
Monitor statistics for Port 2/1/4
=====
                               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 2/1/4 interval 3 repeat 3 rate

Monitor statistics for Port 2/1/4

```

-----
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
Bits                                  0                                0
Utilization (% of port capacity)      0.00                            0.00
-----

```

At time t = 6 sec (Mode: Rate)

```

-----
Octets                                0                                0
Packets                               0                                0
Errors                                0                                0
Bits                                  0                                0
Utilization (% of port capacity)      0.00                            0.00
-----

```

At time t = 9 sec (Mode: Rate)

```

-----
Octets                                0                                0
Packets                               0                                0
Errors                                0                                0
Bits                                  0                                0
Utilization (% of port capacity)      0.00                            0.00
=====

```

A:ALA-12>monitor#

\*A:Cpm-A> monitor port bundle-fr-1/1.1

Monitor statistics for Port bundle-fr-1/1.1

```

-----
Input                                Output
-----
At time t = 0 sec (Base Statistics)
-----
Octets                                0                                0

```

Packets	0	0
Errors	0	0

## qos

- Syntax** `qos`
- Context** `monitor`
- Description** This command enables the context to configure criteria to monitor QoS scheduler statistics for specific customers and SAPs.

## arbiter-stats

- Syntax** `arbiter-stats`
- Context** `monitor>qos`
- Description** This command enables the context to configure monitor commands for arbiter statistics.

## card

- Syntax** `card slot-number fp fp-number queue-group queue-group-name instance instance-id [ingress] [access | network] [interval seconds] [repeat repeat] [absolute | percent-rate | reference-rate] [arbiter {root | name}]`
- Context** `monitor>qos>arbiter-stats`
- Description** This command monitors arbiter statistics in an ingress FP queue group.
- Parameters**
  - slot-number* — Specifies the slot number associated with the queue group, expressed as an integer.
    - Values** 1 to 10
  - fp-number* — Specifies the FP number associated with the queue group, expressed as an integer.
    - Values** 1 to 8
  - queue-group-name* — Specifies the name of the queue group, up to 32 characters.
  - instance-id* — Specifies the identification of a specific instance of the queue-group.
    - Values** 1 to 65535
  - ingress** — Displays arbiter-name statistics applied on the ingress FP.
  - access** — Displays arbiter-name statistics applied on the FP access.
  - network** — Displays arbiter-name statistics applied on the FP network.

*seconds* — Configures the interval for each display in seconds.

**Values** 11 to 60

**Default** 11 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**percent-rate** — Displays rate-per-second for each statistic based on the reference rate of 10G.

*reference-rate* — Displays rate-per-second for each statistic as a percentage based on the reference rate specified.

**Values** 100M, 1G, 10G, 40G, 100G, 400G

**Default** 10G

*name* — Specifies the name of the policer control policy arbiter.

**Values** An existing arbiter-name in the form of a string up to 32 characters long 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.

**root** — Specifies the root arbiter.

## customer

**Syntax** **customer** *customer-id* **site** *customer-site-name* [**arbiter** {**root** | *name*}] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

**Context** monitor>qos>arbiter-stats

**Description** This command monitors arbiter statistics for a customer site.

**Parameters** *customer-id* — Specifies the ID number to be associated with the customer, expressed as an integer.

**Values** 1 to 2147483647

*customer-site-name* — Specifies the customer site which is an anchor point for ingress and egress arbiter hierarchy.

*name* — Specifies the name of the policer control policy arbiter. This parameter is mandatory if the SAP resides on a LAG in adapt-qos link or port-fair mode.

**Values** An existing arbiter-name in the form of a string up to 32 characters long 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.

**root** — Specifies the root arbiter.

**ingress** — Displays arbiter-name statistics applied on the site ingress.

**egress** — Displays arbiter-name statistics applied on the site egress.

*seconds* — Configures the interval for each display in seconds.

**Values** 11 to 60

**Default** 11 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic.

## port

**Syntax** **port** *port-id* **egress** *network* **queue-group** *queue-group-name* **instance** *instance-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] [**arbiter** {**root** | *name*}]

**Context** monitor>qos>arbiter-stats

**Description** This command monitors arbiter statistics for a customer site.

**Parameters** *port-id* — Specifies the port ID.

**Values** slot/mda/port [.channel]

*network* — Specifies statistics for an egress network queue group.

**Values** network

*queue-group-name* — Specifies the name of the queue group, up to 32 characters.

*instance-id* — Specifies the identification of a specific instance of the queue-group.

**Values** 1 to 65535

*seconds* — Configures the interval for each display in seconds.

**Values** 11 to 60

**Default** 11 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic.

*name* — Specifies the name of the policer control policy arbiter.

**Values** An existing arbiter-name in the form of a string, up to 32 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.

**root** — Specifies the root arbiter.

## sap

**Syntax** **sap** *sap-id* [**arbiter** {**root** | *name*}] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

**Context** monitor>qos>arbiter-stats

**Description** This command monitors arbiter statistics for a SAP.

**Parameters** *sap-id* — Specifies the physical port identifier portion of the SAP definition.

*name* — Specifies the name of the policer control policy arbiter, up to 32 characters. This parameter is mandatory if the SAP resides on a LAG in adapt-qoslink or port-fair mode.

**root** — Specifies the arbiter to which this queue would be feeding.

**ingress** — Displays *scheduler-name* statistics applied on the ingress SAP.

**egress** — Displays *scheduler-name* statistics applied on the egress SAP.

*seconds* — Configures the interval for each display in seconds.

**Values** 11 to 60

**Default** 11 seconds

*repeat* — Configures the number of times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

---

## subscriber

<b>Syntax</b>	<b>subscriber</b> <i>sub-ident-string</i> [ <b>arbiter</b> { <b>root</b>   <i>name</i> }] [ <b>ingress</b>   <b>egress</b> ] [ <b>interval</b> <i>seconds</i> ] [ <b>repeat</b> <i>repeat</i> ] [ <b>absolute</b>   <b>rate</b> ]
<b>Context</b>	monitor>qos>arbiter-stats
<b>Description</b>	This command monitors arbiter statistics for a subscriber.
<b>Parameters</b>	<p><i>sub-ident-string</i> — Specifies an existing subscriber identification policy name, up to 32 characters.</p> <p><i>name</i> — Specifies the name of the policer control policy arbiter.</p> <p><b>root</b> — Specifies the arbiter to which this queue would be feeding.</p> <p><b>ingress</b> — Displays arbiter name statistics applied on the ingress SAP.</p> <p><b>egress</b> — Displays arbiter name statistics applied on the egress SAP.</p> <p><i>seconds</i> — Configures the interval for each display in seconds.</p> <p><b>Values</b> 11 to 60</p> <p><b>Default</b> 11 seconds</p> <p><i>repeat</i> — Configures how many times the command is repeated.</p> <p><b>Values</b> 1 to 999</p> <p><b>Default</b> 10</p> <p><b>absolute</b> — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.</p> <p><b>rate</b> — Displays rate-per-second for each statistic instead of the delta.</p>

## port

<b>Syntax</b>	<p><b>port</b> <i>port-id</i> <b>exp-secondary-shaper</b> <i>shaper-name</i> [<b>interval</b> <i>seconds</i>] [<b>repeat</b> <i>repeat</i>] [<b>absolute</b>   <b>rate</b>]</p> <p><b>port</b> <i>port-id</i> <b>vport</b> <i>name</i> [<b>interval</b> <i>seconds</i>] [<b>repeat</b> <i>repeat</i>]</p>
<b>Context</b>	monitor>qos
<b>Description</b>	This command monitors expanded secondary shaper statistics.
<b>Parameters</b>	<p><i>port-id</i> — Specifies the port ID.</p> <p><b>Values</b> <i>slot/mda/port</i> <i>esat-id/slot/port</i> <i>pxc-id.sub-port</i></p> <p><i>shaper-name</i> — Displays statistics for the named exp secondary shaper.</p>

*seconds* — Configures the interval for each display in seconds.

**Values** 11 to 60

**Default** 11 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic.

**vport name** — Displays statistics for the named Vport.

## scheduler-stats

**Syntax** **scheduler-stats**

**Context** monitor>qos

**Description** This command enables the context to configure monitor commands for scheduler statistics.

## customer

**Syntax** **customer customer-id site customer-site-name [scheduler scheduler-name] [ingress | egress] [interval seconds] [repeat repeat] [absolute | rate]**

**Context** monitor>qos>scheduler-stats

**Description** This command monitors scheduler statistics per customer multi-service-site. The first screen displays the current statistics related to the specified customer ID and customer site name. 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. These commands display selected statistics per the configured number of times at the interval specified.

**Parameters** *customer-id* — Specifies the ID number to be associated with the customer, expressed as an integer.

**Values** 1 to 2147483647

*customer-site-name* — Specifies the customer site, which is an anchor point for ingress and egress virtual scheduler hierarchy.

*scheduler-name* — Specifies an existing *scheduler-name*. Scheduler names are configured in the **config>qos>scheduler-policy>tier level** context. This parameter is mandatory if the customer resides on a LAG in adapt-qos link or port-fair mode.

**Values** An existing *scheduler-name* is in the form of a string, up to 32 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.

**ingress** — Displays the customer's multi-service-site ingress scheduler policy.

**egress** — Displays the customer's multi-service-site egress scheduler policy.

*seconds* — Configures the interval for each display in seconds.

**Values** 11 to 60

**Default** 11 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

## port

**Syntax** **port** *port-id* **queue-group** *queue-group-name* [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] [**access** | **network**] [**instance** *instance-id*]  
**port** *port-id* **vport** *name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

**Context** monitor>qos>scheduler-stats

**Description** This command monitors scheduler statistics in a port queue group or a VPORT.

**Parameters** *port-id* — Specifies the port ID.

**Values** *slot/mdal/port*

*queue-group-name* — Specifies the name of the queue group, up to 32 characters.

*instance-id* — Specifies the identification of a specific instance of the queue-group.

**Values** 1 to 65535

**ingress** — Specifies statistics are for an ingress queue group.

**egress** — Specifies statistics are for an egress queue group.



*seconds* — Configures the interval for each display in seconds.

**Values** 11 to 60

**Default** 11 seconds

*repeat* — Configures the number of times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic.

**access** — Displays scheduler statistics applied on an access port.

**network** — Displays scheduler statistics applied on a network port.

*name* — Displays statistics for the named Vport, up to 32 characters.

## sap

**Syntax** **sap** *sap-id* [**scheduler** *scheduler-name*] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

**Context** monitor>qos>scheduler-stats

**Description** Use this command to monitor scheduler statistics for a SAP at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the specified 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 **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** *sap-id* — Specifies the physical port identifier portion of the SAP definition.

*scheduler-name* — Specifies an existing *scheduler-name*, up to 32 characters.

Scheduler names are configured in the **config>qos>scheduler-policy>tier level** context. This parameter is mandatory if the SAP resides on a LAG in adapt-qoslink or port-fair mode.

**ingress** — Displays *scheduler-name* statistics applied on the ingress SAP.

**egress** — Displays *scheduler-name* statistics applied on the egress SAP.

*seconds* — Configures the interval for each display in seconds.

**Values** 11 to 60

**Default** 11 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

## sap

**Syntax** **sap** *sap-id* [**scheduler** *scheduler-name*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]  
**sap** *sap-id* **encap-group** *group-name* [**member** *encap-id*] [**scheduler** *scheduler-name*]  
[**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

**Context** monitor>qos>scheduler-stats

**Description** This command monitors scheduler statistics for a SAP encap-group.

**Parameters** *sap-id* — Specifies the physical port identifier portion of the SAP definition.  
*group-name* — Displays statistics for the encap group, up to 32 characters.  
*encap-id* — Specifies the value of the encap-id to be displayed.

**Values** 0 to 16777215

*scheduler-name* — Specifies an existing scheduler-name. Scheduler names are configured in the **config>qos>scheduler-policy>tier** level context. This parameter is mandatory if the SAP resides on a LAG in adapt-qoslink or port-fair mode.

**Values** An existing scheduler-name is in the form of a string, up to 32 characters, composed of printable, 7-bit ASCII characters.

*seconds* — Configures the interval for each display in seconds.

**Values** 11 to 60

**Default** 11 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic.

---

## subscriber

- Syntax** **subscriber** *sub-ident-string* [**scheduler** *scheduler-name*] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]  
**subscriber** *sub-ident-string* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] **sap** *sap-id*  
**sla-profile** *sla-profile-name*
- Context** monitor>qos>scheduler-stats
- Description** This command monitors scheduler statistics for a subscriber.
- Parameters** *sub-ident-string* — Specifies an existing subscriber identification policy name, up to 32 characters.
- scheduler-name* — Specifies an existing QoS scheduler policy name, up to 32 characters. Scheduler names are configured in the **config>qos>scheduler-policy>tier** level context.
- ingress** — Displays *scheduler-name* statistics applied on the ingress SAP.
- egress** — Displays *scheduler-name* statistics applied on the egress SAP.
- seconds* — Configures the interval for each display in seconds.
- Values** 11 to 60
- Default** 11 seconds
- repeat* — Configures how many times the command is repeated.
- Values** 1 to 999
- Default** 10
- absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
- rate** — Displays rate-per-second for each statistic instead of the delta.
- sap-id* — Specifies the physical port identifier portion of the SAP definition.
- sla-profile-name* — Specifies the SLA profile belonging to the subscriber host, up to 32 characters.

## router

- Syntax** **router** [*router-instance*]  
**router service-name** *service name*
- Context** monitor
- Description** This command enables the context to configure criteria to monitor statistical information for a variety of routing protocols.

**Parameters** *router-instance* — Specifies the router name or service ID.

**Values**

*router-name*: Base, management, *cpm-vr-name*, vpls-management  
*vprn-service-id*: 1 to 2147483647  
*cpm-vr-name* up to 32 characters

**Default** Base

*service-name* — Specifies the service name used to identify the router instance. The name can be up to 64 characters long.

## bgp

**Syntax** **bgp**

**Context** monitor>router

**Description** This command monitors commands for the BGP instance.

## neighbor

**Syntax** **neighbor** *ip-addr* [*ip-addr*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

**Context** monitor>router>bgp

**Description** This command displays statistical BGP neighbor information at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the specified neighbor(s). 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** *ip-addr* — Displays damping information for entries received from the BGP neighbor. Up to five IP addresses can be specified.

**Values** *a.b.c.d*

*seconds* — Configures the interval for each display in seconds.

**Values** 3 to 60

**Default** 10 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

**Output** The following output is an example of BGP neighbor information.

### Sample Output

```
A:ALA-12>monitor>router>bgp# neighbor 192.0.2.10 interval 3 repeat 3 absolute
=====
Monitor statistics for BGP Neighbor 192.0.2.10
=====
At time t = 0 sec
-----
Recd. Prefixes   : 2                Sent Prefixes   : 0
Recd. Paths      : 0                Suppressed Paths : 0
Num of Flaps     : 0
i/p Messages     : 916              o/p Messages    : 916
i/p Octets       : 17510           o/p Octets      : 17386
i/p Updates      : 2                o/p Updates     : 0
-----
At time t = 3 sec
-----
Recd. Prefixes   : 0                Sent Prefixes   : 0
Recd. Paths      : 0                Suppressed Paths : 0
Num of Flaps     : 0
i/p Messages     : 0                o/p Messages    : 0
i/p Octets       : 0                o/p Octets      : 0
i/p Updates      : 0                o/p Updates     : 0
-----
At time t = 6 sec
-----
Recd. Prefixes   : 0                Sent Prefixes   : 0
Recd. Paths      : 0                Suppressed Paths : 0
Num of Flaps     : 0
i/p Messages     : 0                o/p Messages    : 0
i/p Octets       : 0                o/p Octets      : 0
i/p Updates      : 0                o/p Updates     : 0
-----
At time t = 9 sec
-----
Recd. Prefixes   : 0                Sent Prefixes   : 0
Recd. Paths      : 0                Suppressed Paths : 0
Num of Flaps     : 0
i/p Messages     : 0                o/p Messages    : 0
i/p Octets       : 6                o/p Octets      : 0
i/p Updates      : 0                o/p Updates     : 0
=====
A:ALA-12>monitor>router>bgp#
```

---

## isis

<b>Syntax</b>	<b>isis</b> [ <i>isis-instance</i> ]
<b>Context</b>	monitor>router
<b>Description</b>	This command monitors commands for the ISIS instance.
<b>Parameters</b>	<i>isis-instance</i> — Specifies the ISIS protocol instance within the router instance.
<b>Values</b>	0 to 31

## statistics

<b>Syntax</b>	<b>statistics</b> [ <i>interval seconds</i> ] [ <i>repeat repeatf</i> ] [ <b>absolute</b>   <b>rate</b> ]
<b>Context</b>	monitor>router>isis
<b>Description</b>	<p>This command displays statistical IS-IS traffic information at the configured interval until the configured count is reached.</p> <p>The first screen displays the current statistics related to the specified router statistics. The subsequent statistical information listed for each interval is displayed as a delta to the previous display. When the keyword <b>rate</b> is specified, the rate-per-second for each statistic is displayed instead of the delta.</p> <p>Monitor commands are similar to <b>show</b> commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.</p>
<b>Parameters</b>	<p><i>seconds</i> — Configures the interval for each display in seconds.</p> <p><b>Values</b> 3 to 60</p> <p><b>Default</b> 10 seconds</p> <p><i>repeat</i> — Configures how many times the command is repeated.</p> <p><b>Values</b> 1 to 999</p> <p><b>Default</b> 10</p> <p><b>absolute</b> — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.</p> <p><b>rate</b> — Displays rate-per-second for each statistic instead of the delta.</p>
<b>Output</b>	The following output is an example of ISIS statistics.

### Sample Output

```
A:ALA-12>monitor>router>isis# statistics interval 3 repeat 2 absolute
=====
ISIS Statistics
```

```
=====
At time t = 0 sec (Base Statistics)
-----
ISIS Instance      : 1                SPF Runs       : 2
Purge Initiated   : 0                LSP Regens.    : 11

CSPF Statistics

Requests          : 0                Request Drops  : 0
Paths Found       : 0                Paths Not Found: 0
-----
PDU Type   Received   Processed   Dropped    Sent      Retransmitted
-----
LSP        0           0           0           0          0
IIH        0           0           0           74         0
CSNP       0           0           0           0          0
PSNP       0           0           0           0          0
Unknown    0           0           0           0          0
-----
At time t = 3 sec (Mode: Absolute)
-----
ISIS Instance      : 1                SPF Runs       : 2
Purge Initiated   : 0                LSP Regens.    : 11

CSPF Statistics

Requests          : 0                Request Drops  : 0
Paths Found       : 0                Paths Not Found: 0
-----
PDU Type   Received   Processed   Dropped    Sent      Retransmitted
-----
LSP        0           0           0           0          0
IIH        0           0           0           74         0
CSNP       0           0           0           0          0
PSNP       0           0           0           0          0
Unknown    0           0           0           0          0
-----
At time t = 6 sec (Mode: Absolute)
-----
ISIS Instance      : 1                SPF Runs       : 2
Purge Initiated   : 0                LSP Regens.    : 11

CSPF Statistics

Requests          : 0                Request Drops  : 0
Paths Found       : 0                Paths Not Found: 0
-----
PDU Type   Received   Processed   Dropped    Sent      Retransmitted
-----
LSP        0           0           0           0          0
IIH        0           0           0           74         0
CSNP       0           0           0           0          0
PSNP       0           0           0           0          0
Unknown    0           0           0           0          0
=====

A:ALA-12>monitor>router>isis# statistics interval 3 repeat 2 rate
=====
```

```

ISIS Statistics
=====
At time t = 0 sec (Base Statistics)
-----
ISIS Instance      : 1                SPF Runs       : 2
Purge Initiated   : 0                LSP Regens.    : 11

CSPF Statistics

Requests          : 0                Request Drops  : 0
Paths Found       : 0                Paths Not Found: 0
-----
PDU Type  Received  Processed  Dropped   Sent      Retransmitted
-----
LSP        0         0         0         0         0
IIH        0         0         0         76        0
CSNP       0         0         0         0         0
PSNP       0         0         0         0         0
Unknown    0         0         0         0         0
-----
At time t = 3 sec (Mode: Rate)
-----
ISIS Instance      : 1                SPF Runs       : 0
Purge Initiated   : 0                LSP Regens.    : 0

CSPF Statistics

Requests          : 0                Request Drops  : 0
Paths Found       : 0                Paths Not Found: 0
-----
PDU Type  Received  Processed  Dropped   Sent      Retransmitted
-----
LSP        0         0         0         0         0
IIH        0         0         0         0         0
CSNP       0         0         0         0         0
PSNP       0         0         0         0         0
Unknown    0         0         0         0         0
-----
At time t = 6 sec (Mode: Rate)
-----
ISIS Instance      : 1                SPF Runs       : 0
Purge Initiated   : 0                LSP Regens.    : 0

CSPF Statistics

Requests          : 0                Request Drops  : 0
Paths Found       : 0                Paths Not Found: 0
-----
PDU Type  Received  Processed  Dropped   Sent      Retransmitted
-----
LSP        0         0         0         0         0
IIH        0         0         0         1         0
CSNP       0         0         0         0         0
PSNP       0         0         0         0         0
Unknown    0         0         0         0         0
=====
A:ALA-12>monitor>router>isis#
    
```



---

## ldp

<b>Syntax</b>	<b>ldp</b>
<b>Context</b>	monitor>router
<b>Description</b>	This command monitors commands for the LDP instance.

## fec-egress-stats

<b>Syntax</b>	<b>fec-egress-stats</b> <i>ip-prefix/mask</i> [ <b>interval</b> <i>seconds</i> ] [ <b>repeat</b> <i>repeat</i> ] [ <b>absolute</b>   <b>rate</b> ]
<b>Context</b>	monitor>router>ldp
<b>Description</b>	This command monitors egress statistics for LDP FEC prefixes.
<b>Parameters</b>	<i>ip-prefix/mask</i> — Specifies information for the specified IP prefix and mask length.

### Values

ipv4-prefix	a.b.c.d
ipv4-prefix-le	0 to 32
ipv6-prefix	x:x:x:x:x:x:x (eight 16-bit pieces) x:x:x:x:x:d.d.d.d
	x: [0 to FFFF] H d: [0 to 255] D
ipv6-prefix-le	0 to 128

*seconds* — Configures the interval for each display in seconds.

**Values** 3 to 60

**Default** 10

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

## session

<b>Syntax</b>	<b>session</b> <i>ldp-id</i> [ <i>ldp-id</i> ] [ <b>interval</b> <i>seconds</i> ] [ <b>repeat</b> <i>repeat</i> ] [ <b>absolute</b>   <b>rate</b> ]
---------------	---

**Context** monitor>router>ldp

**Description** This command displays statistical information for LDP sessions at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the specified LDP session(s). 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** *ldp-id* — Specifies the IP address of the LDP session to display. Up to five IP addresses can be specified in a single statement.

**Values**

ipv4-address	label-space	
ipv6-address	[label-space]	
	label-space	0 to 65535
ipv4-address	a.b.c.d	
ipv6-address	x:x:x:x:x:x:x (16 eight-bit pieces)	
	x:x:x:x:x:d.d.d.d	
	x: [0 to FFFF] H	
	d: [0 to 255] D	

*seconds* — Configures the interval for each display, in seconds.

**Values** 3 to 60  
**Default** 10 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999  
**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

**Output** The following output is an example of LDP session information.

**Sample Output**

```
A:ALA-103>monitor>router>ldp# session 10.10.10.104 interval 3 repeat 3 absolute
=====
```

```

Monitor statistics for LDP Session 10.10.10.104
=====
                               Sent                Received
-----
At time t = 0 sec (Base Statistics)
-----
FECs                          1                2
Hello                         5288             5289
Keepalive                      8225             8225
Init                           1                1
Label Mapping                  1                4
Label Request                   0                0
Label Release                   0                0
Label Withdraw                  0                0
Label Abort                     0                0
Notification                    0                0
Address                         1                1
Address Withdraw                 0                0
-----
At time t = 3 sec (Mode: Absolute)
-----
FECs                          1                2
Hello                         5288             5289
Keepalive                      8226             8226
Init                           1                1
Label Mapping                  1                4
Label Request                   0                0
Label Release                   0                0
Label Withdraw                  0                0
Label Abort                     0                0
Notification                    0                0
Address                         1                1
Address Withdraw                 0                0
-----
At time t = 6 sec (Mode: Absolute)
-----
FECs                          1                2
Hello                         5288             5290
Keepalive                      8226             8226
Init                           1                1
Label Mapping                  1                4
Label Request                   0                0
Label Release                   0                0
Label Withdraw                  0                0
Label Abort                     0                0
Notification                    0                0
Address                         1                1
Address Withdraw                 0                0
-----
At time t = 9 sec (Mode: Absolute)
-----
FECs                          1                2
Hello                         5288             5290
Keepalive                      8226             8226
Init                           1                1
Label Mapping                  1                4
Label Request                   0                0
Label Release                   0                0
Label Withdraw                  0                0

```

```

Label Abort                0                0
Notification               0                0
Address                    1                1
Address Withdraw           0                0
=====
A:ALA-12>monitor>router>ldp#

A:ALA-12>monitor>router>ldp# session 10.10.10.104 interval 3 repeat 3 rate
=====
Monitor statistics for LDP Session 10.10.10.104
=====
                Sent                Received
-----
At time t = 0 sec (Base Statistics)
-----
FECs                1                2
Hello              5289              5290
Keepalive          8227              8227
Init                1                1
Label Mapping       1                4
Label Request       0                0
Label Release       0                0
Label Withdraw      0                0
Label Abort         0                0
Notification        0                0
Address             1                1
Address Withdraw    0                0
-----
At time t = 3 sec (Mode: Rate)
-----
FECs                0                0
Hello               0                0
Keepalive           0                0
Init                0                0
Label Mapping       0                0
Label Request       0                0
Label Release       0                0
Label Withdraw      0                0
Label Abort         0                0
Notification        0                0
Address             0                0
Address Withdraw    0                0
-----
At time t = 6 sec (Mode: Rate)
-----
FECs                0                0
Hello               0                0
Keepalive           0                0
Init                0                0
Label Mapping       0                0
Label Request       0                0
Label Release       0                0
Label Withdraw      0                0
Label Abort         0                0
Notification        0                0
Address             0                0
Address Withdraw    0                0
-----

```

```

At time t = 9 sec (Mode: Rate)
-----
FECs                0                0
Hello               0                0
Keepalive           0                0
Init                0                0
Label Mapping       0                0
Label Request       0                0
Label Release       0                0
Label Withdraw      0                0
Label Abort         0                0
Notification        0                0
Address             0                0
Address Withdraw    0                0
-----
A:ALA-12>monitor>router>ldp#

```

## statistics

**Syntax** `statistics [interval seconds] [repeat repeat] [absolute | rate]`

**Context** monitor>router>ldp

**Description** Monitor statistics for LDP instance at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the LDP statistics. 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** *seconds* — Configures the interval for each display in seconds.

**Values** 3 to 60

**Default** 10 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

**Output** The following output is an example of LDP statistics information.

### Sample Output

```
A:ALA-12>monitor>router>ldp# statistics interval 3 repeat 3 absolute
=====
Monitor statistics for LDP instance
=====
At time t = 0 sec (Base Statistics)
-----
Addr FECs Sent      : 0                Addr FECs Recv      : 0
Serv FECs Sent      : 1                Serv FECs Recv      : 2
-----
At time t = 3 sec (Mode: Absolute)
-----
Addr FECs Sent      : 0                Addr FECs Recv      : 0
Serv FECs Sent      : 1                Serv FECs Recv      : 2
-----
At time t = 6 sec (Mode: Absolute)
-----
Addr FECs Sent      : 0                Addr FECs Recv      : 0
Serv FECs Sent      : 1                Serv FECs Recv      : 2
-----
At time t = 9 sec (Mode: Absolute)
-----
Addr FECs Sent      : 0                Addr FECs Recv      : 0
Serv FECs Sent      : 1                Serv FECs Recv      : 2
=====
A:ALA-12>monitor>router>ldp#
```

```
A:ALA-12>monitor>router>ldp# statistics interval 3 repeat 3 rate
=====
Monitor statistics for LDP instance
=====
At time t = 0 sec (Base Statistics)
-----
Addr FECs Sent      : 0                Addr FECs Recv      : 0
Serv FECs Sent      : 1                Serv FECs Recv      : 2
-----
At time t = 3 sec (Mode: Rate)
-----
Addr FECs Sent      : 0                Addr FECs Recv      : 0
Serv FECs Sent      : 0                Serv FECs Recv      : 0
-----
At time t = 6 sec (Mode: Rate)
-----
Addr FECs Sent      : 0                Addr FECs Recv      : 0
Serv FECs Sent      : 0                Serv FECs Recv      : 0
-----
At time t = 9 sec (Mode: Rate)
-----
Addr FECs Sent      : 0                Addr FECs Recv      : 0
Serv FECs Sent      : 0                Serv FECs Recv      : 0
=====
A:ALA-12>monitor>router>ldp#
```

## mpls

**Syntax**    **mpls**

**Context** monitor>router

**Description** This commands monitors commands for the MPLS instance.

## interface

**Syntax** **interface** *interface* [*interface*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] [**aux-stats**]

**Context** monitor>router>mpls

**Description** This command displays statistics for MPLS interfaces at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the MPLS interface(s). 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** *interface* — Specifies the IP address of the interface (*ip-address*) or interface name (*ip-int-name*). Up to five interfaces can be specified. If the string contains special characters (#, \$, spaces, and so on), the entire string must be enclosed within double quotes.

**Values** *ip-int-name, ip-address*

*seconds* — Configures the interval for each display, in seconds.

**Values** 11 to 60

**Default** 11 seconds

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

**aux-stats** — Displays auxiliary MPLS statistics next to the default MPLS statistics.

**Output** The following output is an example of MPLS interface information.

### Sample Output

```
A:ALA-12>monitor>router>mpls# interface system interval 3 repeat 3 absolute
=====
Monitor statistics for MPLS Interface "system"
```

```

=====
At time t = 0 sec (Base Statistics)
-----
Transmitted  : Pkts - 0                Octets - 0
Received    : Pkts - 0                Octets - 0
-----
At time t = 3 sec (Mode: Absolute)
-----
Transmitted  : Pkts - 0                Octets - 0
Received    : Pkts - 0                Octets - 0
-----
At time t = 6 sec (Mode: Absolute)
-----
Transmitted  : Pkts - 0                Octets - 0
Received    : Pkts - 0                Octets - 0
-----
At time t = 9 sec (Mode: Absolute)
-----
Transmitted  : Pkts - 0                Octets - 0
Received    : Pkts - 0                Octets - 0
=====
A:ALA-12>monitor>router>mpls#

A:ALA-12>monitor>router>mpls# interface system interval 3 repeat 3 rate
=====
Monitor statistics for MPLS Interface "system"
=====
-----
Transmitted  : Pkts - 0                Octets - 0
Received    : Pkts - 0                Octets - 0
-----
At time t = 3 sec (Mode: Rate)
-----
Transmitted  : Pkts - 0                Octets - 0
Received    : Pkts - 0                Octets - 0
-----
At time t = 6 sec (Mode: Rate)
-----
Transmitted  : Pkts - 0                Octets - 0
Received    : Pkts - 0                Octets - 0
-----
At time t = 9 sec (Mode: Rate)
-----
Transmitted  : Pkts - 0                Octets - 0
Received    : Pkts - 0                Octets - 0
=====
A:ALA-12>monitor>router>mpls#

A:ALA-12>monitor router mpls interface aux-stats
=====
Monitor statistics for MPLS Interface "toR2"
=====
-----
At time t = 0 sec (Base Statistics)
-----
Transmitted  : Pkts - 0                Octets - 0
Received    : Pkts - 0                Octets - 0
Transmitted  : SR-Pkts - 0            SR-Octets - 0

```



```

Received      : SR-Pkts - 0                      SR-Octets - 0
=====
A:ALA-12>monitor>router>mpls#
  
```

## lsp-egress-stats

- Syntax** `lsp-egress-stats lsp lsp-name [interval seconds] [repeat repeat] [absolute | rate] [bits]`
- Context** monitor>router>mpls
- Description** This command displays egress statistics for LSP interfaces at the configured interval until the configured count is reached.
- Default** no lsp-egress-stats
- Parameters**
- lsp-name* — Specifies the LSP name, up to 64 characters.
  - repeat* — Specifies how many times the command is repeated.
    - Values** 1 to 999
    - Default** 10
  - seconds* — Specifies the interval for each display, in seconds.
    - Values** 3 to 60
    - Default** 10
  - absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
  - rate** — Displays rate-per-second for each statistic instead of the delta.
  - bits** — Displays the output values in bits rather than in octets.
- Output** The following output is an example of LSP egress statistics information.

### Sample Output

```

B:Dut-C-cpm2# monitor router mpls lsp-egress-stats lsp sample repeat 3 interval 10
absolute
=====
Monitor egress statistics for MPLS LSP "sample"
-----
At time t = 0 sec (Base Statistics)
-----
LSP Name      : sample
-----
Collect Stats : Enabled                Accting Plcy. : 5
Adm State     : Up                     PSB Match     : True
FC BE
InProf Pkts   : 0                      OutProf Pkts  : 551
InProf Octets : 0                      OutProf Octets: 560918
FC L2
InProf Pkts   : 0                      OutProf Pkts  : 551
  
```

```

InProf Octets : 0                               OutProf Octets: 560918
FC AF
InProf Pkts   : 551                             OutProf Pkts   : 0
InProf Octets : 560918                         OutProf Octets : 0
FC L1
InProf Pkts   : 551                             OutProf Pkts   : 0
InProf Octets : 560918                         OutProf Octets : 0
FC H2
InProf Pkts   : 0                               OutProf Pkts   : 551
InProf Octets : 0                               OutProf Octets : 560918
FC EF
InProf Pkts   : 0                               OutProf Pkts   : 551
InProf Octets : 0                               OutProf Octets : 560918
FC H1
InProf Pkts   : 0                               OutProf Pkts   : 551
InProf Octets : 0                               OutProf Octets : 560918
FC NC
InProf Pkts   : 551                             OutProf Pkts   : 0
InProf Octets : 560918                         OutProf Octets : 0
    
```

-----  
At time t = 10 sec (Mode: Absolute)  
-----

LSP Name : sample  
-----

```

Collect Stats : Enabled                         Accting Plcy. : 5
Adm State     : Up                             PSB Match     : True
FC BE
InProf Pkts   : 0                             OutProf Pkts   : 580
InProf Octets : 0                             OutProf Octets : 590440
FC L2
InProf Pkts   : 0                             OutProf Pkts   : 580
InProf Octets : 0                             OutProf Octets : 590440
FC AF
InProf Pkts   : 580                           OutProf Pkts   : 0
InProf Octets : 590440                       OutProf Octets : 0
FC L1
InProf Pkts   : 580                           OutProf Pkts   : 0
InProf Octets : 590440                       OutProf Octets : 0
FC H2
InProf Pkts   : 0                             OutProf Pkts   : 580
InProf Octets : 0                             OutProf Octets : 590440
FC EF
InProf Pkts   : 0                             OutProf Pkts   : 580
InProf Octets : 0                             OutProf Octets : 590440
FC H1
InProf Pkts   : 0                             OutProf Pkts   : 580
InProf Octets : 0                             OutProf Octets : 590440
FC NC
InProf Pkts   : 580                           OutProf Pkts   : 0
InProf Octets : 590440                       OutProf Octets : 0
    
```

-----  
At time t = 20 sec (Mode: Absolute)  
-----

LSP Name : sample  
-----

```

Collect Stats : Enabled                         Accting Plcy. : 5
Adm State     : Up                             PSB Match     : True
FC BE
InProf Pkts   : 0                             OutProf Pkts   : 609
    
```

```
InProf Octets : 0                               OutProf Octets: 619962
FC L2
InProf Pkts   : 0                               OutProf Pkts   : 609
InProf Octets : 0                               OutProf Octets: 619962
FC AF
InProf Pkts   : 609                             OutProf Pkts   : 0
InProf Octets : 619962                         OutProf Octets: 0
FC L1
InProf Pkts   : 609                             OutProf Pkts   : 0
InProf Octets : 619962                         OutProf Octets: 0
FC H2
InProf Pkts   : 0                               OutProf Pkts   : 609
InProf Octets : 0                               OutProf Octets: 619962
FC EF
InProf Pkts   : 0                               OutProf Pkts   : 609
InProf Octets : 0                               OutProf Octets: 619962
FC H1
InProf Pkts   : 0                               OutProf Pkts   : 609
InProf Octets : 0                               OutProf Octets: 619962
FC NC
InProf Pkts   : 609                             OutProf Pkts   : 0
InProf Octets : 619962                         OutProf Octets: 0
```

-----  
At time t = 30 sec (Mode: Absolute)  
-----

LSP Name : sample  
-----

```
Collect Stats : Enabled                        Accting Plcy. : 5
Adm State     : Up                            PSB Match     : True
FC BE
InProf Pkts   : 0                               OutProf Pkts   : 638
InProf Octets : 0                               OutProf Octets: 649484
FC L2
InProf Pkts   : 0                               OutProf Pkts   : 638
InProf Octets : 0                               OutProf Octets: 649484
FC AF
InProf Pkts   : 638                             OutProf Pkts   : 0
InProf Octets : 649484                         OutProf Octets: 0
FC L1
InProf Pkts   : 638                             OutProf Pkts   : 0
InProf Octets : 649484                         OutProf Octets: 0
FC H2
InProf Pkts   : 0                               OutProf Pkts   : 638
InProf Octets : 0                               OutProf Octets: 649484
FC EF
InProf Pkts   : 0                               OutProf Pkts   : 638
InProf Octets : 0                               OutProf Octets: 649484
FC H1
InProf Pkts   : 0                               OutProf Pkts   : 638
InProf Octets : 0                               OutProf Octets: 649484
FC NC
InProf Pkts   : 638                             OutProf Pkts   : 0
InProf Octets : 649484                         OutProf Octets: 0
```

=====  
B:Dut-C-cpm2#

## lsp-ingress-stats

- Syntax** `lsp-ingress-stats lsp lsp-name [interval seconds] [repeat repeat] [absolute | rate] ip-address [bits]`
- Context** monitor>router>mpls
- Description** This command displays ingress statistics for LSP interfaces at the configured interval until the configured count is reached.
- Parameters**
- lsp-name* — Specifies the LSP name up to 64 characters.
  - repeat* — Specifies how many times the command is repeated.
    - Values** 1 to 999
    - Default** 10
  - seconds* — Specifies the interval for each display, in seconds.
    - Values** 3 to 60
    - Default** 10
  - absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
  - rate** — Displays rate-per-second for each statistic instead of the delta.
  - ip-address* — Specifies the IP address.
    - Values** *a.b.c.d*
  - bits** — Displays the output values in bits rather than in octets.
- Output** The following output is an example of LSP ingress statistics information.

### Sample Output

```
B:Dut-C-cpm2# monitor router mpls lsp-ingress-stats lsp sample 192.0.2.1 repeat 3
interval 10 absolute
-----
Monitor ingress statistics for MPLS LSP "sample"
-----
At time t = 0 sec (Base Statistics)
-----
LSP Name       : sample
Sender         : 192.0.2.1
-----
Collect Stats  : Enabled                Accting Plcy. : None
Adm State      : Up                    PSB Match     : True
FC BE
InProf Pkts   : 539                    OutProf Pkts  : 0
InProf Octets : 548702                 OutProf Octets: 0
FC L2
InProf Pkts   : 0                      OutProf Pkts  : 539
InProf Octets : 0                      OutProf Octets: 548702
FC AF
InProf Pkts   : 0                      OutProf Pkts  : 0
```

```
InProf Octets : 0                OutProf Octets: 0
FC L1
InProf Pkts   : 1078            OutProf Pkts   : 0
InProf Octets : 1097404        OutProf Octets : 0
FC H2
InProf Pkts   : 0              OutProf Pkts   : 539
InProf Octets : 0              OutProf Octets : 548702
FC EF
InProf Pkts   : 539            OutProf Pkts   : 0
InProf Octets : 548702        OutProf Octets : 0
FC H1
InProf Pkts   : 539            OutProf Pkts   : 0
InProf Octets : 548702        OutProf Octets : 0
FC NC
InProf Pkts   : 0              OutProf Pkts   : 539
InProf Octets : 0              OutProf Octets : 548702
```

-----  
At time t = 10 sec (Mode: Absolute)  
-----

```
LSP Name      : sample
Sender        : 192.0.2.1
```

```
-----
Collect Stats : Enabled          Accting Plcy. : None
Adm State     : Up              PSB Match     : True
FC BE
InProf Pkts   : 568            OutProf Pkts   : 0
InProf Octets : 578224        OutProf Octets : 0
FC L2
InProf Pkts   : 0              OutProf Pkts   : 568
InProf Octets : 0              OutProf Octets : 578224
FC AF
InProf Pkts   : 0              OutProf Pkts   : 0
InProf Octets : 0              OutProf Octets : 0
FC L1
InProf Pkts   : 1136           OutProf Pkts   : 0
InProf Octets : 1156448       OutProf Octets : 0
FC H2
InProf Pkts   : 0              OutProf Pkts   : 568
InProf Octets : 0              OutProf Octets : 578224
FC EF
InProf Pkts   : 568            OutProf Pkts   : 0
InProf Octets : 578224        OutProf Octets : 0
FC H1
InProf Pkts   : 568            OutProf Pkts   : 0
InProf Octets : 578224        OutProf Octets : 0
FC NC
InProf Pkts   : 0              OutProf Pkts   : 568
InProf Octets : 0              OutProf Octets : 578224
```

-----  
At time t = 20 sec (Mode: Absolute)  
-----

```
LSP Name      : sample
Sender        : 192.0.2.1
```

```
-----
Collect Stats : Enabled          Accting Plcy. : None
Adm State     : Up              PSB Match     : True
FC BE
InProf Pkts   : 597            OutProf Pkts   : 0
InProf Octets : 607746        OutProf Octets : 0
```

```

FC L2
InProf Pkts : 0
InProf Octets : 0
OutProf Pkts : 597
OutProf Octets: 607746
FC AF
InProf Pkts : 0
InProf Octets : 0
OutProf Pkts : 0
OutProf Octets: 0
FC L1
InProf Pkts : 1194
InProf Octets : 1215492
OutProf Pkts : 0
OutProf Octets: 0
FC H2
InProf Pkts : 0
InProf Octets : 0
OutProf Pkts : 597
OutProf Octets: 607746
FC EF
InProf Pkts : 597
InProf Octets : 607746
OutProf Pkts : 0
OutProf Octets: 0
FC H1
InProf Pkts : 597
InProf Octets : 607746
OutProf Pkts : 0
OutProf Octets: 0
FC NC
InProf Pkts : 0
InProf Octets : 0
OutProf Pkts : 597
OutProf Octets: 607746

```

-----  
At time t = 30 sec (Mode: Absolute)  
-----

```

LSP Name      : sample
Sender        : 192.0.2.1

```

```

-----
Collect Stats : Enabled
Adm State     : Up
PSB Match     : True
Accting Plcy. : None
FC BE
InProf Pkts  : 627
InProf Octets : 638286
OutProf Pkts : 0
OutProf Octets: 0
FC L2
InProf Pkts  : 0
InProf Octets : 0
OutProf Pkts : 627
OutProf Octets: 638286
FC AF
InProf Pkts  : 0
InProf Octets : 0
OutProf Pkts : 0
OutProf Octets: 0
FC L1
InProf Pkts  : 1254
InProf Octets : 1276572
OutProf Pkts : 0
OutProf Octets: 0
FC H2
InProf Pkts  : 0
InProf Octets : 0
OutProf Pkts : 627
OutProf Octets: 638286
FC EF
InProf Pkts  : 627
InProf Octets : 638286
OutProf Pkts : 0
OutProf Octets: 0
FC H1
InProf Pkts  : 627
InProf Octets : 638286
OutProf Pkts : 0
OutProf Octets: 0
FC NC
InProf Pkts  : 0
InProf Octets : 0
OutProf Pkts : 627
OutProf Octets: 638286

```

=====  
B:Dut-C-cpm2#

---

## tp-lsp-egress-stats

- Syntax** `tsp-lsp-egress-stats lsp lsp-name [interval seconds] [repeat repeat] [absolute | rate]`
- Context** monitor>router>mpls
- Description** This command monitors MPLS TP LSP egress statistics.
- Parameters** *lsp-name* — Specifies the LSP name, up to 64 characters.  
*repeat* — Specifies how many times the command is repeated.
- Values** 1 to 999
- Default** 10
- seconds* — Specifies the interval for each display, in seconds.
- Values** 3 to 60
- Default** 10
- absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
- rate** — Displays rate-per-second for each statistic instead of the delta.

## tp-lsp-ingress-stats

- Syntax** `tsp-lsp-ingress-stats lsp lsp-name [interval seconds] [repeat repeat] [absolute | rate]`
- Context** monitor>router>mpls
- Description** This command monitors MPLS TP LSP ingress statistics.
- Parameters** *lsp-name* — Specifies the LSP name, up to 64 characters.  
*repeat* — Specifies how many times the command is repeated.
- Values** 1 to 999
- Default** 10
- seconds* — Specifies the interval for each display, in seconds.
- Values** 3 to 60
- Default** 10
- absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
- rate** — Displays rate-per-second for each statistic instead of the delta.

---

## ospf

<b>Syntax</b>	<b>ospf</b> [ <i>ospf-instance</i> ]
<b>Context</b>	monitor>router
<b>Description</b>	This command enables the context to configure monitor commands for the OSPF instance.
<b>Parameters</b>	<i>ospf-instance</i> — Specifies the OSPF instance.
	<b>Values</b> 0 to 31

## ospf3

<b>Syntax</b>	<b>ospf</b> [ <i>ospf-instance</i> ]
<b>Context</b>	monitor>router
<b>Description</b>	This command enables the context to configure monitor commands for the OSPF3 instance.
<b>Parameters</b>	<i>ospf-instance</i> — Specifies the OSPF3 instance.
	<b>Values</b>

<i>ospf-instance</i>	0 to 31, 64 to 95
	0 to 31          ipv6-unicast address-family
	64 to 95        ipv4-unicast address-family

## interface

<b>Syntax</b>	<b>interface</b> <i>interface</i> [ <i>interface</i> ] [ <b>interval</b> <i>seconds</i> ] [ <b>repeat</b> <i>repeat</i> ] [ <b>absolute</b>   <b>rate</b> ]
<b>Context</b>	monitor>router>ospf monitor>router>ospf3
<b>Description</b>	<p>This command displays statistics for OSPF interfaces at the configured interval until the configured count is reached.</p> <p>The first screen displays the current statistics related to the OSPF interface(s). The subsequent statistical information listed for each interval is displayed as a delta to the previous display.</p> <p>When the keyword <b>rate</b> is specified, the rate-per-second for each statistic is displayed instead of the delta.</p> <p>Monitor commands are similar to <b>show</b> commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.</p>



**Parameters** *interface* — Specifies the IP address of the interface (*ip-address*) or interface name (*ip-int-name*). Up to five interfaces can be specified. If the string contains special characters (#, \$, spaces, and so on), the entire string must be enclosed within double quotes.

**Values** *ip-int-address, ip-address*

*seconds* — Configures the interval for each display, in seconds.

**Values** 3 to 60

**Default** 10

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

**Output** The following output is an example of OSPF interface information.

### Sample Output

```
A:ALA-12>monitor>router>ospf# interface to-104 interval 3 repeat 3 absolute
=====
Monitor statistics for OSPF Interface "to-104"
=====
At time t = 0 sec (Base Statistics)
-----
Tot Rx Packets : 8379          Tot Tx Packets : 8528
Rx Hellos      : 8225          Tx Hellos      : 8368
Rx DBDs        : 6            Tx DBDs        : 12
Rx LSRs        : 2            Tx LSRs        : 1
Rx LSUs        : 55           Tx LSUs        : 95
Rx LS Acks     : 91           Tx LS Acks     : 52
Retransmits    : 2            Discards       : 0
Bad Networks   : 0            Bad Virt Links : 0
Bad Areas      : 0            Bad Dest Adrs  : 0
Bad Auth Types : 0            Auth Failures  : 0
Bad Neighbors  : 0            Bad Pkt Types  : 0
Bad Lengths    : 0            Bad Hello Int. : 0
Bad Dead Int.  : 0            Bad Options    : 0
Bad Versions   : 0
-----
At time t = 3 sec (Mode: Absolute)
-----
Tot Rx Packets : 8379          Tot Tx Packets : 8528
Rx Hellos      : 8225          Tx Hellos      : 8368
Rx DBDs        : 6            Tx DBDs        : 12
Rx LSRs        : 2            Tx LSRs        : 1
Rx LSUs        : 55           Tx LSUs        : 95
Rx LS Acks     : 91           Tx LS Acks     : 52
Retransmits    : 2            Discards       : 0
Bad Networks   : 0            Bad Virt Links : 0
```

```

Bad Areas      : 0
Bad Auth Types : 0
Bad Neighbors  : 0
Bad Lengths    : 0
Bad Dead Int.  : 0
Bad Versions   : 0
Bad Dest Adrs  : 0
Auth Failures  : 0
Bad Pkt Types  : 0
Bad Hello Int. : 0
Bad Options    : 0
    
```

-----  
At time t = 6 sec (Mode: Absolute)  
-----

```

Tot Rx Packets : 8380
Rx Hellos      : 8226
Rx DBDs        : 6
Rx LSRs        : 2
Rx LSUs        : 55
Rx LS Acks     : 91
Retransmits    : 2
Bad Networks   : 0
Bad Areas      : 0
Bad Auth Types : 0
Bad Neighbors  : 0
Bad Lengths    : 0
Bad Dead Int.  : 0
Bad Versions   : 0
Tot Tx Packets : 8529
Tx Hellos      : 8369
Tx DBDs        : 12
Tx LSRs        : 1
Tx LSUs        : 95
Tx LS Acks     : 52
Discards       : 0
Bad Virt Links : 0
Bad Dest Adrs  : 0
Auth Failures  : 0
Bad Pkt Types  : 0
Bad Hello Int. : 0
Bad Options    : 0
    
```

-----  
At time t = 9 sec (Mode: Absolute)  
-----

```

Tot Rx Packets : 8380
Rx Hellos      : 8226
Rx DBDs        : 6
Rx LSRs        : 2
Rx LSUs        : 55
Rx LS Acks     : 91
Retransmits    : 2
Bad Networks   : 0
Bad Areas      : 0
Bad Auth Types : 0
Bad Neighbors  : 0
Bad Lengths    : 0
Bad Dead Int.  : 0
Bad Versions   : 0
Tot Tx Packets : 8529
Tx Hellos      : 8369
Tx DBDs        : 12
Tx LSRs        : 1
Tx LSUs        : 95
Tx LS Acks     : 52
Discards       : 0
Bad Virt Links : 0
Bad Dest Adrs  : 0
Auth Failures  : 0
Bad Pkt Types  : 0
Bad Hello Int. : 0
Bad Options    : 0
    
```

=====  
A:ALA-12>monitor>router>ospf#

A:ALA-12>monitor>router>ospf# interface to-104 interval 3 repeat 3 rate

=====  
Monitor statistics for OSPF Interface "to-104"  
=====

At time t = 0 sec (Base Statistics)  
-----

```

Tot Rx Packets : 8381
Rx Hellos      : 8227
Rx DBDs        : 6
Rx LSRs        : 2
Rx LSUs        : 55
Rx LS Acks     : 91
Retransmits    : 2
Bad Networks   : 0
Bad Areas      : 0
Tot Tx Packets : 8530
Tx Hellos      : 8370
Tx DBDs        : 12
Tx LSRs        : 1
Tx LSUs        : 95
Tx LS Acks     : 52
Discards       : 0
Bad Virt Links : 0
Bad Dest Adrs  : 0
    
```

```
Bad Auth Types : 0
Bad Neighbors  : 0
Bad Lengths    : 0
Bad Dead Int.  : 0
Bad Versions   : 0
Auth Failures  : 0
Bad Pkt Types  : 0
Bad Hello Int. : 0
Bad Options    : 0
```

-----  
At time t = 3 sec (Mode: Rate)

```
-----
Tot Rx Packets : 0
Rx Hellos      : 0
Rx DBDs        : 0
Rx LSRs        : 0
Rx LSUs        : 0
Rx LS Acks     : 0
Retransmits    : 0
Bad Networks   : 0
Bad Areas      : 0
Bad Auth Types : 0
Bad Neighbors  : 0
Bad Lengths    : 0
Bad Dead Int.  : 0
Bad Versions   : 0
Tot Tx Packets : 0
Tx Hellos      : 0
Tx DBDs        : 0
Tx LSRs        : 0
Tx LSUs        : 0
Tx LS Acks     : 0
Discards       : 0
Bad Virt Links : 0
Bad Dest Addrs : 0
Auth Failures  : 0
Bad Pkt Types  : 0
Bad Hello Int. : 0
Bad Options    : 0
```

-----  
At time t = 6 sec (Mode: Rate)

```
-----
Tot Rx Packets : 0
Rx Hellos      : 0
Rx DBDs        : 0
Rx LSRs        : 0
Rx LSUs        : 0
Rx LS Acks     : 0
Retransmits    : 0
Bad Networks   : 0
Bad Areas      : 0
Bad Auth Types : 0
Bad Neighbors  : 0
Bad Lengths    : 0
Bad Dead Int.  : 0
Bad Versions   : 0
Tot Tx Packets : 0
Tx Hellos      : 0
Tx DBDs        : 0
Tx LSRs        : 0
Tx LSUs        : 0
Tx LS Acks     : 0
Discards       : 0
Bad Virt Links : 0
Bad Dest Addrs : 0
Auth Failures  : 0
Bad Pkt Types  : 0
Bad Hello Int. : 0
Bad Options    : 0
```

-----  
At time t = 9 sec (Mode: Rate)

```
-----
Tot Rx Packets : 0
Rx Hellos      : 0
Rx DBDs        : 0
Rx LSRs        : 0
Rx LSUs        : 0
Rx LS Acks     : 0
Retransmits    : 0
Bad Networks   : 0
Bad Areas      : 0
Bad Auth Types : 0
Bad Neighbors  : 0
Bad Lengths    : 0
Bad Dead Int.  : 0
Bad Versions   : 0
Tot Tx Packets : 0
Tx Hellos      : 0
Tx DBDs        : 0
Tx LSRs        : 0
Tx LSUs        : 0
Tx LS Acks     : 0
Discards       : 0
Bad Virt Links : 0
Bad Dest Addrs : 0
Auth Failures  : 0
Bad Pkt Types  : 0
Bad Hello Int. : 0
Bad Options    : 0
```

=====  
A:ALA-12>monitor>router>ospf#

---

## neighbor

- Syntax** `neighbor ip-address [ip-address] [interval seconds] [repeat repeat] [absolute | rate]`
- Context** monitor>router>ospf
- Description** This command displays statistical OSPF neighbor information at the configured interval until the configured count is reached.
- The first screen displays the current statistics related to the specified OSPF neighbors. 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** *ip-address* — Specifies the IP address to display information for entries received from the specified OSPF neighbor. Up to five IP addresses can be specified.
- Values** a.b.c.d
- seconds* — Configures the interval for each display, in seconds.
- Values** 3 to 60
- Default** 10
- repeat* — Configures the number of times the command is repeated.
- Values** 1 to 999
- Default** 10
- absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
- rate** — Displays rate-per-second for each statistic instead of the delta.
- Output** The following output is an example of OSPF neighbor information.

### Sample Output

```
A:ALA-12>monitor>router# ospf neighbor 10.0.0.104 interval 3 repeat 3 absolute
=====
Monitor statistics for OSPF Neighbor 10.0.0.104
=====
At time t = 0 sec (Base Statistics)
-----
Bad Nbr States      : 0                LSA Inst fails    : 0
Bad Seq Nums       : 0                Bad MTUs         : 0
Bad Packets        : 0                LSA not in LSDB  : 0
Option Mismatches: 0                Nbr Duplicates   : 0
-----
```

```
At time t = 3 sec (Mode: Absolute)
-----
Bad Nbr States   : 0          LSA Inst fails   : 0
Bad Seq Nums    : 0          Bad MTUs         : 0
Bad Packets     : 0          LSA not in LSDB : 0
Option Mismatches: 0        Nbr Duplicates   : 0
-----

At time t = 6 sec (Mode: Absolute)
-----
Bad Nbr States   : 0          LSA Inst fails   : 0
Bad Seq Nums    : 0          Bad MTUs         : 0
Bad Packets     : 0          LSA not in LSDB : 0
Option Mismatches: 0        Nbr Duplicates   : 0
-----

At time t = 9 sec (Mode: Absolute)
-----
Bad Nbr States   : 0          LSA Inst fails   : 0
Bad Seq Nums    : 0          Bad MTUs         : 0
Bad Packets     : 0          LSA not in LSDB : 0
Option Mismatches: 0        Nbr Duplicates   : 0
=====
A:ALA-12>monitor>router#

A:ALA-12>monitor>router# ospf neighbor 10.0.0.104 interval 3 repeat 3 absolute
=====
Monitor statistics for OSPF Neighbor 10.0.0.104
=====
-----

At time t = 0 sec (Base Statistics)
-----
Bad Nbr States   : 0          LSA Inst fails   : 0
Bad Seq Nums    : 0          Bad MTUs         : 0
Bad Packets     : 0          LSA not in LSDB : 0
Option Mismatches: 0        Nbr Duplicates   : 0
-----

At time t = 3 sec (Mode: Rate)
-----
Bad Nbr States   : 0          LSA Inst fails   : 0
Bad Seq Nums    : 0          Bad MTUs         : 0
Bad Packets     : 0          LSA not in LSDB : 0
Option Mismatches: 0        Nbr Duplicates   : 0
-----

At time t = 6 sec (Mode: Rate)
-----
Bad Nbr States   : 0          LSA Inst fails   : 0
Bad Seq Nums    : 0          Bad MTUs         : 0
Bad Packets     : 0          LSA not in LSDB : 0
Option Mismatches: 0        Nbr Duplicates   : 0
-----

At time t = 9 sec (Mode: Rate)
-----
Bad Nbr States   : 0          LSA Inst fails   : 0
Bad Seq Nums    : 0          Bad MTUs         : 0
Bad Packets     : 0          LSA not in LSDB : 0
Option Mismatches: 0        Nbr Duplicates   : 0
=====
A:ALA-12>monitor>router#
```

## neighbor

<b>Syntax</b>	<b>neighbor</b> <i>router-id interface-name</i> [ <b>interval seconds</b> ] [ <b>repeat repeat</b> ] [ <b>absolute   rate</b> ] <b>area area-id</b>
<b>Context</b>	monitor>router>ospf3
<b>Description</b>	<p>This command displays statistical OSPF3 neighbor information at the configured interval until the configured count is reached.</p> <p>The first screen displays the current statistics related to the specified OSPF3 neighbor(s). The subsequent statistical information listed for each interval is displayed as a delta to the previous display.</p> <p>When the keyword <b>rate</b> is specified, the rate-per-second for each statistic is displayed instead of the delta.</p> <p>Monitor commands are similar to <b>show</b> commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.</p>
<b>Parameters</b>	<p><i>router-id</i> — Specifies the IP address.</p> <p><b>Values</b> a.b.c.d</p> <p><i>interface-name</i> — Specifies the interface name, up to 32 characters.</p> <p><i>seconds</i> — Configures the interval for each display, in seconds.</p> <p><b>Values</b> 3 to 60</p> <p><b>Default</b> 10</p> <p><i>repeat</i> — Configures the number of times the command is repeated.</p> <p><b>Values</b> 1 to 999</p> <p><b>Default</b> 10</p> <p><b>absolute</b> — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.</p> <p><b>rate</b> — Displays rate-per-second for each statistic instead of the delta.</p> <p><i>area-id</i> — Specifies the OSPF area, up to 256 characters.</p>

## virtual-link

<b>Syntax</b>	<b>virtual-link</b> <i>nbr-rtr-id area area-id</i> [ <b>interval seconds</b> ] [ <b>repeat repeat</b> ] [ <b>absolute   rate</b> ]
<b>Context</b>	monitor>router>ospf monitor>router>ospf3
<b>Description</b>	This command displays statistical OSPF virtual link information at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the specified neighbor(s). 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**
- nbr-rtr-id* — Specifies the IP address to uniquely identify a neighboring router in the autonomous system.
    - Values** a.b.c.d
  - area-id* — Specifies the OSPF area ID, expressed in dotted decimal notation or as a 32-bit decimal integer.
    - Values** *ip-address*, 0 to 4294967295
  - seconds* — Configures the interval for each display, in seconds.
    - Values** 3 to 60
    - Default** 10
  - repeat* — Configures how many times the command is repeated.
    - Values** 1 to 999
    - Default** 10
  - absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
  - rate** — Displays rate-per-second for each statistic instead of the delta.

## virtual-neighbor

- Syntax** **virtual-neighbor** *nbr-rtr-id* **area** *area-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- Context** monitor>router>ospf  
monitor>router>ospf3
- Description** This command displays statistical OSPF virtual neighbor information at the configured interval until the configured count is reached.
 

The first screen displays the current statistics related to the specified OSPF virtual neighbor router. 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** *nbr-rtr-id* — Specifies the IP address to uniquely identify a neighboring router in the autonomous system.
- Values** a.b.c.d
- area-id* — Specifies the OSPF area ID, expressed in dotted decimal notation or as a 32-bit decimal integer.
- Values** *ip-address*, 0 to 4294967295
- seconds* — Configures the interval for each display, in seconds.
- Values** 3 to 60
- Default** 10
- repeat* — Configures how many times the command is repeated.
- Values** 1 to 999
- Default** 10
- absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
- rate** — Displays rate-per-second for each statistic instead of the delta.

## pim

- Syntax** **pim**
- Context** monitor>router
- Description** This command monitors commands for the PIM instance.

## group

- Syntax** **group** *grp-ip-address* [**source** *ip-address*] [**interval** *interval*] [**repeat** *repeat*] [**absolute** | **rate**]
- Context** monitor>router>pim
- Description** This command monitors statistics for a PIM source group.
- Parameters** *grp-ip-address* — Specifies the IP address of an multicast group that identifies a set of recipients that are interested in a particular data stream.



---

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

**Values** 0.0.0.0 to 255.255.255.255

**Default** the IP address of the egress IP interface

*interval* — Configures the interval for each display, in seconds.

**Values** 10, 20, 30, 40, 50, 60

**Default** 10

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

## rip

**Syntax** `rip`

**Context** `router>monitor`

**Description** This command monitors commands for the RIP instance.

## ripng

**Syntax** `ripng`

**Context** `router>monitor`

**Description** This command monitors commands for the RIP instance.

## neighbor

**Syntax** `neighbor neighbor [neighbor] [interval seconds] [repeat repeat] [absolute | rate]`

**Context** `monitor>router>rip`  
`monitor>router>ripng`

**Description** This command displays statistical RIP neighbor information at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the specified RIP neighbor(s). 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** *neighbor* — Specifies the IP interface name or the IP address of the neighbor to be monitored. Up to five can be specified in a single statement.

**Values** *ip-int-name, ip-address*

*seconds* — Configures the interval for each display, in seconds.

**Values** 3 to 60

**Default** 10

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

## rsvp

**Syntax** **rsvp**

**Context** monitor>router

**Description** This command monitors commands for the RSVP instance.

## interface

**Syntax** **interface** *interface* [*interface*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

**Context** monitor>router>rsvp

**Description** This command displays statistics for RSVP interfaces at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the RSVP interface(s). 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** *interface* — Specifies the IP address of the interface (*ip-address*) or interface name (*ip-int-name*). Up to five interfaces can be specified. If the string contains special characters (#, \$, spaces, and so on), the entire string must be enclosed within double quotes.
- Values** *ip-int-name, ip-address*
- seconds* — Configures the interval for each display, in seconds.
- Values** 3 to 60
- Default** 10
- repeat* — Configures how many times the command is repeated.
- Values** 1 to 999
- Default** 10
- absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
- rate** — Displays rate-per-second for each statistic instead of the delta.

## vrrp

- Syntax** **vrrp**
- Context** monitor>router
- Description** This command enables the context to configure criteria to monitor VRRP statistical information for a VRRP enabled on a specific interface.

## instance

- Syntax** **instance interface** *interface-name* **vr-id** *virtual-router-id* [**ipv6**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- Context** monitor>router>vrrp
- Description** This command monitors statistics for a VRRP instance.
- Parameters** *interface-name* — Specifies the name of the existing IP interface on which VRRP is configured, up to 32 characters.
- virtual-router-id* — Specifies the virtual router ID for the existing IP interface, expressed as a decimal integer.
- Values** 1 to 255

**ipv6** — Specifies the IPv6 instance.

**seconds** — Configures the interval for each display, in seconds.

**Values** 3 to 60

**Default** 10

**repeat** — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**rate** — Displays rate-per-second for each statistic instead of the delta.

## service

**Syntax** **service**

**Context** monitor

**Description** This command enables the context to configure criteria to monitor specific service SAP criteria.

## id

**Syntax** **id** *service-id*

**Context** monitor>service

**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 **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** *service-id* — Specifies the unique service identification number which identifies the service in the service domain.

## sap

<b>Syntax</b>	<b>sap sap-id [interval seconds] [repeat repeat] [absolute   rate]</b> <b>sap sap-id encap-group group-name [member encap-id] [interval seconds] [repeat repeat] [absolute   rate]</b>																																																						
<b>Context</b>	monitor>service>id																																																						
<b>Description</b>	<p>This command monitors statistics for a SAP associated with this service.</p> <p>This command displays statistics for a specific SAP, identified by the <i>port-id</i> and encapsulation value, at the configured interval until the configured count is reached.</p> <p>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 <b>rate</b> is specified, the rate-per-second for each statistic is displayed instead of the delta.</p> <p>Monitor commands are similar to <b>show</b> commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.</p>																																																						
<b>Parameters</b>	<i>sap-id</i> — Specifies the physical port identifier portion of the SAP definition.																																																						
	<b>Values</b>																																																						
	<table border="0"> <tr> <td style="vertical-align: top;">:null</td> <td><i>port-id   bundle-id   bpgrp-id   lag-id   aps-id</i></td> <td></td> </tr> <tr> <td style="vertical-align: top;">dot1q</td> <td><i>port-id   bundle-id   bpgrp-id   lag-id   aps-id   pw-id:[qtag1 cp-conn-prof-id]</i></td> <td></td> </tr> <tr> <td style="vertical-align: top;">qinq</td> <td><i>port-id   bundle-id   bpgrp-id   lag-id   pw-id:[qtag1 cp-conn-prof-id].[qtag2   cp-conn-prof-id]</i></td> <td></td> </tr> <tr> <td></td> <td><b>cp</b></td> <td>keyword</td> </tr> <tr> <td></td> <td><i>conn-prof-id</i></td> <td>1 to 8000</td> </tr> <tr> <td style="vertical-align: top;">atm</td> <td><i>port-id   aps-id [:vpi/vci   vpi   vpi1.vpi2   cp.conn-prof-id]</i></td> <td></td> </tr> <tr> <td></td> <td><b>cp</b></td> <td>keyword</td> </tr> <tr> <td></td> <td><i>conn-prof-id</i></td> <td>1 to 8000</td> </tr> <tr> <td style="vertical-align: top;">frame</td> <td><i>port-id   aps-id:dldci</i></td> <td></td> </tr> <tr> <td style="vertical-align: top;">cisco-hdlc</td> <td><i>slot/mda/port.channel</i></td> <td></td> </tr> <tr> <td style="vertical-align: top;">cem</td> <td><i>slot/mda/port.channel</i></td> <td></td> </tr> <tr> <td style="vertical-align: top;">ima-grp</td> <td><i>bundle-id [:vpi/vci   vpi   vpi1.vpi2   cp.conn-prof-id]</i></td> <td></td> </tr> <tr> <td></td> <td><b>cp</b></td> <td>keyword</td> </tr> <tr> <td></td> <td><i>conn-prof-id</i></td> <td>1 to 8000</td> </tr> <tr> <td style="vertical-align: top;">port-id</td> <td><i>slot/mda/port[.channel]</i></td> <td></td> </tr> <tr> <td></td> <td><i>esat-id/slot/port</i></td> <td></td> </tr> <tr> <td></td> <td><i>pxc-id.sub-port</i></td> <td></td> </tr> <tr> <td style="vertical-align: top;">bundle-id</td> <td><b>bundle-type-slot/mda.-bundle-num</b></td> <td></td> </tr> </table>	:null	<i>port-id   bundle-id   bpgrp-id   lag-id   aps-id</i>		dot1q	<i>port-id   bundle-id   bpgrp-id   lag-id   aps-id   pw-id:[qtag1 cp-conn-prof-id]</i>		qinq	<i>port-id   bundle-id   bpgrp-id   lag-id   pw-id:[qtag1 cp-conn-prof-id].[qtag2   cp-conn-prof-id]</i>			<b>cp</b>	keyword		<i>conn-prof-id</i>	1 to 8000	atm	<i>port-id   aps-id [:vpi/vci   vpi   vpi1.vpi2   cp.conn-prof-id]</i>			<b>cp</b>	keyword		<i>conn-prof-id</i>	1 to 8000	frame	<i>port-id   aps-id:dldci</i>		cisco-hdlc	<i>slot/mda/port.channel</i>		cem	<i>slot/mda/port.channel</i>		ima-grp	<i>bundle-id [:vpi/vci   vpi   vpi1.vpi2   cp.conn-prof-id]</i>			<b>cp</b>	keyword		<i>conn-prof-id</i>	1 to 8000	port-id	<i>slot/mda/port[.channel]</i>			<i>esat-id/slot/port</i>			<i>pxc-id.sub-port</i>		bundle-id	<b>bundle-type-slot/mda.-bundle-num</b>	
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bundle-id	<b>bundle-type-slot/mda.-bundle-num</b>																																																						

	<b>bundle</b>	keyword
	<i>type</i>	ima   fr   ppp
	<i>bundle-num</i>	1 to 336
bpgrp-id	<b>bpgrp-type-bpgrp-num</b>	
	<b>bgrp</b>	keyword
	<i>type</i>	ima   ppp
	<i>bgrp-num</i>	1 to 2000
aps-id	<b>aps-group-id</b> [.channel]	
	<b>aps</b>	keyword
	<i>group-id</i>	1 to 128
ccag-id	<b>ccag-id.path-id</b> [cc-type]:cc-id	
	<b>ccag</b>	keyword
	<i>id</i>	1 to 8
	<i>path-id</i>	a   b
	<i>cc-type</i>	.sap-net   .net-sap
	<i>cc-id</i>	1 to 4094
eth-tunnel	<b>eth-tunnel-id</b> [:eth-tun-sap-id]	
	<i>id</i>	1 to 1024
	<i>eth-tun-sap-id</i>	0 to 4094
lag-id	<b>lag-id</b>	
	<b>lag</b>	keyword
	<i>id</i>	1 to 800
pw-id	<b>pw-id</b>	
	<b>pw</b>	keyword
	<i>id</i>	1 to 10239
qtag1	*   0 to 4094	
qtag2	*   null   0 to 4094	
vpi	0 to 4095 (NNI)	
	0 to 255 (UNI)	
vci	1   2   5 to 65535	
dlci	16 to 1022	
tunnel-id	<b>tunnel-id.private</b>   <i>public:tag</i>	
	<b>tunnel</b>	keyword
	<i>id</i>	1 to 16
	<i>tag</i>	0 to 4094

*port-id* — Specifies the physical port ID in the *slot/mda/port*, **esat-id/slot/port** or **pxc-id.sub-port** format.

If the card in the slot has XMA/MDAs installed, the *port-id* must be in the *slot\_number/MDA\_number/port\_number* format. For example, 6/2/3 specifies port 3 on XMA/MDA 2 in slot 6.

The *port-id* must reference a valid port type. When the *port-id* parameter represents SONET/SDH and TDM channels, the port ID must include the channel ID. A period “.” separates the physical port from the *channel-id*. The port must be configured as an access port. Channels are supported on the 7750 SR.

If the SONET/SDH port is configured as clear-channel then only the port is specified.

*bundle-id* — Specifies the multilink bundle to be associated with this IP interface. The **bundle** keyword must be entered at the beginning of the parameter. This parameter applies to the 7750 SR.

The command syntax must be configured as follows:

bundle-id: **bundle**-type-slot-id/mda-slot.bundle-num

bundle-id value range: 1 to 128

For example:

```
*A:ALA-12>config# port bundle-ppp-5/1.1
*A:ALA-12>config>port# multilink-bundle
```

*bggrp-id* — Specifies the bundle protection group ID to be associated with this IP interface. The **bpgrp** keyword must be entered at the beginning of the parameter. This parameter applies to the 7750 SR.

The command syntax must be configured as follows:

<i>bpgrp-id:</i>	<i>bpgrp-type-bpgrp-num</i>
type:	ima
<i>bpgrp-num</i> value range:	1 to 1280

Example:

```
*A:ALA-12>config# port bpgrp-ima-1
*A:ALA-12>config>service>vpls$ sap bpgrp-ima-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.

#### Values

qtag1:	0 to 4094
qtag2 :	*   0 to 4094

The values depends on the encapsulation type configured for the interface. [Table 23](#) describes the allowed values for the port and encapsulation types.

**Table 23** qtag values by port and encapsulation type

Port Type	Encap-Type	Allowed Values	Comments
Ethernet	Null	0	The SAP is identified by the port.
Ethernet	Dot1q	0 to 4094	The SAP is identified by the 802.1Q tag on the port. Note that 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. Note that a 0 qtag1 value also accepts untagged packets on the dot1q port.
SONET/ SDH	IPCP	—	The SAP is identified by the channel. No BCP is deployed and all traffic is IP.
SONET/ SDH TDM	BCP-Null	0	The SAP is identified with a single service on the channel. Tags are assumed to be part of the customer packet and not a service delimiter.
SONET/ SDH TDM	BCP-Dot1q	0 to 4094	The SAP is identified by the 802.1Q tag on the channel.
SONET/ SDH TDM	Frame Relay	16 to 991	The SAP is identified by the data link connection identifier (DLCI).
SONET/ SDH ATM	ATM	vpi (NNI) 0 to 4095 vpi (UNI) 0 to 255 vci 1, 2, 5 to 65535	The SAP is identified by port or by PVPC or PVCC identifier (vpi, vpi/vci, or vpi range).

*group-name* — Specifies the name of the encap group, up to 32 characters.

*encap-id* — Specifies the value of the encapsulation ID to be displayed.

**Values** 0 to 16777215

*seconds* — Configures the interval for each display, in seconds.

**Values** 11 to 60

**Default** 11



*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays absolute rate-per-second value for each statistic.

**rate** — Displays rate-per-second for each statistic instead of the delta.

**Output** The following output is an example of SAP information.

**Sample Output**

```
*A:cses-A13# monitor service id 88 sap 1/1/2:0
=====
Monitor statistics for Service 88 SAP 1/1/2:0
=====
-----
At time t = 0 sec (Base Statistics)
-----
-----
Sap Statistics
-----
Last Cleared Time      : N/A
                        Packets          Octets
Forwarding Engine Stats
Dropped                : 0                0
Off. HiPrio            : 0                0
Off. LowPrio           : 0                0
Off. Uncolor           : 0                0

Queueing Stats(Ingress QoS Policy 1)
Dro. HiPrio            : 0                0
Dro. LowPrio           : 0                0
For. InProf            : 0                0
For. OutProf           : 0                0

Queueing Stats(Egress QoS Policy 1)
Dro. InProf            : 0                0
Dro. OutProf           : 0                0
For. InProf            : 0                0
For. OutProf           : 0                0
-----
Sap per Queue Stats
-----
                        Packets          Octets

Ingress Queue 1 (Unicast) (Priority)
Off. HiPrio            : 0                0
Off. LoPrio            : 0                0
Dro. HiPrio            : 0                0
Dro. LoPrio            : 0                0
For. InProf            : 0                0
For. OutProf           : 0                0
```

---

**sdp**

- Syntax** **sdp** {*sdp-id* [:*vc-id*] | **far-end** *ip-address*} [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- Context** monitor>service>id
- Description** This command monitors statistics for an SDP binding associated with this service.
- Parameters** *sdp-id* — Specifies the SDP identifier.
- Values** sdp-id: 1 to 17407  
vc-id: 1 to 4294967295
- ip-address* — Specifies the system address of the far-end router for the SDP in dotted decimal notation. The string may be up to 32 characters.
- seconds* — Configures the interval for each display, in seconds.
- Values** 11 to 60  
**Default** 11
- repeat* — Configures how many times the command is repeated.
- Values** 1 to 999  
**Default** 10
- absolute** — Displays absolute rate-per-second value for each statistic.
- rate** — Displays rate-per-second for each statistic instead of the delta.
- Output** The following output is an example of SDP information.

**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)
-----
I. Fwd. Pkts.   : 0                               I. Dro. Pkts.   : 0
```

```
E. Fwd. Pkts.      : 0                      E. Fwd. Octets   : 0
=====
A:ALA-12#
```

## subscriber

**Syntax**

```
subscriber sub-ident-string sap sap-id sla-profile sla-profile-name [repeat repeat]
[absolute | rate] [base]
subscriber sub-ident-string sap sap-id sla-profile sla-profile-name [repeat repeat]
[absolute | rate] egress-policer-id egress-policer-id
subscriber sub-ident-string sap sap-id sla-profile sla-profile-name [repeat repeat]
[absolute | rate] egress-queue-id egress-queue-id
subscriber sub-ident-string sap sap-id sla-profile sla-profile-name [repeat repeat]
[absolute | rate] ingress-policer-id ingress-policer-id
subscriber sub-ident-string sap sap-id sla-profile sla-profile-name [repeat repeat]
[absolute | rate] ingress-queue-id ingress-queue-id
```

**Context** monitor>service

**Description** This command monitors statistics for a subscriber.

**Parameters**

**sub-ident-string** — Specifies an existing subscriber identification profile to monitor, up to 32 characters.

**sap-id** — Specifies the physical port identifier portion of the SAP definition.

### Values

:null	<i>port-id</i>   <i>bundle-id</i>   <i>bpgrp-id</i>   <i>lag-id</i>   <i>aps-id</i>	
dot1q	<i>port-id</i>   <i>bundle-id</i>   <i>bpgrp-id</i>   <i>lag-id</i>   <i>aps-id</i>   <i>pw-id</i> : <i>[qtag1 cp-conn-prof-id]</i>	
qinq	<i>port-id</i>   <i>bundle-id</i>   <i>bpgrp-id</i>   <i>lag-id</i>   <i>pw-id</i> : <i>[qtag1 cp-conn-prof-id].[qtag2   cp-conn-prof-id]</i>	
	<b>cp</b>	keyword
	<i>conn-prof-id</i>	1 to 8000
atm	<i>port-id</i>   <i>aps-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i>   <b>cp</b> . <i>conn-prof-id</i> ]	
	<b>cp</b>	keyword
	<i>conn-prof-id</i>	1 to 8000
frame	<i>port-id</i>   <i>aps-id</i> : <i>dlci</i>	
cisco-hdlc	<i>slot/mda/port.channel</i>	
cem	<i>slot/mda/port.channel</i>	
ima-grp	<i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i>   <b>cp</b> . <i>conn-prof-id</i> ]	
	<b>cp</b>	keyword
	<i>conn-prof-id</i>	1 to 8000

port-id	<i>slot/mda/port[.channel]</i> <b>esat-id/slot/port</b> <b>pxc-id.sub-port</b>	
bundle-id	<b>bundle-type-slot/mda.-bundle-num</b> <b>bundle</b> <i>type</i> <i>bundle-num</i>	keyword ima   fr   ppp 1 to 336
bpgrp-id	<b>bpgrp-type-bpgrp-num</b> <b>bgrp</b> <i>type</i> <i>bgrp-num</i>	keyword ima   ppp 1 to 2000
aps-id	<b>aps-group-id[.channel]</b> <b>aps</b> <i>group-id</i>	keyword 1 to 128
ccag-id	<b>ccag-id.path-id[cc-type]:cc-id</b> <b>ccag</b> <i>id</i> <i>path-id</i> <i>cc-type</i> <i>cc-id</i>	keyword 1 to 8 a   b .sap-net   .net-sap 1 to 4094
eth-tunnel	<b>eth-tunnel-id[:eth-tun-sap-id]</b> <i>id</i> <i>eth-tun-sap-id</i>	1 to 1024 0 to 4094
lag-id	<b>lag-id</b> <b>lag</b> <i>id</i>	keyword 1 to 800
pw-id	<b>pw-id</b> <b>pw</b> <i>id</i>	keyword 1 to 10239
qtag1	*   0 to 4094	
qtag2	*   null   0 to 4094	
vpi	0 to 4095 (NNI) 0 to 255 (UNI)	
vci	1   2   5 to 65535	
dlci	16 to 1022	
tunnel-id	<b>tunnel-id.private   public:tag</b> <b>tunnel</b> <i>id</i> <i>tag</i>	keyword 1 to 16 0 to 4094

*sla-profile-name* — Specifies an existing SLA profile. The name can be a maximum of 32 characters long.

*seconds* — Configures the interval for each display, in seconds.

**Values** 11 to 60

**Default** 11

*repeat* — Configures how many times the command is repeated.

**Values** 1 to 999

**Default** 10

**absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.

**Default** mode delta

**rate** — Displays rate-per-second for each statistic instead of the delta.

**base** — Monitor base statistics.

*egress-policer-id* — Monitors statistics for the policer.

**Values** 1 to 63

*egress-queue-id* — Monitors statistics for this queue.

**Values** 1 to 8

*ingress-policer-id* — Monitors statistics for this policer.

**Values** 1 to 63

*ingress-queue-id* — Monitors statistics for this queue.

**Values** 1 to 32

**Output** The following output is an example of subscriber-information.

### Sample Output

```
A:Dut-A# monitor service subscriber nokia_100 sap 1/2/1:101 sla-profile sla_
default
=====
Monitor statistics for Subscriber nokia_100
=====
At time t = 0 sec (Base Statistics)
-----
SLA Profile Instance statistics
-----
Off. HiPrio           Packets           Octets
: 0                   0
Off. LowPrio          : 94531           30704535
Off. Uncolor          : 0                0

Queueing Stats (Ingress QoS Policy 1000)
Dro. HiPrio           : 0                0
Dro. LowPrio          : 7332             2510859
```

```
For. InProf      : 0          0
For. OutProf     : 87067     28152288
```

Queueing Stats (Egress QoS Policy 1000)

```
Dro. InProf      : 880        127660
Dro. OutProf     : 0          0
For. InProf      : 90862     12995616
For. OutProf     : 0          0
```

-----  
SLA Profile Instance per Queue statistics  
-----

	Packets	Octets
Ingress Queue 1 (Unicast) (Priority)		
Off. HiPrio	: 0	0
Off. LowPrio	: 0	0
Off. Uncolor	: 0	0
Dro. HiPrio	: 0	0
Dro. LowPrio	: 0	0
For. InProf	: 0	0
For. OutProf	: 0	0

Ingress Queue 2 (Unicast) (Priority)		
Off. HiPrio	: 0	0
Off. LowPrio	: 94531	30704535
Off. Uncolor	: 0	0
Dro. HiPrio	: 0	0
Dro. LowPrio	: 7332	2510859
For. InProf	: 0	0
For. OutProf	: 87067	28152288

Ingress Queue 3 (Unicast) (Priority)		
Off. HiPrio	: 0	0
Off. LowPrio	: 0	0
Off. Uncolor	: 0	0
Dro. HiPrio	: 0	0
Dro. LowPrio	: 0	0
For. InProf	: 0	0
For. OutProf	: 0	0

Ingress Queue 11 (Multipoint) (Priority)		
Off. HiPrio	: 0	0
Off. LowPrio	: 0	0
Off. Uncolor	: 0	0
Dro. HiPrio	: 0	0
Dro. LowPrio	: 0	0
For. InProf	: 0	0
For. OutProf	: 0	0

Egress Queue 1		
Dro. InProf	: 880	127660
Dro. OutProf	: 0	0
For. InProf	: 90862	12995616
For. OutProf	: 0	0

Egress Queue 2		
Dro. InProf	: 0	0
Dro. OutProf	: 0	0
For. InProf	: 0	0
For. OutProf	: 0	0

```
Egress Queue 3
Dro. InProf      : 0          0
Dro. OutProf     : 0          0
For. InProf      : 0          0
For. OutProf     : 0          0
=====
```

A:Dut-A#

```
A:Dut-A# monitor service subscriber nokia_100 sap 1/2/1:101 sla-
profile sla_default base rate
=====
```

Monitor statistics for Subscriber nokia\_100

At time t = 0 sec (Base Statistics)

-----  
SLA Profile Instance statistics  
-----

	Packets	Octets
Off. HiPrio	: 0	0
Off. LowPrio	: 109099	35427060
Off. Uncolor	: 0	0
Queueing Stats (Ingress QoS Policy 1000)		
Dro. HiPrio	: 0	0
Dro. LowPrio	: 8449	2894798
For. InProf	: 0	0
For. OutProf	: 100523	32489663
Queueing Stats (Egress QoS Policy 1000)		
Dro. InProf	: 880	127660
Dro. OutProf	: 0	0
For. InProf	: 105578	15104553
For. OutProf	: 0	0

-----  
At time t = 11 sec (Mode: Rate)  
-----

SLA Profile Instance statistics  
-----

	Packets	Octets	% Port Util.
Off. HiPrio	: 0	0	0.00
Off. LowPrio	: 1469	477795	0.38
Off. Uncolor	: 0	0	0.00
Queueing Stats (Ingress QoS Policy 1000)			
Dro. HiPrio	: 0	0	0.00
Dro. LowPrio	: 119	40691	0.03
For. InProf	: 0	0	0.00
For. OutProf	: 1349	437350	0.34
Queueing Stats (Egress QoS Policy 1000)			
Dro. InProf	: 0	0	0.00
Dro. OutProf	: 0	0	0.00
For. InProf	: 1469	209129	0.16
For. OutProf	: 0	0	0.00

=====

A:Dut-A#

```
A:Dut-A# monitor service subscriber nokia_100 sap 1/2/1:101 sla-
```

```

profile sla_ default ingress-queue-id 1
=====
Monitor statistics for Subscriber nokia_100
=====
At time t = 0 sec (Base Statistics)
-----
                Packets                Octets
Ingress Queue 1 (Unicast) (Priority)
Off. HiPrio      : 0                    0
Off. LowPrio     : 0                    0
Off. Uncolor     : 0                    0
Dro. HiPrio      : 0                    0
Dro. LowPrio     : 0                    0
For. InProf      : 0                    0
For. OutProf     : 0                    0
=====
A:Dut-A#

A:Dut-A# monitor service subscriber nokia_100 sap 1/2/1:101 sla-profile
sla_ default egress-queue-id 1
=====
Monitor statistics for Subscriber nokia_100
-----
At time t = 0 sec (Base Statistics)
-----
                Packets                Octets
Egress Queue 1
Dro. InProf      : 880                  127660
Dro. OutProf     : 0                    0
For. InProf      : 164366               23506178
For. OutProf     : 0                    0
=====
A:Dut-A#

```

### 2.12.2.3 CLI Environment Commands

#### alias

**Syntax**     **alias** *alias-name alias-command-name*  
**no alias** *alias-name*

**Context**    environment

**Description**    This command enables the substitution of a command line (or part of a command line) by an alias. Use the **alias** command to create alternative or easier to remember/understand names for an entity or command string. If the string contains special characters (#, \$, spaces, and so on), the entire string must be enclosed within double quotes. The special characters “/” and “\” cannot be used as the first character inside an alias string. An alias can contain a double



quote character by preceding the quote with a “\” character (for example, **alias my-alias "| match \"string\""**). Only a single command can be present in the command string (the command can be long with many parameters but there is no support for aliases that include multiple CLI commands/lines). The **alias** command can be entered in any context but must be created in the **root>environment** context.

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

**alias soi "show router ospf interface"**

Complex aliases can be created to have shortcuts for customized show routine output:

**environment alias my-summary "| match expression \"----|Description|Interface|Admin State|Oper State|Transceiver Type|Optical Compliance|Link Length\" | match invert-match expression \"Ethernet Interface|OTU Interface\" | match invert-match expression \"----\" post-lines 1"**

and then used like this:

**show port detail my-summary**

- Parameters**
- alias-name* — Specifies the alias name, up to 80 characters. Do not use a valid command string for the name of the alias. If the alias specified is an actual command, this causes the command to be replaced by the alias.
  - alias-command-name* — Specifies the command name to be associated, up to 320 characters.

## create

- Syntax** **[no] create**
- Context** environment
- Description** By default, the **create** command is required to create a new OS entity.  
The **no** form of the command disables requiring the **create** keyword.
- Default** create

## kernel

- Syntax** **kernel password *password***  
**no kernel**
- Context** environment
- Description** This command enables and disables the kernel.

**Parameters** *password* — Specifies the password to access the kernel, up to 256 characters.

## more

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

**Context** environment

**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 the 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

**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 an ellipsis (“...”).

```
A:ALA-1>environment# reduced-prompt 2
A:ALA-1>config>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 the command reverts to the default.

**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.

**Values** 0 to 15

**Default** 2

## saved-ind-prompt

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

**Context** environment

**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.

```
*A:ALA-48# admin save
Writing file to ftp://192.0.2.43/./sim48/sim48-config.cfg
Saving configuration .... Completed.
A:ALA-48#
```

## shell

**Syntax** **shell -password *password***  
**no shell**

**Context** environment

**Description** This command enables and disables the shell.

**Parameters** *password* — Specifies the password to enter the shell, up to 256 characters.

## suggest-internal-objects

**Syntax** **[no] suggest-internal-objects**

**Context** environment

**Description** This command enables suggesting of internally created objects while auto completing. The **no** form of the command disables the command.

## terminal

**Syntax** **terminal**

	<b>no terminal</b>
<b>Context</b>	environment
<b>Description</b>	This command enables the context to configure the terminal screen length for the current CLI session.

## length

<b>Syntax</b>	<b>length</b> <i>lines</i>
<b>Context</b>	environment>terminal
<b>Description</b>	This command sets the number of lines on a screen.
<b>Parameters</b>	<i>lines</i> — Specifies the number of lines for the terminal screen length, expressed as a decimal integer.
	<b>Values</b> 1 to 512
	<b>Default</b> 24 — terminal dimensions are set to 24 lines long by 80 characters wide

## width

<b>Syntax</b>	<b>width</b> <i>width</i>
<b>Context</b>	environment>terminal
<b>Description</b>	This command determines display terminal width.
<b>Default</b>	width 80
<b>Parameters</b>	<i>width</i> — Sets the width of the display terminal.
	<b>Values</b> 1 to 512

## time-display

<b>Syntax</b>	<b>time-display</b> { <i>local</i>   <i>utc</i> }
<b>Context</b>	environment
<b>Description</b>	This command displays time stamps 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 time stamp is displayed.

In general all time stamps 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
- Parameters** **local** — Indicates that local time should be used.  
**utc** — Indicates that UTC time should be used.

## time-stamp

- Syntax** [no] time-stamp
- Context** environment
- Description** This command specifies whether the time-stamp should be displayed before the prompt.

### 2.12.2.4 Candidate Commands

## candidate

- Syntax** candidate
- Context** <root>
- Description** This command enables the context to edit candidate configurations.
- Commands in the **candidate** CLI branch, except **candidate edit**, are available only when in edit-cfg mode.

## edit

- Syntax** edit [exclusive]
- Context** candidate
- Description** This command enables the edit-cfg mode where changes can be made to the candidate configuration and sets the edit-point to the end of the candidate. In edit-cfg mode the CLI prompt contains **edit-cfg** near the root of the prompt. Commands in the **candidate** CLI branch, except **candidate edit**, are available only when in edit-cfg mode.

**Parameters** **exclusive** — Allows a user to exclusively create a candidate configuration by blocking other users (and other sessions of the same user) from entering edit-cfg mode. Exclusive edit-cfg mode can only be entered if the candidate configuration is empty and no user is in edit-cfg mode. Once a user is in exclusive edit-cfg mode no other users/sessions are allowed in edit-cfg mode. The user must either commit or discard the exclusive candidate before leaving exclusive edit-cfg mode. If the CLI session times out while a user is in exclusive edit-cfg mode then the contents of the candidate are discarded. The **admin disconnect** command can be used to force a user to disconnect (and to clear the contents of the candidate) if they have the candidate locked.

## commit

**Syntax** **commit** [**confirmed** *timeout*] [**comment** *comment*]  
**commit no-checkpoint** [**confirmed** *timeout*]

**Context** candidate

**Description** This command applies the changes in the candidate configuration to the active running configuration. The candidate changes will take operational effect.

If a commit operation is successful then all of the candidate changes will take operational effect and the candidate is cleared. If there is an error in the processing of the commit, or a 'commit confirmed' is not confirmed and an auto-revert occurs, then the router will return to a configuration state with none of the candidate changes applied. The operator can then continue editing the candidate and try a commit later.

By default, the SR OS will automatically create a new rollback checkpoint after a commit operation. The rollback checkpoint will contain the new configuration changes made by the commit. An optional **no-checkpoint** keyword can be used to avoid the auto-creation of a rollback checkpoint after a commit.

A commit operation is blocked if a rollback revert is currently being processed.

**Parameters** **confirmed** — specifies that the commit operation (if successful) should be automatically reverted (undone) at the end of the timeout period unless the operator issues the confirm command before the timeout period expires. A rollback checkpoint is created after the commit operation (if successful) and will remain available whether the commit is auto-reverted or not. The contents of the candidate will remain visible (candidate view) and changes to the candidate are blocked until the timeout is completed or the **candidate confirm** command is executed. If the timeout expires and an auto-revert occurs, then the original candidate config will be available in edit-cfg mode.

Standard line-by-line non-transactional configuration commands (including via SNMP) are not blocked during the countdown period and any changes made to the configuration during the countdown period will be rolled back if the timeout expires. The confirmed option is useful when changes are being made that could impact management reachability to the router.

A rollback revert is blocked during the countdown period until the commit has been confirmed.

*timeout* — Specifies the auto-revert timeout period, in minutes.

**Values** 1 to 168

**no-checkpoint** — Specifies to avoid the automatic creation of a rollback checkpoint for a successful commit.

**comment** *comment* — Adds a comment up to 255 characters to the automatic rollback checkpoint.

## confirm

<b>Syntax</b>	<b>confirm</b>
<b>Context</b>	candidate
<b>Description</b>	<p>This command is used to stop an automatic reversion to the previous configuration after the <b>candidate commit confirmed</b> command was used. If the <b>confirm</b> command is not executed before the commit confirmed timeout period expires then the previous commit changes will be undone and the previous candidate configuration will be available for editing and a subsequent commit.</p> <p>During the countdown the contents of the candidate will remain visible (candidate view) and changes to the candidate are blocked until the timeout is completed or the candidate confirm command is executed. Executing the <b>confirm</b> command clears the contents of the candidate and allows editing of the candidate.</p>

## copy

<b>Syntax</b>	<b>copy</b> [ <i>line</i> ]
<b>Context</b>	candidate
<b>Description</b>	<p>This command copies the selected CLI node (which includes all sub-branches) into a temporary buffer that can be used for a subsequent insert. The contents of the temporary buffer are deleted when the operator exits the candidate edit mode.</p>
<b>Parameters</b>	<p><i>line</i> — Specifies which line to copy.</p> <p><b>Values</b> line, offset, <b>first</b>, <b>edit-point</b>, <b>last</b></p> <p>line — absolute line number</p> <p>offset — relative line number to the current edit point. Prefixed with '+' or '-'.</p> <p><b>first</b> — keyword to indicate the first line</p> <p><b>edit-point</b> — keyword to indicate the current edit point</p> <p><b>last</b> — keyword to indicate the last line that is not 'exit'</p>

---

## delete

<b>Syntax</b>	<b>delete</b> [ <i>line</i> ]
<b>Context</b>	candidate
<b>Description</b>	This command deletes the selected CLI node (which includes all sub-branches). The deleted lines are also copied into a temporary buffer that can be used for a subsequent insert.
<b>Parameters</b>	<i>line</i> — Indicates which line to delete.

**Values**line, offset, **first**, **edit-point**, **last**

<b>line</b>	absolute line number
<b>offset</b>	relative line number to current edit point. Prefixed with '+' or '-'
<b>first</b>	keyword - first line
<b>edit-point</b>	keyword - current edit point
<b>last</b>	keyword - last line that is not 'exit'

## discard

<b>Syntax</b>	<b>discard</b> [ <b>now</b> ]
<b>Context</b>	candidate
<b>Description</b>	This command deletes the entire contents of the candidate configuration and exits the edit-cfg mode. Undo cannot be used to recover a candidate that has been discarded with <b>candidate discard</b> .
<b>Parameters</b>	<b>now</b> — Avoids a confirmation prompt for the discard.

## goto

<b>Syntax</b>	<b>goto</b> <i>line</i>
<b>Context</b>	candidate
<b>Description</b>	This command changes the edit point of the candidate configuration. The edit point is the point after which new commands are inserted into the candidate configuration as an operator navigates the CLI and issues commands in edit-cfg mode.
<b>Parameters</b>	<b>line</b> — Indicates which line to change starting at the point indicated by the following options.

**Values**



line, offset, **first**, **edit-point**, **last**

line	absolute line number
offset	relative line number to current edit point. Prefixed with '+' or '-'
<b>first</b>	keyword - first line
<b>edit-point</b>	keyword - current edit point
<b>last</b>	keyword - last line that is not 'exit'

## insert

**Syntax** `insert [line]`

**Context** candidate

**Description** This command inserts the contents of the temporary buffer (populated by a previous copy or delete command) into the candidate configuration. The contents are inserted by default after the current edit point. Optional parameters allow the insertion after some other point of the candidate. The contents of the temporary buffer are deleted when the operator exits candidate edit mode.

Insertions are context-aware. The temporary buffer always stores the CLI context (such as the current CLI branch) for each line deleted or copied. If the lines to be inserted are supported at the context of the insertion point then the lines are simply inserted into the configuration. If the lines to be inserted are not supported at the context of the insertion point, then the context at the insertion point is first closed using multiple exit statements, the context of the lines to be inserted is built (added) into the candidate at the insertion point, then the lines themselves are added, the context of the inserted lines is closed using exit statements and finally the context from the original insertion point is built again leaving the context at the same point as it was before the insertion.

**Parameters** *line* — Indicates where to insert the line starting at the point indicated by the following options.

### Values

line, offset, **first**, **edit-point**, **last**

line	absolute line number
offset	relative line number to current edit point. Prefixed with '+' or '-'
<b>first</b>	keyword - first line
<b>edit-point</b>	keyword - current edit point
<b>last</b>	keyword - last line that is not 'exit'

---

## load

<b>Syntax</b>	<b>load</b> <i>file-url</i> [ <b>overwrite</b>   <b>insert</b>   <b>append</b> ]
<b>Context</b>	candidate
<b>Description</b>	This command loads a previously saved candidate configuration into the current candidate. The edit point will be set to the end of the loaded configuration lines. The candidate configuration cannot be modified while a load is in progress.
<b>Default</b>	If the candidate is empty then a load without any of the optional parameters (such as <b>overwrite</b> , and so on) will load the <i>file-url</i> into the candidate. If the candidate is not empty then one of the options, such as <b>overwrite</b> , <b>insert</b> , and so on, must be specified.
<b>Parameters</b>	<i>file-url</i> — Specifies the directory and filename to load. <b>overwrite</b> — Discards the contents of the current candidate and replace it with the contents of the file. <b>insert</b> — Inserts the contents of the file at the current edit point. <b>append</b> — Inserts the contents of the file at the end of the current candidate.

## quit

<b>Syntax</b>	<b>quit</b>
<b>Context</b>	candidate
<b>Description</b>	This command exits the <b>edit-cfg</b> mode. The contents of the current candidate will not be deleted and the operator can continue editing the candidate later.

## redo

<b>Syntax</b>	<b>redo</b> [ <i>count</i> ]				
<b>Context</b>	candidate				
<b>Description</b>	This command reapplies the changes to the candidate that were removed using a previous <b>undo</b> . All <b>undo</b> or <b>redo</b> history is lost when the operator exits <b>edit-cfg</b> mode.  A <b>redo</b> command is blocked if another user has made changes in the same CLI branches that would be impacted during the redo.				
<b>Parameters</b>	<b>count</b> — Specifies the number of previous changes to reapply. <table><tr><td><b>Values</b></td><td>1 to 50</td></tr><tr><td><b>Default</b></td><td>1</td></tr></table>	<b>Values</b>	1 to 50	<b>Default</b>	1
<b>Values</b>	1 to 50				
<b>Default</b>	1				

---

## replace

<b>Syntax</b>	<b>replace</b> [ <i>line</i> ]
<b>Context</b>	candidate
<b>Description</b>	This command displays the specified line (a single line only) and allows it to be changed.
<b>Parameters</b>	<i>line</i> — Indicates which line to replace starting at the point indicated by the following options.
	<b>Values</b>
	line, offset, <b>first</b> , <b>edit-point</b> , <b>last</b>
	line                    absolute line number
	offset                 relative line number to current edit point. Prefixed with '+' or '-'
	<b>first</b> keyword - first line
	<b>edit-point</b> keyword - current edit point
	<b>last</b> keyword - last line that is not 'exit'

## save

<b>Syntax</b>	<b>save</b> <i>file-url</i>
<b>Context</b>	candidate
<b>Description</b>	This command saves the current candidate to a file.
<b>Parameters</b>	<i>file-url</i> — Specifies the directory and filename.

## undo

<b>Syntax</b>	<b>undo</b> [ <i>count</i> ]
<b>Context</b>	candidate
<b>Description</b>	This command removes the most recent change(s) done to the candidate. The changes can be reapplied using the <b>redo</b> command. All undo or redo history is lost when the operator exits the <b>edit-cfg</b> mode. Undo can not be used to recover a candidate that has been discarded with <b>candidate discard</b> .
	An <b>undo</b> command is blocked if another user has made changes in the same CLI branches that would be impacted during the undo.

**Parameters** *count* — Specifies the number of previous changes to remove.

**Values** 1 to 50

**Default** 1

## view

**Syntax** **view** [*line*]

**Context** candidate

**Description** This command displays the candidate configuration along with line numbers that can be used for editing the candidate configuration.

**Parameters** *line* — Displays the candidate configuration starting at the point indicated by the following options (the display is not limited to the current CLI context/branch).

**Values**

line, offset, <b>first</b> , <b>edit-point</b> , <b>last</b>	
line	absolute line number
offset	relative line number to current edit point. Prefixed with '+' or '-'
<b>first</b>	keyword - first line
<b>edit-point</b>	keyword - current edit point
<b>last</b>	keyword - last line that is not 'exit'

## info

**Syntax** **info** [**operational**]

**Context** <root>

**Description** This command displays the operational configuration of the context that the operator is currently in. In edit-cfg mode, the **operational** keyword is mandatory when using the **info** command.

## candidate

**Syntax** **candidate**

**Context** show>system

**Description** This command shows candidate configuration information.

**Output** The following output is an example of candidate information, and [Table 24](#) describes the output fields.

**Sample Output**

```
*A:bksim3107# show system candidate
=====
Candidate Config Information
=====
Candidate configuration state      : modified
Num editors/viewers               : 0
Candidate cfg exclusive locked    : no
Last commit state                 : revert-failed
Last commit time                  : 10/23/2012 17:21:47
Checkpoint created with last commit : yes
Scheduled revert time             : N/A
Last commit revert time           : 10/23/2012 17:22:47
=====

Users in edit-cfg mode
=====
Username      Type (from)
=====
admin         Console
Joris         Telnet (192.0.2.239)
=====
```

**Table 24** Candidate Output Fields

Label	Description
Candidate configuration state	<ul style="list-style-type: none"> <li>• empty — indicates there are no uncommitted changes in the candidate config</li> <li>• modified — indicates there are uncommitted changes in the candidate config</li> <li>• unconfirmed — indicates there are no uncommitted changes in the candidate config but the result of the last commit will be auto-reverted unless it is confirmed before the timeout expires</li> </ul>
Num editors/viewers	Displays the number of CLI sessions currently in edit-cfg mode
Candidate cfg exclusive locked	Indicates if a user has exclusively locked the candidate using the <b>candidate edit exclusive</b> command

**Table 24** Candidate Output Fields (Continued)

Label	Description (Continued)
Last commit state	<ul style="list-style-type: none"> <li>• none — indicates there have been no commits since the last reboot of the node</li> <li>• in-progress — indicates the system is currently committing the candidate config</li> <li>• success — indicates the last commit finished successfully</li> <li>• revert-pending — indicates the last commit finished successfully but has not been confirmed yet, and will be auto-reverted if it is not confirmed before the timeout expires</li> <li>• failed — indicates the last commit failed and has been undone</li> <li>• revert-in-progress — indicates the last commit finished successfully but was not confirmed in time and is currently being reverted</li> <li>• reverted — indicates the last commit finished successfully but was not confirmed in time and has been reverted</li> <li>• revert-failed — indicates the last commit finished successfully but was not confirmed in time and the system attempted to revert it but failed</li> </ul>
Last commit time	Displays the time at which the last commit attempt was started
Checkpoint created with last commit	Indicates if a rollback checkpoint was created after the previous commit completed
Scheduled revert time	Indicates the currently scheduled auto-revert time based on the confirmed option being used with a candidate commit
Last commit revert time	Displays the time the commit was last reverted
Users in edit-cfg mode	Lists all the user sessions that are currently in edit-cfg mode
Type (from)	Indicates the type of session (such as Console, Telnet, and so on) and also the source of the session (such as the source IP address of the remote host)

### 2.12.2.5 Rollback Commands

compare

**Syntax**    `compare [to checkpoint2]`

**compare** *checkpoint1 to checkpoint2*

<b>Context</b>	admin admin>rollback config>xx (where xx is any sub-branch at any level below config, but not at the config context itself)
<b>Description</b>	<p>This command displays the differences between rollback checkpoints and the active operational configuration, with source1 as the base/first file to which source2 is compared.</p> <p>A compare operation does not check authorization of each line of output. Permission to execute the compare operation from the admin branch of CLI (authorization for the <b>admin rollback compare</b> or <b>admin compare</b> command itself) should only be given to users who are allowed to view the entire configuration, similar to permissions for <b>admin display-config</b>.</p>
<b>Default</b>	<p>The defaults for source1 and source2 are context aware and differ based on the branch in which the command is executed. In general, the default for source1 matches the context from which the command is issued.</p> <ul style="list-style-type: none"> <li>• In the admin node: No defaults. source1 and source2 must be specified.</li> <li>• In the admin&gt;rollback node:           <ul style="list-style-type: none"> <li>source1 default = active-cfg, source2 default = latest-rb</li> <li>compare: equivalent to “compare active-cfg to latest-rb”</li> <li>compare to source2: equivalent to “compare active-cfg to source2”</li> </ul> </li> <li>• In a config&gt;xx node:           <ul style="list-style-type: none"> <li>compare to source2: equivalent to “compare active-cfg to source2”</li> </ul> </li> </ul>
<b>Parameters</b>	<p><i>checkpoint1, checkpoint2</i> — Specifies comparison information.</p> <p><b>Values</b></p> <ul style="list-style-type: none"> <li><b>active-cfg</b> — The current operational configuration that is active in the node.</li> <li><b>latest-rb</b> — The most recent rollback checkpoint (the checkpoint file at the configured rollback-location with “*.rb” as the suffix).</li> <li><b>rescue</b> — The rescue configuration (at the configured rescue-location).</li> <li><i>checkpoint-id</i> — An ID indicating a specific rollback checkpoint. A checkpoint-id of 1 indicates the rollback checkpoint file (at the configured rollback-location) with “*.rb.1” as the suffix, 2 for file “*.rb.2”, and so on.</li> </ul>

delete

<b>Syntax</b>	<b>delete</b> [{ <i>checkpoint-id</i>   <b>rescue</b>   <b>latest-rb</b> }]
<b>Context</b>	admin>rollback

- Description** This command deletes a rollback checkpoint and 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 **config 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.
- It is not advised to manually delete a rollback checkpoint (for example, using a **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-id* — An ID indicating a specific rollback checkpoint. A checkpoint-id of 1 indicates the rollback checkpoint file (at the configured rollback location) with \*.rb.1 as the suffix, 2 for file \*.rb.2, and so on.
- Values** 1 to 9
- latest-rb** — Specifies the most recently created rollback checkpoint (corresponds to the file-url.rb rollback checkpoint file).
- rescue** — Deletes the rescue checkpoint. No checkpoint suffix numbers are changed.

## revert

- Syntax** **revert** {**latest-rb** | *checkpoint-id* | **rescue**} [**now**]
- Context** admin>rollback
- 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** **latest-rb** — Specifies the most recently created rollback checkpoint (corresponds to the file-url.rb rollback checkpoint file).
- checkpoint-id* — Specifies the configuration to return to (which rollback checkpoint file to use). Checkpoint-id of 1 corresponds to the file-url.rb.1 rollback checkpoint file. The higher the id, the older the checkpoint. Max is the highest rollback checkpoint supported or configured.
- Values** 1 to 9
- rescue** — Specifies to revert to the rescue checkpoint.
- now** — Forces a rollback revert without any interactive confirmations (assumes 'y' for any confirmations that would have occurred).



---

## save

<b>Syntax</b>	<b>save</b> [ <b>comment</b> <i>comment</i> ] [ <b>rescue</b> ]
<b>Context</b>	admin>rollback
<b>Description</b>	<p>If the optional <b>rescue</b> 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, then the last checkpoint file is deleted.</p> <p>If the <b>rescue</b> keyword is used, then this command saves the current operational configuration as a rescue configuration at the location and with the filename specified by the rescue location. The filename will have the suffix .rc appended.</p>
<b>Parameters</b>	<p><i>comment-string</i> — Specifies a comment, up to 255 characters, that is associated with the checkpoint.</p> <p><b>rescue</b> — Saves the rescue checkpoint instead of a normal rollback checkpoint.</p>

## view

<b>Syntax</b>	<b>view</b> [ <i>checkpoint-id</i>   <b>rescue</b>   <b>latest-rb</b> ]
<b>Context</b>	admin>rollback
<b>Description</b>	This command displays the checkpoint.
<b>Parameters</b>	<p><b>latest-rb</b> — Specifies the most recently created rollback checkpoint (corresponds to the file-url.rb rollback checkpoint file).</p> <p><i>checkpoint-id</i> — Indicates rollback checkpoint file to be viewed. Checkpoint-id of 1 corresponds to the file-url.rb.1 rollback checkpoint file. The higher the id, the older the checkpoint. Max is the highest rollback checkpoint supported or configured.</p> <p><b>Values</b> 1 to 9</p> <p><b>rescue</b> — Displays the rescue configuration.</p>

## view

<b>Syntax</b>	<b>view</b> { <i>source</i> }
<b>Context</b>	admin
<b>Description</b>	The context to configure administrative system viewing parameters. Only authorized users can execute the commands in the <b>admin</b> context.

**Parameters** *source* — Specifies the source of the configuration to view.

**Values** active-cfg, rescue, latest-rb, checkpoint-id

**active-cfg** — Specifies current running configuration.

**rescue** — Specifies a rescue checkpoint configuration.

**latest-rb** — Specifies the latest configuration.

*checkpoint-id* — Specifies a specific checkpoint file configuration.

**Values** 1 to 9

## local-max-checkpoints

**Syntax** **local-max-checkpoints** [*number-of-files*]  
**no local-max-checkpoints**

**Context** config>system>rollback

**Description** This command configures the maximum number of rollback checkpoint files when the rollback-location is on local compact flash.

**Default** no local-max-checkpoints

**Parameters** *number of files* — Specifies the maximum rollback files on a compact flash.

**Values** 1 to 50

## remote-max-checkpoints

**Syntax** **remote-max-checkpoints** [*number-of-files*]  
**no remote-max-checkpoints**

**Context** config>system>rollback

**Description** Configures the maximum number of rollback checkpoint files when the rollback-location is remote (for example, ftp).

**Default** no remote-max-checkpoints

**Parameters** *number of files* — Specifies the maximum rollback files saved at a remote location.

**Values** 1 to 200

## rescue-location

**Syntax** **rescue-location** *file-url*  
**no rescue-location**

<b>Context</b>	config>system>rollback
<b>Description</b>	The location and filename of the rescue configuration is configurable to be local (on compact flash) or remote. The suffix <code>.rc</code> will be automatically appended to the filename when a rescue configuration file is saved. Trivial FTP (TFTP) is not supported for remote locations.
<b>Default</b>	no rescue location
<b>Parameters</b>	<i>file-url</i> — Specifies the URL or filename.
	<b>Values</b>
	<i>local-url</i>   <i>remote-url</i>
	<i>local-url</i> [cflash-id]/[file-path] up to 200 characters, including cflash-id directory length of up to 99 characters each
	<i>remote-url</i> [ftp://login:pswd@ remote-locn]/[file-path] up to 255 characters, directory length of up to 99 characters each
	<i>remote-locn</i> [hostname   ipv4-address   ipv6-address]
	<i>ipv4-address</i> a.b.c.d
	<i>ipv6-address</i> 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 <i>interface</i> - 32 chars max, for link local addresses
	<i>cflash-id</i> cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
	rescue filename suffixed with <code>.rc</code> during the rescue file creation

## rollback-location

<b>Syntax</b>	<b>rollback-location</b> <i>file-url</i> / <i>rollback filename</i> <b>no rollback-location</b>
<b>Context</b>	config>system>rollback
<b>Description</b>	The location and name of the rollback checkpoint files is configurable to be local (on compact flash) or remote. The <i>file-url</i> must not contain a suffix (just a path/directory + filename). The suffixes for rollback checkpoint files are ".rb", ".rb.1", ..., ".rb.9" and are automatically appended to rollback checkpoint files.
<b>Default</b>	no rollback-location
<b>Parameters</b>	<i>file-url</i> — Specifies the URL or rollback filename.
	<b>Values</b>
	<i>local-url</i>   <i>remote-url</i>
	<i>local-url</i> [cflash-id]/[file-path] up to 200 characters, including cflash-id directory length of up to 99 characters each

*remote-url*            [*{ftp://}login:pswd@ remote-locn/*][*file-path*] up to 255 characters, directory length of up to 99 characters each

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

*ipv4-address*           *a.b.c.d*

*ipv6-address*           *x:x:x:x:x:x[-interface]*  
*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 each, for link local addresses

*cflash-id*             cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

*rollback-filename* — Specifies the rollback file name.

**Values**            suffixed with .rb, .rb.1 up to .9 during rollback checkpoint creation

### 2.12.2.6 Show Commands

The following command outputs are examples only; actual displays may differ depending on supported functionality and user configuration.

#### alias

**Syntax**            **alias**

**Context**           <root>

**Description**       This command displays a list of existing aliases.

**Output**            The following output is an example of alias information, and [Table 25](#) 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 epibe
ssvpls                                show service service-using vpls
ssvprn                                show service service-using vprn
ssi                                    show service service-using ies
-----
Number of aliases : 5
=====
```

---

A:ALA-103>config>system#

**Table 25 Show Alias Output Fields**

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.



---

## 3 File System Management

### 3.1 The File System

The SR OS 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.

Although some of the storage devices on routers are not actually compact flash devices (for example, cf1: on the 7950 XRS is an internal SSD), we refer to all storage devices as compact flash.

#### 3.1.1 Compact Flash Devices

The file system is based on a DoS file system (with an optional Reliance file system). In the 7750 SR and 7450 ESS, each control processor can have up to three compact flash devices numbered one through three. In the 7950 XRS, each CCM has an SSD and up to two compact flash devices. The names for these devices are:

- cf1:
- cf2:
- cf3:

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

The three compact flash devices on the 7450 ESS and 7750 SR OS are removable and have an administrative state (shutdown/no shutdown).

The cf2: and cf3: compact flash devices on the 7950 XRS routers are removable and have an administrative state (shutdown/no shutdown). cf1: is an internal SSD.



**Note:** To prevent corrupting open files in the file system, you should only remove a compact flash that is administratively shutdown. The SR OS gracefully closes any open files on the device, so it can be safely removed.

## 3.1.2 URLs

The arguments for the SR OS 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*).

The SR 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 five types of URLs: local, ftp, tftp, http, and https. The syntax for each of the URL types are listed in [Table 26](#).

**Table 26** URL Types and Syntax

URL Type	Syntax	Notes
<i>local-url</i>	<code>[cflash-id:\]path</code>	<i>cflash-id</i> is the compact flash device name. Values: cf1:, cf2:, cf3:
<i>ftp-url</i>	<code>ftp://[username[:password]@]host/path</code>	An absolute ftp path from the root of the remote file system. <i>username</i> is the ftp user name <i>password</i> is the ftp user password <i>host</i> is the remote host <i>path</i> is the path to the directory or file
	<code>ftp://[username[:password]@]host/.path</code>	A relative ftp path from the user's home directory. Note the period and slash (".") in this syntax compared to the absolute path.
<i>tftp-url</i>	<code>tftp://host[/path]/filename</code>	tftp is only supported for operations on file-urls.
<i>http-url</i>	<code>http://[username[:password]@]host[:port]/path</code>	<i>host</i> is an HTTP server <i>port</i> defaults to 80
<i>https-url</i>	<code>https://[username[:password]@]host[:port]/path</code>	<i>host</i> is an HTTPS server <i>port</i> defaults to 443

If the host portion of the URL is an IPv6 address, then the address should be enclosed in square brackets. For example:

```
ftp://user:passw@[3ffe::97]/./testfile.txt
```

```
tftp://[2001:db8:3333:4444:5555:6666:7777:8888]/./testfile.txt
```



The system accepts either forward slash (/) or backslash (\) characters to delimit directory and/or filenames in URLs. Similarly, the SR OS SCP client application can use either slash or backslash characters, but not all SCP 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 SCP client application to send files to the SCP 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 SCP server.

For example, a destination directory specified as "cf1:\dir1\file1" will be transmitted to the SCP server as "cf1:dir1file1" where the backslash escape characters are stripped by the SCP 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 properly delimit directories and the filename.

When a special character is used in a password, it can cause issues when that password is encoded as part of a URL. To prevent this issue, percent encoding can be used. Percent encoding is a mechanism to encode 8-bit characters that have specific meaning in the context of URLs. The encoding consists of substitution of a percent character (%) followed by the hexadecimal representation of the ASCII value of the replaced character.

If an HTTP or HTTPS server redirects the system to a different URL (from an "HTTP 301" error or similar response), the system prompts the user "y/n" to either repeat the operation with the new URL or terminate it. To avoid this, use the **no-redirect** parameter to automatically refuse HTTP redirects. A command issued with the **force** parameter, and without **no-redirect** parameter, automatically accepts redirects. If a file command is redirected more than eight times, or if it queries an HTTPS URL and gets redirected to an HTTP URL, the command automatically terminates as a security measure.

When connecting to an HTTPS server, the system verifies the server's TLS certificate. For the certificate to pass verification, the system must have a **ca-profile** (**config>system>security>pki>ca-profile**) already configured for the server's Certificate Authority (CA), and the profile must contain up-to-date certificate and CRL files. HTTPS file commands do not use OCSP. If the certificate was issued by an intermediate CA, then the system must have a **ca-profile** for every CA tracing back to the root CA. If the server's certificate fails verification for any reason, the file command terminates. Refer to the *7450 ESS, 7750 SR, 7950 XRS, and VSR System Management Guide* for more information.

An HTTPS **file** command may also include a **client-tls-profile** parameter, referring to a **config>system>security>tls>client-tls-profile** object (refer to the *7450 ESS, 7750 SR, 7950 XRS, and VSR System Management Guide* for more information). This profile provides the cipher list, client certificate, and trust anchor the system uses when communicating with the HTTPS server.

A **file** command that connects to an HTTP or HTTPS server outside the local network may need to use an HTTP proxy. The user may add the **proxy** parameter to point to a proxy server (which must be an HTTP URL).

### 3.1.3 Wildcards

The platform SR OS 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 cf3:\ # copy test*.cfg
siliconvalleycf1:\testfile.cfg
1 file(s) copied.
A:ALA-1>file cf3:\ # cd siliconvalley
A:ALA-1>file cf3:\siliconvalley\ # dir
Volume in drive cf1 on slot A has no label.
Directory of cf3:\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 cf3:\siliconvalley\ #
```

As in a DoS file system, the wildcard characters can only be used in some of the file commands.

Another example of wildcard usage:

```
A:21# show router mpls lsp 1-63-8*
=====
MPLS LSPs (Originating)
=====
LSP Name                               To                               Fastfail
Adm   Opr
Config
-----
1-63-8-cc                               192.0.2.8                       No
Up    Dwn
1-63-8-cw                               192.0.2.8                       No
Up    Dwn
```

-----  
LSPs : 2

-----  
A:21#

## 3.2 File Management Tasks

The following sections are basic system tasks that can be performed.

Note that when a file system operation is performed with the **copy**, **delete**, **move**, **rd**, or **scp** commands that can potentially delete or overwrite a file system entry, a prompt appears to confirm the action. The **force** keyword performs the copy, delete, move, rd, and scp actions without displaying the confirmation prompt.

All the commands can operate on the local file system. [Table 27](#) indicates which commands also support remote file operations.

**Table 27** File Command Local and Remote File System Support

Command	local-url	ftp-url	tftp-url	http-url	https-url
attrib	X				
cd	X	X			
copy	X	X	X	X	X
delete	X	X		X	X
dir	X	X			
md		X			
move	X	X		X	X
rd		X			
repair					
scp	source only				
type	X	X	X	X	X
version	X	X	X		
shutdown					

### 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 CLI syntax displayed below to modify file attributes:

**CLI Syntax:**   file>  
                  attrib [+r | -r] file-url

The following shows an example of the command syntax:

**Example:**     # file  
                  file cf3:\ # attrib  
                  file cf3:\ # attrib +r BOF.SAV  
                  file cf3:\ # attrib

The following example shows the file configuration:

```
A:ALA-1>file cf3:\ # attrib
cf3:\bootlog.txt
cf3:\bof.cfg
cf3:\boot.ldr
cf3:\bootlog_prev.txt
cf3:\BOF.SAV
A:ALA-1>file cf3:\ # attrib +r BOF.SAV
A:ALA-1>file cf3:\ # attrib
cf3:\bootlog.txt
cf3:\bof.cfg
cf3:\boot.ldr
cf3:\bootlog_prev.txt
R      cf3:\BOF.SAV
```

## 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 CLI syntax displayed below to modify file attributes:

**CLI Syntax:**   file>  
                  md file-url

The following is an example of the command syntax:

```
file cf1:\ # md test1file 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 CLI syntax displayed below to copy files:

**CLI Syntax:**

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

The following displays an example of the copy command syntax:

**Example:**

```
A:ALA-1>file cf1:\ # copy
104.cfgcf1:\test1\test2\test3\test.cfg

A:ALA-1>file cf1:\ # scp file1
admin@192.168.0.1:cf1:\file1

A:ALA-1>file cf1:\ # scp file2 user2@192.168.0.1:/user2/
file2

A:ALA-1>file cf1:\ # scp cf2:/file3
admin@192.168.0.1:cf1:\file3
```

### 3.2.4 Moving Files

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

Use the CLI syntax displayed below to move files:

**CLI Syntax:**

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

The following displays an example of the command syntax:

**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 Deleting Files and Removing Directories

Use the **delete** and **rd** commands to delete files and remove directories. Directories can be removed even if they contain files and/or subdirectories. To remove a directory that contains files and/or subdirectories, use the **rd /s** command. When files or directories are deleted, they cannot be recovered.

The **force** option deletes the file or directory without prompting the user to confirm.

Use the CLI syntax displayed below to delete files and then remove directories:

**CLI Syntax:** file#  
 delete file-url [force]  
 rd file-url [force]

The following displays an example of the command syntax:

```
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:\ #
```

Use the CLI syntax displayed below to remove a directory without first deleting files or subdirectories:

**CLI Syntax:** file

---

```
rd file-url rf
```

### 3.2.6 Displaying Directory and File Information

Use the **dir** command to display a list of files on a file system. The **type** command displays the contents of a file. The **version** command displays the version of a \*.tim or iom.tim file. (iom.tim file is used for the XCM on the 7950 XRS).

Use the CLI syntax displayed below to display directory and file information:

**CLI Syntax:**

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

The following shows an example of the command syntax:

```
A:ALA-1>file cfl:\ # dir
Volume in drive cfl on slot A has no label.
Directory of cfl:\
01/01/1980 12:00a          7597 test.cfg
01/01/1980 12:00a          957 b.
08/19/2001 02:14p        230110 BOOTROM.SYS
01/01/1980 12:00a          133 NVRAM.DAT
04/03/2003 05:32a          1709 103.ndx
01/28/2003 05:06a          1341 103.cftg.ndx
01/28/2003 05:06a        20754 103.cftg
04/05/2003 02:20a      <DIR>      test
          15 File(s)          338240 bytes.
          3 Dir(s)          1097728 bytes free.

A:ALA-1>file cfl:\ # type fred.cfg
# Saved to /cflash1/fred.cfg
# Generated THU FEB 21 01:30:09 2002 UTC
exit all
config
#-----
# Chassis Commands
#-----
card 2 card-type faste-tx-32
exit
#-----
# Interface Commands
#-----
# Physical port configuration
interface faste 2/1
shutdown
mode network
exit
interface faste 2/2
shutdown
exit
interface faste 2/3
```



```
shutdown
exit
interface faste 2/4
A:ALA-1>file cf1:\ # version boot.tim
TiMOS-L-1.0.B3-8
A:ALA-1>file cf1:\ #
```

## 3.2.7 Repairing the File System

Use the repair command to check a compact flash device for errors and repair any errors found.

Use the CLI syntax displayed below to check and repair a compact flash device:

**CLI Syntax:**   file  
                  repair [cflash-id]

The following example shows the command syntax:

```
A:ALA-1>file cf3:\ # repair
Checking drive cf3: on slot A for errors...
Drive cf31: on slot A is OK.
```



---

## 3.3 File Command Reference

### 3.3.1 Command Hierarchy

#### 3.3.1.1 File Commands

- file**
- **attrib** [+r | -r] *file-url*
  - **attrib**
  - **cd** [*file-url*]
  - **copy** *source-file-url dest-file-url* [**force**] [**no-redirect**] [**client-tls-profile** *profile*] [**proxy** *proxy-url*]
  - **delete** *file-url* [**force**] [**no-redirect**] [**client-tls-profile** *profile*] [**proxy** *proxy-url*]
  - **dir** [*file-url*] [**sort-order** {d | n | s}] [**reverse**]
  - **format** [*cflash-id*] [**reliable**]
  - **md** *file-url*
  - **move** *old-file-url new-file-url* [**force**] [**no-redirect**] [**client-tls-profile** *profile*] [**proxy** *proxy-url*]
  - **rd** *file-url* **rf**
  - **rd** *file-url* [**force**]
  - **repair** [*cflash-id*]
  - **scp** *local-file-url destination-file-url* [**router** *router-instance*] [**force**]
  - **scp** *local-file-url destination-file-url* [**force**] **service** *service-name*
  - [**no**] **shutdown** [**active**] [**standby**]
  - [**no**] **shutdown** *cflash-id*
  - **type** *file-url* [**no-redirect**] [**client-tls-profile** *profile*] [**proxy** *proxy-url*]
  - **version** *file-url* [**check**]
  - **vi** *local-url*

### 3.3.2 Command Descriptions

#### 3.3.2.1 File System Commands

##### shutdown

**Syntax**    [**no**] **shutdown** [**active**] [**standby**]  
            [**no**] **shutdown** [*cflash-id*]

**Context**    file

**Description** This command shuts down (unmounts) the specified CPM(s).

Use the **no shutdown [active] [standby]** command to enable one or both CPM.

Use the **no shutdown [cflash-id]** command to enable a compact flash (cf1:, cf2:, or cf3:) on the CPM/CCM. The **no shutdown** command can be issued for a specific slot when no compact flash is present. When a flash card is installed in the slot, the card will be activated upon detection.

In redundant systems, use the **no shutdown** command on cf3: on both SF/CPMs or CCMs in order to facilitate synchronization. See the [synchronize](#) command.



**Note:** The **shutdown** command must be issued prior to removing a flash card. If no parameters are specified, then the drive referred to by the current working directory will be shut down.

### LED Status Indicators

[Table 28](#) lists the possible states for the compact flash and their LED status indicators.

**Table 28** LED Status Indicators

State	Description
Operational	If a compact flash is present in a drive and operational (no shutdown), the respective LED is lit green. The LED flickers when the compact flash is accessed. <b>Note:</b> Do not remove the compact flash during a read/write operation.
Flash defective	If a compact flash is defective, the respective LED blinks amber to reflect the error condition and a trap is raised.
Flash drive shut down	When the compact flash drive is shut down and a compact flash present, the LED is lit amber. In this state, the compact flash can be ejected.
No compact flash present, drive shut down	If no compact flash is present and the drive is shut down the LED is unlit.
No compact flash present, drive enabled	If no compact flash is present and the drive is not shut down the LED is unlit.
Ejecting a compact flash	The compact flash drive should be shut down before ejecting a compact flash card. The LED should turn to solid (not blinking) amber. This is the only mode to safely remove the flash card. If a compact flash drive is not shut down before a compact flash is ejected, the LED blinks amber for approximately 5 seconds before shutting off.

The **shutdown** or **no shutdown** state is not saved in the configuration file. Following a reboot all compact flash drives are in their default state.

- Default** no shutdown
- Parameters** *cflash-id* — Specifies the compact flash slot ID to be shut down or enabled. If *cflash-id* is specified, the drive is shut down or enabled. If no *cflash-id* is specified, the drive referred to by the current working directory is assumed. If a slot number is not specified, then the active CPM is assumed.
  - Values** cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
  - Default** the current compact flash device
- active** — Specifies that all drives on the active CPM are shutdown or enabled.
- standby** — Specifies that all drives on the standby CPM are shutdown or enabled.
  - When both **active** and **standby** keywords are specified, then all drives on both CPM are shutdown.

### 3.3.2.2 File Commands

#### file

- Syntax** **file**
- Context** root
- Description** Specifies 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.

#### attrib

- Syntax** **attrib** [+r | -r] *file-url*  
**attrib**
- Context** file
- Description** This command sets or clears/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 wildcard (\*).

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. For example:

```
ALA-1>file cf3:\ # attrib
cf3:\bootlog.txt
cf3:\bof.cfg
cf3:\boot.ldr
cf3:\sr1.cfg
cf3:\test
cf3:\bootlog_prev.txt
cf3:\BOF.SAV
```

**Parameters** *file-url* — Specifies the URL for the local file.

#### Values

<i>local-url</i>	[ <i>cflash-id</i> ][ <i>file-path</i> ] up to 200 characters, including <i>cflash-id</i> directory length 99 chars max each
<i>remote-url</i>	[[ftp://   tftp://]login:pswd@remote-locn/][ <i>file-path</i> ] up to 247 characters directory length up to 199 characters
<i>remote-locn</i>	[hostname   ipv4-address   [ipv6-address]]
<i>ipv4-address</i>	a.b.c.d
<i>ipv6-address</i>	x:x:x:x:x:x:[-interface] 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 255
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

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

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

## cd

<b>Syntax</b>	<b>cd</b> [ <i>file-url</i> ]
<b>Context</b>	file
<b>Description</b>	This command displays or changes the current working directory in the local file system.
<b>Parameters</b>	<i>file-url</i> — Specifies the file URL.

#### Values

<i>local-url</i>	<i>[cflash-id][file-path]</i> up to 200 characters, including cflash-id directory length 99 chars max each
<i>remote-url</i>	<i>[[ftp://   tftp://]login:pswd@remote-locn/][file-path]</i> up to 247 characters directory length up to 199 characters
<i>remote-locn</i>	<i>[hostname   ipv4-address   [ipv6-address]]</i>
<i>ipv4-address</i>	<i>a.b.c.d</i>
<i>ipv6-address</i>	<i>x:x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x:x:d.d.d.d[-interface]</i> <i>x - [0 to FFFF]H</i> <i>d - [0 to 255]D</i> interface - up to 32 characters, for link local addresses 255
<i>cflash-id</i>	<i>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</i>

If no *file-url* is entered, the current working directory is displayed.

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

*directory-url* — Specifies the destination directory.

## copy

**Syntax** `copy source-file-url dest-file-url [force] [no-redirect] [client-tls-profile profile] [proxy proxy-url]`

**Context** file

**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 wildcard (\*) can be used to copy multiple 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 cf2 in slot B to a file called **destfile** in a directory called production on cf1 in slot A, the syntax is:

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

To FTP a file named **121201.cfg** in directory `mydir` stored on `cf1` in slot A 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 cf1-A/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.

#### Values

<i>local-url</i>	<i>[cflash-id][file-path]</i> up to 200 characters, including cflash-id directory length 99 chars max each
<i>remote-url</i>	<i>[[ftp://   tftp://   http://   https://]login:pswd@remote-locn/][file-path]</i> up to 247 characters directory length up to 199 characters
<i>remote-locn</i>	<i>[hostname   ipv4-address   [ipv6-address]]</i>
<i>ipv4-address</i>	<i>a.b.c.d</i>
<i>ipv6-address</i>	<i>x:x:x:x:x:x:[-interface]</i> <i>x:x:x:x:x:d.d.d.d[-interface]</i> <i>x - [0 to FFFF]H</i> <i>d - [0 to 255]D</i> interface - up to 32 characters, for link local addresses 255
<i>cflash-id</i>	<i>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</i>

*dest-file-url* — Specifies the destination of the copied file or directory.

**force** — Specifies to force an immediate copy of the specified file(s). Executes the command without displaying a user prompt message. This command also automatically accepts HTTP redirects unless overridden by the **no-redirect** parameter.

*profile* — Specifies the TLS client profile configured under **config>system>security>tls>client-tls-profile** to use.

*proxy-url* — Specifies the URL of an HTTP proxy. For example, `http://proxy.mydomain.com:8000`. This URL must be an HTTP URL and not an HTTPS URL.

**no-redirect** — Specifies to automatically refuse any HTTP redirects without prompting the user.

## delete

**Syntax** **delete** *file-url* [**force**] [**no-redirect**] [**client-tls-profile** *profile*] [**proxy** *proxy-url*]



<b>Context</b>	file												
<b>Description</b>	<p>This command deletes the specified file.</p> <p>The optional wildcard (*) can be used to delete multiple files that share a common (partial) prefix and/or (partial) suffix. When the wildcard is entered, the following prompt displays for each file that matches the wildcard:</p> <p>“Delete file &lt;filename&gt; (y/n)?”</p>												
<b>Parameters</b>	<p><i>file-url</i> — Specifies the file name to delete.</p> <p style="text-align: center;"><b>Values</b></p> <table border="0"> <tr> <td style="vertical-align: top;"><i>local-url</i></td> <td><i>[cflash-id][file-path]</i> up to 200 characters, including cflash-id directory length up to 99 each</td> </tr> <tr> <td style="vertical-align: top;"><i>remote-url</i></td> <td><i>[[ftp://   tftp://   http://   https://]login:pswd@remote-locn/][file-path]</i> up to 247 characters directory length up to 99 characters each</td> </tr> <tr> <td style="vertical-align: top;"><i>remote-locn</i></td> <td><i>[hostname   ipv4-address   [ipv6-address]]</i></td> </tr> <tr> <td style="vertical-align: top;"><i>ipv4-address</i></td> <td><i>a.b.c.d</i></td> </tr> <tr> <td style="vertical-align: top;"><i>ipv6-address</i></td> <td><i>x:x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x:x:d.d.d.d[-interface]</i> <i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D interface - up to 32 characters, for link local addresses 255</td> </tr> <tr> <td style="vertical-align: top;"><i>cflash-id</i></td> <td><i>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</i></td> </tr> </table> <p><b>force</b> — Forces an immediate deletion of the specified file(s). The command <b>file delete * force</b> deletes all the wildcard matching files without displaying a user prompt message. This command also automatically accepts HTTP redirects unless overridden by the <b>no-redirect</b> parameter.</p> <p><i>profile</i> — Specifies the TLS client profile configured under <b>config&gt;system&gt;security&gt;tls&gt;client-tls-profile</b> to use.</p> <p><i>proxy-url</i> — Specifies the URL of an HTTP proxy. For example, <i>http://proxy.mydomain.com:8000</i>. This URL must be an HTTP URL and not an HTTPS URL.</p> <p><b>no-redirect</b> — Specifies to automatically refuse any HTTP redirects without prompting the user.</p>	<i>local-url</i>	<i>[cflash-id][file-path]</i> up to 200 characters, including cflash-id directory length up to 99 each	<i>remote-url</i>	<i>[[ftp://   tftp://   http://   https://]login:pswd@remote-locn/][file-path]</i> up to 247 characters directory length up to 99 characters each	<i>remote-locn</i>	<i>[hostname   ipv4-address   [ipv6-address]]</i>	<i>ipv4-address</i>	<i>a.b.c.d</i>	<i>ipv6-address</i>	<i>x:x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x:x:d.d.d.d[-interface]</i> <i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D interface - up to 32 characters, for link local addresses 255	<i>cflash-id</i>	<i>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</i>
<i>local-url</i>	<i>[cflash-id][file-path]</i> up to 200 characters, including cflash-id directory length up to 99 each												
<i>remote-url</i>	<i>[[ftp://   tftp://   http://   https://]login:pswd@remote-locn/][file-path]</i> up to 247 characters directory length up to 99 characters each												
<i>remote-locn</i>	<i>[hostname   ipv4-address   [ipv6-address]]</i>												
<i>ipv4-address</i>	<i>a.b.c.d</i>												
<i>ipv6-address</i>	<i>x:x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x:x:d.d.d.d[-interface]</i> <i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D interface - up to 32 characters, for link local addresses 255												
<i>cflash-id</i>	<i>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</i>												

---

**dir****Syntax** `dir [file-url] [sort-order {d | n | s}] [reverse]`**Context** file**Description** This command displays a list of files and subdirectories in a directory.**Parameters** *file-url* — Specifies the path or directory name.  
Use the *file-url* with the optional wildcard (\*) to reduce the number of files to list.**sort-order {d | n | s}** — Specifies the sort order.**Values**  
d — date  
n — name  
s — size**reverse** — Reverses the sort order.**Default** Lists all files in the current working directory.

<i>local-url</i>	<code>[cflash-id][file-path]</code> up to 200 characters, including cflash-id directory length up to 99 each
<i>remote-url</i>	<code>[[ftp://   tftp://]login:pswd@remote-locn/][file-path]</code> up to 247 characters directory length up to 99 characters each
<i>remote-locn</i>	<code>[hostname   ipv4-address   [ipv6-address]]</code>
<i>ipv4-address</i>	<code>a.b.c.d</code>
<i>ipv6-address</i>	<code>x:x:x:x:x:x:x[-interface]</code> <code>x:x:x:x:x:x:d.d.d.d[-interface]</code> x - [0 to FFFF]H d - [0 to 255]D interface - up to 32 characters, for link local addresses 255
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

**Output** The following output is an example of directory information.**Sample Output**

```
A:cses-E12>file cf3:\ # dir
- dir [<file-url>] [sort-order { d | n | s}] [reverse]

<file-url>          : <local-url> | <remote-url>
                    local-url    - [<cflash-id>/][<file-path>]
                                   200 chars max, including cflash-id
                                   directory length 99 chars max each
                    remote-url    - [ftp://<login>:<pswd>@<remote-locn>/
                                   ][<file-path>]
```

```

                                255 chars max
                                directory length 99 chars max each
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..FFFF]H
                 d - [0..255]D
                 interface - 32 chars max, for link
                 local addresses
cflash-id     - cf1:|cf1-A:|cf1-B:|cf2:|cf2-A:|
                 cf2-B:|cf3:|cf3-A:|cf3-B:
< d | n | s>   : Sort order: d - date, n - name, s - size
<reverse>     : keyword - reverse order
A:cses-E12>file cf3:\ # dir
  
```

## format

- Syntax** `format [cflash-id] [reliable]`
- Context** `root>file`
- Description** This command formats the compact flash. The compact flash must be shut down before starting the format.
- Parameters** *cflash-id* — Specifies the compact flash type.
- Values** `cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:`
- reliable** — Enables the reliance file system and disables the default DoS file system. This option is valid only on compact flashes 1 and 2.

## md

- Syntax** `md file-url`
- Context** `file`
- 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 directory name to be created.
- Values**
- |            |  |
|------------|--|
| local-url  | <code>[cflash-id][file-path]</code> up to 200 characters, including cflash-id directory length up to 99 each |
| remote-url | <code>[[ftp://   tftp://]login:pswd@remote-locn/][file-path]</code> up to 247 characters                     |

<i>remote-locn</i>	directory length up to 99 characters each [hostname   ipv4-address   [ipv6-address]]
<i>ipv4-address</i>	<i>a.b.c.d</i>
<i>ipv6-address</i>	<i>x:x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x:x:d.d.d.d[-interface]</i>
	<i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D
	interface - up to 32 characters, for link local addresses 255
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

## move

<b>Syntax</b>	<b>move</b> <i>old-file-url new-file-url</i> [ <b>force</b> ] [ <b>no-redirect</b> ] [ <b>client-tls-profile</b> <i>profile</i> ] [ <b>proxy</b> <i>proxy-url</i> ]
<b>Context</b>	file
<b>Description</b>	This command moves a local file, system file, or a directory. If the target already exists, the command fails and an error message displays.  The following prompt appears if the destination file already exists:  “Overwrite destination file (y/n)?”
<b>Parameters</b>	<i>old-file-url</i> — Specifies the file or directory to be moved.
	<b>Values</b>
<i>local-url</i>	[ <i>cflash-id</i> ]/[ <i>file-path</i> ] up to 200 characters, including cflash-id directory length up to 99 each
<i>remote-url</i>	[[ftp://   tftp://   http://   https://]login:pswd@remote-locn/ ][ <i>file-path</i> ] up to 247 characters
<i>remote-locn</i>	directory length up to 99 characters each [hostname   ipv4-address   [ipv6-address]]
<i>ipv4-address</i>	<i>a.b.c.d</i>
<i>ipv6-address</i>	<i>x:x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x:x:d.d.d.d[-interface]</i>
	<i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D
	interface - up to 32 characters, for link local addresses 255
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

*new-file-url* — Specifies the new destination to place the old-file-url.

**Values**

<i>local-url</i>	[ <i>cflash-id</i> ]/[ <i>file-path</i> ] up to 200 characters, including <i>cflash-id</i> directory length up to 99 each
<i>remote-url</i>	[[ <i>ftp://</i>   <i>tftp://</i> ]{ <i>login:pswd@remote-locn</i> }/][ <i>file-path</i> ] up to 247 characters directory length up to 99 characters each
<i>remote-locn</i>	[ <i>hostname</i>   <i>ipv4-address</i>   [ <i>ipv6-address</i> ]]
<i>ipv4-address</i>	<i>a.b.c.d</i>
<i>ipv6-address</i>	<i>x:x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x:x:d.d.d.d[-interface]</i> <i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D interface - up to 32 characters, for link local addresses 255
<i>cflash-id</i>	<i>cf1:</i> , <i>cf1-A:</i> , <i>cf1-B:</i> , <i>cf2:</i> , <i>cf2-A:</i> , <i>cf2-B:</i> , <i>cf3:</i> , <i>cf3-A:</i> , <i>cf3-B:</i>

**force** — Forces an immediate move of the specified file(s).

The **file move force** command moves the specified file(s) without displaying a user prompt message. This command also automatically accepts HTTP redirects unless overridden by the **no-redirect** parameter.

*profile* — Specifies the TLS client profile configured under **config>system>security>tls>client-tls-profile** to use.

*proxy-url* — Specifies the URL of an HTTP proxy. For example, *http://proxy.mydomain.com:8000*. This URL must be an HTTP URL and not an HTTPS URL.

**no-redirect** — Specifies to automatically refuse any HTTP redirects without prompting the user.

rd

<b>Syntax</b>	<b>rd</b> <i>file-url</i> <b>rf</b> <b>rd</b> <i>file-url</i> [ <b>force</b> ]
<b>Context</b>	file
<b>Description</b>	If the directory is empty, the <b>rd</b> command is used to remove it. The <b>force</b> option executes the command without prompting the user to confirm the action.  If the directory contains files and/or subdirectories, the <b>rf</b> parameter must be used to remove the directory.

**Example:**

```
A:nE1>file cf1:\ # rd test
Are you sure (y/n)? y
Deleting directory cf1:\test ..MINOR: CLI Cannot delete cf1:\test.
A:nE1>file cf1:\ # rd test force
Deleting directory cf1:\test .MINOR: CLI Cannot delete cf1:\test.

A:nE1>file cf1:\ # rd testbase rf
Deleting all subdirectories and files in specified directory. y/n ?y
Deleting directory cf1:\testbase\testbase1 ..OK
Deleting directory cf1:\test .OK
```

**Parameters** *file-url* — Specifies the directory to be removed.

**Values**

<i>local-url</i>	[ <i>cflash-id</i> ]/[ <i>file-path</i> ] up to 200 characters, including cflash-id directory length up to 99 each
<i>remote-url</i>	[{ftp://   tftp://}login:pswd@remote-locn/][ <i>file-path</i> ] up to 247 characters directory length up to 99 characters each
<i>remote-locn</i>	[hostname   ipv4-address   [ipv6-address]]
<i>ipv4-address</i>	a.b.c.d
<i>ipv6-address</i>	x:x:x:x:x:x:x[- <i>interface</i> ] x:x:x:x:x:x:d.d.d.d[- <i>interface</i> ] x - [0 to FFFF]H d - [0 to 255]D interface - up to 32 characters, for link local addresses 255
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

**rf** — Forces a recursive delete.

**force** — Forces an immediate deletion of the specified directory. The **rd file-url force** command executes the command without displaying a user prompt message.

**repair**

<b>Syntax</b>	<b>repair</b> [ <i>cflash-id</i> ]
<b>Context</b>	file
<b>Description</b>	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 shut down or enabled. When a specific *cflash-id* is specified, then that drive is shut down. If no *flash-id* is specified, the drive referred to by the current working directory is assumed. If a slot number is not specified, then the active CSM is assumed.

**Values** cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

**Default** the current compact flash device.

## scp

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

**Context** file

**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.

**Parameters** *local-file-url* — Specifies the local source file or directory.

**Values**

<i>[cflash-id]</i> <i>file-path</i>	up to 200 characters
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

*destination-file-url* — Specifies the destination file.

**Values**

<i>destination-file-*</i> : <i>user@hostname:file-path</i>	- up to 255 characters
<i>user</i>	up to 32 characters
<i>hostname</i>	[ <i>dns-name</i>   <i>ipv4-address</i>   “[ <i>ipv6-address</i> ”]]
<i>ipv4-address</i>	<i>a.b.c.d</i>
<i>ipv6-address</i>	<i>x:x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x:d.d.d.d[-interface]</i> <i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D <i>interface</i> - up to 32 characters, mandatory for link local addresses
<i>dns-name</i>	up to 128 characters
<i>file-path</i>	up to 200 characters, directory length up to 99 characters

*user* — Specifies the SSH user.

*hostname* — Specifies the remote host IP address or DNS name.

*file-path* — Specifies the destination path.

*router-instance* — Specifies the router name or service ID used to specify the router instance.

#### Values

<i>router-name</i>	“Base”, “management”, “vpls-management”
<i>vprn-service-id</i>	1 to 2147483647

**Default** Base

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

*service-name* — Specifies the service name used to identify the router instance. The service name can be a maximum of 64 characters long.

## type

**Syntax** **type** *file-url* [**no-redirect**] [**client-tls-profile** *profile*] [**proxy** *proxy-url*]

**Context** file

**Description** This command displays the contents of a text file.

**Parameters** *file-url* — Specifies the file contents to display.

#### Values

<i>local-url</i>	[ <i>cflash-id</i> ]/[ <i>file-path</i> ] up to 200 characters, including <i>cflash-id</i> directory length up to 99 each
<i>remote-url</i>	[{ftp://   tftp://   http://   https://}login:pswd@remote-locn/][ <i>file-path</i> ] up to 247 characters directory length up to 99 characters each
<i>remote-locn</i>	[hostname   ipv4-address   [ipv6-address]]
<i>ipv4-address</i>	a.b.c.d
<i>ipv6-address</i>	x:x:x:x:x:x[- <i>interface</i> ] x:x:x:x:x:d.d.d.d[- <i>interface</i> ] x - [0 to FFFF]H d - [0 to 255]D interface - up to 32 characters, for link local addresses 255
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:



*profile* — Specifies the TLS client profile configured under **config>system>security>tls>client-tls-profile** to use.

*proxy-url* — Specifies the URL of an HTTP proxy. For example, `http://proxy.mydomain.com:8000`. This URL must be an HTTP URL and not an HTTPS URL.

**no-redirect** — Specifies to automatically refuse any HTTP redirects without prompting the user.

## version

<b>Syntax</b>	<b>version</b> <i>file-url</i> [ <b>check</b> ]
<b>Context</b>	file
<b>Description</b>	This command displays the version of an SR OS *.tim or iom.tim file. The iom.tim file is used for the XCM on the 7950 XRS.
<b>Parameters</b>	<i>file-url</i> — Specifies the file name of the target file.

### Values

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

**check** — Validates the .tim file.

**Output** The following output is an example of SR OS version information.

### Sample Output

```
A:Redundancy>file cf3:\ # version ftp://test:1234@192.0.2.79/usr/global/images/6.1/R4/cpm.tim
TiMOS-C-6.1.R4 for 7750
```

---

```
Thu Oct 30 14:21:09 PDT 2018 by builder in /relx.1/b1/Rx/panos/main
A:Redundancy>file cf3:\ # version check ftp://test:1234@192.0.2.79/usr/global/
images/6.1/R4/cpm.tim
TiMOS-C-6.1.R4 for 7750
Thu Oct 30 14:21:09 PDT 2018 by builder in /relx.1/b1/Rx/panos/main
Validation successful
A:Redundancy>file cf3:\ #
```

## vi

<b>Syntax</b>	<b>vi</b> <i>local-url</i>
<b>Context</b>	file
<b>Description</b>	Edit files using the vi editor. For more information, refer to <a href="#">VI Editor</a> .
<b>Parameters</b>	<i>local-url</i> — Specifies the local source file or directory.
<b>Values</b>	<i>[cflash-id]/file-path</i> <i>cflash-id</i> : cf1:, cf2:, cf3:

## 4 Boot Options

### 4.1 System Initialization

The primary copy of SR OS software is located on a compact flash card. The removable media is shipped with each router and contains a copy of the OS image.



**Note:**

- The modules contain three slots for removable compact flash cards. The drives are named Compact Flash Slot #1 (cf1), Compact Flash Slot #2 (cf2), and Compact Flash Slot #3 (cf3). Configurations and executable images can be stored on flash cards or an FTP file location.
- The flash card containing the bootstrap and boot option files must be installed in Compact Flash Slot #3 (cf3).
- You must have a console connection.

Starting a router begins with hardware initialization (a reset or power cycle). By default, the system searches Compact Flash Slot #3 (cf3) for the boot.ldr file (also known as the bootstrap file). The boot.ldr file is the image that reads and executes the system initialization commands configured in the boot option file (BOF). The default value to initially search for the boot.ldr file on cf3 cannot be modified.

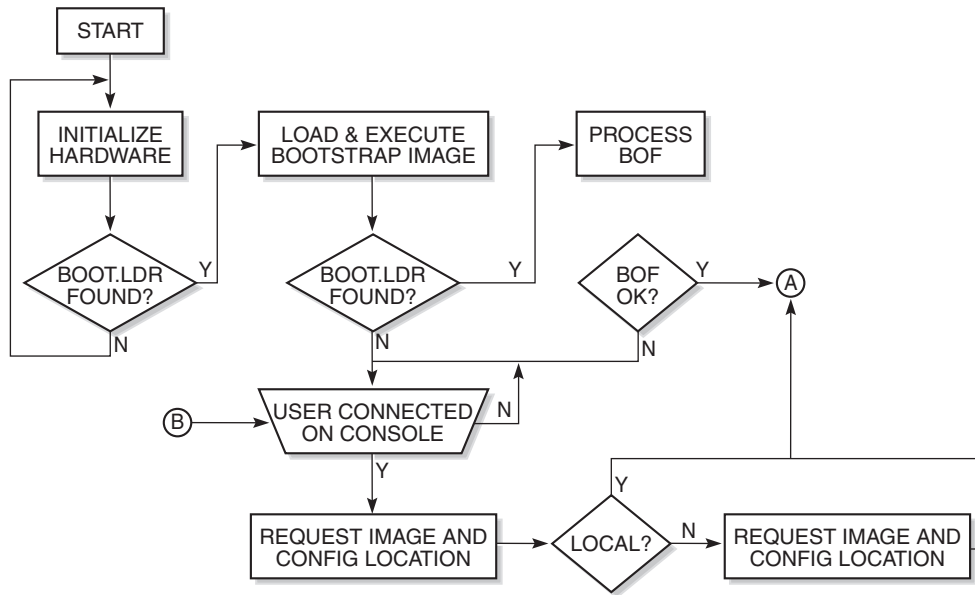
The following is an example of a console display output when the boot.ldr file cannot be located on cf3.

```
...
(memory test messages)
(serial number information)
Searching for boot.ldr on local drives:
No disk in cf3
No disk in cf3
No disk in cf3
Error - file boot.ldr not found on any drive
Please insert CF containing boot.ldr. Rebooting in 5 seconds.
```

When the bootstrap image is loaded, the BOF is read to obtain the location of the image and configuration files. The BOF must be located on the same compact flash drive as the boot.ldr file.

[Figure 4](#) displays the system initialization sequence. In the figure, “A” refers to [Figure 5](#), and “B” refers to the list of files on the compact flash.

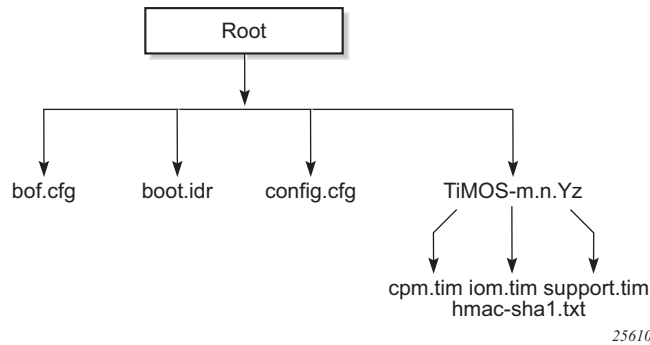
**Figure 4** System Initialization - Part 1



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Figure 5 displays the compact flash directory structure and file names for the multislot models.

**Figure 5** Files on the Compact Flash



25610

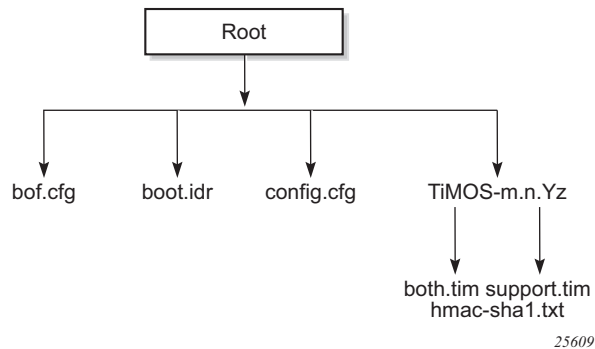
Files on compact flash are:

- bof.cfg — Boot option file
- boot.ldr — Bootstrap image
- config.cfg — Default configuration file
- TIMOS-m.n.Yz:  
m — Major release number

- n — minor release number
- Y:A — Alpha release
- B — Beta release
- M — Maintenance release
- R — Released software
- z — Version number
  - cpm.tim — CPM image file
  - iom.tim — XCM/IOM image file
  - support.tim — required data for SR OS .tim files
  - hmac-sha1.txt (in FIPS-140-2 mode only)

Figure 6 displays the compact flash directory structure and file names for the 1-slot models (7750 SR-1 and 7750 SR-1s).

**Figure 6 Files on the Compact Flash (1-slot and 1-slot non-redundant)**



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Files on the compact flash (1-slot models) are:

- bof.cfg — Boot option file
- boot.idr — Bootstrap image
- config.cfg — Default configuration file
- TiMOS-m.n.Yz:
  - m — Major release number
  - n — Minor release number
    - Y:A — Alpha release
    - B — Beta release
    - M — Maintenance release
    - R — Released software
  - z — Version number

- both.tim — CPM and IOM image file
- support.tim — required data for SR OS .tim files
- hmac-sha1.txt (in FIPS-140-2 mode only)

The 7750 SR includes a boot option for running the node in a FIPS-140-2 mode. This mode limits the use of cryptographic algorithms on the CPM to only those that are in accordance with the FIPS-140-2 certifications associated with the 7750 SR.

### 4.1.1 Configuration and Image Loading

When the system executes the boot.ldr file, the initialization parameters from the BOF are processed. Three locations can be configured for the system to search for the files that contains the runtime 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.

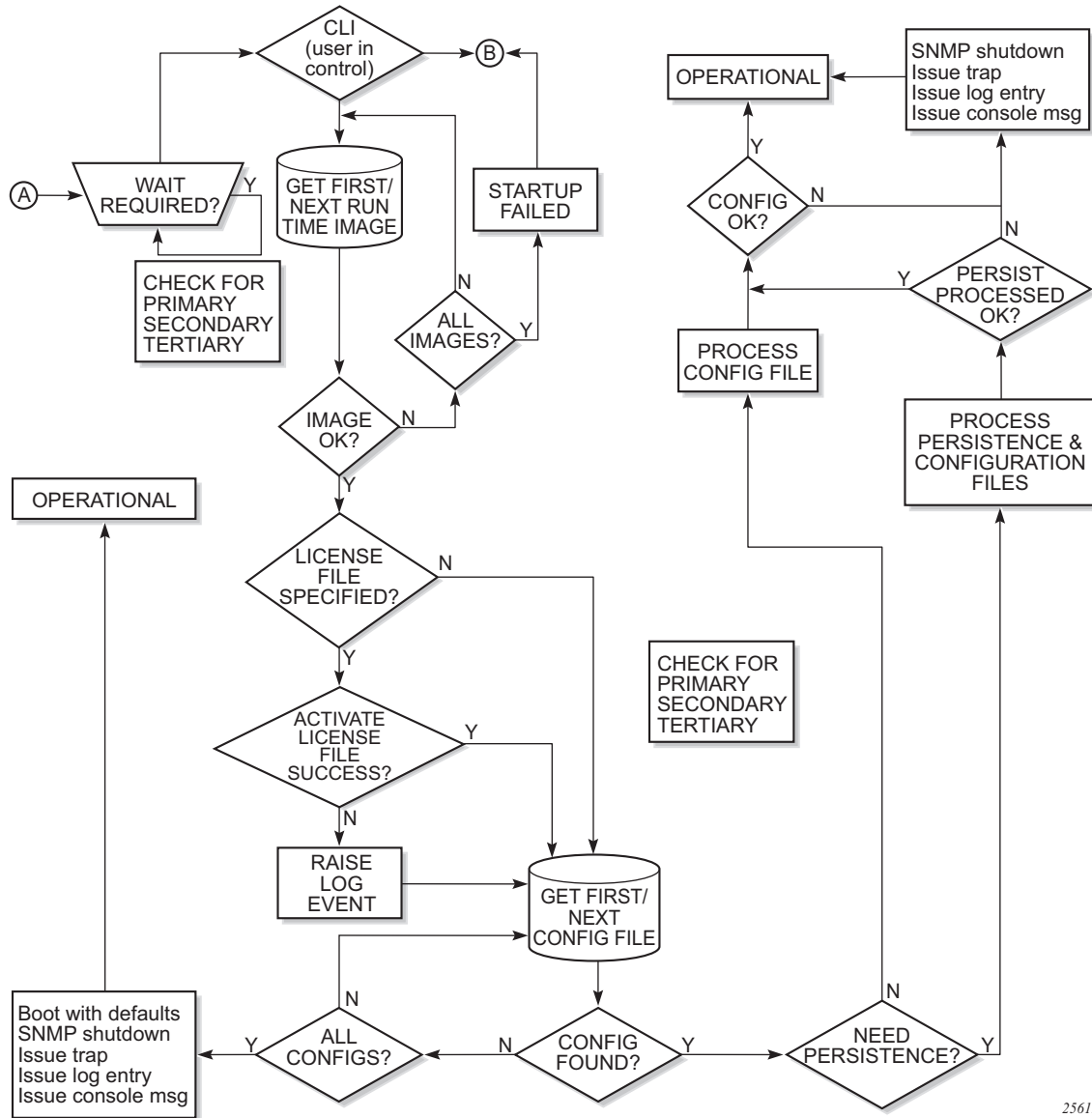
If the BOF cannot be found or loaded, then the system enters a console message dialog session prompting the user to enter alternate file locations and file names.

The **boot.ldr** can be interrupted during the boot sequence by pressing any key on the CPM console port. The operator must then type **sros** and press **ENTER** within 30 seconds or the **boot.ldr** continues to try to boot the system. This key sequence ensures that noise or misconfiguration does not inadvertently interrupt the boot sequence. If the operator types **sros** and presses **ENTER** within 30 seconds, they are brought to a console message dialog session prompting the user to enter file locations and other boot information.

When the runtime image is successfully loaded, control is passed from the bootstrap loader to the image. The runtime image first attempts to read the license file if one has been included in the bof. If a license file is found, it is activated. If there are any issues with the activation, a log event is raised but the startup processing continues with the reading of the configuration file. The runtime image next attempts to locate the configuration file as configured in the BOF. Like the runtime image, 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. The configuration file includes chassis, card, MDA, and port configurations, as well as system, routing, and service configurations.

[Figure 7](#) displays the boot sequence.

**Figure 7 System Initialization - Part 2**



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The following displays an example of BOF output:

```
A:ALA-1>bof# show bof
=====
Memory BOF
=====
no autonegotiate
duplex      full
speed      100
address    10.10.0.1/20 active
```

```
wait      3
primary-image cf3:\both.tim
primary-config cf3:\test123.cfg
primary-dns 192.168.10.20
persist   on
dns-domain test.nokia.com
=====
A:ALA-1>bof#
```

### 4.1.1.1 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, LSP IDs, path IDs, etc. If persistence is not required and the configuration file is successfully processed, then the system becomes operational. If persist is required, then 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. Note that 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.

### 4.1.1.2 Lawful Intercept

Lawful Intercept (LI) describes a process to intercept telecommunications by which law enforcement authorities can unobtrusively monitor voice and data communications to combat crime and terrorism with higher security standards of lawful intercept capabilities in accordance with local law and after following due process and receiving proper authorization from competent authorities. The interception capabilities are sought by various telecommunications providers.

As lawful interception is subject to national regulation, requirements vary from one country to another. This implementation satisfies most national standard's requirements. LI is configurable for all service types.



---

### 4.1.1.3 FIPS-140-2 Mode

The 7750 SR includes a configurable parameter in the `bof.cfg` file to make the node run in FIPS-140-2 mode. When the node boots in FIPS-140-2 mode, the following behaviors are enabled on the node:

- The node performs an HMAC-SHA1 integrity test on the software images `.tim` files.
- The node limits the use of encryption and authentication algorithms to only those allowed for the associated FIPS-140-2 certification of the 7750-SR.
- Cryptographic module startup tests are executed on the CPM when the node boots to ensure the associated approved FIPS-140-2 algorithms are operating correctly.
- Cryptographic module conditional tests are executed when required during normal operation of associated when using FIPS-140-2 approved algorithms.
- When configuring user-defined encryption or authentication keys, the CLI prompts for the key to be re-entered. If the re-entered key does not match the original, the CLI command is canceled. This affects several protocols and applications.

To support FIPS-140-2, an HMAC-SHA-1 integrity check is performed to verify the integrity of the software images. The following file is included in the TIMOS-m.n.Yz software bundle containing the `hmac-sha-1` signature:

- `hmac-sha1.txt`

During the loading of the `cpm.tim` or `both.tim`, a HMAC-SHA-1 check is performed to ensure that the calculated HMAC-SHA-1 of the loaded image matches that stored in the `hmac-sha1.txt` file.

The HMAC-SHA-1 check is performed on the data loaded from the `.tim` file. Note that when configuring the `primary-image`, `secondary-image` and `tertiary-image`, the `hmac-sha1.txt` file must exist in the same directory as the `.tim` files. If the load has been verified correctly from the HMAC-SHA-1 integrity check, the load continues to start up as normal. If the load is not verified by the HMAC-SHA-1 integrity check, the image load fails.

After the HMAC-SHA-1 integrity check passes, the nodes continue their normal startup sequence including reading the `config.cfg` file and loading the configuration. The `config.cfg` file used to boot the node in FIPS-140-2 mode must not contain any configuration that is not supported in FIPS-140-2 mode. If such configuration is present in the `config.cfg` file when the node boots, the node loads the `config.cfg` file until the location of the offending configuration and then halt the configuration at that point. Upon a failure to load the `config.cfg` file, a failure message is printed on the console.

---

Enabling FIPS-140-2 restricts the ability to configure and use cryptographic algorithms and functions that are not FIPS approved. FIPS-140-2 impacts the ability to configure SSH, SNMP and certificates. Refer to the *7450 ESS*, *7750 SR*, *7950 XRS*, and *VSR System Management Guide* for details of FIPS-140-2 related items.

In addition, signature algorithms of the following combinations only are approved for FIPS:

- FIPS-140 Approved - Digital Signature Standard (DSS)
  - DSA
  - RSA
  - ECDSA
- FIPS-140 Approved - Secured Hash Standard (SHS)
  - SHA-1
  - SHA-224
  - SHA-256
  - SHA-384
  - SHA-512

Any other combination is not supported in FIPS mode. Using other FIPS signature algorithms in certificates affecting IPsec can cause tunnels to fail. Restrictions to cryptographic algorithms are listed in the *7450 ESS*, *7750 SR*, *7950 XRS*, and *VSR System Management Guide*.

#### 4.1.1.4 System Profiles

System profiles provide flexibility when using FP4-based line cards by supporting different system capabilities. The system profile is defined in the BOF and is used by the system when it is next rebooted. Contact your Nokia representative for system profile information.

The following system profiles are supported:

- Profile none  
This profile represents the existing system capabilities and allows FP3- and FP4-based hardware to co-exist within a system. This profile is indicated by the omission of the **system-profile** parameter in the BOF.
- Profile A

---

This profile is primarily targeted at subscriber services and Layer 2 and 3 VPN business services and is defined by configuring the BOF **system-profile** parameter to **profile-a**.

- Profile B

This profile is primarily targeted at infrastructure routing, core, peering, and DC-GW applications.

System profile **profile-a** and **profile-b** support only FP4-based line cards. Provisioning FP2- or FP3-based line cards is prohibited when the system profile is set to **profile-a** or **profile-b**. If FP2- or FP3-based card types are present in the boot configuration when using these profiles, the boot sequence aborts the loading of the configuration file when it encounters their configuration.

When changing between system profiles, it is mandatory to remove all configuration commands for features that are not supported in the target system profile before rebooting the system, otherwise the reboot fails at the unsupported configuration command on startup.

On 7750 SR-1 and 7750 SR-s systems, the following conditions apply:

- The BOF **system-profile** parameter should be configured to either **profile-a** or **profile-b**.
- If the **system-profile** parameter is omitted from the BOF, system profile **profile-a** is used by the system.
- If the BOF **system-profile** parameter is configured to an invalid value, it is ignored and system profile **profile-a** is used by the system.

On 7750 SR-7-B/12-B/12e and 7950 XRS-20/20e systems, the following conditions apply:

- The default system profile is none when the **system-profile** parameter is omitted from the BOF.
- The BOF **system-profile** parameter can be configured to either **profile-a** or **profile-b**, in which case only FP4-based line cards are supported.
- If the BOF **system-profile** parameter is configured to an invalid value, it is ignored and system profile none is used by the system.

On all other systems, the following conditions apply:

- These systems must use profile none (the existing system capabilities). As a result, the **system-profile** parameter must not be configured in the BOF.

- If the **system-profile** parameter is configured to **profile-a** or **profile-b** in the BOF, the system boots, allowing access using the console and CPM management interface, but FP2-based and FP3-based line cards cannot be provisioned; if these card types are present in the boot configuration, the boot sequence aborts loading the configuration file when it encounters their configuration. This issue can be corrected by removing the **system-profile** parameter from the BOF and rebooting the system.
- If the BOF **system-profile** parameter is configured to an invalid value, it is ignored and profile **none** is used by the system.

If a system has two CPMs, and the standby CPM boots with a different **system-profile** parameter than is used on the active CPM, the active CPM reboots the standby CPM and keeps it in a down state. To correct the situation, the BOF can be reconfigured on the standby CPM to match the one configured on the active CPM, and then reboot the system. Alternatively, automatic BOF synchronization can be enabled to keep both CPMs in sync using the following command:

#### **configure redundancy synchronize boot-env**

When performing a minor or major ISSU software upgrade on dual CPM systems, it is important that the system profile in the BOF on both the active and standby CPM is the same and has a value supported on the pre-upgrade software release. If the standby CPM happened to have a system profile which is only supported in the post-upgrade release, the active CPM reboots the standby and keeps it down due to a system profile mis-match.

The BOF system profile can be displayed as follows:

```
*A:PE-1# show bof | match system-profile
      system-profile profile-a
*A:PE-1#
```

The BOF system profile used by the system when it booted can be seen in the boot messages (using the **show boot-messages** command), which display the BOF read when rebooting.

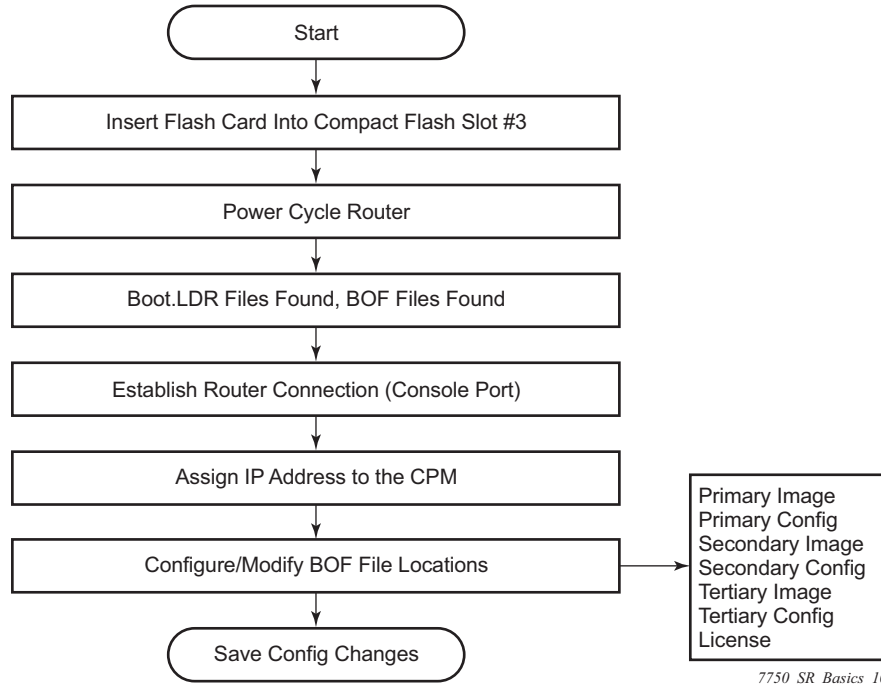
The system profile in use on the system can be displayed as follows:

```
*A:PE-1# show chassis | match "System Profile"
      System Profile           : none
*A:PE-1#
```

## 4.2 Initial System Startup Process Flow

Figure 8 displays the process start your system. Note that this example assumes that the boot loader and BOF image and configuration files are successfully located.

**Figure 8** System Startup Flow



## 4.3 Configuration Notes

This section describes BOF configuration caveats.

- For router initialization, the compact flash card must be installed in the Compact Flash #3 slot.
- The loading sequence is based on the order in which it is placed in the configuration file. It is loaded as it is read in at boot time.

---

## 4.4 Configuring Boot Options File with CLI

This section provides information to configure BOF parameters with CLI.

### 4.4.1 BOF Configuration Overview

Nokia routers do not contain a boot EEPROM. The boot loader code is loaded from the boot.ldr file. The BOF file performs the following tasks:

- Step 1.** Sets up the CPM and CCM Ethernet port (speed, duplex, auto).
- Step 2.** Assigns the IP address for the CPM and CCM Ethernet port.
- Step 3.** Creates static routes for the CPM/CCM Ethernet port.
- Step 4.** Sets the console port speed.
- Step 5.** Configures the Domain Name System (DNS) name and DNS servers.
- Step 6.** Configures the primary, secondary, tertiary configuration source.
- Step 7.** Configures the primary, secondary, and tertiary image source.
- Step 8.** Configures the license source.
- Step 9.** Configures operational parameters.

### 4.4.2 Basic BOF Configuration

The parameters which specify 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:

- Primary address
- Primary image location
- Primary configuration location

The following is a sample of a basic BOF configuration.

```
A:SR-45# show bof
=====
BOF (Memory)
=====
primary-image cf3:/4.0.R20
primary-config cf3:/ospf_default.cfg
address 192.168.189.53/24 active
```

```

static-route      192.168.0.0/16 next-hop 192.168.189.1
static-route      172.16.0.0/8 next-hop 192.168.189.1
autonegotiate
duplexfull
speed100
wait3
persiston
console-speed    115200
=====
A:SR-45#

```

### 4.4.3 Common Configuration Tasks

The following sections are basic system tasks that must be performed.

For details about hardware installation and initial router connections, refer to the specific router hardware installation guide.

#### 4.4.3.1 Searching for the BOF

The BOF should be on the same drive as the boot loader file. If the system cannot load or cannot find the BOF then the system checks whether the boot sequence was manually interrupted. The system prompts for a different image and configuration location.

The following example shows an example of the output when the boot sequence is interrupted.

```

...

#####
Sample output:
Hit a key within 3 seconds to change boot parameters...
Type "sros" and hit ENTER within 29 seconds to begin changing parameters: sros
You must supply some required Boot Options. At any prompt, you can type:
  "restart" - restart the query mode.
  "reboot"  - reboot.
  "exit"    - boot with existing values.
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,
or on the network.
Here are some examples
  cf3:/timos1.0R1
  ftp://user:passwd@192.168.1.150/./timos1.0R1

```



```
ftp://user:passwd@[3FFE::1]../timos1.0R1
The existing Image URL is 'ftp://*: *@192.168.192.20/./images'
Press ENTER to keep it.
Software Image URL: ftp://vxworks:vxw0rks@192.168.10.20/./rel/0.0/xx
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
The existing Config URL is 'ftp://*: *@192.168.192.20/./images/dut-b.cfg'
Press ENTER to keep it, or the word 'none' for no Config URL.
Config File URL: cf1:/config.cfg
License File Location
-----
You must enter the location of the license
file to be used by TiMOS. The file can be on
a Compact Flash device, or on the network.
Here are some examples
  cf1:/license.txt
  ftp://user:passwd@192.168.1.150/./license.txt
  ftp://user:passwd@[3FFE::1]../license.txt
  tftp://192.168.1.150/./license.txt
  tftp://[3FFE::1]../license.txt
License File URL:
No license file specified.
IP Autoconfiguration
-----
This device supports IP autoconfiguration of the management port.
When the Software Image URL and the License File URL are not local,
the network configuration must be static (no autoconfiguration).
When the Config File URL is not local,
the network configuration is recommended to be static (no autoconfiguration).
Per address family the configuration must be either static, either auto.
The Software Image URL is not local and does require that the IPv4 network is static
ally configured.
[IPv4 Autoconfiguration cannot be enabled]
Would you like to enable IPv4 Autoconfiguration? (yes/no) no
Would you like to enable IPv6 Autoconfiguration? (yes/no) no
Network Configuration
-----
You specified a network location for either the
software or the configuration file. You need to
configure IP(v6) for this system.
IP addresses should be entered in standard
dotted decimal form with a network length.
example: 192.168.1.169/24
The existing Active IP address is 192.168.192.23/18. Press ENTER to keep it.
Enter Active IP Address (Type 0 if none desired): 192.168.10.1/20
The existing Standby IP address is 192.168.192.24/18. Press ENTER to keep it.
Enter Standby IP Address (Type 0 if none desired): 192.168.10.2/20
In case of an IPv6, the IPv6 address should be
entered in standard colon hexadecimal notation
with a prefix length.
```

```

        example:  3FFE::1/112
The existing Active IPv6 address is 3000::c0a8:c015/114. Press ENTER to keep it.
Enter Active IPv6 Address (Type 0 if none desired): 3ABC::AAAA:1/100
The existing Standby IPv6 address is 3000::c0a8:c016/114. Press ENTER to keep it.
Enter Standby IPv6 Address (Type 0 if none desired): 3ABC::AAAA:2/100
Would you like to add a static route? (yes/no) yes
Static Routes
-----
    You specified network locations which 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
        example:  3FFE::1:0/112 next-hop 3FFE::2:1
Enter ip route: 1.1.1.0/24 next-hop 192.168.1.250
1.1.1.0/24 next-hop 192.168.1.250
A route to that subnet already exists.
Would you like to add a static route? (yes/no) no
Would you like to add an IPv6 static route? (yes/no) no
The existing fips-140-2 configuration is : 'no fips-140-2'
If you would like to change it please enter 'fips-140-2' followed by ENTER
or press ENTER to keep existing fips configuration
Auto-Boot
-----
    This device supports automated provisioning
    from the network.  When this mode is enabled
    the system will not execute the boot configuration
    file.  Instead, it will boot to the default
    configuration and automatically provision supported
    equipment for further loading from the network.
Would you like to enable Automated-Provisioning? (yes/no) no
New Settings
-----
primary-image  ftp://*:*@192.168.10.20/./rel/0.0/xx
primary-config cf1:/config.cfg
address        192.168.10.1/20 active
address        192.168.10.2/20 standby
address        3abc::aaaa:1/100 active
address        3abc::aaaa:2/100 standby
static-route   1.1.1.0/24 next-hop 192.168.1.250
autonegotiate
duplex         full
speed         100
wait          3
persist       off
no fips-140-2
console-speed 115200
Do you want to overwrite cf3:/bof.cfg with the new settings? (yes/no): yes
Successfully saved the new settings in cf3:/bof.cfg
#####

```

### 4.4.3.2 Accessing the CLI

To access the CLI to configure the software for the first time, follow these steps:

- When the CPM/CCM is installed, and power to the chassis is turned on, the SR OS software automatically begins the boot sequence.
- When the boot loader and BOF image and configuration files are successfully located, establish a router connection (console session).

#### 4.4.3.2.1 Console Connection

To establish a console connection, you will need the following:

- An ASCII terminal or a PC running terminal emulation software set to the parameters shown in the table below.
- A standard serial cable with a male DB9.

[Table 29](#) lists the console configuration parameter values.

**Table 29 Console Configuration Parameter Values**

Parameter	Value
Baud Rate	115,200
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

To establish a console connection:

- Step 1.** Connect the terminal to the Console port on the CPM/CCM using the serial cable.
- Step 2.** Power on the terminal.
- Step 3.** Establish the connection by pressing the <Enter> key a few times on your terminal keyboard.
- Step 4.** At the router prompt, enter the login and password.  
The default login is admin.  
The default password is admin.

## 4.4.4 Configuring BOF Parameters

The following example shows a BOF configuration on a 7750 SR:

```
A:ALA-1>bof# show bof
=====
Memory BOF
=====
no autonegotiate
duplex      full
speed      100
address    10.10.xx.xx/20 active
wait       3
primary-image cf3:\both.tim
primary-config cf3:\test123.cfg
primary-dns 192.168.xx.xx
persist    on
dns-domain test.nokia.com
=====
A:ALA-1>bof#
```

### 4.4.4.1 Autoconfigure

When autoconfigure is enabled, the router performs a DHCP discovery or solicit (IPv6) to get the IP address of the out-of-band (OOB) management port.

The OOB management port can support a DHCP client for IPv4, IPv6, or dual stack. For dual stack, both IPv4 and IPv6 DHCP are configured. When the offer for either of the address families arrives, the management port is configured with the IP address in the offer. Eventually, both offers arrive and the management port is configured with both address families.

When a DHCP client is configured using autoconfigure, all image and license files should be placed and loaded from the CF. The configuration file could be loaded from the network, but Nokia recommends that the config file be on the CF as well. The configuration file is not loaded until the DHCP client offer is received and programmed successfully for the management port IP address, or the DHCP client timeout is expired.

#### 4.4.4.1.1 Autoconfigure Restrictions

When autoconfigure is enabled, a static IP address or static route cannot be configured in the BOF.

Similarly, a DNS server cannot be configured in the BOF, and only the DNS server provided by the DHCP offer can be used to resolve URLs.

The option 15 DNS domain name is not supported. The user can configure the DNS domain in the BOF so that the domain is not blocked when autoconfigure is used. Otherwise, the user must use the absolute URL with the host-name and domain included.

#### 4.4.4.1.2 DHCP Discovery of MAC Addresses

When autoconfigure is used on redundant CPM chassis, the DHCP discovery uses the chassis MAC address. Only the active CPM performs a DHCP discovery and not the inactive CPM. When the offer arrives, the node uses that IP and the chassis MAC as addresses for management. Consequently, the inactive CPM is not reachable by the network, because it has no separate IP address. On activity switch, the inactive CPM inherits the active IP and chassis MAC.

For non-redundant CPMs, the management port MAC is used.



**Note:** The router must be rebooted when enabling autoconfigure for the first time to ensure that the CPM card uses the chassis MAC address.

#### 4.4.4.1.3 IPv6 DUID

SR OS supports type 2 DUID (link local), which is set to the chassis serial number. Type 3 (enterprise) is set to the chassis MAC address. Type 1 is not supported.

For type 2 DUID, the SR OS sends the Nokia Enterprise ID as the second byte of the DUID, followed by the chassis serial number. The first byte is the DUID type code. The chassis serial number starts with capital ASCII letters, which ensures that the serial number is unique as an application ID in the SR OS IPv6 DHCP application domain.

DUID type codes are as follows:

- DHCP6C\_DUID\_ENT\_ID\_\_IPSEC\_IPV4ADDR - 1
- DHCP6C\_DUID\_ENT\_ID\_\_IPSEC\_ASN1DN - 2
- DHCP6C\_DUID\_ENT\_ID\_\_IPSEC\_FQDN - 3
- DHCP6C\_DUID\_ENT\_ID\_\_IPSEC\_USER\_FQDN - 4
- DHCP6C\_DUID\_ENT\_ID\_\_IPSEC\_IPV6ADDR - 5

- DHCP6C\_DUID\_ENT\_ID\_\_IPSEC\_ASN1GN - 6
- DHCP6C\_DUID\_ENT\_ID\_\_IPSEC\_KEYID - 7
- DHCP6C\_DUID\_ENT\_ID\_\_WLAN\_GW - 8
- DHCP6C\_DUID\_ENT\_ID\_\_AUTOBOOT - 9
- DHCP6C\_DUID\_ENT\_ID\_\_ZTP\_BOF\_AUTOP - Capital letters in ASCII

#### 4.4.4.1.4 IPv6 DHCP RAs

An IPv6 DHCP offer does not have an IP prefix within the offer, unlike an IPv4 DHCP offer. The IPv6 prefix is usually obtained from the IPv6 Route Advertisement (RA) arriving from the upstream router. For ZTP, SR OS is a host and assigns a /128 prefix to the IPv6 address obtained from the DHCP offer.

In addition, SR OS supports the installation of IPv6 default and static routes from upstream routers using the IPv6 RA. Multiple upstream routers can respond to a route solicitation with their own RA. SR OS installs all the routes advertised by the RA. If the same route is advertised by multiple upstream routers (next hops), the SR OS installs the route with the highest preference. The SR OS does not support ECMP when the same route is advertised from multiple next hops by multiple RAs.

To ensure that all the RAs are obtained before the auto-provisioning process is started for IPv6, SR OS follows the RFC 4861 recommendation that the host (in this case SR OS) send a minimum of three route solicitations. This is to ensure that if a route solicitation is lost, at least one of the three would reach the upstream routers. Each route solicitation is followed by a 4 s timeout. If the first route solicitation is sent at  $T_0$ , the second is sent at  $T_0+4$  s and the third is sent at  $T_0+8$  s. The upstream routers must respond to the route solicitation within 0.5 s. This means that the SR OS will have all of the RAs and the routes within 8.5 s of the first route solicitation. Therefore, SR OS waits for a maximum of 9 s to receive all RAs.

If the DHCPv6 timeout is less than 9 s, the DHCPv6 timeout is honored even for the RA wait time. If the node has received a single RA and DHCP offer, the process is considered a success. However, it is possible that not all the RAs have arrived on the node because the node has waited less than 9 s.

---

## 4.5 Service Management Tasks

This section discusses service management tasks related to the BOF.

### 4.5.1 System Administration Commands

Use the following administrative commands to perform management tasks.

**CLI Syntax:**   A:ALA-1# admin  
                  display-config  
                  reboot [active | standby | upgrade] [hold] [now]  
                  save [file-url] [detail] [index]

#### 4.5.1.1 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 indices. The info command displays context-level information.

**CLI Syntax:**   admin# display-config [detail | index]  
                  info detail

The following example shows a configuration file for the 7750 SR:

```
A:7750-3>admin# display-config
# TiMOS B-1.0.Ixxx - Copyright (c) 2000-2016 Nokia
# Built on Tues Jan 21 21:39:07 2007 by builder in /rel1.0/xx/panos/main

# Generated WED Jan 31 06:15:29 2007 UTC

exit all
configure
#-----
echo "System Configuration"
#-----
system
    name "7750-3"
    contact "Fred Information Technology"
    location "Bldg.1-floor 2-Room 201"
    cli-code "abcdefg1234"
    coordinates "N 45 58 23, W 34 56 12"
    ccm 1
    exit
    snmp
    exit
    login-control
```

```

        idle-timeout 1440
        motd text "7750-3"
    exit
    time
        sntp
        shutdown
    exit
    zone UTC
    exit
    thresholds
        rmon
    exit
    exit
    exit...
...
-----
echo "Redundancy Configuration"
#-----
    redundancy
        synchronize boot-env
    exit
...exit all

# Finished FRI Nov 21 15:06:16 2008 UTC
A:7750#

```

### 4.5.1.2 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 file names 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 sync to fail.

The following command saves a configuration:

**CLI Syntax:**   bof# save [*cflash-id*]

**Example:**       A:ALA-1# bof  
                   A:ALA-1>bof# save cf3:  
                   A:ALA-1>bof#



The following command saves the system configuration:

**CLI Syntax:** admin# save [*file-url*] [detail] [index]

**Example:** A:ALA-1# admin save cf3:\test123.cfg  
 Saving config.# Saved to cf3:\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.

### 4.5.1.3 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 a BOF address entry is not allowed from a Telnet session.

Use the following CLI syntax to save and remove BOF configuration parameters:

**CLI Syntax:** bof# save [*cflash-id*]

**Example:** A:ALA-1# bof  
 A:ALA-1>bof# save cf3:  
 A:ALA-1>bof#

**CLI Syntax:** bof#  
 bof autoconfigure ipv4 no dhcp  
 bof autoconfigure ipv6 no dhcp  
 no address *ip-address/mask* [active | standby]  
 no autonegotiate  
 no console-speed  
 no dns-domain  
 no li-local-save  
 no li-separate  
 no primary-config  
 no primary-dns  
 no primary-image  
 no secondary-config

```
no secondary-dns
no secondary-image
no static-route ip-address/mask next-hop ip-address
no system-profile
no tertiary-config
no tertiary-dns
no tertiary-image
```

#### 4.5.1.4 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 the following CLI syntax to save a configuration to a different location:

**CLI Syntax:** admin# save [*file-url*] [detail] [index]

**Example:** A:ALA-1>admin# save cf3:\testABC.cfg  
Saving config.# Saved to cf3:\testABC.cfg  
... complete  
A:ALA-1#

#### 4.5.1.5 Rebooting

When an **admin>reboot** command is issued, routers with redundant CPM are rebooted as well as the XMAs, XCMs, and IOMs. 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, the user is prompted to confirm the reboot operation.

Use the following CLI syntax to reboot:

**CLI Syntax:** admin# reboot [active | standby | upgrade] [hold] [now]

**Example:** A:ALA-1>admin# reboot  
A:DutA>admin# reboot  
Are you sure you want to reboot (y/n)? y  
Resetting...OK  
Alcatel 7xxx Boot ROM. Copyright 2000-2007 Alcatel-  
Lucent.  
All rights reserved. All use is subject to applicable  
license agreements.....

## 4.6 BOF Configuration Command Reference

### 4.6.1 Command Hierarchies

#### 4.6.1.1 Configuration Commands

- bof**
- [no] **address** *ip-prefix/ip-prefix-length* [active | standby | standby/A | standby/B | standby/C | standby/D]
  - **autoconfigure**
    - **ipv4**
      - **dhcp** [include-user-class] [timeout *timeout*]
      - **dhcp** client-id [string *ascii-string*] [hex *hex-string*] [include-user-class] [timeout *timeout*]
      - no **dhcp**
    - **ipv6**
      - **dhcp** [include-user-class] [timeout *seconds*]
      - **dhcp** client-id *duid-type* [string *ascii-string*] [hex *hex-string*] [include-user-class] [timeout *timeour*]
      - no **dhcp**
  - [no] **autonegotiate**
  - **console-speed** *baud-rate*
  - no **console-speed**
  - **dns-domain** *dns-name*
  - no **dns-domain**
  - **duplex** {full | half}
  - [no] **ess-system-type**
  - [no] **fips-140-2**
  - [no] **li-local-save**
  - [no] **li-separate**
  - **license-file** *file-url*
  - no **license-file**
  - **persist** {on | off}
  - **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**
  - **speed** *speed*

- [no] **static-route** *ip-prefix/ip-prefix-length next-hop ip-address*
- **system-base-mac** *mac-address*
- **no system-base-mac**
- **system-profile** {*profile-a* | *profile-b*}
- **no system-profile**
- **tertiary-config** *file-url*
- **no tertiary-config**
- **tertiary-dns** *ip-address*
- **no tertiary-dns** [*ip-address*]
- **tertiary-image** *file-url*
- **no tertiary-image**
- **wait** *seconds*

## 4.6.2 Command Descriptions

### 4.6.2.1 File Management Commands

bof

<b>Syntax</b>	<b>bof</b>
<b>Context</b>	<root>
<b>Description</b>	This command creates or edits the boot option 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. 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 IP address of the management port is changed, the change takes place immediately.

Only one entry of the BOF configuration command statement can be saved once the statement has been found to be syntactically correct.

When opening an existing BOF that is not the BOF used in the most recent boot, a message is issued notifying the user that the parameters will not affect the operation of the node.

No default boot option file exists. The router boots with the factory default boot sequence and options.

---

## save

<b>Syntax</b>	<b>save</b> [ <i>cf<sub>flash-id</sub></i> ]				
<b>Context</b>	bof				
<b>Description</b>	<p>This command uses the boot option parameters currently in memory and writes them from the boot option file to the specified compact flash.</p> <p>The BOF must be located in the root directory of the internal or external compact flash drives local to the system and have the mandatory filename of <i>bof.cfg</i>.</p> <p>If a location is not specified, the BOF is saved to the default compact flash drive (cf3:) on the active CPM (typically the CPM in slot A, but the CPM in slot B could also be acting as the active CPM). The slot name is not case-sensitive. You can use upper or lowercase “A” or “B”.</p> <p>Command usage:</p> <ul style="list-style-type: none"><li>• <b>bof save</b> — saves the BOF to the default drive (cf3:) on the active CPM (either in slot A or B)</li><li>• <b>bof save cf3:</b> — saves the BOF to cf3: on the active CPM (either in slot A or B)</li></ul> <p>To save the BOF to a compact flash drive on the standby CPM (for example, the redundant (standby) CPM is installed in slot B), specify -A or -B option.</p> <p>Command usage:</p> <ul style="list-style-type: none"><li>• <b>bof save cf3-A:</b> — saves the BOF to cf3: on CPM in slot A whether it is active or standby</li><li>• <b>bof save cf3-B:</b> — saves the BOF to cf3: on CPM in slot B whether it is active or standby</li></ul> <p>The slot name is not case-sensitive. You can use upper or lowercase “A” or “B”.</p> <p>The <b>bof save</b> and <b>show bof</b> commands allow you to save to or read from the compact flash of the standby CPM. Use the <b>show card</b> command to determine the active and standby CPM (A or B).</p>				
<b>Default</b>	Saves must be explicitly executed. The BOF is saved to cf3: if a location is not specified.				
<b>Parameters</b>	<p><i>flash-id</i> — Specifies the compact flash ID where the <i>bof.cfg</i> is to be saved.</p> <table><tr><td><b>Values</b></td><td>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</td></tr><tr><td><b>Default</b></td><td>cf3:</td></tr></table>	<b>Values</b>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:	<b>Default</b>	cf3:
<b>Values</b>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:				
<b>Default</b>	cf3:				

### 4.6.2.2 BOF Processing Control

#### wait

<b>Syntax</b>	<b>wait</b> <i>seconds</i>
<b>Context</b>	bof
<b>Description</b>	<p>This command configures a pause, in seconds, at the start of the boot process which allows system initialization to be interrupted at the console.</p> <p>When system initialization is interrupted the operator is allowed to manually override the parameters defined in the boot option file (BOF).</p> <p>Only one <b>wait</b> command can be defined in the BOF.</p>
<b>Default</b>	wait 3
<b>Parameters</b>	<p><i>seconds</i> — Specifies the time to pause at the start of the boot process, in seconds.</p> <p><b>Values</b> 1 to10</p>

### 4.6.2.3 Console Port Configuration

#### console-speed

<b>Syntax</b>	<b>console-speed</b> <i>baud-rate</i> <b>no console-speed</b>
<b>Context</b>	bof
<b>Description</b>	<p>This command configures the console port baud rate.</p> <p>When this command is issued while editing the BOF file used for the most recent boot, both the BOF file and the active configuration are changed immediately.</p> <p>The <b>no</b> form of this command reverts to the default value.</p>
<b>Default</b>	console-speed 115200
<b>Parameters</b>	<p><i>baud-rate</i> — Specifies the console port baud rate, expressed as a decimal integer.</p> <p><b>Values</b> 9600, 19200, 38400, 57600, 115200</p>

---

## 4.6.2.4 Image and Configuration Management

### persist

**Syntax** `persist {on | off}`

**Context** bof

**Description** This command specifies 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, LSP IDs, path IDs, and so on. 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. To enable SNMP access, enter the **config>system>snmp>no shutdown** command.

If **persist** is enabled and the **admin save url** command is executed with an FTP path used as the *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 check to ensure that the disk has enough free space. If this there is not enough free space, the persistency will not become active and a trap will be generated. Then, it is up to the operator to free adequate disk space. In the meantime, the system will perform a space availability check every 30 seconds. As soon as the space is available the persistency will become active on the next (30 second) check.

**Default** `persist off`

**Parameters** **on** — Enables the system index saves between reboots.  
**off** — Disables the system index saves between reboots.

### primary-config

**Syntax** `primary-config file-url`  
`no primary-config`

<b>Context</b>	bof								
<b>Description</b>	<p>This command specifies the name and location of the primary configuration file.</p> <p>The system attempts to use the configuration specified in <b>primary-config</b>. If the specified file cannot be located, the system automatically attempts to obtain the configuration from the location specified in <b>secondary-config</b> and then the <b>tertiary-config</b>.</p> <p>If an error in the configuration file is encountered, the boot process aborts.</p> <p>The <b>no</b> form of this command removes the <b>primary-config</b> configuration.</p>								
<b>Parameters</b>	<p><i>file-url</i> — Specifies the primary configuration file location, expressed as a file URL.</p> <p><b>Values</b></p> <table border="0"> <tr> <td><i>file-url</i></td> <td>{<i>local-url</i>   <i>remote-url</i>} (up to 180 characters)</td> </tr> <tr> <td><i>local-url</i></td> <td>[<i>cflash-id</i>][<i>file-path</i>]</td> </tr> <tr> <td><i>remote-url</i></td> <td>[{ftp:// tftp://} <i>login:pswd@remote-locn</i>][<i>file-path</i>]</td> </tr> <tr> <td><i>cflash-id</i></td> <td>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</td> </tr> </table>	<i>file-url</i>	{ <i>local-url</i>   <i>remote-url</i> } (up to 180 characters)	<i>local-url</i>	[ <i>cflash-id</i> ][ <i>file-path</i> ]	<i>remote-url</i>	[{ftp:// tftp://} <i>login:pswd@remote-locn</i> ][ <i>file-path</i> ]	<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
<i>file-url</i>	{ <i>local-url</i>   <i>remote-url</i> } (up to 180 characters)								
<i>local-url</i>	[ <i>cflash-id</i> ][ <i>file-path</i> ]								
<i>remote-url</i>	[{ftp:// tftp://} <i>login:pswd@remote-locn</i> ][ <i>file-path</i> ]								
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:								

## primary-image

<b>Syntax</b>	<p><b>primary-image</b> <i>file-url</i></p> <p><b>no primary image</b></p>								
<b>Context</b>	bof								
<b>Description</b>	<p>This command specifies the primary directory location for runtime image file loading.</p> <p>The system attempts to load all runtime image files configured in the <b>primary-image</b> first. If this fails, the system attempts to load the runtime images from the location configured in the <b>secondary-image</b>. If the secondary image load fails, the tertiary image specified in <b>tertiary-image</b> is used.</p> <p>All runtime image files (*.tim files) must be located in the same directory.</p> <p>The <b>no</b> form of this command removes the <b>primary-image</b> configuration.</p>								
<b>Parameters</b>	<p><i>file-url</i> — Specifies the <i>file-url</i> can be either local (this CPM) or a remote FTP server.</p> <p><b>Values</b></p> <table border="0"> <tr> <td><i>file-url</i></td> <td>{<i>local-url</i>   <i>remote-url</i>} (up to 180 characters)</td> </tr> <tr> <td><i>local-url</i></td> <td>[<i>cflash-id</i>][<i>file-path</i>]</td> </tr> <tr> <td><i>remote-url</i></td> <td>[{ftp:// tftp://} <i>login:pswd@remote-locn</i>][<i>file-path</i>]</td> </tr> <tr> <td><i>cflash-id</i></td> <td>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</td> </tr> </table>	<i>file-url</i>	{ <i>local-url</i>   <i>remote-url</i> } (up to 180 characters)	<i>local-url</i>	[ <i>cflash-id</i> ][ <i>file-path</i> ]	<i>remote-url</i>	[{ftp:// tftp://} <i>login:pswd@remote-locn</i> ][ <i>file-path</i> ]	<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
<i>file-url</i>	{ <i>local-url</i>   <i>remote-url</i> } (up to 180 characters)								
<i>local-url</i>	[ <i>cflash-id</i> ][ <i>file-path</i> ]								
<i>remote-url</i>	[{ftp:// tftp://} <i>login:pswd@remote-locn</i> ][ <i>file-path</i> ]								
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:								



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## system-base-mac

<b>Syntax</b>	<b>system-base-mac</b> <i>mac-address</i> <b>no system-base-mac</b>
<b>Context</b>	bof
<b>Description</b>	<p>This command is used to specify the base MAC address for a VSR-based system. The specified MAC address is used as the first MAC address by the system to assign MAC addresses to individual interfaces.</p> <p>It is strongly recommended that a unique base MAC address is assigned to each VSR instance with a minimum gap of 1024 between base addresses to avoid a MAC address overlap.</p> <p>The <b>no</b> form of this command removes the configured system base MAC address.</p>
<b>Default</b>	no system-base-mac
<b>Parameters</b>	<i>mac-address</i> — Specifies the MAC address.
<b>Values</b>	xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx

## system-profile

<b>Syntax</b>	<b>system-profile</b> { <b>profile-a</b>   <b>profile-b</b> } <b>no system-profile</b>
<b>Context</b>	bof
<b>Description</b>	<p>This command configures the system profile in the BOF.</p> <p>System profile <b>none</b> represents the existing system capabilities and allows FP3- and FP4-based hardware to co-exist within a system. This is indicated by the omission of the <b>system-profile</b> parameter in the BOF, except on 7750 SR-1 systems.</p> <p>System profile <b>profile-a</b> is primarily targeted at subscriber services and layer 2 and 3 VPN business services.</p> <p>System profile <b>profile-b</b> is primarily targeted at infrastructure routing, core, peering, and DC-GW applications.</p> <p>System profile <b>profile-a</b> and <b>profile-b</b> are supported on 7950 XRS-20/20e, 7750 SR-1 and 7750 SR-12e systems, and support only FP4-based line cards.</p> <p>The system profile on 7750 SR-1 systems should be set to <b>profile-a</b>. It is set by default to <b>profile-a</b> when the <b>system-profile</b> parameter is omitted from the BOF, or configured to an invalid value.</p> <p>On 7950 XRS-20/20e and 7750 SR-12e systems, default system profile is none.</p>

On all other systems, the **system-profile** parameter must not be configured in the BOF which sets the system profile to none.

The **no** form of this command removes the **system-profile** parameter from the BOF.

**Default** none

**Parameters** **profile-a** — Specifies that the system profile is for subscriber services and Layer 2 and 3 VPN business services.

**profile-b** — Specifies that the system profile is primarily targeted at infrastructure routing, core, peering, and DC-GW applications.

## secondary-config

**Syntax** **secondary-config** *file-url*  
**no secondary-config**

**Context** bof

**Description** This command specifies 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**.

Note that 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* — Specifies the secondary configuration file location, expressed as a file URL.

### Values

<i>file-url</i>	[ <i>local-url</i>   <i>remote-url</i> ] (up to 180 characters)
<i>local-url</i>	[ <i>cflash-id</i> ][ <i>file-path</i> ]
<i>remote-url</i>	[{ftp:// tftp://} <i>login:pswd@remote-locn</i> ][ <i>file-path</i> ]
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

## secondary-image

**Syntax** **secondary-image** *file-url*  
**no secondary-image**

**Context** bof

**Description** This command specifies 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.

All runtime image files (\*.tim files) must be located in the same directory.

The **no** form of this command removes the **secondary-image** configuration.

**Parameters** *file-url* — Specifies the file URL; can be either local (this CPM) or a remote FTP server.

**Values**

<i>file-url</i>	{ <i>local-url</i>   <i>remote-url</i> } (up to 180 characters)
<i>local-url</i>	[ <i>cflash-id</i> ][ <i>file-path</i> ]
<i>remote-url</i>	[{ftp:// tftp://} <i>login:pswd@remote-locn</i> ][ <i>file-path</i> ]
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

## tertiary-config

**Syntax** **tertiary-config** *file-url*  
**no tertiary-config**

**Context** bof

**Description** This command specifies 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.

Note that 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* — Specifies the tertiary configuration file location, expressed as a file URL.

**Values**

<i>file-url</i>	{ <i>local-url</i>   <i>remote-url</i> } (up to 180 characters)
<i>local-url</i>	[ <i>cflash-id</i> ][ <i>file-path</i> ]
<i>remote-url</i>	[{ftp:// tftp://} <i>login:pswd@remote-locn</i> ][ <i>file-path</i> ]
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

## tertiary-image

**Syntax** **tertiary-image** *file-url*  
**no tertiary-image**

<b>Context</b>	bof								
<b>Description</b>	<p>This command specifies the tertiary directory location for runtime image file loading.</p> <p>The system attempts to load all runtime image files configured in the <b>primary-image</b> first. If this fails, the system attempts to load the runtime images from the location configured in the <b>secondary-image</b>. If the secondary image load fails, the tertiary image specified in <b>tertiary-image</b> is used.</p> <p>All runtime image files (*.tim files) must be located in the same directory.</p> <p>The <b>no</b> form of this command removes the <b>tertiary-image</b> configuration.</p>								
<b>Parameters</b>	<p><i>file-url</i> — Specifies the file URL; can be either local (this CPM) or a remote FTP server.</p> <p style="margin-left: 40px;"><b>Values</b></p> <table border="0" style="margin-left: 40px;"> <tr> <td><i>file-url</i></td> <td>{<i>local-url</i>   <i>remote-url</i>} (up to 180 characters)</td> </tr> <tr> <td><i>local-url</i></td> <td>[<i>cflash-id</i>]/[<i>file-path</i>]</td> </tr> <tr> <td><i>remote-url</i></td> <td>[{ftp:// tftp://} <i>login:pswd@remote-locn</i>]/[<i>file-path</i>]</td> </tr> <tr> <td><i>cflash-id</i></td> <td>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</td> </tr> </table>	<i>file-url</i>	{ <i>local-url</i>   <i>remote-url</i> } (up to 180 characters)	<i>local-url</i>	[ <i>cflash-id</i> ]/[ <i>file-path</i> ]	<i>remote-url</i>	[{ftp:// tftp://} <i>login:pswd@remote-locn</i> ]/[ <i>file-path</i> ]	<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
<i>file-url</i>	{ <i>local-url</i>   <i>remote-url</i> } (up to 180 characters)								
<i>local-url</i>	[ <i>cflash-id</i> ]/[ <i>file-path</i> ]								
<i>remote-url</i>	[{ftp:// tftp://} <i>login:pswd@remote-locn</i> ]/[ <i>file-path</i> ]								
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:								

### 4.6.2.5 Management Ethernet Configuration

address

<b>Syntax</b>	[no] address <i>ip-prefix/ip-prefix-length</i> [ <b>active</b>   <b>standby</b>   <b>standby/A</b>   <b>standby/B</b>   <b>standby/C</b>   <b>standby/D</b> ]
<b>Context</b>	bof
<b>Description</b>	<p>This command assigns an IP address to the management Ethernet port on a CPM. This applies during the boot loader and the running image.</p> <p>On all systems except the 7950 XRS-40, an address must be assigned with the <b>active</b> keyword and for systems with a redundant CPM an additional address may be assigned with the <b>standby</b> keyword. The active address is used by the active CPM whether its CPM A or CPM B and the standby address, if specified, is used by the standby CPM whether its CPM B or CPM A.</p> <p>For the 7950 XRS-40, if the extension chassis shall boot from local compact flash then an active and standby address should be defined for use by the master chassis as defined above.</p>

For the 7950 XRS-40, if the extension chassis shall boot from remote URL, then it is required to assign addresses to the management Ethernet ports for CPM C and CPM D. In this case, the BOF should be updated to have addresses defined using the **standby/A**, **standby/B**, **standby/C**, and **standby/D** keywords in addition to an address using the **active** keyword. With these keywords, CPM A shall always use the address defined using the **standby/A** address when CPM A is running as the standby CPM. Similarly, CPM B shall always use the address defined using the **standby/B** address when CPM B is running as the standby CPM. The active CPM of CPM A and CPM B shall use the address defined using the **active** keyword.

Deleting a BOF address entry is not allowed from a remote session.

Note that changing the active and standby addresses without reboot standby CPM may cause a boot-env sync to fail.

The **no** form of this command deletes the IP address from the CPM Ethernet port.

**Parameters** *ip-prefix/ip-prefix-length* — Specifies the destination address of the aggregate route in dotted decimal notation.

**Values**

<i>ipv4-prefix</i>	<i>a.b.c.d</i> (host bits must be 0)	
<i>ipv4-prefix-length</i>	0 to 32	
<i>ipv6-prefix</i>	<i>x:x:x:x:x:x:x</i> (eight 16-bit pieces)	
	<i>x:x:x:x:x:d.d.d.d</i>	
	<i>x:</i>	[0 to FFFF]H
	<i>d:</i>	[0 to 255]D
<i>ipv6-prefix-length</i>	0 to 128	

**active | standby | standby/A | standby/B | standby/C | standby/D** — specifies which CPM Ethernet address is being configured

**Default** active

## autoconfigure

<b>Syntax</b>	<b>autoconfigure</b>
<b>Context</b>	bof
<b>Description</b>	This command enters the context to autoconfigure the IP address for the BOF. The IPv4 DHCP client, IPv6 DHCP client, and NDP/RA can be configured on the management interface.
<b>Default</b>	no autoconfigure

## ipv4

<b>Syntax</b>	<b>ipv4</b>
<b>Context</b>	bof>autoconfigure
<b>Description</b>	This command enters the context to autoconfigure the IPv4 DHCP client.

## dhcp

<b>Syntax</b>	<b>dhcp [include-user-class] [timeout <i>timeout</i>] dhcp client-id [string <i>ascii-string</i>] [hex <i>hex-string</i>] [include-user-class] [timeout <i>timeout</i>] no dhcp</b>
<b>Context</b>	bof>autoconfigure>ipv4
<b>Description</b>	This command configures the IPv4 DHCP client for OOB management. The OOB management IPv4 can be set using a DHCP server offer.  The <b>no</b> form of this command disables IPv4 DHCP OOB management.
<b>Default</b>	no dhcp
<b>Parameters</b>	<b>include-user-class</b> — Specifies to include Option 77 user class data in the offer. <b>client-id</b> — Specifies to include the client ID for IPv4 Option 61 for auto-discovery. The identifier is opaque and is in string format. By default, this is the chassis serial number. <b>timeout</b> — Specifies the DHCP offer timeout, in seconds. <b>Values</b> 1 to 65535 <b>Default</b> 30 <b>ascii-string</b> — Specifies the string format for this option, up to 127 characters. <b>hex-string</b> — Specifies the hexadecimal format for this option, up to 254 hex nibbles. <b>Values</b> 0x0 to 0xFFFFFFFF

## ipv6

<b>Syntax</b>	<b>ipv6</b>
<b>Context</b>	bof>autoconfigure
<b>Description</b>	This command enters the context to autoconfigure the IPv6 DHCP client.

---

## dhcp

<b>Syntax</b>	<b>dhcp</b> [ <b>include-user-class</b> ] [ <b>timeout</b> <i>timeout</i> ] <b>dhcp client-id</b> <i>duid-type</i> [ <b>string</b> <i>ascii-string</i> ] [ <b>hex</b> <i>hex-string</i> ] [ <b>include-user-class</b> ] [ <b>timeout</b> <i>timeout</i> ] <b>no dhcp</b>
<b>Context</b>	bof>autoconfigure>ipv6
<b>Description</b>	This command configures the IPv6 DHCP client for out-of-band (OOB) management. The OOB management IPv6 can be set using a DHCP server offer.  The <b>no</b> form of this command disables IPv6 DHCP client OOB management.
<b>Default</b>	no dhcp
<b>Parameters</b>	<b>include-user-class</b> — Specifies to include Option 15 user class data in the offer. <b>client-id</b> — Specifies to include the client ID for IPv6 DHCP Option 1 for auto-discovery. The identifier is opaque and is in string format. By default, this is the chassis serial number. <b>seconds</b> — Specifies the DHCP client ID timeout, in seconds. <b>Values</b> 1 to 65535 <b>duid-type</b> — Specifies the type code of the server DUID. <b>Values</b> duid-link-local, duid-enterprise <b>ascii-string</b> — Specifies the string format for this option, up to 124 characters. <b>hex-string</b> — Specifies the hexadecimal format for this option, up to 248 hex nibbles. <b>Values</b> 0x0 to 0xFFFFFFFF <b>timeout</b> — Specifies the DHCP offer timeout, in seconds. <b>Values</b> 1 to 65535 <b>Default</b> 30

## autonegotiate

<b>Syntax</b>	<b>[no] autonegotiate</b>
<b>Context</b>	bof
<b>Description</b>	This command enables speed and duplex autonegotiation on the management Ethernet port in the running configuration and the Boot Option File (BOF).  When <b>autonegotiation</b> is enabled, the link attempts to automatically negotiate the link speed and duplex parameters. If <b>autonegotiation</b> is enabled, then the configured duplex and speed parameters are ignored.

---

The **no** form of this command disables the autonegotiate feature on this port.

## duplex

<b>Syntax</b>	<b>duplex {full   half}</b>
<b>Context</b>	bof
<b>Description</b>	This command configures the duplex mode of the CPM management Ethernet port when autonegotiation is disabled in the running configuration and the Boot Option File (BOF). If the port is configured to autonegotiate this parameter will be ignored.
<b>Parameters</b>	<b>full</b> — Sets the link to full duplex mode. <b>half</b> — Sets the link to half duplex mode.

## ess-system-type

<b>Syntax</b>	<b>[no] ess-system-type</b>
<b>Context</b>	bof
<b>Description</b>	<p>This command allows a new RoHS compliant 7750 SR-12 or 7750 SR-7 chassis to operate as an 7450 ESS-12 or 7450 ESS-7 system.</p> <p>After entering this command, the system must be rebooted for the change to take effect.</p> <p>If the RoHS compliant 7750 SR-12 or 7750 SR-7 chassis is operating as an 7450 ESS system, it can operate with either the 7750 SR or 7450 ESS CPM (subject to SR OS support) but both should always be the same type.</p> <p>In addition, the system can operate with supported 7450 ESS or 7750 SR IOMs, MDAs, and IMMs.</p> <p>The <b>no</b> form of this command disables this mode of operation and returns the system to a 7750 SR chassis type operation on the next reboot.</p>
<b>Default</b>	no ess-system-type

## fips-140-2

<b>Syntax</b>	<b>[no] fips-140-2</b>
<b>Context</b>	bof



---

**Description** This command is used to configure the node in FIPS-140-2 mode. Before using this command, the operator must ensure that no current configuration exists in the config file that is not supported in FIPS-140-2 mode. Failing to remove unsupported configuration will result in the node being unable to boot up. The node must be rebooted after executing this command in order for the node to begin operating in FIPS-140-2 mode.

## li-local-save

**Syntax** `[no] li-local-save`

**Context** bof

**Description** This command enables the lawful intercept (LI) configuration to be saved locally.

## li-separate

**Syntax** `[no] li-separate`

**Context** bof

**Description** This command enables separate access to lawful intercept (LI) information.

## license-file

**Syntax** `license-file file-url`  
`no license-file`

**Context** bof

**Description** This command configures the license location and file name.  
The **no** form of this command removes the file URL from the configuration.

**Parameters** *file-url* — Specifies the *file-url*.

### Values

<i>file-url</i>	{ <i>local-url</i>   <i>remote-url</i> } (up to 180 characters)
<i>local-url</i>	[ <i>cflash-id</i> ]/[ <i>file-path</i> ]
<i>remote-url</i>	[{ftp:// tftp://} <i>login:pswd@remote-locn</i> ]/[ <i>file-path</i> ]
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

## speed

**Syntax** `speed speed`

<b>Context</b>	bof
<b>Description</b>	This command configures the speed for the CPM management Ethernet port when autonegotiation is disabled in the running configuration and the Boot Option File (BOF).  If the port is configured to autonegotiate, this parameter is ignored.
<b>Default</b>	speed 100
<b>Parameters</b>	<i>speed</i> — Sets the link speed, in Mb/s.
	<b>Values</b> 10, 100

### static-route

<b>Syntax</b>	<b>[no] static-route</b> <i>ip-prefix/ip-prefix-length next-hop ip-address</i>		
<b>Context</b>	bof		
<b>Description</b>	This command creates a <b>static route</b> entry for the CPM management Ethernet port in the running configuration and the Boot Option File (BOF).  This command allows manual configuration of static routing table entries. These static routes are only used by traffic generated by the CPM Ethernet port. To reduce configuration, manual address aggregation should be applied where possible.  A static default (0.0.0.0/0 or ::/0) route cannot be configured on the CPM Ethernet port. A maximum of 10 static routes can be configured on the CPM port.  The <b>no</b> form of this command deletes the static route.		
<b>Default</b>	no static-route		
<b>Parameters</b>	<i>ip-prefix/ip-prefix-length</i> — Specifies the destination address of the static route in dotted decimal notation.		
	<b>Values</b>		
	<i>ip-prefix/ip-prefix-length</i>	ipv4-prefix	a.b.c.d (host bits must be 0)
		ipv4-prefix-le	0 to 32
		ipv6-prefix	x:x:x:x:x:x:x (eight 16-bit pieces) x:x:x:x:x:d.d.d.d x: [0 to FFFF]H d: [0to 255]D
		ipv6-prefix-le	0 to128
	<i>ip-address</i>	ipv4-address	a.b.c.d
		ipv6-address	x:x:x:x:x:x:x (eight 16-bit pieces) x:x:x:x:x:d.d.d.d x: [0 to FFFF]H

*d*: [0 to 255]D



**Note:** IPv6 is applicable to the 7750 SR and 7950 XRS only.

*mask* — Specifies the subnet mask, expressed as an integer or in dotted decimal notation.

**Values** 1 to 32 (mask length), 128.0.0.0 to 255.255.255.255 (dotted decimal)

*ip-address* — Specifies the next hop IP address used to reach the destination.

## 4.6.2.6 DNS Configuration Commands

### dns-domain

<b>Syntax</b>	<b>dns-domain</b> <i>dns-name</i> <b>no dns-domain</b>
<b>Context</b>	bof
<b>Description</b>	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 <b>no</b> form of this command removes the domain name from the configuration.
<b>Default</b>	no dns-domain
<b>Parameters</b>	<i>dns-name</i> — Specifies the DNS domain name, up to 178 characters.

### primary-dns

<b>Syntax</b>	<b>primary-dns</b> <i>ip-address</i> <b>no primary-dns</b> [ <i>ip-address</i> ]
<b>Context</b>	bof
<b>Description</b>	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* — Specifies the IP or IPv6 address of the primary DNS server.

**Values**

ipv4-address	<i>a.b.c.d</i>
ipv6-address	x:x:x:x:x:x[-interface] x:x:x:x:x:d.d.d.d[-interface] x: [0 to FFFF]H d: [0 to 255]D
interface	32 chars max, for link local addresses



**Note:** IPv6 is applicable to the 7750 SR and 7950 XRS only.

## secondary-dns

- Syntax** **secondary-dns** *ip-address*  
**no secondary-dns** [*ip-address*]
- Context** bof
- 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 or IPv6 address of the secondary DNS server.

**Values**

ipv4-address	<i>a.b.c.d</i>
ipv6-address	x:x:x:x:x:x[-interface] 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



**Note:** IPv6 is applicable to the 7750 SR and 7950 XRS only.

## tertiary-dns

<b>Syntax</b>	<b>tertiary-dns</b> <i>ip-address</i> <b>no tertiary-dns</b> [ <i>ip-address</i> ]
<b>Context</b>	bof
<b>Description</b>	<p>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.</p> <p>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.</p> <p>The <b>no</b> form of this command removes the tertiary DNS server from the configuration.</p>
<b>Default</b>	no tertiary-dns
<b>Parameters</b>	<i>ip-address</i> — Specifies the IP or IPv6 address of the tertiary DNS server.
	<b>Values</b>
	ipv4-address            a.b.c.d
	ipv6-address            x:x:x:x:x:x:x[-interface]
	x:x:x:x:x:d.d.d.d[-interface]
	x: [0 to FFFF]H
	d: [0 to 255]D
	interface                32 chars max, for link local addresses



**Note:** IPv6 is applicable to the 7750 SR and 7950 XRS only.



---

## 4.7 BOF Show Command Reference

### 4.7.1 Command Hierarchies

```
show
  — bof [cflash-id | booted]
  — boot-messages
```

### 4.7.2 Command Descriptions

#### 4.7.2.1 BOF Show Commands

The command outputs in the following sections are examples only; actual displays may differ depending on supported functionality and user configuration.

#### bof

<b>Syntax</b>	<b>bof</b> [ <i>cf<del>lash</del>-id</i>   <b>booted</b> ]
<b>Context</b>	show
<b>Description</b>	This command displays the Boot Option File (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.
<b>Parameters</b>	<i>cf<del>lash</del>-id</i> — Displays the cflash directory name. The slot name is not case-sensitive. Use upper or lowercase “A” or “B” for the slot name.  <b>Values</b> cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:  <b>booted</b> — displays the boot option file used to boot the system.
<b>Output</b>	The following output is an example of BOF, and <a href="#">Table 30</a> describes the output fields.

#### Sample Output

```
A:ALA-1# show bof cf3:
=====
BOF on cf3:
=====
```

```

autonegotiate
primary-image ftp://test:test@192.168.xx.xx/./both.tim
primary-config ftp://test:test@192.168.xx.xx/./lxx.cfg
secondary-image cfl:/i650/
secondary-config cfl:/config.cfg
address 192.168.xx.xxx/20 active
address 192.168.xx.xxx/20 standby
primary-dns 192.168.xx.xxx
dns-domain test.test.com
autonegotiate
duplex full
speed 100
wait 2
persist off
    console-speed 115200
=====
A:ALA-1#
A:ALA-1# show bof booted
=====
System booted with BOF
=====
primary-image ftp://test:test@192.168.xx.xx/./both.tim
    primary-config ftp://test:test@192.168.xx.xx/./103.cfg
    secondary-image cfl:/i650/
    secondary-config cfl:/config.cfg
    address 192.168.xx.xxx/20 active
    address 192.168.xx.xxx/20 standby
    primary-dns 192.168.xx.xxx
    dns-domain test.test.com
    autonegotiate
    duplex full
    speed 100
    wait 2
persist off
    console-speed 115200
=====
A:ALA-1#
    
```

**Table 30 Show BOF Output Fields**

Label	Description
primary-image	The primary location of the directory that contains the runtime images of both CPM and XCM/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 XCM/IOM.
secondary-config	The secondary location of the file that contains the configuration.



**Table 30 Show BOF Output Fields (Continued)**

Label	Description
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 XCM/IOM.
tertiary-config	The tertiary location of the file that contains the configuration.
address	The IP address and mask associated with the CPM Ethernet port or the secondary CPM port.
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.
duplex	half — Specifies that the system uses half duplex. full — Specifies that the system uses full duplex.
speed	The speed of the CPM Ethernet interface.
console speed	The console port baud rate.
dns domain	The domain name used when performing DNS address resolution.
uplinkA-address	Displays the Uplink-A IP address.
uplinkA-port	Displays the primary port to be used for auto-boot.
uplinkA-route	Displays the static route associated with Uplink-A.
uplinkA-vlan	Displays the VLAN ID to be used on Uplink-A.
uplinkB-address	Displays the Uplink-B IP address.
uplinkB-port	Displays the secondary port to be used for auto-boot.
uplinkB-route	Displays the static route associated with Uplink-B.
uplinkB-vlan	Displays the VLAN ID to be used on Uplink-B.
uplink-mode	Displays the uplink mode of the device.
no-service-ports	Displays the ports on which service traffic is not processed.

**Table 30 Show BOF Output Fields (Continued)**

Label	Description
use-expansion-card-type	The expansion card type.
system-profile	The system profile used by the system when it is rebooted.

## boot-messages

- Syntax** boot-messages
- Context** show
- Description** This command displays boot messages generated during the last system boot.
- Output** The following output is an example of a boot-message.

### Sample Output

```
*A:raven14s# show boot-messages
=====
cf3:/bootlog.txt
=====
Boot log started on CPU#0
  Build: X-0.0.I5679 on Mon Oct  1 18:08:38 PDT 2018 by builder
  CPUCTL FPGA version: 17
Boot rom version is v54
CPU Control FPGA version is 0x17
Multicore RAM test using 10 cores
>>>Testing  SDRAM from 0x0000000002200000 to 0x0000000080000000
>>>Testing  SDRAM from 0xffffffffe0000000 to 0xffffffffe0000000
>>>Testing  SDRAM from 0x0000000080000000 to 0x00000003e4000000
>>>Testing Compact Flash 1... Slot Empty
>>>Testing Compact Flash 2... Slot Empty
>>>Testing Compact Flash 3... OK (STEC M2+ CF 9.0.2)
Board Serial Number is 'NS184100464'
Platforms in Chassis EEPROM 1 is 0x1
Chassis type 34 (sr14s_r1) found in Chassis EEPROM 1
Chassis Serial Number is 'NS173300113'
Searching for boot.ldr on local drives:
Searching cf3 for boot.ldr...
*****
Total Memory: 16GB Chassis Type: sr14s_r1 (0x22) Card Type: pegasus_r1 (0x42) [IO
CTRL Ver:0x17 Date:not-available] Git: [ Tag/Hash: TiMOS_16_0_R4-
g49edf4fa7f67; branch: master, remote: master]
TiMOS-L-16.0.R4 boot/hops Nokia 7xxx ? Copyright (c) 2000-2018 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Sun Sep 30 18:08:18 PDT 2018 by builder in /builds/160/R4/panos/main
TiMOS BOOT LOADER
Extended checks enabled with overhead of 36B
Fair scheduler is now enabled
```

```
Time from clock is TUE NOV 17 15:12:04 2020 UTC
Switching serial output to sync mode... done
Looking for cf3:/bof.cfg ... OK, reading
Contents of Boot Options File on cf3:
```



## 5 Debug Commands

The debug commands enable detailed debug information for various protocols.

Debug output is generally seen by configuring a log with **from debug-trace** and then viewing the output of the log.

The currently enabled debug can be seen using the **show debug** command.

Debug configuration is not persistent across CPM switchovers nor router reboots. The **admin debug-save** command can be used to save the debug configuration. The resulting file could then be executed later as needed.

Individual debug commands are described in the various User Guides where the associated protocols and features are also described. For example, the **debug service id arp-host** command is described in the 7450 ESS, 7750 SR, 7950 XRS, and VSR Layer 3 Services Guide: IES and VPRN.



## 6 Zero Touch Provisioning

Traditional deployment of a new node in a network is a multistep process in which the user connects to the hardware to provision global and local parameters. Zero Touch Provisioning (ZTP) automatically configures a node by obtaining the required information from the network and provisioning the node with minimal manual intervention and configuration. When new nodes that support ZTP are connected and boot up, the node is auto-provisioned.



**Note:** To support ZTP, make sure the new nodes are purchased with the **auto-boot** flag enabled in the factory-loaded BOF.

### 6.1 ZTP Overview

ZTP is used to automatically install and provision new nodes in the field. For out-of-band management, the nodes can be installed and powered up with network connectivity on the management (Mgmt) port. For in-band management, the first two connectors on the first two slots can be used for ZTP.



**Note:** For breakout connectors, only the first breakout port on the first two connectors can be used for ZTP.

After network connectivity is established, the ZTP process automatically starts. The node sends a DHCP discovery request to the DHCP server using a ZTP-capable port and the DHCP server returns an IPv4/IPv6 FTP or HTTP URL from which the provisioning information can be retrieved. The provisioning information is in a file called the provisioning file, which contains the URL of the image, config, and other files to be downloaded. After downloading these files and successfully provisioning, the node automatically reboots and comes back up in normal mode.

#### 6.1.1 Network Requirements

ZTP requires the following network components:

- **DHCP server (IPv4 or IPv6)**

The DHCP server supports assignment of IP addresses through DHCP requests and offers.

- **file server**

The FTP or HTTP URL is used for staging and transfer of RPMs, configurations, images, and scripts.

- **DHCP relay**

DHCP relay is required if the servers are across a Layer 3 network.

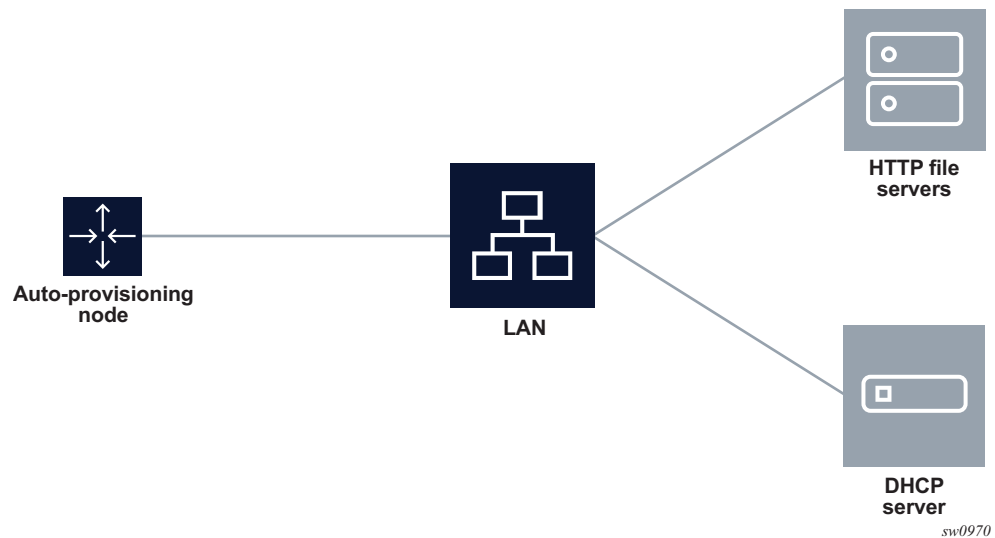
## 6.1.2 Network Support

ZTP operates in the following network environments:

- **node, file servers, and DHCP server in the same subnet**

Figure 9 shows the scenario where all components are in a Layer 2 broadcast domain. There is no DHCP relay and all IP addresses are assigned from a single pool.

**Figure 9** Auto-provisioning with all Components in a Layer 2 Broadcast Domain

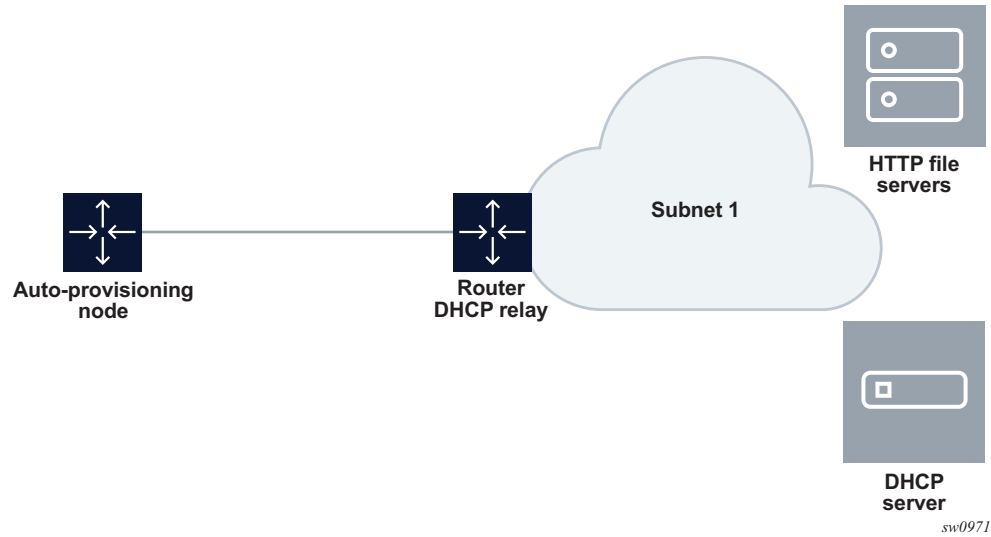


- **file servers and DHCP server in the same subnet, separate from the node**



Figure 10 shows the scenario, where only the file servers and DHCP server are in the same subnet. DHCP relay is used to fill Option 82 as the gateway address. The gateway address is used to find the appropriate pool in the DHCP server to assign the correct subnet IP address to the system.

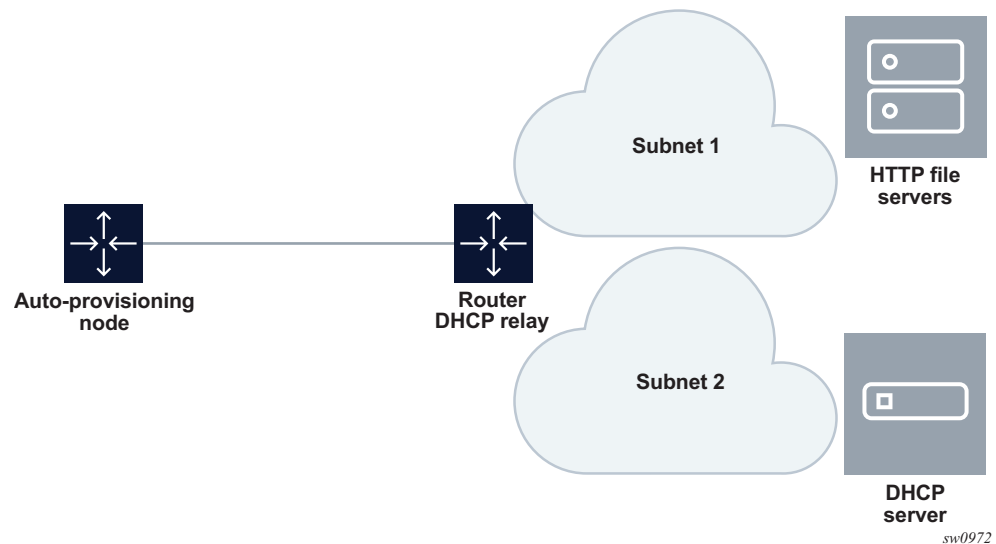
**Figure 10** Auto-provisioning with all Components in a Layer 2 Broadcast Domain



DHCP allows the Option 3 router to define the default gateway. If multiple addresses are provided using Option 3, the first address is used for the default gateway.

- **node, file servers, and DHCP server in different subnets**

Figure 11 shows the scenario, where all components are in different subnets. DHCP relay adds the Option 82 gateway address to the DHCP request, and the DHCP server adds the Option 3 gateway address of the file server.

**Figure 11 Auto-provisioning with all Components in Different Subnets**

## 6.2 ZTP Processes

ZTP consists of the following processes:

- auto-boot process
- auto-provisioning process

### 6.2.1 Auto-boot Process

In this process, the node discovers and provisions the chassis and installed cards.

1. The node is powered up.
2. The out-of-band management port is checked for link connectivity. If a link is not found, the in-band management ports are checked for a link.
3. The first two card or MDA slots are auto-provisioned based on the installed card types. See [ZTP Overview](#) for information about the specific card or MDA slots that are used.
4. The auto-boot process switches control to the auto-provisioning process.

See [Auto-boot Process](#) for more information about the auto-boot process.

## 6.2.2 Auto-provisioning Process

In this process, the node detects operational ports, attempts to discover its IP address, and downloads the relevant files for provisioning.

1. The node sends a DHCP discovery request to the DHCP server using the out-of-band management port. If DHCP discovery is unsuccessful, the node reattempts it using the in-band management ports.
2. After DHCP discovery is successful, the DHCP server returns an IPv4 or IPv6 FTP or HTTP URL of a file server from which the node can retrieve provisioning information.
3. The node downloads the provisioning information and performs the auto-provisioning according to the specifications in the files.
4. After the node is successfully provisioned, it automatically reboots and becomes operationally up.

See [Auto-provisioning Process](#) for more information about the auto-provisioning process.

The SR OS can also initiate the auto-provisioning process using a **tools** command.

## 6.3 DHCP Support for ZTP

This section provides information about DHCP messages, DHCP clients, and DHCP servers that are supported by ZTP.

### 6.3.1 DHCP Server Offer Options 66, 67, and 43

Options 66, 67, and 43 are supported for indicating the location of the provisioning file. If both Options 66 and 67 are present in the DHCP offer, they take precedence over Option 43.

Option 66 contains the server URL or IP address, and Option 67 contains the URL of the provisioning file location.

Options 66 and 67 are meant for use by PXE TFTP, but are also used for HTTP and FTP. If an offer arrives with Options 66 and 67, Option 66 should resolve the server IP address and Option 67 should resolve the file location. Option 66 can be omitted by the provider, in which case Option 67 is used for both the server IP address and provider file URL. If an offer arrives with Option 67 only, it should resolve both the server IP address and file URL.

The auto-provisioning process distinguishes the host part of the URL and can resolve it using DHCP DNS.

### 6.3.1.1 Nokia-specific TLV

The Nokia-specific TLV is NOKIA-DCTOR-AUTOCONFIG. The location of the BOF for each system to use is configured in the optional **autoboot** file parameter, which is a standard Option 43 value initialized at the beginning of the process. The BOF location is sent in Option 43 as part of the DHCP offer and Ack messages from the DHCP server to the system. The system uses the location specified in Option 43 to initiate an FTP download of the BOF.

## 6.3.2 Supported DHCP Client Options for ZTP

Table 31 lists the supported DHCP client options for ZTP.

**Table 31** Supported DHCP Client Options for ZTP

Options	DHCP IPv4 Option	IPv4 Comments	DHCP IPv6 Option	IPv6 Comments
Lease time	Option 51	Always infinite	—	—
Requested option list	Option 55	—	—	—
Client ID	Option 61	Default is chassis serial ID	Option 1 (DUID)	Type 2 — vendor-assigned unique ID (default with chassis serial ID) Type 3 — link-layer address
User class	Option 77	<i>"platform;timos-release;ztp"</i>	Option 15	<i>"platform;timos-release;ztp"</i>

**Table 31 Supported DHCP Client Options for ZTP (Continued)**

Options	DHCP IPv4 Option	IPv4 Comments	DHCP IPv6 Option	IPv6 Comments
Class ID	Option 60	“NOKIA: FmtChassisType Strings”	—	—

### 6.3.3 Supported DHCP Server Options for ZTP

Table 32 lists the supported DHCP server options for ZTP.

**Table 32 Supported DHCP Server Options for ZTP**

Options	DHCP IPv4 Option	IPv4 Comments	DHCP IPv6 Option	IPv6 Comments
Subnet mask	Option 1	—	—	—
Router	Option 3	Default gateway	—	—
DNS server	Option 6	DNS server	—	—
Lease time	Option 51	Must be infinite	—	—
Server address	Option 54	Identifies the DHCP server	—	—
Classless static route	Option 121	Used to install static routes	—	—
NTP server	Option 42	Future support	Option 56	Future support
TFTP server name	Option 66	Server IP address	—	—
Bootfile name	Option 67	URL of the file Can be used without Option 66, in which case it will contain the server name and the URL	Option 59	Server name and URL of the file

**Table 32 Supported DHCP Server Options for ZTP (Continued)**

Options	DHCP IPv4 Option	IPv4 Comments	DHCP IPv6 Option	IPv6 Comments
Vendor-specific options (See <a href="#">Nokia-specific TLV</a> )	Option 43	Nokia proprietary file location Can be used instead of Options 66 or 67, but Options 66 and 67 take precedence over Option 43	Option 17	Nokia proprietary file location Can be used instead of Option 59, but Option 59 takes precedence over Option 17

## 6.3.4 DHCP Discovery and Solicitation

IPv4 DHCP discovery and IPv6 DHCP solicitation are supported.

IPv4 DHCP discovery messages and IPv6 DHCP solicitation messages are sent from out-of-band and in-band management ports with active links. The first valid DHCP offer for the address family that arrives on the node is used.

In the BOF, the auto-boot option can be configured to send out IPv4, IPv6, or both IPv4 and IPv6 DHCP requests.

### 6.3.4.1 DHCP Discovery (IPv4 and IPv6)

This section describes DHCP discovery options.

#### 6.3.4.1.1 DHCP Discovery Options 61 and 77

The SR OS supports both Option 61 (client ID) and Option 77 (user class) DHCP discovery options.

Option 61 provides the client ID; the serial ID of the chassis is used by default. Option 61 is used for DHCP server pool selection. By default, the chassis serial ID is sent in Option 61 with a type of 0. This option is configurable using the **bof auto-boot [client-identifier {string | hex | chassis-mac}]** command.

Option 77 provides the user class, describing what the device is and other information, such as the OS version. This option is set automatically, but can be removed using the BOF configuration. For example, the user can omit **include-user-class** in the BOF auto-boot configuration, to avoid sending Option 77.

For ZTP, the DHCP discovery message should be sent with Option 77; the following information is automatically configured:

```
platform;timos-release;ztp
```

For auto-provisioning, Option 77 should use the following information:

```
platform;timos-release;AP
```

#### 6.3.4.1.2 DHCP Discovery Option 1 DUID (IPv6)

By default, the node will use RFC 3315 DUID Type 2 vendor-assigned unique IDs. The value for *enterprise-id* is 6527 and the identifier is the chassis serial number.



**Note:** The system uses the chassis serial number for ZTP pool selection and auto-provisioning.

The option to use Type 3 is configured in the BOF. For MAC, the chassis MAC address is configured in a string format.

Type 1 is not supported.

#### 6.3.4.2 DHCP Solicitation (IPv6)

Unlike IPv4 DHCP offers, which contain the prefix and default route, IPv6 DHCP offers only contain the IP address assignment. The IPv6 route advertisement (RA) provides the default router and the prefix is set to /128 for the IP address supplied by the DHCP server.

For further information about RA support, see [IPv6 DHCP/RA Details](#). For further information about DHCP server offers, see [DHCP Server Offer Options 66, 67, and 43](#).

---

## 6.3.5 IPv4 and IPv6 DHCP Support

The ZTP process supports the use of IPv4 and IPv6 DHCP clients to obtain the provisioning file.

For ZTP processes, the node transmits both IPv4 and IPv6 discovery and solicitation messages. If offers arrive from both IPv4 and IPv6 servers, both offers are cached and the first offer received is processed. If the first offer does not fulfill the ZTP requirements and is rejected, the second offer is processed and accepted or rejected. If both offers received on an interface are rejected, ZTP will go to the next interface.

The provisioning file only allows file transfer in the address family of the DHCP offer that is used. If the offer is IPv4, the provisioning files are downloaded using IPv4. If the offer is IPv6, the provisioning files are downloaded using IPv6.

### 6.3.5.1 IPv4 Route Installation Details

Option 3 (default route) and Option 121 (classless static route) are supported for IPv4 DHCP.

For identical routes with different next hops, only the first route is installed and the second route is kept as a backup route. ECMP is not supported.

There is no route limit for Option 121.

### 6.3.5.2 IPv6 DHCP/RA Details

IPv6 DHCP offers do not contain an IP prefix. The IPv6 prefix is usually obtained from the IPv6 RA arriving from the upstream router. For ZTP, the 7750 SR is a host; therefore, the system assigns a /128 prefix to the IPv6 address obtained from the DHCP offer.

The 7750 SR supports the use of an IPv6 RA to install IPv6 default and static routes from upstream routers. The system installs all the routes advertised using the RA. If the same route has been advertised from multiple upstream routers (next hops), the system installs the route with the highest preference. The 7750 SR does not support ECMP if the same route is advertised from multiple next hops by multiple RAs.



In accordance with RFC 4861 recommendations, the 7750 SR ensures that all RAs are obtained before the auto-provisioning process is started for IPv6. RFC 4861 recommends that the host (in this case, the 7750 SR) send a minimum of three route solicitations to increase the likelihood of at least one route solicitation being received by the upstream routers.

Each route solicitation is followed by a 4-second timeout, so the third route solicitation is sent 8 seconds after the first. The upstream routers must respond within 0.5 seconds. As a result, the 7750 SR receives all RAs and routes within 8.5 seconds of the first route solicitation, and will wait a maximum of 9 seconds to receive all RAs; ZTP always waits 20 seconds to receive all RAs, however, only the first RA received will be used.

### 6.3.5.3 ZTP and DHCP Timeouts

The ZTP timeout interval is 30 minutes. After each ZTP timeout, the node reboots and reattempts the ZTP process. The node does not reboot if the ZTP timeout interval expires while the node is executing a DHCP offer or downloading files. The node executes the DHCP offer until it succeeds or fails, at which point the node reboots; if the offer is successful, the node comes up in normal operation mode.

The DHCP timeout interval is 20 seconds. If a DHCP offer is not received within the DHCP timeout interval, the auto-provisioning process is reattempted using the next valid interface.

## 6.4 ZTP Procedure Details

This section describes ZTP procedures including node bootup, BOF, auto-provisioning, logs, and events.

### 6.4.1 Node Bootup

After the node is powered up, the BOF is examined for the **auto-boot** flag status. If the **auto-boot** flag is set in the bof.cfg file, the node goes into ZTP mode. If the **auto-boot** flag is not set in the bof.cfg file, the node continues booting normally.

If it is in ZTP mode, the node provisions all hardware necessary for the ZTP process. This includes the fabric, the first two card slots, and the MDAs for the first two card slots. The node then checks for links on the management (Mgmt) port and valid Ethernet ports.



**Note:** A bof.cfg file with the **auto-boot** flag enabled can be shipped as an orderable part with the applicable software license. The auto-boot flag can also be set using the **bof>auto-boot** command.

For more information about the BOF, see [BOF](#).

### 6.4.1.1 Reinitiating ZTP During Normal Node Bootup

ZTP can be reinitiated any time by setting the **auto-boot** flag and configuring the flag options in the BOF. After the auto-boot flag is set, any reboot forces the node into ZTP mode, including DHCP discovery, and downloading and reprocessing the provisioning file. The old BOF is kept in the storage medium until the ZTP process is successful, then the old BOF information is overwritten. If an unsuccessful ZTP process is interrupted and the **auto-boot** flag is removed, the node boots using the old BOF.

## 6.4.2 BOF

Two versions of each supported 7750 SR platform software license are currently available: one for non-ZTP bootup, and one for ZTP bootup. Software packages for ZTP bootup contain a bof.cfg file with the **auto-boot** flag set, which causes the node to automatically boot up in ZTP mode and execute ZTP processes.

The **auto-boot** flag contains the following information:

- **client ID**

The client ID is sent to the DHCP server to identify the chassis or node and to find a pool for the DHCP offer. If no client ID is configured, the chassis serial number is sent.

This option is used for both IPv4 client ID and IPv6 DUID Type 2.

- **port (port:vlan)**

The port is used to send DHCP discovery; the port number must be configured manually in the BOF.

For more information about the BOF, see [Boot Options](#).

---

### 6.4.2.1 SD Card and Compact Flash Support

Nokia recommends that the provisioning file be downloaded to an SD card, and the BOF should point to the SD card for imaging and configuration.

The BOF does not support loading from the network using HTTP or HTTPS.

### 6.4.3 Auto-boot Process

This section describes the ZTP auto-boot process.

#### 6.4.3.1 Options and Option Modification

By default, the auto-boot process scans all ZTP-enabled ports to find a port with an operational link. The scanned ports include:

- out-of-band management port (Mgmt port)
- Ethernet ports on the first two card or MDA slots (used for in-band management)



**Note:** For breakout connectors, only the first breakout port in the connector can be used for ZTP.

ZTP will attempt to discover the node IP via DHCP and will identify the node using DHCP client ID Option 61 (IPv4) or Option 1 (IPv6). The client ID uses the chassis serial number by default. The chassis serial number is visible on the shipping box of the chassis.

[Table 31](#) lists the default DHCP client options for ZTP. Some client options can be manually configured in the BOF using the **bof>auto-boot** command.

The optional **auto-boot** command parameters are as follows:

- **[management-port]**  
This keyword specifies that ZTP should only be performed using the out-of-band management port (Mgmt port).
- **[in-band [vlan *vlan-id*]]**

This keyword specifies that ZTP should only be performed using Ethernet ports on the first two card or MDA slots. The *vlan-id* parameter can be used to specify an in-band VLAN to use for the auto-boot process.

- **[ipv4] [ipv6]**

These keywords specify that IPv4 discovery, IPv6 discovery, or both, should be performed. If both keywords are specified, the system will dual-stack.

- **[client-identifier {string *ascii-string* | hex *hex-string* | chassis-mac}]**

These parameters identify the node to the DHCP server and find a pool for DHCP offers. This information is sent using Option 61 (IPv4) or Option 1 (IPv6). If the parameters are not configured, the chassis serial number is sent by default. This option is used for both IPv4 client ID and IPv6 DUID Type 2.

- **[include-user-class]**

This keyword specifies that Option 77 should be included.

The **auto-boot** options can be modified using the **bof>auto-boot** command, or by interrupting the bootup process and manually modifying the *bof.cfg* file.



**Caution:** Manually modifying the *bof.cfg* file is not recommended. When modifying **auto-boot** options using CLI, all required options must be explicitly configured because the default cases will no longer be used. When modifying the *bof.cfg* file manually, the format must be correct.

### 6.4.3.2 CLI Access

The auto-boot process is executed in the background and does not block CLI usage. The user can enter CLI commands while the auto-boot process is running in the background. A warning message is displayed to notify the user that the auto-boot process is being executed. Any configurations performed using the CLI may be lost when the node reboots following successful auto-boot and auto-provisioning processes. After the node has finished booting and if the **auto-boot** flag is set in the BOF, the node displays the login prompt.

The user can access the CLI using a console and can change and save the BOF configuration; the user can remove or modify the **auto-boot** parameter in the BOF.

### 6.4.3.3 Interrupting Auto-boot

The auto-boot process can be interrupted using the **tools>auto-boot terminate** command. After the auto-boot process is terminated, use the **bof>auto-boot** command to modify the **auto-boot** flag.



**Note:** The **auto-boot** flag can also be modified without interrupting the auto-boot process.

## 6.4.4 Auto-provisioning Process

This section describes the ZTP auto-provisioning process.

See [Provisioning Files](#) for information about files that are downloaded during the auto-provisioning process.

### 6.4.4.1 Auto-provisioning Procedure

After the node enters ZTP mode, the auto-discovery process is executed to provision the necessary hardware for node discovery.

The following are the operational steps of the auto-discovery process.

1. DHCP is used to discover the IP address of the node.
2. Options 66 and 67, or Option 43 is used to find and download the provisioning file.

The provisioning file includes the location of necessary files, such as configuration information, system image, and licenses, along with the DNS needed to resolve these location URLs. The file also includes BOF information required to boot the node into operational mode.

3. The provisioning file is executed to download the named files to the node.
4. After all files are successfully downloaded, the node is rebooted and the **auto-boot** flag is cleared from the BOF.

After the node reboots, it comes up in normal operational mode.

The node can be put back into ZTP mode by editing the BOF to include the **auto-boot** flag and saving the BOF. Doing so causes the node to enter ZTP mode after it is rebooted.

---

Use one of the following methods to run the auto-provisioning process.

- **automatic execution**

The auto-boot process will automatically execute the auto-provisioning process if the **auto-boot** flag is set in the BOF.

- **manual execution**

The auto-provisioning process can be executed manually using the **tools>perform>system>auto-node-provisioning** command.

If the auto-provisioning process is executed manually, only interfaces without IP addresses are considered part of the discovery mechanism. Additionally, while the process is running, it will attempt to discover DHCP servers using all card or MDA slots and ports with Layer 3 interfaces that do not have IP addresses.



**Note:** Using the **tools>perform>system>auto-node-provisioning** command while the auto-boot process is running is not allowed.

#### 6.4.4.2 Out-of-band Management Versus In-band Management

The auto-provisioning process can use the out-of-band management port (Mgmt port) or in-band management on Ethernet ports.

The node attempts the auto-provisioning process using any port with an operational link, starting with the out-of-band management port. If the node cannot be discovered using the out-of-band management port, either because the port is down or is not receiving a DHCP offer from the DHCP server, the process is reattempted using the Ethernet ports. If the Ethernet ports fail, the management port is tried again and the cycle repeats sequentially.

The following operational guidelines apply to in-band and out-of-band management ports.

- Out-of-band management and in-band management support untagged frames.
- Out-of-band management does not support dot1q (VLAN tags).
- In-band management supports dot1q interfaces if the VLAN is correctly configured in the BOF.
- VLAN discovery is not supported.

If out-of-band management is used, no card or MDA provisioning is necessary and the auto-provisioning process executes as soon as an active link is detected on the Mgmt port.

To use out-of-band management exclusively, use the **bof>auto-boot management-port** command.

To use in-band management exclusively, use the **bof>auto-boot inband [vlan *vlan-id*]** command.

#### 6.4.4.2.1 Supported In-band Management Ports

See [ZTP Overview](#) for information about which ports support in-band management for ZTP.

### 6.4.5 Provisioning Files

Provisioning files are created by the operator, based on requirements and the locations of the necessary files. A provisioning file contains the locations and URLs of critical files, such as the system image, configuration information, and necessary licenses, and can also contain DNS server information used to resolve these locations.

A provisioning file consists of two main parts:

- location of file types

Contains locations of the following file types:

- system image
- configuration information
- licenses

These items can be downloaded using FTP or HTTP; DNS server information can also be included.

- BOF information

BOF information can be loaded on the node after the ZTP processes are completed; the BOF portion of the file must be formatted correctly.



**Caution:** Ensure that the **auto-boot** flag is not set on the BOF that will be downloaded by the auto-provisioning process. Failure to do so will cause the node to go back into ZTP mode after it reboots.

The provisioning file is stored on the SD card and can be executed using the **tools>perform>system>auto-node-provisioning>file** command to re-download the named files.

---

### 6.4.5.1 Provisioning File Download

The provisioning file location is discovered using DHCP offer Options 66, 67, or 43, and is downloaded using HTTP only.

The provisioning file URL can be resolved using DNS, in which case up to three DNS server IP addresses should be present in the DHCP offer using Option 6 (IPv4). The DHCP DNS is only used for resolving the provisioning file URL, and not for resolving the URLs of the files named within the provisioning file.

ZTP does not support Option 15 domain names; the URL of the provisioning file should be in "*host/domain*" format, or a simple IP address should be used.

### 6.4.5.2 Provisioning File Resolution Using DNS

If the downloaded provisioning file includes a DNS IP in the DNS section of the file, the URLs of the files in the provisioning file must be resolved using this DNS server or by the DNS server listed in the DHCP offer.

Up to three DNS addresses (primary, secondary, tertiary) can be listed in the DNS section of the provisioning file. If all three DNS addresses are listed, they are attempted in the order they are listed, to resolve the file URLs.

### 6.4.5.3 File Download and Redundancy

Up to three locations can be set for each file type, using the `primary-url`, `secondary-url`, and `tertiary-url` fields. The auto-provisioning process attempts to download all files using the `primary-url` information for each file. If this attempt is unsuccessful, the process will reattempt using the `secondary-url` information for each file. If this attempt is not successful, the process will reattempt, using the `tertiary-url` information.

A ZTP operation is considered successful when all files named in the provisioning file are downloaded. If all file locations are attempted and all named files are not successfully downloaded, the auto-provisioning process fails and ZTP will reattempt the provisioning process using the next valid interface.

### 6.4.5.4 Sample Provisioning File

The following output is an example of provisioning file information.



```

dns {
  primary 192.0.2.1
  secondary 192.0.2.2
  tertiary 192.0.2.3
  domain sample.domain.com
}
download {
  image "cf3:/both.tim" {
    primary-url "http://192.168.40.140:81/both.tim"
    secondary-url "http://192.168.40.140:81/both.tim"
    tertiary-url "http://192.168.40.140:81/both.tim"
  }
  image "cf3:/support.tim" {
    primary-url "http://192.168.40.140:81/support.tim"
    secondary-url "http://192.168.40.140:81/support.tim"
    tertiary-url "http://192.168.40.140:81/support.tim"
  }
  config "cf3:/config.cfg" {
    primary-url "ftp://ftpserv:name@192.168.194.50/./images/dut-a.cfg"
    secondary-url "http://192.168.41.140:81/dut-a.cfg"
    tertiary-url "http://192.168.42.140:81/dut-a.cfg"
  }
  file "cf3:/license.txt" {
    primary-url "ftp://ftpserv:name@192.168.194.50/./images/provision_example.cfg"
    secondary-url "http://192.168.41.140:81/dut-a.cfg"
    tertiary-url "http://192.168.42.140:81/dut-a.cfg"
  }
}
bof {
  primary-image cf3:/both.tim
  primary-config cf3:/config.tim
  address 192.168.100.1 active
  autonegotiate
  duplex full
  speed 100
  wait 3
  persist off
  console-speed 115200
}

```

### 6.4.5.5 Proxy Support

HTTP can connect to public servers using a proxy. The proxy is in URL format and the URL must be resolved using the provisioning file DNS.

The proxy can include a username and password. Proxy PAC is not supported.

Proxy information formatting is as follows:

*http://user@hostname:file-path*

*proxy http://ip-or-url user@hostname:port*

## 6.4.6 Logs and Events

ZTP displays detailed events about all stages of the auto-boot and auto-provisioning processes. All events are saved in a log file on the SD card at the end of the ZTP process.

---

## 6.5 ZTP Command Reference

### 6.5.1 Command Hierarchies

#### 6.5.1.1 Configuration Commands

##### bof

- **auto-boot** [management-port] [inband [vlan *vlan-id*]] [ipv4] [ipv6] [client-identifier {string *ascii-string* | hex *hex-string* | chassis-mac}] [include-user-class]
- **no auto-boot**

##### tools

- **auto-boot** {retry | terminate}
- **auto-boot** echo [debugger]
- **no auto-boot** echo [debugger]
- **dump**
  - **auto-boot** [detail]
  - **auto-boot** log
- **perform**
  - **system**
    - **auto-node-provisioning**
      - **file** *provisioning-file-url* [save-provision-file-destination *file-url*] [reboot-on-success]

## 6.5.2 Configuration Commands

### 6.5.2.1 ZTP BOF Commands

#### auto-boot

<b>Syntax</b>	<b>auto-boot</b> [ <b>management-port</b> ] [ <b>inband</b> [ <b>vlan</b> <i>vlan-id</i> ]] [ <b>ipv4</b> ] [ <b>ipv6</b> ] [ <b>client-identifier</b> { <b>string</b> <i>ascii-string</i>   <b>hex</b> <i>hex-string</i>   <b>chassis-mac</b> }] [ <b>include-user-class</b> ] <b>no auto-boot</b>
<b>Context</b>	bof
<b>Description</b>	This command enables the <b>auto-boot</b> flag in the BOF and configures the auto-boot options for ZTP. When modifying <b>auto-boot</b> options using CLI, all required options must be explicitly configured as the default cases will no longer be used.  The <b>no</b> form of this command disables the <b>auto-boot</b> flag.
<b>Default</b>	no auto-boot
<b>Parameters</b>	<b>management-port</b> — Specifies that the out-of-band management port (Mgmt port) should be used for ZTP.  <b>inband</b> — Specifies that in-band management through an Ethernet port should be used for ZTP.  <i>vlan-id</i> — Specifies an in-band VLAN to use for the auto-boot process. <b>Values</b> 0 to 4094  <b>ipv4</b> — Enables IPv4 DHCP discovery. This parameter is mandatory if the <b>ipv6</b> parameter is not specified.  <b>ipv6</b> — Enables IPv6 DHCP solicitation. This parameter is mandatory if the <b>ipv4</b> parameter is not specified.  <i>ascii-string</i> — Specifies a DHCP client identification string, up to 58 ASCII characters, to be used for Option 61 (IPv4) or Option 1 (IPv6).  <i>hex-string</i> — Specifies a DHCP client identification string, up to 116 hexadecimal nibbles, to be used for Option 61 (IPv4) or Option 1 (IPv6). <b>Values</b> 0x0 to 0xFFFFFFFF  <b>chassis-mac</b> — Specifies that the chassis MAC address should be used as the DHCP client identification string for Option 61 (IPv4) or Option 1 (IPv6).  <b>include-user-class</b> — Specifies that Option 77 should be included in DHCP messages.

---

## 6.5.2.2 ZTP Tools Commands

### auto-boot

<b>Syntax</b>	<b>auto-boot {retry   terminate}</b> <b>auto-boot echo [debugger]</b> <b>no auto-boot echo [debugger]</b>
<b>Context</b>	tools
<b>Description</b>	This command starts and stops the auto-boot process. It is also used to enable the display of auto-discovery information in the CLI.  This command can be used only if the <b>auto-boot</b> flag is enabled in the BOF.  The <b>no</b> form of this command disables the display of auto-discovery information.
<b>Parameters</b>	<b>retry</b> — Executes the auto-boot process. <b>terminate</b> — Stops an executing auto-boot process. <b>echo</b> — Enables the display of auto-discovery information in the CLI. <b>debugger</b> — Includes debugging information in the displayed auto-discovery information.

### auto-boot

<b>Syntax</b>	<b>auto-boot [detail]</b> <b>auto-boot log</b>
<b>Context</b>	tools>dump
<b>Description</b>	This command displays auto-boot process information.
<b>Parameters</b>	<b>detail</b> — Displays detailed information. <b>log</b> — Saves auto-boot process information to a log file.

### auto-node-provisioning

<b>Syntax</b>	<b>auto-node-provisioning</b>
<b>Context</b>	tools>perform>system
<b>Description</b>	This command enables the context to configure auto-provisioning process parameters and manually execute the auto-provisioning process.

## file

<b>Syntax</b>	<b>file</b> <i>provisioning-file-url</i> [ <b>save-provision-file-destination</b> <i>file-url</i> ] [ <b>reboot-on-success</b> ]
<b>Context</b>	tools>perform>system>auto-node-provisioning
<b>Description</b>	This command executes the auto-provisioning process. When the auto-provisioning process is executed using the <b>file</b> command, DHCP discovery and solicitation is not performed.
<b>Parameters</b>	<p><i>provisioning-file-url</i> — Specifies the location of the provisioning file.</p> <p><b>Values</b>    <i>local-url, remote-url</i></p> <p><i>local-url</i> — [<i>cflash-id</i>]/<i>file-path</i>; 200 characters max</p> <p><i>remote-url</i> — {ftp   http   https}://[<i>login:password</i>@]<i>remote-locn</i>/<i>file-path</i></p> <p><i>remote-locn</i> — {<i>hostname</i>   <i>ipv4-address</i>   <i>ipv6-address</i>}[<i>:port</i>]</p> <p><i>ipv4-address</i> — a.b.c.d</p> <p><i>ipv6-address</i> — x:x:x:x:x:x[-<i>interface</i>] x:x:x:x:x:d.d.d.d[-<i>interface</i>] x — 0 to FFFF (hexadecimal) d — 0 to 255 (decimal)</p> <p><i>port</i> — 0 to 65535</p> <p><i>cflash-id</i> — cf1:m cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</p> <p><i>file-url</i> — Specifies the location to save the provisioning file.</p> <p><b>Values</b>    [<i>cflash-id</i>]/<i>file-path</i></p> <p><i>cflash-id</i> — cf1:m cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</p> <p><b>reboot-on-success</b> — Reboots the router when the auto-provisioning process completes successfully.</p>

## 7 Tools Commands

The tools commands provide two primary functions:

- dump
- perform

The **tools dump** commands are used to provide additional detailed and enhanced information about various aspects of the router.

The **tools perform** commands provide the ability to trigger a variety of actions in the router such as a card power cycle (**tools perform card power-cycle**), APS switchovers, and so on.

Individual tools commands are described in the various User Guides where the associated protocols and features are also described. For example, the **tools dump log subscriptions** command is described in the 7450 ESS, 7750 SR, 7950 XRS, and VSR System Management Guide.





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## 8 System Management

### 8.1 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.

On SR OS routers, it is possible to query the DNS server for IPv6 addresses. By default, the DNS names are queried for A-records only (address-preference is IPv4-only). If the address-preference is set to IPv6 first, the DNS server is queried for AAAA-records first, and if there is no successful reply, then A-records.

#### 8.1.1 System Information

This section describes system information components.

##### 8.1.1.1 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 node's fully-qualified domain name. The system name can be any ASCII-printable text string of up to 64 characters.

##### 8.1.1.2 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 on how to contact this person. The system contact can be any ASCII-printable text string of up to 80 characters.

### 8.1.1.3 System Location

The system location is the MIB II sysLocation object which is a text string conventionally used to describe the node's physical location, for example, "Bldg MV-11, 1st Floor, Room 101". The system location can be any ASCII-printable text string of up to 80 characters.

### 8.1.1.4 System Coordinates

The system coordinates is the Nokia Chassis MIB tmnxChassisCoordinates object. 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>*

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, and 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, examples include:

- 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.

### 8.1.1.5 Naming Objects

Do not configure named objects with a name that starts with "\_tmnx\_", or with "\_" in general.

### 8.1.1.6 Common Language Location Identifier

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.

### 8.1.1.7 DNS Security Extensions

DNS Security (DNSSEC) Extensions are now implemented in the SR OS, allowing operators to configure DNS behavior of the router to evaluate whether the Authenticated Data bit was set in the response received from the recursive name server and to trust the response, or ignore it.

## 8.1.2 System Time

SR-series 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 SR-series routers OS software has options for local time translation as well as system clock synchronization.

### 8.1.2.1 Time Zones

Setting a time zone in SR OS allows for times to be displayed in the local time rather than in UTC. SR OS has 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 in length and is unique 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.

SR OS includes multiple commands to control the presentation of times in either UTC or local time zone format. For a CLI session, the environment variable **time-display** may be set to indicate UTC or local time zone. This setting only affects time strings shown during that specific CLI session. In addition, a global setting of **config>system>time>prefer-local-time** can be used to control time strings for objects with larger scope than a single CLI session, including the following:

- log filenames and log header information
- times in rollback information
- times in rollback and configuration files header information
- times related to CRON scripts
- times in the event handler system

A separate control per log file controls the format of the time strings on the event recorded into the logs (separate from the log filename and header information). Use the **config>log>log-id>time-format** command to set these time strings.

The SR OS system-defined time zones are listed in [Table 33](#), which includes both time zones with and without summer time correction.

**Table 33 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

**Table 33 System-Defined Time Zones (Continued)**

Acronym	Time Zone Name	UTC Offset
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
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 (e.g., Perth)	UTC +8
ACST	Central Standard Time (e.g., Darwin)	UTC +9.5
AEST	Eastern Standard/Summer Time (e.g., Canberra)	UTC +10

### 8.1.2.2 Network Time Protocol (NTP)

NTP is the Network Time Protocol defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis* and RFC 5905, *Network Time Protocol Version 4: Protocol and Algorithms Specification*. It allows for the participating network nodes to keep time more accurately and more importantly they can maintain time in a more synchronized fashion between all participating network nodes.

NTP uses stratum levels to define the number of hops from a reference clock. The reference clock is considered to be 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 higher stratum levels are separated from the stratum-1 server over a network path, thus, 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.

SR OS routers normally operate as a stratum-2 or higher device. The router relies on an external stratum-1 server to source accurate time into the network. However, SR OS also allows for the use of the local PTP recovered time to be sourced into NTP. In this latter case, the local PTP source appears as a stratum-0 server and SR OS advertises itself as a stratum-1 server. Activation of the PTP source into NTP may impact the network NTP topology because the SR OS router is promoted to stratum 1.

SR OS router runs a single NTP clock which then operates NTP message exchanges with external NTP clocks. Exchanges can be made with external NTP clients, servers, and peers. These exchanges can be through the base, management, or VPRN routing instances.

NTP operates associations between clocks as either client or server, symmetric active and symmetric passive, or broadcast modes. These modes of operation are applied according to which elements are configured on the router. To run server mode, the operator must enable NTP server mode for the base and each desired VPRN routing instance. To run client mode, the operator must configure external servers. If both the local router and remote router are configured with each other as peers, then the router operates in symmetric active mode. If only one side of the association has peering configured, then the modes are symmetric passive. To operate using broadcast mode, interfaces must be configured to transmit as broadcast servers or receive as broadcast clients.

NTP server operation for both unicast and broadcast communication within a VPRN is configured within the VPRN (refer to the NTP Within a VPRN Service section in *7450 ESS, 7750 SR, 7950 XRS, and VSR Layer 3 Services Guide: IES and VPRN*).



**Note:** NTP provides lightweight synchronization across a network for alignment of system time for logging purposes. NTP does not provide the high accuracy time needed for the on-air applications of the mobile base stations. The more recent PTP protocol has been developed for these applications (see [Network Synchronization](#)).

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. The node, by default, transmits NTP packets in NTP version 4 mode.
- Authentication keys — Authentication keys implement increased security support in carrier and other networks. Both DES and MD5 authentication are supported, as well as multiple keys.
- Operation in symmetric active mode — This capability requires that NTP be 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.
- Server and peer addressing using IPv6 — Both external servers and external peers may be defined using IPv6 or IPv4 addresses. Other features (such as multicast, broadcast) use IPv4 addressing only.
- Broadcast or multicast modes — When operating in these modes, the node receives or sends using either a multicast (default 224.0.1.1) or a broadcast address. Multicast is supported only on the CPM MGMT port.
- 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, then SNTP transitions to an operationally down state. If NTP is removed from the configuration or shut down, then SNTP resumes an operationally up state.
- Gradual clock adjustment — As several applications (such as Service Assurance Agent (SAA)) can use the clock, and if determined that a major (128 ms or more) adjustment needs to be performed, the adjustment is performed by programmatically stepping the clock. If a minor (less than 128 ms) adjustment must be performed, then the adjustment is performed by either speeding up or slowing down the clock.
- In order to avoid the generation of too many events/trap the NTP module rates limit the generation of events/traps to three per second. At that point a single trap is generated that indicates that event/trap squashing is taking place.

---

### 8.1.2.3 SNTP Time Synchronization

For synchronizing the system clock with outside time sources, the SR OS includes a Simple Network Time Protocol (SNTP) client. As defined in RFC 2030, SNTP Version 4 is an adaptation of the Network Time Protocol (NTP). SNTP typically provides time accuracy within 100 milliseconds of the time source. SNTP can only receive the time 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.

SNTP 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. External servers may only be specified using IPv4 addresses.

In the SR OS, the SNTP client can be configured for either broadcast or unicast client mode.

### 8.1.2.4 CRON

The CRON feature supports periodic and date and time-based scheduling in SR OS. CRON can be used, for example, to schedule Service Assurance Agent (SAA) functions. CRON functionality includes the ability to specify scripts that need to be run, when they are scheduled, including one-time only functionality (one-shot), interval and calendar functions. 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 supports the schedule element. The schedule function configures the type of schedule to run, including one-time only (one-shot), periodic, or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute, and interval (seconds).



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## 8.2 High Availability

This section discusses the high availability (HA) routing options and features available to service providers that help diminish vulnerability at the network or service provider edge and alleviate the effect of a lengthy outage on IP networks.

High availability is an important feature in service provider routing systems. High availability is gaining momentum due to the unprecedented growth of IP services and applications in service provider networks 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. High availability 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 popularity of high availability routing is evident at the network or service provider edge where thousands of connections are hosted and rerouting options around a failed piece of equipment can often be limiting. Or, a single access link exists to a customer because of additional costs for redundant links. As service providers converge business-critical services such as real-time voice (VoIP), video, and VPN applications over their IP networks, high availability becomes much more stringent compared to the requirements for best-effort data. Network and service availability become critical aspects when offering advanced IP services which dictates that IP routers that are used to construct the foundations of these networks be resilient to component and software outages.

For high availability configuration information, see [Synchronization and Redundancy](#).

### 8.2.1 HA Features

As more and more critical commercial applications move onto the IP/MPLS networks, providing high availability services becomes increasingly important. This section describes high availability features for routers. Most of these features only apply to routers with two Control Processor Modules (CPM).

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## 8.2.1.1 Redundancy

The redundancy features enable the duplication of data elements and software functionality to maintain service continuation in case of outages or component failure.

Refer to the *7450 ESS, 7750 SR, and VSR Multiservice Integrated Service Adapter and Extended Services Appliance Guide* for information about redundancy for the Integrated Service Adapter (ISA).

### 8.2.1.1.1 Software Redundancy

Software outages are challenging even when baseline hardware redundancy is in place. There should be a balance to provide high availability routing otherwise router problems typically propagate not only throughout the service provider network, but also externally to other connected networks possibly belonging to other service providers. This could affect customers on a broad scale. Presently, there are several software availability features that contribute to the percentage of time that a router is available to process and forward traffic.

To fully appreciate high availability, you should realize that 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 for the 7750 SR and 7950 XRS only.

Therefore, router software has to recover faster than the specified time interval to maintain up time.

### 8.2.1.1.2 Configuration Redundancy

Features configured on the active device CPM are saved on the standby CPM as well. When the active device CPM fails, these features are brought up on the standby device CPM that takes over the mastership.

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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 since it must first re-initialize connections by bringing up Layer 2 connections and Layer 3 routing protocols and then rebuild routing tables.
- Hot standby — The router image, configuration, and network state is already loaded on the standby and it receives continual updates from the active route processor and the swapon is immediate. However, hot standby affects conventional router performance as more frequent synchronization increases consumption of system resources. Nokia's newer generation service routers address this issue because they already have extra processing built into the system.

#### 8.2.1.1.3 Component Redundancy

Component redundancy is critical to reduce MTTR for the system and primarily consists of the following router features:

- Dual route processor modules — For a highly available architecture, redundant Control Processor Modules (CPM) are essential. The route processing functions of the CPM calculate the most efficient route to an Internet destination and communicate the best path information to peer routers. Rapid information synchronization between the primary and secondary CPMs is crucial to minimize recovery time.
- Switch fabric (SFM) redundancy — Failure of a single switch fabric card with little to no loss of traffic.
- Redundant line cards — LAG, ECMP and other techniques to spread traffic over multiple line cards so that a failure of one line card does not impact the services being delivered.
- Redundant power supply — A power module can be removed without impact on traffic.
- Redundant fan — Failure of a fan module without impacting traffic.
- Hot swap — Components in a live system can be replaced or become active without taking the system down or affecting traffic flow to/from other modules.

---

Router hardware architecture plays a key role in the availability of the system. The principle router architecture styles are centralized and distributed. In these architectures, both active and standby route processors, I/O modules (IOMs) (also called line cards), fans, and power supplies maintain a low MTTR for the routing system.

However, in a centralized architecture, packet processing and forwarding is performed in a central shared route processor and the individual line cards are relatively simple. The cards rely solely on the route processor for routing and forwarding intelligence and, should the centralized route processor fail, there is greater impact to the system overall, as all routing and packet forwarding stops.

In a distributed system, the packet forwarding functionality is situated on each line card. Distributing the forwarding engines off the central route processor and positioning one on each line card lowers the impact of route processor failure as the line cards can continue to forward traffic during an outage.

The distributed system is better suited to enable the convergence of business critical services such as real-time voice (VoIP), Video, and VPN applications over IP networks with superior performance and scalability. The centralized architecture can be prone to performance bottleneck issues and limits service offerings through poor scalability which may lead to customer and service SLA violations.

#### **8.2.1.1.4 Service Redundancy**

All service-related statistics are kept during a switchover. Services, SDPs, and SAPs remains up with a minimum loss of forwarded traffic during a CPM switchover.

#### **8.2.1.1.5 Accounting Configuration Redundancy**

When there is a switchover and the standby CPM becomes active, the accounting servers are checked and if they are administratively up and capable of coming online (media present, and so on), the standby is brought online and new accounting files are created at that point. Users must manually copy the accounting records from the failed CPM.

## 8.2.1.2 Nonstop Forwarding

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 IOMs, XCMs and XMAAs.

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. 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, and also requires that surrounding routers adhere to separate extension standards for each protocol. Every router vendor must support protocol extensions for interoperability.

## 8.2.1.3 Nonstop Routing (NSR)

With NSR on the SR-series router devices, 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 such that routing topology and reachability are not affected, even in the presence of routing updates. NSR achieves high availability through parallelization by maintaining up to date routing state information, at all times, on the standby route processor. This capability is achieved independently of protocols or protocol extensions, providing a more robust solution than graceful restart protocols between network routers.

The NSR implementation on the SR-series routers supports all routing protocols. NSR makes it possible to keep the existing sessions (BGP, LDP, OSPF, etc.) during a CPM switchover, including support for MPLS signaling protocols. Peers do not see any change.

Protocol extensions are not required. There are no interoperability issues and there is no need to define protocol extensions for every protocol. Unlike nonstop forwarding and graceful restart, the forwarding information in NSR is always up to date, which eliminates possible blackholes or forwarding loops.

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Traditionally, addressing high availability issues have been patched through non-stop forwarding solutions. With the implementation of NSR, these limitations are overcome by delivering an intelligent hitless failover solution. This enables a carrier-class foundation for transparent networks, required to support business IP services backed by stringent SLAs. This level of high availability poses a major issue for conventional routers whose architectural design limits or prevents them from implementing NSR.

### 8.2.1.4 CPM Switchover

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 can 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 configure a batch file that executes after failover by using the **`config system switchover-exec`** CLI command.

### 8.2.1.5 Synchronization

Synchronization between the CPMs includes the following:

- [Configuration and boot-env Synchronization](#)
- [State Database Synchronization](#)

#### 8.2.1.5.1 Configuration and boot-env Synchronization

Configuration and boot-env synchronization are supported in **`admin>redundancy>synchronize`** and **`config>redundancy>synchronize`** contexts.

### 8.2.1.5.2 State Database Synchronization

If a new standby CPM is inserted into the system, it synchronizes with the active CPM upon a successful boot process.

If the standby CPM is rebooted, it synchronizes with the active CPM upon a successful boot process.

When configuration or state changes occur, an incremental synchronization is conducted from the active CPM to the standby CPM.

If the synchronization fails, the standby does not reboot automatically. The **show redundancy synchronization** command displays synchronization output information.

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the **admin reboot standby** command on the active or the standby CPM.

## 8.3 Synchronization and Redundancy

SR-series routers supporting redundancy use a 1:1 redundancy scheme. Redundancy methods facilitate system synchronization between the active and standby Control Processor Modules (CPMs) so they maintain identical operational parameters to prevent inconsistencies in the event of a CPM failure.

When automatic system synchronization is enabled for an entity, any save or delete file operations 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:, cf2:, and cf3:).

Synchronization can occur either:

- **Automatically** — Automatic synchronization is disabled by default. To enable automatic synchronization, the **config>redundancy>synchronization** command must be specified with either the **boot-env** parameter or the **config** parameter.

When the **boot-env** parameter is specified, the BOF, boot.ldr, config, and image files are automatically synchronized. When the **config** parameter is specified, only the config 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, the **admin>redundancy>synchronization** command must be entered with the **boot-env** parameter or the **config** parameter.

When the **boot-env** parameter is specified, the BOF, boot.ldr, config, and image files are synchronized. When the **config** parameter is specified, only the config files are synchronized.

The following shows the output displayed during a manual synchronization of configuration files.

```
A:ALA-12>admin>redundancy# synchronize config
Syncing configuration.....

Syncing configuration.....Completed.
A:ALA-12#
```



### 8.3.1 Active and Standby Designations

Typically, the first Switch Fabric (SF)/CPM card installed in a redundant SR-series router chassis assumes the role as active, regardless of being inserted in Slot A or B. The next CPM installed in the same chassis then assumes the role as the standby CPM. If two CPM are inserted simultaneously (or almost simultaneously) and are booting at the same time, then preference is given to the CPM installed in Slot A.

If only one CPM is installed in a redundant router device, then it becomes the active CPM regardless of the slot it is installed in.

The active and standby designations can be visually determined by LEDs on the CPM/CCM faceplate. Refer to the appropriate platform *Installation* Guide for LED indicator details.

The following output 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.

The following is an example of the 7950 XRS output:

```
*A:7950 XRS-20# show card
=====
Card Summary
=====
Slot   Provisioned Type           Admin Operational  Comments
      Equipped Type (if different) State State
-----
1      xcm-x20                    up   provisioned
A      cpm-x20                    up   up/active
B      cpm-x20                    up   up/standby
=====
```

The following console message displays when a CPM boots, sees an active CPM, and becomes the standby CPM:

```
...
Slot A contains the Active CPM
This CPM (Slot B) is the Standby CPM
```

### 8.3.2 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 then comes back online, it becomes the standby CPM.

When the standby CPM comes online, the following output is shown:

```

Active CPM in Slot A has stopped
Slot B is now active CPM

Attempting to exec configuration file:
'cf3:/config.cfg' ...

...

Executed 49,588 lines in 8.0 seconds from file cf3:\config.cfg

```

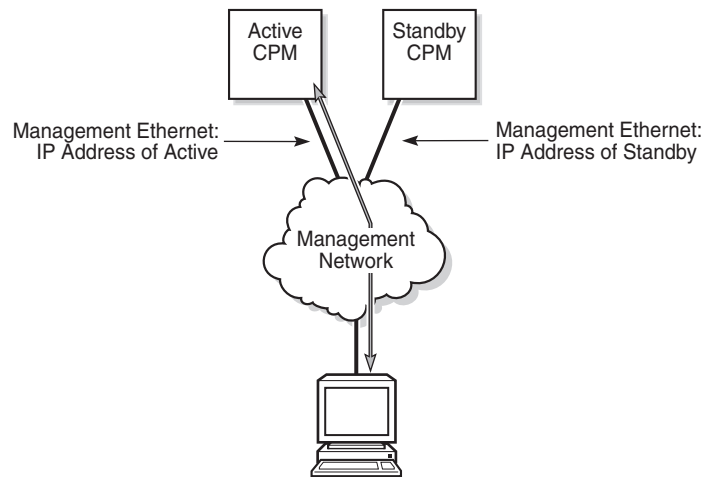
### 8.3.3 OOB Management Ethernet Port Redundancy

The SR OS platform provides a resilient out-of-band (OOB) management Ethernet redundancy mode for system management.

When the management Ethernet port is down on the active CPM, the OOB Ethernet redundancy feature allows the active CPM to use the management Ethernet port of the standby CPM, as shown in [Figure 12](#) and [Figure 13](#).

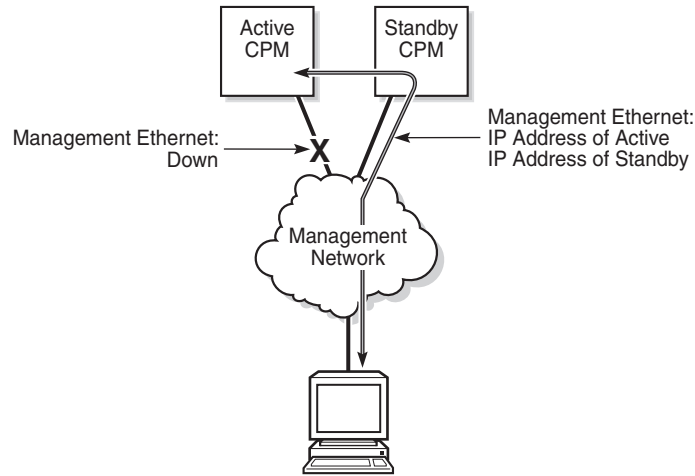
OOB management Ethernet port redundancy is enabled using the `config>redundancy>mgmt-ethernet-redundancy` command.

**Figure 12 Management Ethernet: Normal Mode**



25169

**Figure 13 Management Ethernet: Redundancy Mode**



25168

### 8.3.4 Persistence

The persistence feature on the 7750 SR allows information learned through DHCP snooping across reboots to be kept. This information can include data such as the IP address, MAC binding information, lease length information, and ingress SAP information (required for VPLS snooping to identify the ingress interface). This information is referred to as the DHCP lease-state information.

When a DHCP message is snooped, there are steps that make the data persistent in a system with dual CPMs. In systems with only one CPM, only Step 1 applies. In systems with dual CPMs, all steps apply.

1. When a DHCP ACK is received from a DHCP server, the entry information is written to the active CPM Compact Flash. If writing was successful, the ACK is forwarded to the DHCP client. If persistency fails completely (bad cflash), a trap is generated indicating that persistency can no longer be guaranteed. If the complete persistency system fails the DHCP ACKs are still forwarded to the DHCP clients. Only during small persistency interruptions or in overload conditions of the Compact Flash, DHCP ACKs may get dropped and not forwarded to the DHCP clients.
2. DHCP message information is sent to the standby CPM and also there the DHCP information is logged on the Compact Flash. If persistency fails on the standby also, a trap is generated.

### 8.3.4.1 Dynamic Data Persistency (DDP) Access Optimization for DHCP Leases

A high rate of DHCP renewals can create a load on the compact flash file system when subscriber management and/or DHCP server persistence is enabled. To optimize the access to the Dynamic Data Persistency (DDP) files on the compact flash, a lease-time threshold can be specified that controls the eligibility of a DHCP lease for persistency updates when no other data other than the lease expiry time is to be updated.

```
configure
  system
    persistence
      subscriber-mgmt
        location cf2:
      exit
      dhcp-server
        location cf2:
      exit
      options
        dhcp-lease-time-threshold [days <days>] [hrs <hours>]
        [min <minutes>] [sec <seconds>]
      exit
    exit
  exit
```

When the offered lease time of the DHCP lease is less than the configured threshold, the lease is flagged to skip persistency updates and is installed with its full lease time upon a persistency recovery after a reboot.

The **dhcp-lease-time-threshold** command controls persistency updates for:

- DHCPv4 and DHCPv6 leases for a DHCP relay or proxy (enabled with **persistence subscriber-mgmt**)
- DHCPv4 leases for DHCP snooping in a VPLS service (enabled with **persistence subscriber-mgmt**)
- DHCPv4 and DHCPv6 leases for a DHCP server (enabled with **persistence dhcp-server**)

To check if a DHCP relay or proxy lease is flagged to skip persistency updates, use the **tools dump persistence submgt record record-key** CLI command. When flagged to skip persistency updates, the persistency record output includes “Skip Persistency Updates: true”.

To check if a DHCP server lease is flagged to skip persistency updates, use the **tools dump persistence dhcp-server record** *record-key* CLI command. When flagged to skip persistency updates, the persistency record output includes “lease mode : LT” (LT = Lease Time) and a “lease time : ...” field. When not flagged to skip persistency updates, the persistency record output includes “lease mode : ET” (ET = Expiry Time) and an “expires : ...” field.

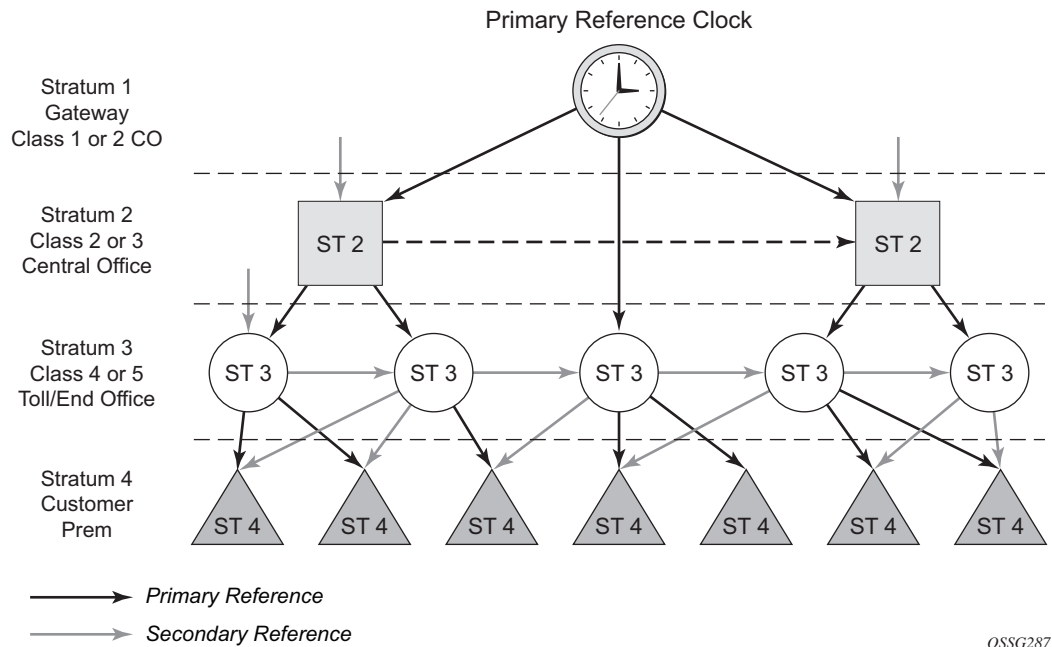
## 8.4 Network Synchronization

This section describes network synchronization capabilities available on SR OS platforms. These capabilities involve multiple approaches to network timing; namely SDH/SONET, Synchronous Ethernet, BITS, and Adaptive clocking and a Precision Time Protocol (PTP) IEEE 1588v2. These features address barriers to entry by:

- Providing synchronization quality required by the mobile space; such as radio operations and circuit emulation services (CES) transport.
- Augmenting and potentially replacing the existing (SONET/SDH) timing infrastructure and delivering high quality network timing for time sensitive applications in the wireline space.

Network synchronization is commonly distributed in a hierarchical master-slave topology at the physical layer as shown in [Figure 14](#).

**Figure 14 Conventional Network Timing Architecture (North American Nomenclature)**



The architecture shown in [Figure 14](#) provides the following benefits:

- 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.

- Uses reliable physical media to provide transport of the timing signal; it doesn't 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 is 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 operates within prescribed network performance specifications without any reference for a specified time-frame. 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 or loop timing. In addition, some TDM channels can use adaptive 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 still get through but downstream devices should not use the recovered line timing as it is be traceable to an acceptable stratum source.

## 8.4.1 Central Synchronization Sub-System

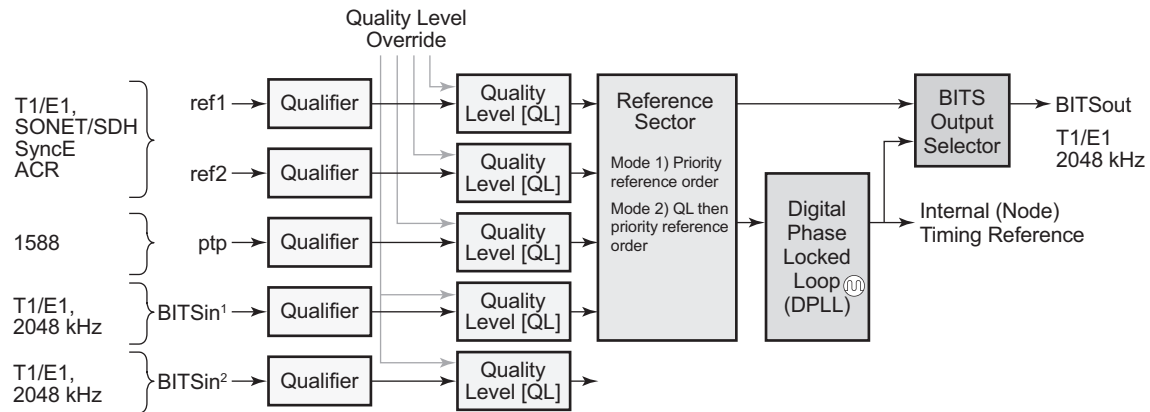
The timing subsystem for the platforms has a central clock located on the CPM (motherboard). The timing subsystem performs many of the duties of the network element clock as defined by Telcordia (GR-1244-CORE) and ITU-T G.781.

The system can select from up to three (7950 XRS) or four (7450 ESS and 7750 SR) timing inputs to train the local oscillator. The priority order of these references must be specified. This is a simple ordered list of inputs: {bits, ref1, ref2, ptp}. The CPM clock output shall have the ability to drive the clocking for all line cards in the system. The routers support selection of the node reference using Quality Level (QL) indications. See [Figure 15](#) for a description of the synchronization selection process for the CPM clock.



**Note:** Not all signals are available on all platforms.

**Figure 15 CPM Clock Synchronization Reference Selection**



al\_0553

The recovered clock can derive its timing from any of the following:

- OC3/STM1, OC12/STM4, OC48/STM16, OC192/STM64 ports (7450 ESS and 7750 SR only)
- T1/E1 CES channel (adaptive clocking) (7750 SR only)
- Synchronous Ethernet ports
- T1/E1 port (7750 SR only)
- BITS port on the CPM or CCM module
- 10GE ports in WAN PHY mode
- IEEE 1588v2 slave port (PTP) (7450 ESS and 7750 SR only)
- SyncE/1588 port on the CPM or the CCM

The BITS ports accept T1 or E1 signal formats. Some hardware also supports the 2048 kHz signal format. The format must be common between all BITSin and BITSout ports.

All settings of the signal characteristics for the BITS input apply to both ports. When the active CPM considers the BITS input as a possible reference, it first considers the BITS input port on the active CPM or CCM followed by the BITS input port on the standby CPM or CCM in that relative priority order. This relative priority order is in addition to the user-definable **ref-order**. For example, a **ref-order** of **bits ref1 ref2** would actually be BITS in (active CPM or CCM), followed by BITS in (standby CPM or CCM), followed by ref1, followed by ref2. When **ql-selection** is enabled, the QL of each BITS input port is viewed independently. The higher QL source is chosen.



When the active CPM considers the SyncE/1588 as a possible reference, the active CPM first considers the SyncE/1588 port on the active CPM or CCM, followed by the SyncE/1588 port on the standby CPM or CCM in that relative priority order. This relative priority order is in addition to the user-definable **ref-order**. For example, a **ref-order** of **syncce ref1 ref2** would actually be SyncE/1588 (active CPM or CCM), followed by SyncE/1588 (standby CPM or CCM), followed by ref1, followed by ref2. When **ql-selection** is enabled, the QL of each SyncE/1588 input port is viewed independently. The higher QL source is chosen.

The restrictions on the location for the source-port or source-bits for **ref1** and **ref2** are listed in [Table 34](#).

**Table 34 Ref1 and Ref2 Timing References**

Platform	Ref1 Slots	Ref2 Slots	Notes
7450 ESS-7	1 to 2	3 to 5	—
7450 ESS-12	1 to 5	6 to 10	—
7750 SR-1	1	1	Ref1 and ref2 cannot be on the same MDA
7750 SR-7	1 to 2	3 to 5	—
7750 SR-12	1 to 5	6 to 10	—
7750 SR-12e	1 to 5	6 to 9	—
7750 SR-a4	1	1	Ref1 and ref2 cannot be on the same MDA. Two CPMs must be installed to allow two references to be used.
7750 SR-a8	1 to 2	1 to 2	Ref1 and ref2 cannot be on the same slot.
7750 SR-1e	1	1	Ref1 and ref2 cannot be on the same MDA
7750 SR-2e	1 to 2	1 to 2	Ref1 and ref2 cannot be on the same MDA
7750 SR-3e	1 to 3	1 to 3	Ref1 and ref2 cannot be on the same MDA
7750 SR-1s	1	1	Ref1 and ref2 cannot be on the same MAC chip. Refer to the <i>7750 SR-1s Installation Guide</i> or use the <b>show datapath</b> command for the mappings.
7750 SR-2s	1 to 2	1 to 2	Ref1 and ref2 cannot be on the same slot.

**Table 34 Ref1 and Ref2 Timing References (Continued)**

Platform	Ref1 Slots	Ref2 Slots	Notes
7750 SR-7s	1 to 6	1 to 6	Ref1 and ref2 cannot be on the same slot. Slot 6 cannot be used if a CPM has been installed in that slot.
7750 SR-14s	1 to 6	1 to 6	Ref1 and ref2 cannot be on the same slot.
7950 XRS-20	1 to 10	1 to 10	Ref1 and ref2 cannot be on the same slot
7950 XRS-20e	1 to 10	1 to 10	Ref1 and ref2 cannot be on the same slot
7950 XRS-40	1 to 10	1 to 10	Ref1 and ref2 cannot be on the same slot

The BITS output ports can be configured to provide either the unfiltered recovered line clock from a line card port or the output of the central clock. The first case would be used if the port was connected to deliver an input reference directly to a dedicated timing device in the facility (BITS or SASE device). The second case would be used to test the quality of the clocking used by the router.

When QL selection mode is disabled, then the reversion setting controls when the central clock can re-select a previously failed reference.

The [Table 35](#) shows the selection followed for two reference in both revertive and non-revertive modes:

**Table 35 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

**Table 35 Revertive, non-Revertive Timing Reference Switching Operation (Continued)**

Status of Reference A	Status of Reference B	Active Reference Non-revertive Case	Active Reference Revertive Case
OK	Failed	A	A
Failed	Failed	holdover	holdover
Failed	OK	B	B
Failed	Failed	holdover	holdover
OK	OK	A or B	A

### 8.4.2 7950 XRS-40 Extension Chassis Central Clocks

The central clock architecture described above applies to each chassis of the 7950 XRS-40. There is a central clock located on each of the CPMs present in the extension chassis. However, there is no configuration for the central clocks on the CPMs of the extension chassis. The central clocks only use the BITS input ports of the extension chassis for their input reference. It is assumed that the quality of the reference provided into the BITS input ports of the extension chassis CPMs is equal to the quality of the Master chassis central clocks. Refer to the *Installation* Guide for appropriate physical cabling to support this architecture.

### 8.4.3 Synchronization Status Messages (SSM)

SSM provides a mechanism to allow the synchronization distribution network to both determine the quality level of the clock sourcing a given synchronization trail and to allow a network element to select the best of multiple input synchronization trails. Synchronization Status messages have been 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 to allow synchronization reconfigurations when timing is distributed in both directions around a ring.

---

The following sections provide details about the SSM message functionality for different signal types. These functions apply to all platforms that support the given signal type.

### 8.4.3.1 DS1 Signals

DS1 signals can carry an indication of the quality level of the source generating the timing information using the SSM transported within the 1544 Kbit/s signal's Extended Super Frame (ESF) Data Link (DL) as specified in Recommendation G.704. No such provision is extended to SF formatted DS1 signals.

The format of the data link messages in ESF frame format is "0xxx xxx0 1111 1111", transmitted rightmost bit first. The six bits denoted "xxx xxx" contain the actual message; some of these messages are reserved for synchronization messaging. It takes 32 frames (such as 4 ms) to transmit all 16 bits of a complete DL.

### 8.4.3.2 E1 Signals

E1 signals can carry an indication of the quality level of the source generating the timing information using the SSM as specified in Recommendation G.704.

One of the Sa4 to Sa8 bits, (the actual Sa bit is for operator selection), is allocated for Synchronization Status Messages. To prevent ambiguities in pattern recognition, it is necessary to align the first bit (San1) with frame 1 of a G.704 E1 multi-frame.

The numbering of the San (n = 4, 5, 6, 7, 8) bits. A San bit is organized as a 4-bit nibble San1 to San4. San1 is the most significant bit; 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.

### 8.4.3.3 SONET/SDH Signals

The SSM of SDH and SONET interfaces is carried in the S1 byte of the frame overhead. Each frame contains the four bit value of the QL.

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#### 8.4.3.4 DS3/E3

DS3/E3 signals are not required to be synchronous. However, it is acceptable for their clocking to be generated from a synchronization source. The 7750 SR and the 7450 ESS permit E3/DS3 physical ports to be specified as a central clock input reference.

DS3/E3 signals do not support an SSM channel. QL-override should be used for these ports if ql-selection is enabled

### 8.4.4 Synchronous Ethernet

Traditionally, Ethernet-based networks employ the physical layer transmitter clock to be derived from an inexpensive +/-100ppm crystal oscillator and the receiver locks onto it. There is no need for long term frequency stability because the data is packetized and can be buffered. For the same reason there is no need for consistency between the frequencies of different links. However, you can derive the physical layer transmitter clock from a high quality frequency reference by replacing the crystal with a frequency source traceable to a primary reference clock. This would not affect the operation of any of the Ethernet layers, for which this change would be transparent. The receiver at the far end of the link would lock onto the physical layer clock of the received signal, and thus itself gain access to a highly accurate and stable frequency reference. Then, in a manner analogous to conventional hierarchical master-slave network synchronization, this receiver could lock the transmission clock of its other ports to this frequency reference and a fully time synchronous network could be established.

The advantage of using Synchronous Ethernet, compared with methods that rely on sending timing information in packets over an unlocked physical layer, is that it is not influenced by impairments introduced by the higher levels of the networking technology (packet loss, packet delay variation). Hence, the frequency accuracy and stability may be expected to exceed those of networks with unsynchronized physical layers.

Synchronous Ethernet allows operators to gracefully integrate existing systems and future deployments into conventional industry-standard synchronization hierarchy. The concept behind synchronous Ethernet is analogous to SONET/SDH system timing capabilities. It allows the operator to select any (optical) Ethernet port as a candidate timing reference. The recovered timing from this port is then used to time the system (for example, the CPM locks to this provisioned reference selection). The operator then could ensure that any of system output would be locked to a stable traceable frequency source.

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If the port is a fixed copper Ethernet port and in 1000BASE-T mode of operation, there is a dependency on the 802.3 link timing for the Synchronous Ethernet functionality (refer to ITU-T G.8262). The 802.3 link Master-Slave 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.

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, refer to ITU-T G.8264.

## 8.4.5 Clock Source Quality Level Definitions

The following clock source quality levels have been identified for the purpose of tracking network timing flow. These levels make up all of the defined network deployment options given in Recommendation G.803 and G.781. The Option I network is a network developed on the original European SDH model; whereas, the 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 also define additional codes for internal use. These include the following:

- 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. All of these independent values are assigned as the singled value of 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.

There is also an internal quality level of QL-UNKNOWN. This is used to differentiate from a received QL-STU code but is equivalent for the purposes of QL selection.

[Table 36](#) lists the synchronization message coding and source priorities for SSM received.

**Table 36 Synchronization Message Coding and Source Priorities — SSM Value Received on Port**

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
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

Table 37 lists the synchronization message coding and source priorities for SSM transmitted.

**Table 37 Synchronization Message Coding and Source Priorities — SSM Values Transmitted by Interface of Types**

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)
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- QL_INVALID	1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)
14- QL-FAILED	1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)
15 - QL-UNC	1011 (sec/eec1)	1010 (st3/eec2)	1011 (sec)	00010000 11111111 (st3)



**Note:** When the internal Quality level is in the range of 9 through 14, the output codes shown in [Table 37](#), only appear if QL selection is disabled. If ql-selection is enabled, then all of these internal states are changed to internal state 15 (Holdover) and the ssm value generated reflects the holdover quality of the internal clock.



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## 8.4.6 Advanced G.781 Features

The central clock of the node supports several advanced features of the G.781 standard. These include the specification of a minimum acceptable QL value for the input references, the specification of a minimum acceptable QL value for the BITS output port, the ability to squelch the BITS output signal, and the specification of a Wait To Restore timer for input references. These features allow for more options in the management of the synchronization topology.

## 8.4.7 IEEE 1588v2 PTP

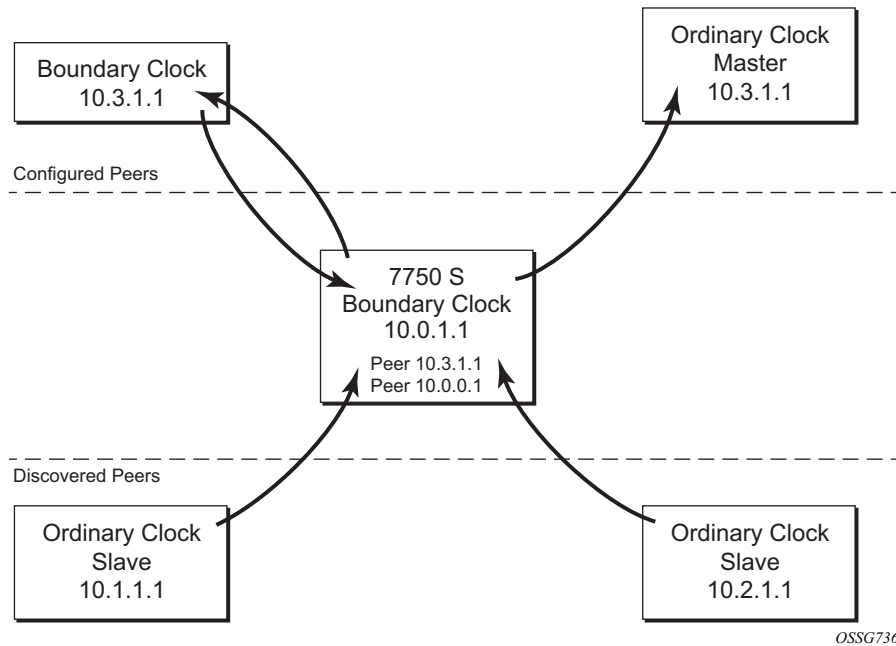
Precision Time Protocol (PTP) is a timing-over-packet protocol defined in the IEEE 1588v2 standard 1588 PTP 2008.

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 frequency 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.

Support is provided for an ordinary clock in slave or master mode or a boundary clock. When configured as an ordinary clock master, PTP can only be used for the distribution of a frequency reference, not a time reference. The boundary clock and ordinary clock slave can be used for both frequency and time distribution.

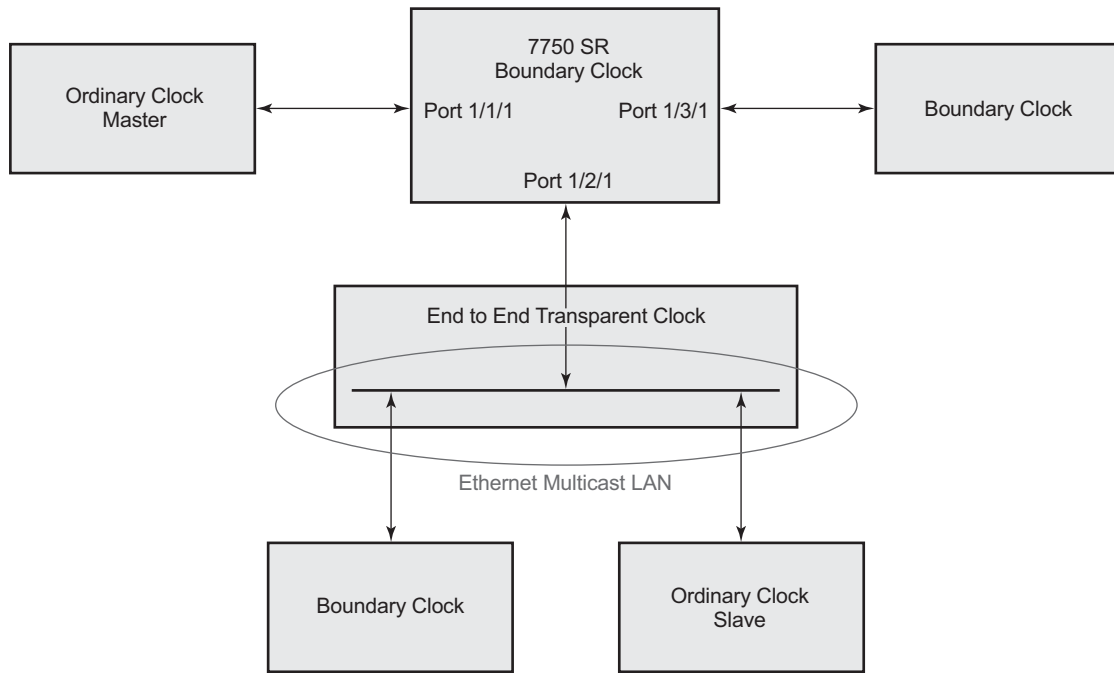
The ordinary clock master, ordinary clock slave, and boundary clock communicate with neighboring IEEE 1588v2 clocks. These neighbor clocks can be ordinary clock masters, ordinary clock slaves, or boundary clocks. The communication can be based on either unicast IPv4 sessions transported through IP interfaces or multicast Ethernet transported through Ethernet ports.

For the unicast IP sessions, the external clocks are labeled 'peers'. There are two types of peers: configured and discovered. An ordinary clock slave or a boundary clock should have configured peers for each PTP neighbor clock from which it might accept synchronization information. The router initiates unicast sessions with all configured peers. An ordinary clock master or boundary clock accepts unicast session requests from external peers. If the peer is not a configured peer, then it is considered a discovered peer. An ordinary clock master or boundary clock can deliver synchronization information toward discovered peers. [Figure 16](#) shows the relationship of various neighbor clocks using unicast IP sessions to communicate with a 7750 SR configured as a boundary clock with two configured peers.

**Figure 16 Peer Clocks**

For multicast Ethernet operation, the router shall listen for and transmit PTP messages using the configured multicast MAC address. Neighbor clocks are discovered via the reception of messages through an enabled Ethernet port. An ordinary clock master, ordinary clock slave, and a boundary clock support more than one neighbor PTP clock connecting into a single port. This might be encountered with the deployment of an Ethernet multicast LAN segment between the local clock and the neighbor PTP ports using an End to end transparent clock or an Ethernet switch. The Ethernet switch is not recommended due to the introduction of PDV and the potential degradation of performance but it can be used if appropriate to the application. [Figure 17](#) shows the relationship of various neighbor clocks using multicast Ethernet sessions to a 7750 SR configured as a boundary clock. The 7750 SR has three ports configured for multicast Ethernet communications. Port 1/2/1 of the 7750 SR shows a connection where there are two neighbor clocks connecting to one port of the 7750 SR through an end-to-end transparent clock.

**Figure 17 Ethernet Multicast Ports**



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The ordinary clock master, ordinary clock slave, and boundary clock allow for PTP operation over both unicast IPv4 and multicast Ethernet at the same time.

The IEEE 1588v2 standard includes the concept of PTP profiles. These profiles are defined by industry groups or standards bodies that define how IEEE 1588v2 is to be used for a particular application.

Currently, three profiles are supported:

- IEEE 1588v2 default profile
- ITU-T Telecom profile for frequency (G.8265.1)
- ITU-T Telecom profile for time with full timing support (G.8275.1)

When an ordinary clock slave or a boundary clock receive *Announce* messages from one or more configured peers or multicast neighbors, it executes a Best Master Clock Algorithm (BMCA) to determine the state of communication between itself and the peers. The system uses the BMCA 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 slave clocks. Each profile has a dedicated BMCA.

If the **profile** setting for the clock is `ieee1588-2008`, the precedence order for the best master selection algorithm is as follows:

- priority1
- clock class
- clock accuracy
- PTP variance (offsetScaledLogVariance)
- priority2
- clock identity
- steps removed from the grandmaster

The ordinary clock master, ordinary clock slave, and boundary clock set their local parameters as listed in [Table 38](#):

**Table 38** Local Clock Parameters When Profile is set to ieee1588-2008

Parameter	Value
clockIdentity	Chassis MAC address following the guidelines of 7.5.2.2.2 of IEEE 1588
clockClass	13 — local clock configured as ordinary clock master and is locked to an external reference 14 — local clock configured as ordinary clock master and in holdover after having been locked to an external source 248 — local clock configured as ordinary clock master and is in free run or the router is configured as a boundary clock 255 — local clock configured as ordinary clock slave
clockAccuracy	FE — unknown
offsetScaledLogVariance	FFFF — not computed

If the **profile** setting for the clock is g8265dot1-2010, the precedence order for the best master selection algorithm is:

- clock class
- priority

The ordinary clock master, ordinary clock slave, and boundary clock set their local parameters as listed in [Table 39](#):

**Table 39 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 as per Table 1/G.8265.1 255 — the clock is configured as ordinary clock slave

The g8265dot1-2010 profile is for use in an environment with only ordinary clock masters and slaves for frequency distribution.

If the **profile** setting for the clock is g8275dot1-2014, the precedence order for the best master 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 slave 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 ordinary clock master, ordinary clock slave, and boundary clock set their local parameters as listed in [Table 40](#):

**Table 40 Local Clock Parameters When Profile is set to: g8275dot1-2014**

Parameter	Value
clockIdentity	Chassis MAC address following the guidelines of 7.5.2.2.2 of IEEE 1588
clockClass	165 — local clock configured to a boundary clock and the boundary clock was previously locked to a grandmaster with a clock class of 6 248 — local clock configured as boundary clock 255 — local clock configured as ordinary clock slave
clockAccuracy	FE — unknown
offsetScaledLogVariance	FFFF — not computed

---

There is a limit on the number of external PTP clocks to which the ordinary clock slave or boundary clock requests unicast service (# configured peers) and also a limit to the number of external PTP clocks to which the ordinary clock master or boundary clock grants unicast service (# discovered peers). An association where the boundary clock has a symmetric relationship with another boundary clock (in other words, they both have the other as a configured peer) consumes a request and a grant unicast service in each router.

The number of configured Ethernet ports is not restricted.

There are limits to the maximum transmitted and received event message rates supported in the router. Each unicast IP service established consumes a portion of one of the unicast message limits. Once either limit is reached, additional unicast service requests are refused by sending a grant response with zero in the duration field.

Refer to the scaling guide for the appropriate release for the specific unicast message limits related to PTP.

Multicast messages are not considered when validating the unicast message limit. When multicast messaging on Ethernet ports is enabled, the PTP load needs to be monitored to ensure the load does not exceed the capabilities. There are several commands that can be used for this monitoring:

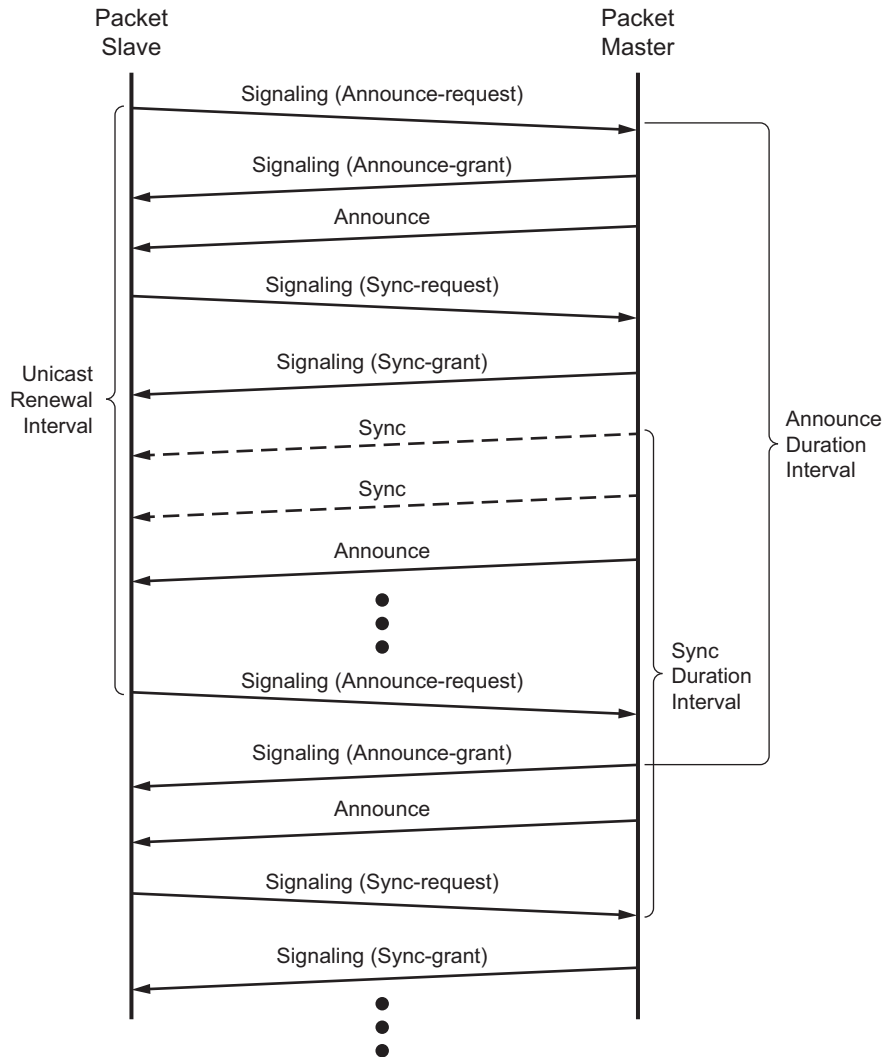
- The **show system cpu** command identifies the load of the PTP software process. If the capacity usage reaches 100%, the PTP software process on the router is at its limit of transmitting and/or receiving PTP packets.

Because the user cannot control the amount of PTP messages being received over the Ethernet ports, the statistics commands can be used to identify the source of the message load:

- **show system ptp statistics** has aggregate packet rates
- **show system ptp port** and **show system ptp port *port-id* [detail]** display received packet rates

**Figure 18** shows the unicast negotiation procedure performed between a slave and a peer clock that is selected to be the master clock. The slave clock requests Announce messages from all peer clocks but only request Sync and Delay\_Resp messages from the clock selected to be the master clock.

**Figure 18** Messaging Sequence Between the PTP Slave Clock and PTP Master Clock



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### 8.4.7.1 PTP Clock Synchronization

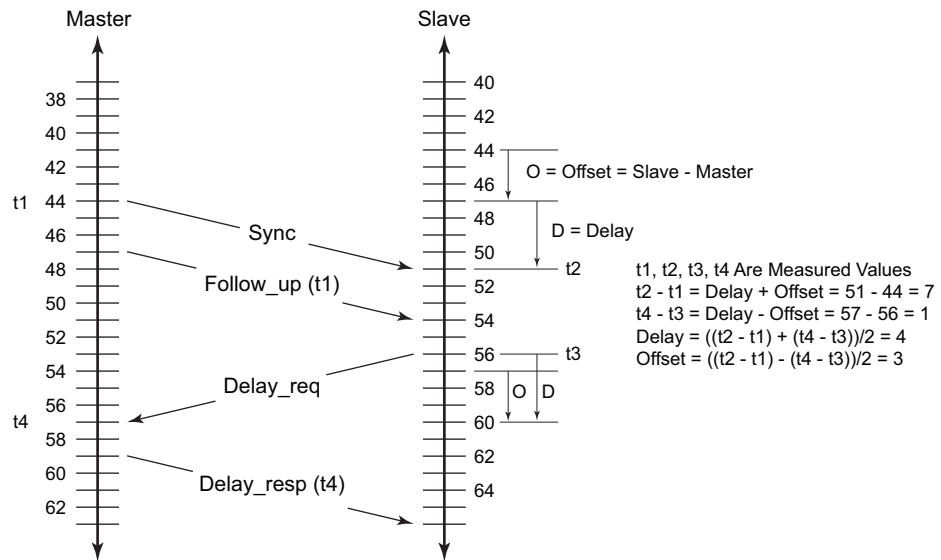
The IEEE 1588v2 standard allows for synchronization of the frequency and time from a master clock to one or more slave clocks over a packet stream. This packet-based synchronization can be over unicast UDP/IPv4 or multicast Ethernet.

As part of the basic synchronization timing computation, a number of event messages are defined for synchronization messaging between the PTP slave port and PTP master port. A one-step or two-step synchronization operation can be used, with the two-step operation requiring a follow-up message after each synchronization message. Ordinary clock master and boundary clock master ports use one-step operation; ordinary clock slave and boundary clock slave ports can accept messages from either one-step or two-step operation master ports.

The IEEE 1588v2 standard includes a mechanism to control the topology for synchronization distribution. The Best Master Clock Algorithm (BMCA) defines the states for the PTP ports on a clock. One port is set into slave state and the other ports are set to master (or passive) states. Ports in slave state recovered synchronization delivered by from an external PTP clock and ports in master state transmit synchronization to toward external PTP clocks.

The basic synchronization timing computation between the PTP slave and PTP master is shown in Figure 19. This figure illustrates the offset of the slave clock referenced to the best master signal during startup.

**Figure 19 PTP Slave and Master Time Synchronization Computation**



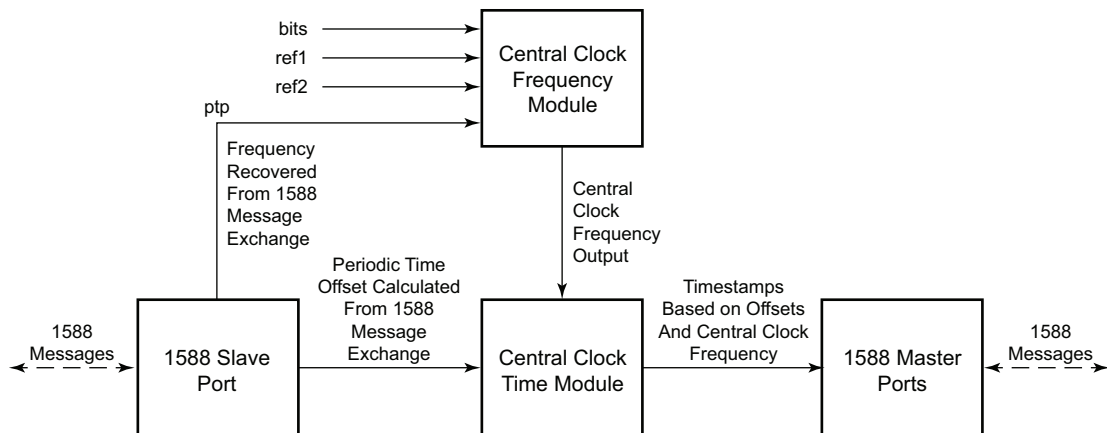
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When using IEEE 1588v2 for distribution of a frequency reference, the slave calculates a message delay from the master to the slave based on the timestamps exchanged. A sequence of these calculated delays contain information of the relative frequencies of the master clock and slave clock but has a noise component related to the packet delay variation (PDV) experienced across the network. The slave must filter the PDV effects so as to extract the relative frequency data and then adjust the slave frequency to align with the master frequency.

When using IEEE 1588v2 for distribution of time, the 7750 SR and 7450 ESS use the four timestamps exchanged using the IEEE 1588v2 messages to determine the offset between the router time base and the external master clock time base. The router determines the offset adjustment and then in between these adjustments, the router maintains the progression of time using the frequency from the central clock of the router. This allows time to be maintained using a BITS input source or 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 a system timing input reference enabled. [Figure 20](#) displays how IEEE 1588v2 is used for time distribution.

**Figure 20 Using IEEE 1588v2 For Time Distribution**



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### 8.4.7.2 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 grand master clock and the slave clock. In particular, when IEEE 1588v2 is used to distribute high accuracy time, such as for mobile base station phase requirements, then the network architecture requires the deployment of PTP awareness in every device between the Grandmaster and the mobile base station slave.

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In addition, performance is also improved by the removal of any PDV caused by internal queuing within the boundary clock or slave clock. This is accomplished with hardware that is capable of detecting and time stamping the IEEE 1588v2 packets at the Ethernet interface. This capability is referred to as port-based time stamping.

#### 8.4.7.2.1 Port-Based Timestamping of PTP Messages

For optimal performance, the 1588 packets should be time-stamped at the ingress and egress. This avoids any possible PDV that might be introduced between the port and the CPM. The ability to timestamp in the interface hardware is provided on a subset of the IMM and MDA assemblies of the routers. Generally, all FP4-based XMA, XMA-s, and MDA-e-XP modules support 1588 port-based timestamping. For other assemblies, contact your Nokia representative to verify the support for 1588 port-based timestamping.

In order for this to operate, the CPM, IOM, IMM, and MDAs must be running firmware that supports this capability. The CPM firmware upgrade occurs automatically when the CPM card software is updated. Since upgrading of IOM, IMM, and MDA firmware is service impacting, this upgrade is not performed automatically on a soft reset of the MDA. The IOM/IMM firmware is upgraded when the IOM/IMM card is hard reset. The MDA firmware is programmed during system initialization, when the MDA is inserted, or when the MDA is hard reset via a **clear mda** or **clear card** command. However, when an MDA is soft reset via either a **clear card soft** command or during a major ISSU, the MDA firmware is not updated.

Port-based timestamping of 1588 packets cannot be used at the same time for Ethernet encapsulation and IP encapsulation on a given port. This means that PTP cannot be configured on an Ethernet port if **ptp-hw-assist** is already configured on a L3 interface associated with that port. Similarly, **ptp-hw-assist** cannot be configured on a L3 interface if its associated port is already configured as a PTP port.

#### 8.4.7.3 PTP Capabilities

For each PTP message type to be exchanged between the router and an external 1588 clock, a Unicast Session must be established using the Unicast Negotiation procedures. The router allows configuration of the message rate to be requested from external 1588 clocks. The router also supports a range of message rates that it grants to requests received from the external 1588 clocks.

[Table 41](#) describes the ranges for both the rates that the router can request and grant.

**Table 41 Message Rates Ranges and Defaults**

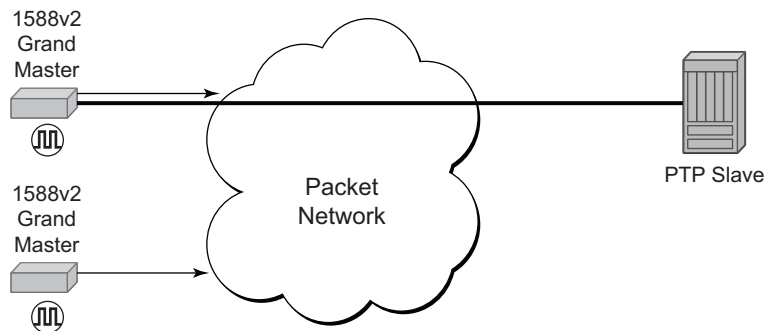
Message Type	Rates Requested by the 7450 ESS, 7750 SR, and 7950 XRS		Rates Granted by the 7450 ESS, 7750 SR, and 7950 XRS	
	Min	Max	Min	Max
Announce	1 packet every 16 seconds	8 packets/second	packet every 16 seconds	8 packets/second
Sync	1 packet/second	64 packet/second	1 packet/second	128 packet/second
Delay_Resp	1 packet/second	64 packets/second	1 packet/second	128 packets/second
(Duration)	300	300	1	1000

State and statistics data for each PTP peer are available to assist in the detection of failures or unusual situations.

### 8.4.7.4 PTP Ordinary Slave Clock For Frequency

Traditionally, only clock frequency is required to ensure smooth transmission in a synchronous network. The PTP ordinary clock with slave capability on the router 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. [Figure 21](#) shows a PTP ordinary slave clock network configuration.

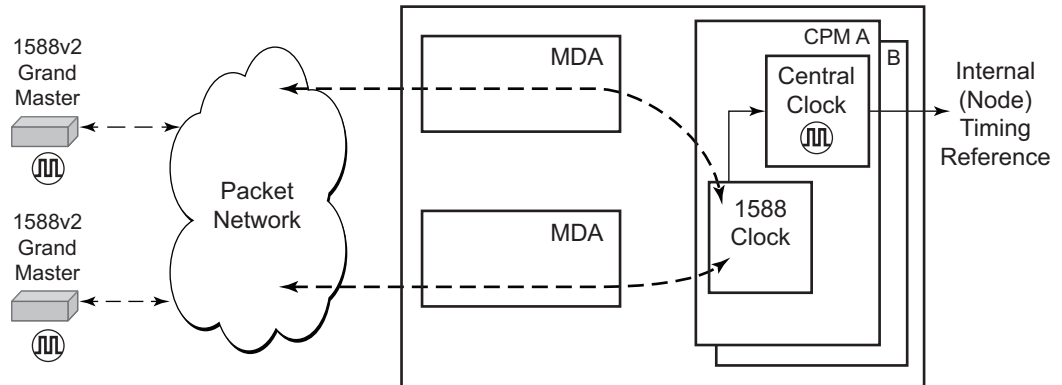
**Figure 21 Slave Clock**



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The PTP slave capability is implemented on the CPM, version 3 or later. The IEEE 1588v2 messages can ingress and egress the router on any line interface. [Figure 22](#) shows the operation of an ordinary PTP clock in slave mode.

**Figure 22 Ordinary Slave Clock Operation**

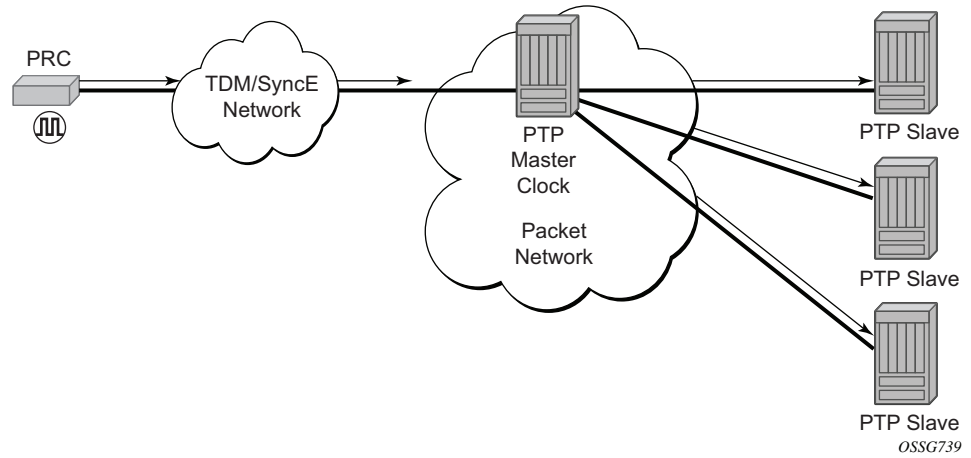


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#### 8.4.7.5 PTP Ordinary Master Clock For Frequency

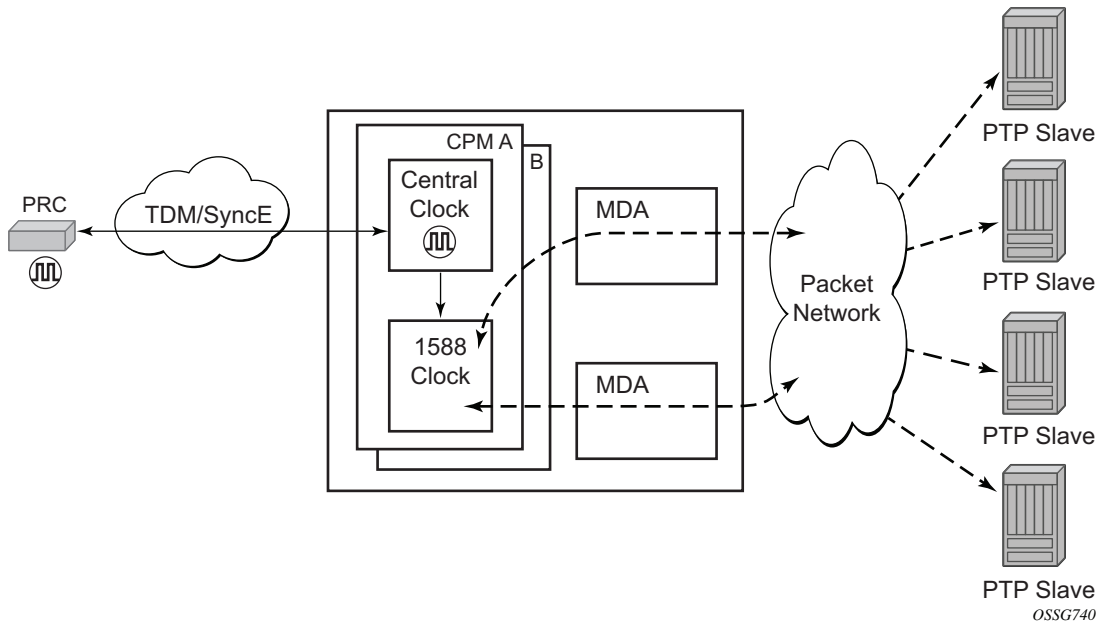
The router supports the PTP ordinary clock in master mode. Normally, a IEEE 1588v2 grand master is used to support many slaves and boundary clocks in the network. In cases where only a small number of slaves and boundary clocks exist and only frequency is required, a PTP integrated master clock can greatly reduce hardware and management costs to implement PTP across the network. It also provides an opportunity to achieve better performance by placing a master clock closer to the edge of the network, as close to the slave clocks as possible. [Figure 23](#) shows a PTP master clock network configuration.

**Figure 23 PTP Master Clock**



All packets are routed to their destination via the best route as determined in the route table; see [Figure 24](#). It does not matter which ports are used to ingress and egress these packets (unless port based time stamping is enabled for higher performance).

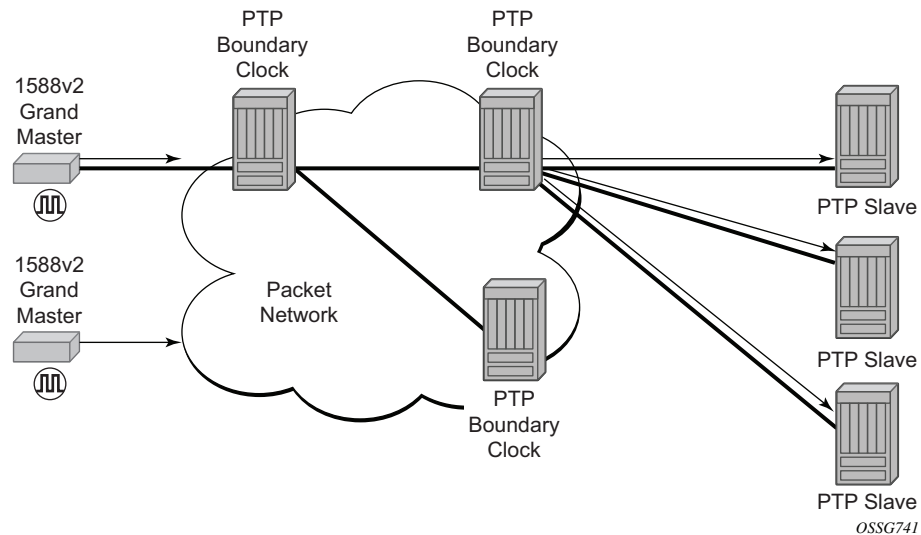
**Figure 24 Ordinary Master Clock Operation**



### 8.4.7.6 PTP Boundary Clock for Frequency and Time

The router supports boundary clock PTP devices in both master and slave states. IEEE 1588v2 can function across a packet network that is not PTP-aware; however, the 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 the routers. By using routers with boundary clock functionality in the path between the grand master clock and the slave clock, one long path over many hops is split into multiple shorter segments, allowing better PDV control and improved slave 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 slave of an upstream grand master (ordinary clock) or boundary clock, and as a PTP master of downstream slaves (ordinary clock) and/or boundary clocks, as shown in [Figure 25](#).

**Figure 25** Boundary Clock



In addition, the use of port based timestamping in every network element between the grandmaster and the end slave application is highly recommended for delivering time to meet one microsecond accuracies required of mobile applications.

The router always uses the frequency output of the central clock to maintain the timebase within the router. The PTP reference into the central clock should always be enabled as an option if the router is configured as a boundary clock. This avoids the situation of the router entering holdover while propagating time with 1588.



**Note:** The ITU-T defined a network architecture for node-by-node time distribution in their Recommendations. These recommendations require that Synchronous Ethernet be used with IEEE 1588 (using the G.8275.1 profile) to meet the target performance.

### 8.4.7.7 PTP Clock Redundancy

The PTP module in the router exists on the CPM. The PTP module on the standby CPM is kept synchronized to the PTP module on the active CPM. All sessions with external PTP peers are maintained over a CPM switchover.

### 8.4.7.8 PTP Time for System Time and OAM Time

PTP has the potential to provide much more accurate time into the router than can be obtained with NTP. This PTP recovered time can be made available for system time and OAM packet time stamping to improve the accuracies of logged events and OAM delay measurements. The mechanism to activate PTP as the source for these internal time bases is to allocate PTP as a local server into NTP. This permits the NTP time recovery to use PTP as a source for time and then distribute it within the router to system time and the OAM process. This activation also affects the operation of the NTP server within the SR OS. The PTP server appears as NTP stratum 0 server and therefore the SR OS advertises itself as an NTP Stratum 1 server to external peers and clients. This activation may impact the NTP topology.

### 8.4.7.9 PTP within Routing Instances

PTP is supported over direct Ethernet encapsulation (that is, PTP ports) and UDP/IP encapsulation (that is, PTP peers). PTP ports operate below the routing plane. They can be used on appropriate ports irrespective of any type of router interface also on the port. PTP peers operate at the routing plane and have restrictions based on and across the following router instances.

Transmission and reception of PTP messages using PTP peers is supported in the following contexts:

- Network interface in the Base routing instance (**config>router>interface**)
- IES interface (**config>service>ies>interface**)
- VPRN interface (**config>service>vprn>interface**)

---

Transmission and reception of PTP messages using PTP peers is not supported in the following contexts:

- IES spoke SDP interface (**config>service>ies>spoke-sdp>interface**)
- VPRN spoke SDP interface (**config>service>vprn>spoke-sdp>interface**)
- VPRN transport tunnel (**config>service>vprn>auto-bind-tunnel** or **config>service>vprn>spoke-sdp**)
- Any interface of the management router instance
- Any interface of the vpls-management router instance
- Any interface of a user created CPM router instance

It is important to note that there is only one PTP clock within the router. All PTP ports and PTP peers communicate into one clock instance. Only one router instance may have PTP peers configured, which means that only that router instance (or PTP port) can run the slave functionality and recover time from an external PTP clock. All other router instances only support the dynamic PTP peers. The PTP process in the router only includes outward server time towards the dynamic PTP peers. The dynamic PTP peers are shared across all router instances. If it is desired to control the number of dynamic peers that can be consumed by a given routing instance, then it must be configured for that routing instance.



## 8.5 System-Wide ATM Parameters

On the 7750 SR, the ATM ping OAM loopback feature can be enabled on an ATM SAP for a period of time configured through the interval and the send-count parameters. When the ATM SAP terminates on IES or VPRN services, a failure of the loopback state machine does not bring down the Layer 3 interface. Only receiving AIS/RDI OAM cells or entering the AIS/RDI state brings down the Layer 3 interface.

The ATM ping OAM loopback feature can also be enabled on a continuous basis on an ATM SAP terminating on IES or VPRN services. When the loopback state machine fails, the Layer 3 interface is brought down.

The ATM OAM loopback parameters must first be enabled and configured in the **config>system>atm>oam** context, and then enabled in the IES or VPRN service interface SAP **atm oam** context.

Refer to the *7450 ESS, 7750 SR, 7950 XRS, and VSR Layer 3 Services Guide: IES and VPRN* for further information.

## 8.6 QinQ Network Interface Support

The creation of network interfaces on a QinQ-encapsulated VLAN can be enabled on a system-wide level using the `config>system>ip>allow-qinq-network-interface` command.

When enabled, the egress IOM limits are changed to allow a maximum of 11 MPLS labels instead of 12.

Table 42 lists the allowed and restricted QinQ combinations.

**Table 42** QinQ Combination (✓) and Restriction (x) Table

	SAP x.0	SAP x.*	SAP x.y	Nw interface x.0	Nw interface x.*	Nw interface x.y	SAP *.*	SAP *.NULL	SAP 0.*	Inverse SAP
SAP x.0	x	✓	✓	x	x	x	✓	✓	✓	x
SAP x.*	✓	x	✓	x	x	x	✓	✓	✓	x
SAP x.z	✓	✓	✓	x	x	✓	✓	✓	✓	✓
Nw interface x.0	x	x	x	x	x	✓	✓	✓	✓	x
Nw interface x.*	x	x	x	x	x	x	✓	✓	✓	x
Nw interface x.z	x	x	✓	✓	x	✓	✓	✓	✓	x
SAP *.*	✓	✓	✓	✓	✓	✓	x	✓	✓	✓
SAP *.NULL	✓	✓	✓	✓	✓	✓	✓	x	✓	x
SAP 0.*	✓	✓	✓	✓	✓	✓	✓	✓	x	x
Inverse SAP	x	x	✓	x	x	x	✓	x	x	x

---

## 8.7 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 related to the capabilities and status of the local device. Separately from the transmit direction, the LLDP agent can also receive the same kind of information for a remote device which is stored in the related MIBs.

LLDP itself does not contain a mechanism for soliciting specific information from other LLDP agents, nor does it provide a specific means of confirming the receipt of information. LLDP allows the transmitter and the receiver to be separately enabled, making it possible to configure an implementation so the local LLDP agent can either transmit only or receive only, or can transmit and receive LLDP information.

The information fields in each LLDP frame are contained in a LLDP Data Unit (LLDPDU) as a sequence of variable length information elements, that each include type, length, and value fields (known as TLVs), where:

- Type identifies what kind of information is being sent.
- Length indicates the length of the information string in octets.
- Value is the actual information that needs to be sent (for example, a binary bit map or an alphanumeric string that can contain one or more fields).

Each LLDPDU contains four mandatory TLVs and can contain optional TLVs as selected by network management:

- Chassis ID TLV
- Port ID TLV
- Time To Live TLV
- Zero or more optional TLVs, as allowed by the maximum size of the LLDPDU
- End Of LLDPDU TLV

The chassis ID and the port ID values are concatenated to form a logical identifier that is used by the recipient to identify the sending LLDP agent/port. Both the chassis ID and port ID values can be defined in a number of convenient forms. Once selected however, the chassis ID/port ID value combination remains the same as long as the particular port remains operable.

A non-zero value in the TTL field of the time-to-live TLV tells the receiving LLDP agent how long all information pertaining to this LLDPDU's identifier is valid so that all the associated information can later be automatically discarded by the receiving LLDP agent if the sender fails to update it in a timely manner. A zero value indicates that any information pertaining to this LLDPDU's identifier is to be discarded immediately.

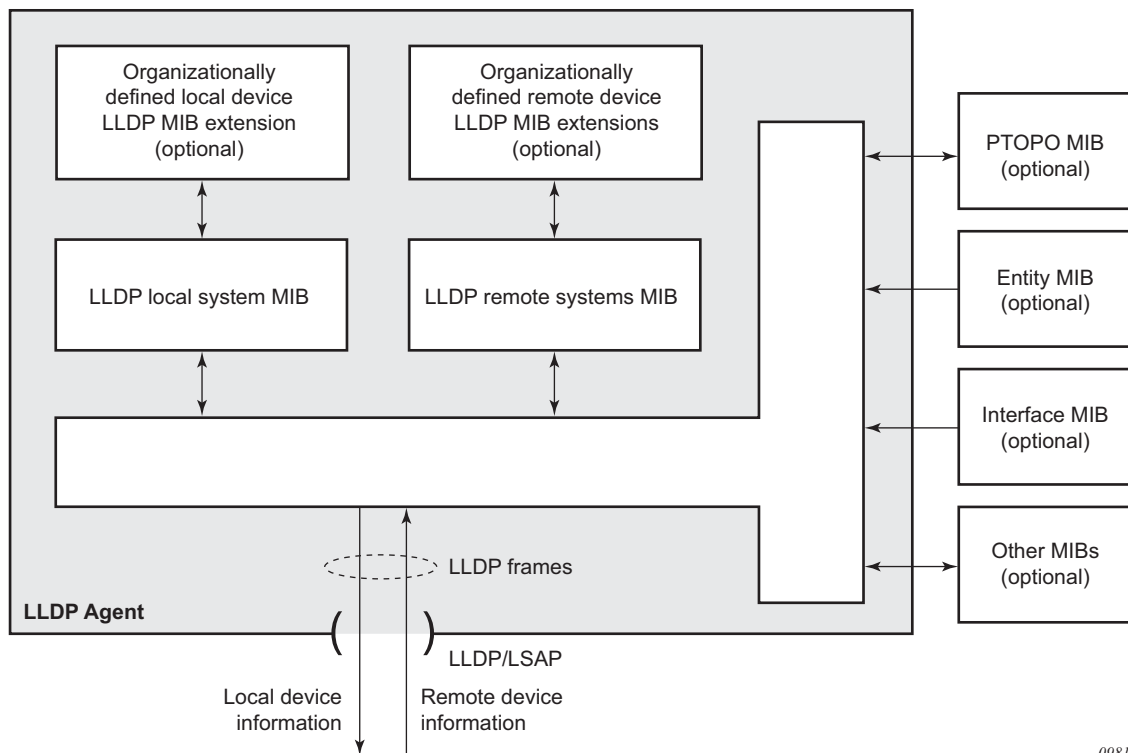
A TTL value of zero can be used, for example, to signal that the sending port has initiated a port shutdown procedure.

The end of a LLDPDU TLV marks the end of the LLDPDU.

The IEEE 802.1ab standard defines a protocol that:

- Advertises connectivity and management information about the local station to adjacent stations on the same IEEE 802 LAN.
- Receives network management information from adjacent stations on the same IEEE 802 LAN.
- Operates with all IEEE 802 access protocols and network media.
- Establishes a network management information schema and object definitions that are suitable for storing connection information about adjacent stations.
- Provides compatibility with a number of MIBs as depicted in [Figure 26](#).

**Figure 26 LLDP Internal Architecture for a Network Node**

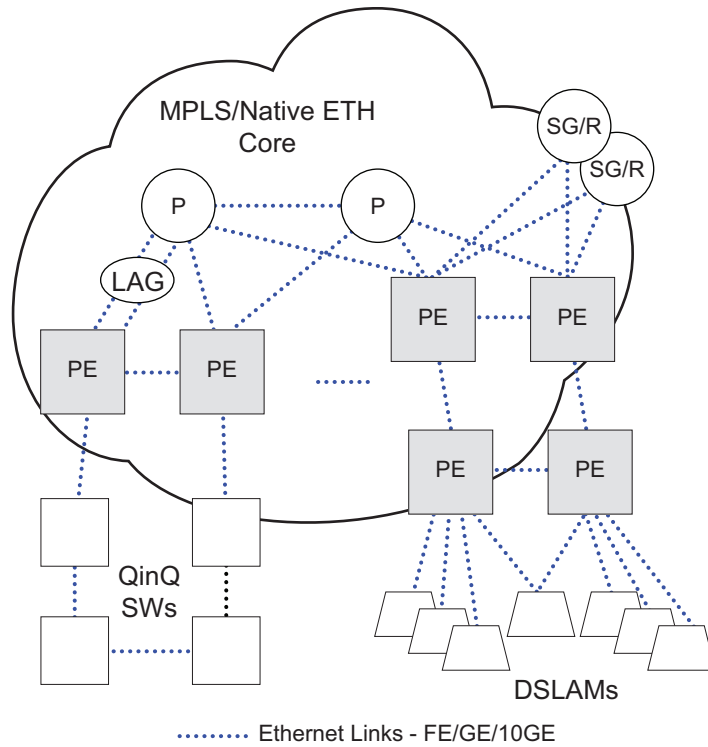


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Network operators must be able to discover the topology information in order to detect and address network problems and inconsistencies in the configuration. Moreover, standard-based tools can address the complex network scenarios where multiple devices from different vendors are interconnected using Ethernet interfaces.

The example displayed in [Figure 27](#) depicts a MPLS network that uses Ethernet interfaces in the core or as an access/hand off interfaces to connect to different kind of Ethernet enabled devices such as service gateway/routers, QinQ switches, DSLAMs or customer equipment.

**Figure 27 Customer Use Example For LLDP**



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IEEE 802.1ab LLDP running on each Ethernet interfaces in between all the above network elements may be used to discover the topology information.

---

## 8.8 IP Hashing as an LSR

It is now possible to include IP header in the hash routine at an LSR for the purpose of spraying labeled-IPv4 and labeled-IPv6 packets over multiple equal cost paths in ECMP in an LDP LSP and/or over multiple links of a LAG group in all types of LSPs.

A couple of configurable options are supported. The first option is referred to as the Label-IP Hash option and is designated in the CLI as **lbl-ip**. When enabled, the hash algorithm parses down the label stack and once it hits the bottom of the stack, it checks the next nibble. If the nibble value is four or six then it assumes it is an IPv4 or IPv6 packet. The result of the hash of the label stack, along with the incoming port and system IP address, is fed into another hash along with source and destination address fields in the IP packet's header. The second option is referred to as IP-only hash and is enabled in CLI by entering the **iponly** keyword. It operates the same way as the Label-IP Hash method except the hash is performed exclusively on the source and destination address fields in the IP packet header. This method supports both IPv4 and IPv6 payload and operates on packets received on an IP interface on an IOM3-XP/IMM port only.

By default, MPLS packet hashing at an LSR is based on the whole label stack, along with the incoming port and system IP address. This method is referred to as Label-Only Hash option and is enabled in CLI by entering the **lbl-only** keyword.

The **lbl-only**, **lbl-ip** and **ip-only** hashing options can be configured system-wide and can also be overridden on a per-IP-interface basis.

## 8.9 Satellites

There are two types of SAS-Sx satellites supported on the 7750 SR:

- Ethernet satellites
- TDM satellites

The following primary tasks must be performed to configure a satellite.

1. Create a software repository that specifies where the SAS-Sx should obtain its correct software image.
2. Create an Ethernet or TDM satellite association that binds a chassis to a set of uplinks and a software repository.
3. Configure the satellite ports to specify port configuration and service association.

### 8.9.1 Ethernet Satellites

The Ethernet satellite support feature allows a 7210 SAS-Sx or SAS-S chassis to act as a port extension for the 7750 SR host. In this configuration, all configuration and management functions are performed through the host node. Management of the SAS-Sx/SAS-S node is not required when it is configured in an Ethernet satellite operations mode.

[Table 43](#) lists the supported Ethernet satellite chassis.

**Table 43 Supported Ethernet Satellite Chassis**

Chassis Type	Sat-Type String
7210 SAS-Sx 24-port fiber	es24-1gb-sfp
7210 SAS-Sx 48-port fiber	es48-1gb-sfp
7210 SAS-S 24F4SFP+	es24-sass-1gb-sfp
7210 SAS-S 48F4SFP+	es48-sass-1gb-sfp
7210 SAS-Sx 24-port copper 7210 SAS-S 24-port copper	es24-1gb-tx
7210 SAS-Sx 48-port copper 7210 SAS-S 48-port copper	es48-1gb-tx

**Table 43 Supported Ethernet Satellite Chassis (Continued)**

Chassis Type	Sat-Type String
7210 SAS-Sx 24-port copper + PoE 7210 SAS-S 24-port copper + PoE	es24-1gb-tx
7210 SAS-Sx 48-port copper + PoE 7210 SAS-S 48-port copper + PoE	es48-1gb-tx
7210 SAS-Sx 64-port 10GE (CFP)	es64-10gb-sfpp+4-100gb-cfp4
7210 SAS-Sx 64-port 10GE + 4-port QSFP28	es64-10gb-sfpp+4-100gb-qsfp28
7210 SAS-Mxp	es24-sasmxp-1gb-sfp

**Note:**

- The 7210 SAS-Sx 64-port 10GE Ethernet satellite supports both 10GE and 1GE optics. See the *7210 Optics Guide* for a list of supported modules.
- The 64x10GE + 4xQSFP28 SAS-Sx satellite does not support the local-forwarding feature.
- The 7210 SAS-Mxp does not support the local forwarding feature.
- PoE functionality is not supported when the 7210 PoE capable switches are used in satellite mode.

## 8.9.2 TDM Satellites

The SONET/SDH ETR chassis is the only available TDM satellite and can be configured for different modes. [Table 44](#) lists the supported modes of the satellite chassis.

**Table 44 Supported SONET/SDH Satellite Chassis**

Chassis Type	Sat-Type String
4 port OC3	ts4-choc3-sfp
4 port STM1	ts4-chstm1-sfp
1 port OC12	ts1-choc12-sfp
1 port STM4	ts1-chstm4-sfp



The default type on a supplied TDM satellite is `ts4-choc3-sfp`. Updating to another type initiates a reboot of the satellite.

The TDM satellite provides CEM functionalities supported on the 7750 SR OC3/OC12 CES MDAs. The satellite is built using the same architecture as the 7705 SAR-8 adapter cards and is designed to transport existing TDM services including:

- Cpipe service of DS1/E1 channels within SONET/SDH in structure-agnostic mode (SATOP) as described in RFC4553
- MEF8 service of DS1/E1 channels within SONET/SDH in structure-agnostic mode

The following types of synchronization are supported:

- DS1/E1 channels can be independently loop-timed, node-timed, or differentially-timed
- OC3/STM1/OC12/STM4 ports can be node-timed

To provide a stable frequency from the host to the SONET/SDH satellite, ensure that the host's clock is referenced to a suitable timing source (for example, BITS) and configure Synchronous Ethernet from the host's Ethernet port connecting to the satellite. Copper Ethernet SFPs are not supported because they do not support Synchronous Ethernet.

The TDM satellite is entirely managed through a 7750 SR host system, such as 7750 SR, 7750 SR-a, or 7750 SR-e. As a satellite, no new IP address needs to be assigned. Services on the satellite are provisioned on the host in the same manner as any ports in a native MDA. The TDM satellite connects to the SR host using a Gigabit Ethernet link, thereby not occupying valuable slots space in the host system. APS is supported across satellites connecting to a single host.

### 8.9.3 Software Repositories for Satellites

The software repositories define the locations from where the host can obtain software for subcomponents including Ethernet satellites. The software repository is also used to upgrade an existing subcomponent by changing the location of the image to be served to the remote device. The software repositories are not used for management of the host router software, which is managed using the standard procedures described in the *SR OS 20.x.Rx Software Release Notes*.

Each software repository supports up to three locations to search for the software. A location may be a URL or a directory on a compact flash. When an upgrade operation is initiated, each of the three locations is checked in sequence to locate the required software. The upgrade operation fails if the software is not located in any of the configured locations. The satellite booting operation also fails if the software cannot be located.

At least one software repository must be configured to support a satellite connected to the local host by using the **config>system>software-repository** CLI tree, as follows.

1. Create a software repository using a unique repository name.
2. Specify the primary location for the SAS-Sx image.
3. Optionally, specify a secondary or tertiary image location and a description.



**Caution:** Software for TDM satellites and Ethernet satellites should be stored in separate software repositories. There is one file that has the same name for both types of software, that is overwritten if they are placed in the same repository.

## 8.9.4 Satellite Software Upgrade Overview

The process to change or upgrade the satellite software consists of the following steps.

1. Copy the new satellite software images to a local compact flash card. It is recommended that the new image files be placed in a different directory.  
Although you can store the satellite software on a remote server and use a URL to reference the remote location, it is recommended that the primary image location is locally accessible.
2. Create a new software repository using a new name and at least a primary-location for the 7210 SAS-Sx image.
3. Modify the satellite configuration such that the **software-repository** parameter references the newly created software repository.

Use the following CLI context:

```
config>system>satellite>eth-sat sat-id
```

or

```
config>system>satellite>tdm-sat sat-id
```

4. Reboot the satellite to load the new software.

Depending on whether a firmware update is needed, perform one of the following steps to reboot the satellite.

- 
- a. A satellite firmware update is not required.
    - i. The satellite loads the new software the next time it reboots.
    - ii. You can reset the satellite with the following administrative command, if required.  
**admin satellite eth-sat *sat-id* reboot [now]**  
or  
**admin satellite tdm-sat *sat-id* reboot [now]**
  - b. A satellite firmware update is required.
    - i. To continue the upgrade to the 7210 firmware image, enter one of the following commands and allow it to execute completely:  
**admin satellite eth-sat *sat-id* sync-boot-env**  
or  
**admin satellite tdm-sat *sat-id* sync-boot-env**
    - ii. Reboot the satellite again using the **upgrade** keyword to update the firmware image.  
  
The **upgrade** keyword causes the 7210 SAS-Sx to upgrade the included firmware images. This process takes longer than a normal reboot.  
  
**admin satellite eth-sat *sat-id* reboot upgrade now**  
or  
**admin satellite tdm-sat *sat-id* reboot upgrade now**

## 8.9.5 100GE Client Ports

Ports 67 and 68 on the 64x10GE + 4x100GE satellites (sat-type es64-10gb-sfpp+4-100gb-cfp4) can be reassigned as client ports instead of uplinks. This provides the flexibility to offer 100GE services from these satellite chassis. These two 100GE ports can be reconfigured as client ports using the **port-template** configuration commands. The port template must be configured before port topology bindings are configured as well as before SAPs, interfaces, or services can be applied to the associated satellite ports.

This feature is not supported on the es64-10gb-sfpp+4-100gb-qsf28 satellite.

## 8.9.6 Satellite Configuration

After creating the software repositories, configure the satellite. The satellite configuration is required to create a satellite binding to a satellite ID, and to provide additional information that uniquely identifies the satellite chassis, chassis type, and the software repository to be used to boot the remote satellite.

The following parameters can be specified for a satellite.

- **mac-address** — The satellite chassis MAC address must be specified. This is used to bind a specific chassis to the associated satellite ID. (The local host router boots only satellites with configured MAC addresses.) This parameter is mandatory.
- **sat-type** — The satellite chassis type must be specified and must match the chassis type that the satellite advertises during the boot process. This parameter is mandatory.
- **software-repository**— A preconfigured software repository must be specified in the satellite configuration. This defines the location of the software image to boot the associated 7210 SAS-Sx. This parameter is mandatory.
- **no shutdown** — By default, a new satellite is in a shutdown state; use the **no shutdown** command to bring the satellite online. This parameter is mandatory.
- **description** — Use this command to configure a description string associated with the satellite. This parameter is optional.
- **sync-e** — Use this command to enable the **sync-e** option. This parameter is only available for an Ethernet satellite. This parameter is optional.

### 8.9.6.1 Satellite Client Port ID Formats

Use the following format to reference Ethernet satellite client ports:

**port esat-** *sat-id/slotNum/portNum*

where:

- *sat-id* is between 1 and 20
- *slotNum* is always 1
- *portNum* is between 1 and 64

Use the following format to reference Ethernet satellite uplink port:

**port esat-** *sat-id/1/uplink-id*

where:

- *sat-id* is between 1 and 20
- *uplink-id* is between **u1** and **u4**

Use the following format to reference TDM satellite client ports:

**port tsat-** *sat-id/slotNum/portNum.channel*

where:

- *sat-id* is between 1 and 20
- *slotNum* is always 1
- *portNum* is between 1 and 4

Use the following format to reference TDM satellite uplink port:

**port tsat-** *sat-id/1/u1*

where:

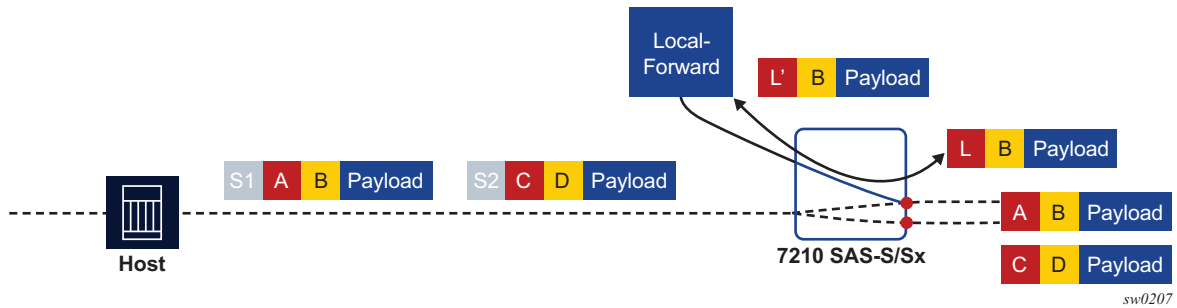
- *sat-id* is between 1 and 20

### 8.9.6.2 Local Forwarding

The local forwarding capability allows traffic to be forwarded between two client satellite ports without going through the SR host, which allows for optimal forwarding by preserving uplink bandwidth.

- Locally forwarded traffic is identified based on the ingress VLAN tag.
- The outer VLAN tag used to identify the traffic to be locally forwarded can be different at the two bypass endpoints. In that case, as traffic is forwarded from the ingress to the egress, the outer VLAN tag is modified.
- The bypass paths are bidirectional, so only a single local-forwarding path needs to be defined to allow for traffic flow in both directions.

[Figure 28](#) shows an example of local forwarding.

**Figure 28 Local Forwarding**

A local-forward bypass is created by using the following commands to create a local-forward bypass, then associating a set of two satellite access points as endpoints for the local-forward bypass.

- The two endpoints must be ports on the same Ethernet satellite chassis.
- If a LAG is used as an endpoint, all member links must be ports on the same Ethernet satellite.
- All satellite ports must be client ports by default, or must be configured as a client port using the port-template command.

```
config system satellite
  local-forward <id> [create]
  description <string>
  sap <sat-port>:qtag | <lag-id>:qtag
  exit
  sap <sat-port>:qtag | <lag-id>:qtag
  exit
  [no] shutdown
exit
```

#### Example Configuration:

To configure a local-forward bypass between client ports esat-2/1/1:66 and esat-2/1/50:101, use the following commands:

```
config system satellite
  local-forward 10 create
  description "local-forward to offload router"
  sap esat-2/1/1:66
  exit
  sap esat-2/1/50:101
  exit
  no shutdown
exit
```

### 8.9.6.3 Port Template

The **port-template** command hierarchy allows the creation of a satellite template that reconfigures the port role and uplink association for one or more satellite ports. This template can then be applied to one or more Ethernet satellite instances, in which case those satellites inherit the specified port role and uplink associations.

The port template is necessary when reconfiguring a satellite uplink as a client port for use as part of a local-forward bypass path.

```
configure
  system
    satellite
      [no] port-template <template-name> sat-type <sat-type> [create]
      port <port-id>
        role {none | uplink | client | system-default}
        uplink {<port-id> | system-default | none}
      exit
      [no] description <string>
      [no] shutdown
```

### 8.9.6.4 10GE Client Ports

Ports 51 and 52 on the 48xGE + 4x10GE satellite chassis can be reassigned as client ports instead of uplink ports. This provides the flexibility to offer 10GE services from these satellite chassis. These two 10GE ports can be reconfigured as client ports using the **port-template** configuration commands described above. The port template configuration must be done before SAPs, interfaces, or services can be applied to the associated satellite ports.

### 8.9.6.5 10GE Uplinks on the 64x10GE+4x100GE Satellite

On the 7210 SAS-Sx 64x10GE + 4x100GE (es64-10gb-sfpp+4-100gb-cfp4) satellite, selected 10GE ports can be reconfigured and used as the satellite uplinks to the host router running SR OS.

Up to 16 10GE interfaces can be used as the uplinks for the associated satellite. A new satellite template that configures the desired 10GE interfaces as uplinks must be created. In addition, use the port template **port-template** to specify the uplink association between the remaining client ports and configured uplinks.

Apply the new template to the desired satellite using the **config>system>satellite>eth-sat *sat-id*>sat-type *sat-type*>port-template *template-name*** command, where the *template-name* is the name configured in the **port-template** context.

This feature requires the 7210 SAS-Sx to be running at least Release 9.0.R10 or later.

The following restrictions apply:

- The 10GE ports used as satellite uplinks must start at port 1 and be sequential, up to the maximum of 16 10GE uplinks.
- When 10GE ports are used as uplinks, the 4x100GE port are not available for use and should be configured as **role none**.

The following is an example configuration:

```
config>system
  satellite
    port-template "10gUp" sat-type "es64-10gb-sfpp4-100gb-cfp4" create
      port 1/1/1
        role uplink
        uplink none
      exit
      port 1/1/2
        role uplink
        uplink none
      exit
      port 1/1/3
        role uplink
        uplink none
      exit
      port 1/1/4
        role uplink
        uplink none
      exit
      ...
      port 1/1/9
        uplink 1/1/1
      exit
      port 1/1/10
      ...
      port 1/1/16
        uplink 1/1/2
      exit
      ...
      port 1/1/65
        role none
      exit
      port 1/1/66
        role none
      exit
      ...
      no shutdown
    exit
```



```

eth-sat 20 create
  mac-address d0:99:d5:96:ee:41
  sat-type "es64-10gb-sfpp+4-100gb-cfp4" port-template "10gUp"
  software-repository "rep1"
  no shutdown
exit
exit
exit
  
```

### 8.9.6.6 Satellite Uplink Resiliency

An option in the **port-map** configuration allows a secondary uplink to be assigned to enable uplink resiliency. A secondary uplink is used to carry the traffic associated with the client port if the primary uplink becomes unavailable. If traffic is switched to the secondary uplink, once the primary uplink becomes available, traffic is reverted to the primary as soon as possible.

The configuration of a secondary uplink is performed on a per-client port basis using the **port-map** command.

```

config>system>sat>eth-sat>port-map client-port-id primary primary-uplink-port-id [secondary secondary-uplink-port-id]
  
```

```

config>system>sat>eth-sat>port-map client-port-id system-default
  
```

To configure a secondary uplink, after the primary uplink is specified, the **secondary** keyword should be included, followed by the intended uplink to be used as the secondary uplink.

For example,

```

config>system>satellite>eth-sat 1
  port-map esat-1/1/2 primary esat-1/1/u1 secondary esat-1/1/u3
  
```

- If there are no SAPs or interfaces bound to a client port, then any change can be made to the uplinks
- If a SAP or interface is bound to a client port, or the client port is member of a LAG or ETH tunnel, then only one uplink change per configuration command is allowed (see below)
- The primary cannot be changed directly, this requires multiple steps.
  1. swap primary and secondary
  2. remove secondary
  3. add new secondary
  4. perform a second swap of primary and secondary

The following are basic actions allowed with a single command:

- add or delete secondary uplink
- swap primary and secondary
- add a secondary uplink and swap secondary with primary

## 8.10 Auto-Provisioning

Auto-provisioning is used to provision a node using an external DHCP server and file server. It is used to obtain a configuration file and an image file from an external server using an in-band mechanism. Auto-provisioning is not compatible with an out-of-band management port.

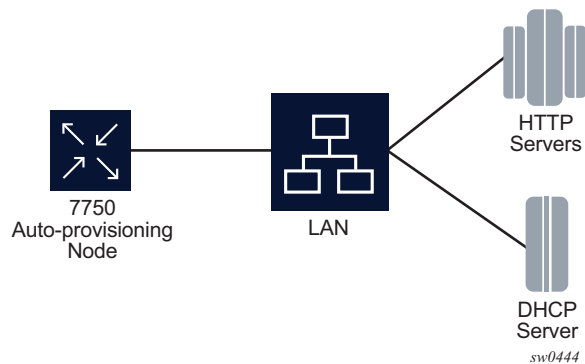
Before using auto-provisioning, the SR OS must be booted up and running the application image. In addition, it needs to have some minimum configuration before the auto-provision script is executed by the operator.

After the auto-provision application is triggered using a tools command, SR OS checks all operationally up ports without IP addresses and send DHCP discovery to these interfaces. The DHCP server needs to be configured with Option 67 and the user must provide the SR OS with the URL of a file server and the corresponding directory for the image.

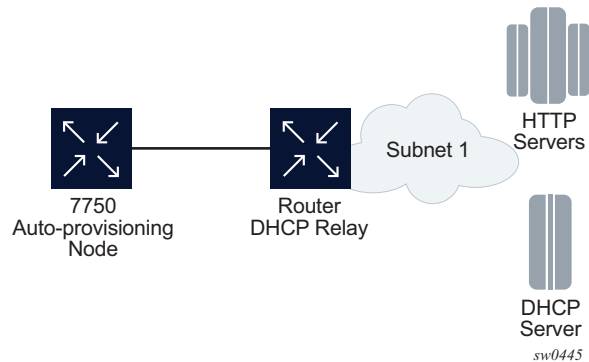
Figure 29 to Figure 31 describe scenarios in which auto-provisioning are used.

In Figure 29, there is no DHCP relay and all IP addresses are assigned from a single pool.

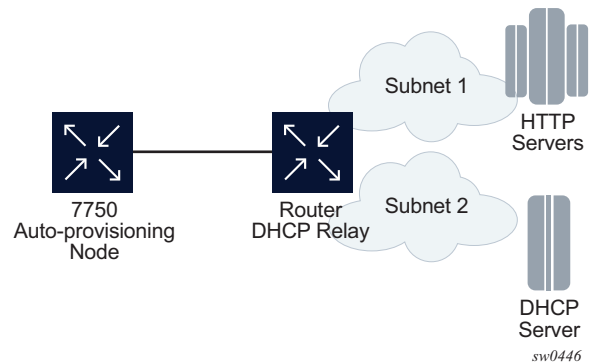
**Figure 29 Example of a Network with no DHCP Relay**



In Figure 30, there is a DHCP relay which injects the Option 82 as a gateway address. The DHCP server is assigned the IP address from the pool dictated by the gateway address option 82. The DHCP server and HTTP server are in the same subnet. The DHCP offer has option 3 "router" which is used for a default gateway creation on the 7750 SR.

**Figure 30** Example of a Network with a DHCP Relay

In [Figure 31](#), all components are in different subnets. The DHCP relay adds Option 82 to the DHCP request as the gateway address which is used for pool selection. The DHCP server must add option 3 configured with the gateway address of the HTTP server.

**Figure 31** Example of a Network with Multiple Subnets

## 8.10.1 Auto-provisioning limits

The following are some configuration limits for auto-provisioning:

- A maximum of 12 Layer 3 interfaces are supported for auto-provisioning
- Only IPv4 auto-provisioning is supported

- It is highly recommended to only have a basic card, MDA, port, and interface configuration as described in this document and no additional static routes or IGP or BGP protocols when performing auto-provisioning because auto-provisioning installs default static routes that may be affected by any extra routing configuration.
- A maximum of 255 characters is supported for the remote URL (200 character maximum for the filepath, the rest for the main URL consisting of the protocol, login credentials, and host IP). A maximum of 200 characters is supported for the local URL. The local file or folder name must not exceed 99 characters.
- The maximum number of file pairs for each image/config record is 10.

## 8.10.2 Auto-provisioning Process

1. The auto-provisioning process starts by going through interfaces with a port configuration and no IP address (IPv4 or IPv6) one by one.
2. The first interface that matches triggers the DHCP client process. See [Auto-provisioning DHCP Rules](#).
3. A static route is automatically configured with the default gateway received by DHCP offer (option 3 "Router" in DHCP offer).
4. Option 67 points to the location of a provisioning file. This is a URL in HTTP format.
5. The node downloads this provisioning file and places it on compact flash or RAM (configurable). The URL is in IP format and there is no need for DNS.
6. The node uses the **primary-image/cfg-download** parameters of the provisioning file to download the image and config file and places them at the destination dictated by the provisioning file. Only compact flash is supported.  
If the primary-image/cfg-download server times out, two more redundant servers can be configured using secondary and tertiary options.
  - a. The node goes through the config file primary, secondary, and tertiary server first.
  - b. Then the node goes through the image primary, secondary, and tertiary server.
  - c. If the node fails to download the image or config, then the auto-provisioning process considers this interface unusable and moves to the next interface. The auto-provisioning also informs the DHCP task of the failure so DHCP releases the IP and sends a DHCP release.
7. The node loads the bof part of the provisioning file into the bof and save the bof. The bof must point to compact flash.

8. The user can force a reboot after successful execution or choose to clear the force reboot option and reboot the node manually.
9. After the reboot, the node boots from compact flash and comes back up with an operational bof.cfg
10. Any further image or config updates are done using a console.

### 8.10.3 Auto-provisioning DHCP Rules

The following are the DHCP rules in the auto-provisioning stage:

1. First, auto-provisioning walks through the interfaces with a configured port, where the port is in operational status up, one by one.
2. It sends a DHCP request to the first configured interface with a port up and no IP address configured.
  - a. If, on this interface, multiple DHCP offers arrives, only the first offer is sent to the auto-provisioning task and the other offers are ignored. This could occur if the node is on a LAN and multiple DHCP servers are connected to the interface.
  - b. The DHCP client has an exponential retry mechanism. If the DHCP offer does not arrive from the server, the client resends a DHCP request at 2, 4, 8, 32 and 64 s, with 64 s being the maximum timeout, If the 64 s timeout interval is reached, the DHCP client keeps retrying every 64 s. The user can configure a timeout value. If no DHCP offer has arrived by this timeout value, the auto-provisioning process moves to the next interface.
  - c. If the DHCP offer arrives on the port and the DHCP client task does not acknowledge the DHCP offer, for any reason, it disables the DHCP client and remove the IP from the port.
  - d. If the DHCP offer arrives on the port and the DHCP client acknowledges the offer, it sends the information to auto-provisioning. If auto-provisioning does not like the offer, because there is no option 67, option 67 is malformed, or for any other reason listed in [Auto-provisioning Failure](#), the auto-provisioning process deconfigures the DHCP client and the DHCP client sends a DHCP release, and unassigns the IP address.
  - e. In case of failure, detailed information is displayed by the auto-provisioning process and the process moves to the next port that is up and does not have an IP address.
3. If auto-provisioning is successful using the offer and its option then the provisioning file download starts through HTTP.

The **auto-provisioning** command is CLI blocking. All information about the auto-provisioning process is displayed on the CLI and logged.

## 8.10.4 Auto-provisioning Failure

Auto-provisioning fails for the following reasons:

- There is no Option 67.
- The Option 67 format is not acceptable to auto-provisioning.
- The format is a URL or DNS is not supported.
- There is a failure in the download provisioning file or the server is not reachable.
- There is failure in the download of the image or config file using the provisioning file information, for example, the server is not available, the wrong directory is listed, or the wrong credentials are given.
- The image or config fails to copy to the compact flash.
- The image or config fails to sync to the inactive CPM.
- The BOF does not point to the compact flash, for example, it is pointing to the network.

If the auto-provisioning procedure on this interface fails, then auto-provisioning:

1. Displays all information on the blocked CLI and in the log, explaining the failure in detail.
2. Updates the DHCP task so the DHCP task can take the appropriate actions to release the IP address on the interface. This is done by sending a DHCP release for the DHCP ack received from the server.
3. Goes to the next interface with port up and no IP address.
4. If no other interface with port up is found, the auto-provisioning task stops and a failure error is displayed on the CLI and in the log.

---

## 8.11 Administrative Tasks

This section contains information to perform administrative tasks.

### 8.11.1 Saving Configurations

Whenever configuration changes are made, the modified configuration must be saved so they are not lost when the system is rebooted.

Configuration files are saved by executing explicit command syntax which includes the file URL location to save the configuration file as well as options to save both default and non-default configuration parameters. Boot option file (BOF) parameters specify where the system should search for configuration and image files as well as other operational parameters during system initialization.

For more information about boot option files, refer to the Boot Options section.

### 8.11.2 Specifying Post-Boot Configuration Files

Two post-boot configuration extension files are supported and are triggered when either a successful or failed boot configuration file is processed. The **boot-bad-exec** and **boot-good-exec** commands specify URLs for the CLI scripts to be run following the completion of the bootup configuration. A URL must be specified or no action is taken.

For example, after a configuration file is successfully loaded, the specified URL can contain a nearly identical configuration file with certain commands enabled or disabled, or particular parameters specified and according to the script which loads that file.

### 8.11.3 Network Timing

In Time Domain Multiplexed (TDM)-based networks (for example, SONET or SDH circuit-switched networks), the concept of network timing is used to prevent over-run or under-run issues where circuits are groomed (rebundled) and switched. Hardware exists in each node that takes a common clock derived from an internal oscillator, a specific receive interface, or special BITS interface and provides it to each synchronous interface in the system. Usually, each synchronous interface is allowed



to choose between using the chassis-provided clock or the clocking recovered from the received signal on the interface. The clocking is used to drive the transmit side of the interface. The appropriate configuration at each node which defines how interface clocking is handled must be considered when designing a network that has a centralized timing source so each interface is operating in a synchronous manner.

The effect of timing on a network is dependent on the nature of the type of traffic carried on the network. With bit-wise synchronous traffic (traditional circuit-based voice or video), non-synchronous transmissions cause a loss of information in the streams affecting performance. With packet-based traffic, the applications expect and handle jitter and latency inherent to packet-based networks. When a packet-based network is used to carry voice or video traffic, the applications use data compression and elasticity buffering to compensate for jitter and latency. The network itself relies on appropriate Quality of Service (QoS) definitions and network provisioning to further minimize the jitter and latency the application may experience.

## 8.11.4 Power Supplies

SR OS supports a **power-supply** command to configure the type and number of power supplies present in the chassis. The operational status of a power source is always displayed by the LEDs on the Control Processor/Switch Fabric Module (CP/SFM) front panel, but the power supply information must be explicitly configured in order for a power supply alarm to be generated if a power source becomes operationally disabled.

## 8.11.5 Automatic Synchronization

Use the CLI syntax displayed below to configure synchronization components relating to active-to-standby CPM switchover. In redundant systems, synchronization ensures that the active and standby CPMs have identical operational parameters, including the active configuration, CPM, XCM, and IOM images in the event of a failure or reset of the active CPM.

The **force-switchover** command forces a switchover to the standby CPM card.

To enable automatic synchronization, either the **boot-env** parameter or the **config** parameter must be specified. The synchronization occurs when the **admin save** or **bof save** commands are executed.

When the **boot-env** parameter of the **synchronize** command is specified, the `bof.cfg`, primary/secondary/tertiary configuration files (`.cfg` and `.ndx`), `li`, and `ssh` files are automatically synchronized. When the **config** parameter is specified, only the configuration files are automatically synchronized.

Synchronization also occurs whenever the BOF is modified and when an **admin>save** command is entered with no filename specified.

### 8.11.5.1 Boot-Env Option

The **boot-env** option enables a synchronization of all the files used in system initialization.

When configuring the system to perform this synchronization, the following occurs:

1. The BOF used during system initialization is copied to the same compact flash on the standby CPM (in redundant systems). The synchronization parameters on the standby CPM are preserved.
2. The primary, secondary, and tertiary images, (provided they are locally stored on the active CPM) are copied to the same compact flash on the standby CPM.
3. The primary, secondary, and tertiary configuration files, (provided they are locally stored on the active CPM) are copied to the same compact flash on the standby CPM.

### 8.11.5.2 Config Option

The **config** option synchronizes configuration files by copying the files specified in the active CPM BOF file to the same compact flash on the standby CPM.

Both image files (CPM and IOM) on the 7450 ESS must be located in the same directory. Failure to locate and synchronize both images causes an error to be generated.

## 8.11.6 Manual Synchronization

The **admin redundancy synchronize** command performs manual CPM synchronizations. The **boot-env** parameter synchronizes the BOF, image, and configuration files in redundant systems. The **config** parameter synchronizes only the configuration files in redundant systems.

### 8.11.6.1 Forcing a Switchover

The **force-switchover now** command forces an immediate switchover to the standby CPM card.

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the **admin reboot standby** command on the active or the standby CPM.

---

## 8.12 System Router Instances

SR OS supports multiple Layer 3 router instances. These instances have their own IP addressing spaces and parameters. Router instances are isolated from each other.

The following are the different types of router instances in SR OS:

- **Base**

All SR OS routers have the Base router instance: the system created default router instance used to forward user IP traffic among router line card ports. Router interfaces (that is, network interfaces configured under **configure router [Base]**) and IES services and interfaces exist in the Base router instance. The Base router instance is identified in SNMP as vRtrType = baseRouter (1) and has a vRtrID of 1.

- **VPRN instances**

Another type of router instance is the set of operator configured VPRN services. Each VPRN service has a unique router instance. For more information about VPRN services and their associated router instances, refer to the *7450 ESS, 7750 SR, 7950 XRS, and VSR Layer 3 Services Guide: IES and VPRN*. VPRN router instances are identified in SNMP as vRtrType = vprn (2), and the vRtrID is dynamically allocated.

- **Special system router instances**

SR OS routers also support the following special router instances:

- **management**

The management router instance is a system created router instance that is used for management of the router. The management router instance is bound to CPM/CCM ports A/1 and B/1. This is a CPM router instance which cannot be renamed or deleted by an operator. The management router instance is identified in SNMP as vRtrType = vr(3), and the vRtrID is 4095.

- **vpls-management**

The vpls-management router instance is used for management of VPLS services. It is identified in SNMP as vRtrType = vr(3), and the vRtrID is 4094.

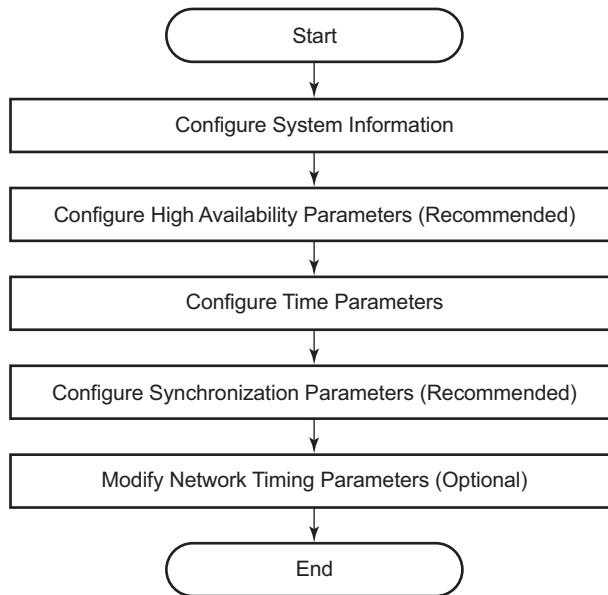
- **User created CPM router instances**

User created CPM router instances are user defined router instances that are mainly used with ethernet ports on the CPM/CCM cards: CPM router instances only use CPM/CCM ethernet ports as interfaces. CPM router instances have a user-defined name and are the only types of non-VPRN router instances that can be created by the user. User created CPM router instances are identified in SNMP as vRtrType = vr(3), and the vRtrID is dynamically allocated.

## 8.13 System Configuration Process Overview

Figure 32 shows the process to provision basic system parameters.

**Figure 32 System Configuration and Implementation Flow**



7750\_SR\_Basics\_27

## **8.14 Configuration Notes**

This section describes system configuration caveats.

### **8.14.1 General**

The system must be properly initialized and the boot loader and BOF files successfully executed in order to access the CLI.





---

## 8.15 Configuring System Management with CLI

This section provides information about configuring system management features with CLI.

### 8.15.1 Saving Configurations

Whenever configuration changes are made, the modified configuration must be saved so the changes will not be 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. For more information about boot option files, see [Boot Options](#).

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 (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 filename) changed since the last boot, the new configuration source is used.

The save command includes an option to save both default and non-default configuration parameters (the **detail** option).

The **index** option specifies that the system preserves system indexes when a save command is executed, regardless of the persistent status in the BOF file. 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, path IDs, and so on. This reduces resynchronizations of the Network Management System (NMS) with the affected network element.

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.

## 8.15.2 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](#)
- [System Time Elements](#)

The following example shows a basic system configuration:

```
A:ALA-12>config>system# info
#-----
echo "System Configuration "
#-----
      name "ALA-12"
      coordinates "Unknown"
      snmp
      exit
      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#
```

## 8.15.3 Common Configuration Tasks

This section provides a brief overview of the tasks that must be performed to configure system parameters and provides the CLI commands.

---

## 8.15.3.1 System Information

This section covers the basic system information parameters to configure the physical location of the router, contact information, location information (the place the router is located such as an address, floor, room number, and so on), global positioning system (GPS) coordinates, and system name.

### 8.15.3.1.1 System Information Parameters

#### Name

Use the **system** 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:

**CLI Syntax:**    `config>system`  
                  `name system-name`

**Example:**        `config>system# name ALA-12`

The following example shows the system name:

```
sysName@domain>config>system# info
#-----
echo "System Configuration "
#-----
      name "ALA-12"
. . .
      exit
-----
sysName@domain>config>system#
```

#### Contact

Use the **contact** command to specify the name of a system administrator, IT staff member, or other administrative entity.

**CLI Syntax:**    `config>system`  
                  `contact contact-name`

**Example:**        `config>system# contact "Fred Information Technology"`

## Location

Use the **location** command to specify the system location of the device. For example, enter the city, building address, floor, room number, and so on, where the router is located.

Use the following CLI syntax to configure the location:

**CLI Syntax:** `config>system  
location location`

**Example:** `config>system# location "Bldg.1-floor 2-Room 201"`

## 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 an SR-series router.

Use the following CLI command syntax to define the CLLI code:

**CLI Syntax:** `config>system  
                  clli-code clli-code`

**Example:** `config>system# clli-code abcdefg1234`

### 8.15.3.1.2 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:

**CLI Syntax:** `config>system  
coordinates coordinates`

**Example:** `config>system# coordinates "N 45 58 23, W 34 56 12"`

The following example shows the configuration output of the 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"  
    clii-code "abcdefg1234"  
    coordinates "N 45 58 23, W 34 56 12"  
  
. . .  
    exit  
-----  
A:ALA-12>config>system#
```

### 8.15.3.1.3 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 show time according to the local time zone.

#### Zone

The **zone** command sets the time zone and/or time zone offset for the router. The router supports system-defined and user-defined time zones. The system-defined time zones are listed in [Table 45](#).

**CLI Syntax:** `config>system>time`  
`zone std-zone-name | non-std-zone-  
name [hh [:mm]]`

**Example:** `config>system>time#`  
`config>system>time# zone GMT`

The following example shows the 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#
```

**Table 45 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
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 (e.g., Perth)	UTC +8 hours

**Table 45 System-defined Time Zones (Continued)**

Acronym	Time Zone Name	UTC Offset
ACST	Central Standard Time (e.g., Darwin)	UTC +9.5 hours
AEST	Eastern Standard/Summer Time (e.g., Canberra)	UTC +10 hours
NZT	New Zealand Standard Time	UTC +12 hours
NZDT	New Zealand Daylight Saving Time	UTC +13 hours

**Summer Time Coordinates**

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 will be adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

**CLI Syntax:**

```

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:**

```

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 45](#), then 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 45](#) or entered as optional parameters in this command.

The following example shows 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

```

## NTP

Network Time Protocol (NTP) is defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis* and RFC 5905, *Network Time Protocol Version 4: Protocol and Algorithms Specification*. It allows for participating network nodes to keep time more accurately and maintain time in a synchronized manner between all participating network nodes.

### Authentication-check

NTP supports an authentication mechanism to provide some security and access control to servers and clients. The default behavior when any authentication keys are configured is to reject all NTP protocol PDUs that have a mismatch in either the authentication key-id, type, or key. The authentication-check command provides for the options to skip or maintain this rejection of NTP PDUs that do not match the authentication requirements.

When authentication-check is configured, NTP PDUs are authenticated on receipt. However, mismatches cause a counter to be increased, one counter for key-id, one for type, and one for key value mismatches.

**CLI Syntax:** config>system>time>ntp  
authentication-check

**Example:** config>system>time>ntp#  
config>system>time>ntp# authentication-check  
config>system>time>ntp# no shutdown

### Authentication-key

The **authentication-key** 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.

**CLI Syntax:** config>system>time>ntp



```
authentication-key key-id {key key} [hash |
  hash2 | custom] type
  {des | message-digest}
```

**Example:**

```
config>system>time>ntp#
config>system>time>ntp# authentication-key 1 key A type
des
config>system>time>ntp# no shutdown
```

The following example 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#
```

### Broadcast

The **broadcast** command is used to transmit broadcast packets on a given interface. Interfaces in the base routing context or the management interface may be specified. Due the relative ease of spoofing of broadcast messages, it is strongly recommended to use authentication with broadcast mode. The messages are transmitted using a destination address that is the NTP Broadcast address.

**CLI Syntax:**

```
config>system>time>ntp
  broadcast [router router-name] {interface
    ip-int-name} [key-id key-id] [version
    version]
    [ttl ttl]
```

**Example:**

```
config>system>time>ntp#
config>system>time>ntp# broadcast interface int11
version 4
ttl 127
config>system>time>ntp# no shutdown
```

The following example in 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#

```

### Broadcastclient

The **broadcastclient** command enables listening to NTP broadcast messages on the specified interface. Interfaces in the base routing context or the management interface may be specified. Due the relative ease of spoofing of broadcast messages, it is strongly recommended to use authentication with broadcast mode. The messages must have a destination address of the NTP Broadcast address.

**CLI Syntax:**

```

config>system>time>ntp
                        broadcastclient [router router-name]
                        {interface ip-int-name}
                        [authenticate]

```

**Example:**

```

config>system>time>ntp#
config>system>time>ntp# broadcastclient interface int11
config>system>time>ntp# no shutdown

```

The following example shows NTP enabled with the broadcastclient parameter enabled.

```

A:ALA-12>config>system>time# info
-----
        ntp
        broadcastclient interface int11
        no shutdown
        exit
-----
A:ALA-12>config>system>time#

```

### Multicast

When configuring NTP the node can be configured to transmit or receive multicast packets on the CPM MGMT port (CPM applies to the 7450 ESS and 7750 SR). Broadcast & Multicast messages can easily be spoofed, therefore, authentication is strongly recommended. Multicast is used to configure the transmission of NTP multicast messages. The **no** construct of this command removes the transmission of multicast packets on the management port.

When transmitting multicast NTP messages the default address of 224.0.1.1 is used.

**CLI Syntax:**

```

config>system>time>ntp
                        multicast [version version] [key-id key-id]

```

**Example:**     `config>system>time>ntp#`  
                  `config>system>time>ntp# multicast`  
                  `config>system>time>ntp# no shutdown`

The following example shows NTP enabled with the multicast command configured.

```
A:ALA-12>config>system>time# info
-----
server 192.168.15.221
multicast
no shutdown
-----
A:ALA-12>config>system>time#
```

### Multicastclient

The **multicastclient** command is used to configure an address to receive multicast NTP messages on the CPM MGMT port (7450 ESS and 7750 SR). Broadcast & Multicast messages can easily be spoofed, therefore, authentication is strongly recommended. The no construct of this command removes the multicast client. If multicastclient is not configured, all NTP multicast traffic will be ignored.

**CLI Syntax:**   `config>system>time>ntp`  
                          `multicastclient [authenticate]`

**Example:**     `config>system>time>ntp#`  
                  `config>system>time>ntp# multicastclient authenticate`  
                  `config>system>time>ntp# no shutdown`

The following example shows NTP enabled with the multicastclient command configured.

```
A:ALA-12>config>system>time# info
-----
server 192.168.15.221
multicastclient
no shutdown
-----
A:ALA-12>config>system>time##
```

### NTP-Server

The **ntp-server** 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 authentication is specified in this command, the NTP server requires client packets to be authenticated based on the key received in the client request.

**CLI Syntax:**    `config>system>time>ntp`  
                  `ntp-server [authenticate]`

**Example:**       `config>system>time>ntp#`  
                  `config>system>time>ntp# ntp-server`  
                  `config>system>time>ntp# no shutdown`

The following example shows NTP enabled with the `ntp-server` command configured.

```
A:sim1>config>system>time>ntp# info
-----
      no shutdown
      ntp-server
-----
A:sim1>config>system>time>ntp#
```

### 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, it is recommended to configure authentication and to configure known time servers as their peers. Use the **no** form of the command to remove the configured peer.

**CLI Syntax:**    `config>system>time>ntp`  
                  `peer ip-address [version version] [key-id key-`  
                  `id]`  
                  `[prefer]`

**Example:**       `config>system>time>ntp#`  
                  `config>system>time>ntp# peer 192.168.1.1 key-id 1`  
                  `config>system>time>ntp# no shutdown`

The following example shows 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#
```

### 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 ten NTP servers can be configured.

**CLI Syntax:**     config>system>time>ntp  
                  server *ip-address* [*key-id key-id*] [*version*  
                  *version*] [*prefer*]

**Example:**       config>system>time>ntp#  
                  config>system>time>ntp# server 192.168.1.1 key-id 1  
                  config>system>time>ntp# no shutdown

The following example shows NTP enabled with the server command configured.

```
A:sim1>config>system>time>ntp# info
-----
no shutdown
server 192.168.1.1 key 1
-----
A:sim1>config>system>time>ntp#
```

## 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.

**CLI Syntax:**     config>system  
                  time  
                  sntp  
                  broadcast-client  
                  server-address *ip-address* [*version version-*  
                  *number*] [*normal* | *preferred*] [*interval*  
                  *seconds*]  
                  no shutdown

### Broadcast-client

The **broadcast-client** command enables listening at the global device level to SNTP broadcast messages on interfaces with broadcast client enabled.

**CLI Syntax:**     config>system>time>sntp  
                  broadcast-client

**Example:**       config>system>time>sntp#  
                  config>system>time>sntp# broadcast-client  
                  config>system>time>sntp# no shutdown

The following example shows 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#
```

### Server-address

The **server-address** command configures an SNTP server for SNTP unicast client mode.

**CLI Syntax:** `config>system>time>sntp#`  
`config>system>time>sntp# server-address ip-address`  
`version version-number [normal | preferred] [interval`  
`seconds]`

**Example:** `config>system>time>sntp#`  
`config>system>time# server-address 10.10.0.94 version 1`  
`preferred interval 100`

The following example shows 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#
```

## CRON

CRON provides various time and date scheduling functions. Configuration notes for the CRON schedule are provided below.

### 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.

**Example:**

```
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
```

The following example 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#
```

### 8.15.3.1.4 ANCP Enhancements

Persistency is available for subscriber’s ANCP attributes and is stored on the on-board compact flash card. ANCP data will stay persistence during an ISSU as well as nodal reboots. During recovery, ANCP attributes are first restored fully from the persistence file, and incoming ANCP sessions are temporarily on hold. Afterwards, new ANCP data can overwrite any existing values. This new data is then stored into the compact flash in preparation for the next event.

## 8.15.3.2 Configuring Synchronization and Redundancy

### 8.15.3.2.1 Configuring Persistence

The following example shows subscriber management system persistence command usage for the 7450 ESS and 7750 SR:

**Example:**

```
config>system# persistence
config>system>persistence# subscriber-mgmt
config>system>persistence>sub-mgmt# description
    "cf3:SubMgmt-Test"
config>system>persistence>sub-mgmt# location cf3:
config>system>persistence>sub-mgmt# exit
```

```
A:ALA-12>config>system>persistence# info
-----
subscriber-mgmt
  description "cf3:SubMgmt-Test"
  location cf1:
  exit
-----
A:ALA-12>config>system>persistence#
```

### 8.15.3.2.2 Configuring Synchronization

The **switchover-exec** command specifies the location and name of the CLI script file executed following a redundancy switchover from the previously active CPM card.

**CLI Syntax:**

```
admin>redundancy
synchronize {boot-env | config}
config>system
switchover-exec file-url
```

### 8.15.3.2.3 Configuring Manual Synchronization

Note that automatic synchronization can be configured in the **config>system>synchronization** context.

**CLI Syntax:**

```
admin
redundancy
  synchronize {boot-env|config}
```

**Example:**

```
admin>redundancy# synchronize config
```



The following shows the output shown during a manual synchronization:

```
A:ALA-12>admin# synchronize config
Syncing configuration.....
Syncing configuration....Completed.
A:ALA-12#
```

#### 8.15.3.2.4 Forcing a Switchover

The **force-switchover now** command forces an immediate switchover to the standby CPM card.

**CLI Syntax:**     admin>redundancy  
                  force-switchover [now]

**Example:**       admin>redundancy# force-switchover now

```
A:ALA-12# admin redundancy force-switchover now
A:ALA-12#
Resetting...
?
```

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the **admin reboot standby** command on the active or the standby CPM.

#### 8.15.3.2.5 Configuring Synchronization Options

Network operators can specify the type of synchronization operation to perform between the primary and secondary CPMs after a change has been made to the configuration files or the boot environment information contained in the boot options file (BOF).

Use the following CLI to configure the boot-env option:

**CLI Syntax:**     config>system  
                  synchronize {boot-env|config}

**Example:**       config>system# synchronize boot-env

The following example shows the configuration:

```
A:ALA-12>config>system# synchronize boot-env
A:ALA-12>config>system# show system synchronization
=====
Synchronization Information
=====
Synchronize Mode      : Boot Environment
Synchronize Status    : No synchronization
Last Config Sync Time : 2006/06/27 06:19:47
Last Boot Env Sync Time : 2006/06/27 06:19:47
=====
A:ALA-12>config>system#
```

Use the following CLI to configure the config option:

**CLI Syntax:** config>system  
synchronize {boot-env|config}

**Example:** config>system# synchronize config

The following example shows the configuration.

```
A:ALA-12>config>system# synchronize config
A:ALA-12>config>system# show system synchronization
=====
Synchronization Information
=====
Synchronize Mode      : Configuration
Synchronize Status    : No synchronization
Last Config Sync Time : 2006/06/27 09:17:15
Last Boot Env Sync Time : 2006/06/24 07:16:37
=====
A:ALA-12>config>system#
```

### 8.15.3.3 Configuring Multi-Chassis Redundancy for LAG

When configuring associated LAG ID parameters, the LAG must be in access mode and LACP must be enabled.

Use the CLI syntax shown below to configure multi-chassis redundancy features.

**CLI Syntax:** config>redundancy  
multi-chassis  
peer ip-address  
authentication-key [authentication-key | hash-  
key] [hash | hash2 | **custom**]  
description description-string  
mc-lag  
hold-on-neighbor-failure duration

```
keep-alive-interval interval
lag lag-id lacp-key admin-key system-id
    system-id [remote-lag lag-id] system-
    priority system-priority
no shutdown
no shutdown
source-address ip-address
sync
    igmp
    igmp-snooping
    pim-snooping [sap]
port [port-id | lag-id] [sync-tag sync-
    tag]
    range encap-range sync-tag sync-tag
no shutdown
srrp
sub-mgmt
```

**Example:**

```
config>redundancy#
config>redundancy# multi-chassis
config>redundancy>multi-chassis# peer 10.10.10.2 create
config>redundancy>multi-chassis>peer# description "Mc-
    Lag peer 10.10.10.2"
config>redundancy>multi-chassis>peer# mc-lag
config>redundancy>mc>peer>mc-lag# lag 1 lacp-key 32666
    system-id 00:00:00:33:33:33 system-priority 32888
config>redundancy>mc>peer>mc-lag# no shutdown
config>redundancy>mc>peer>mc-lag# exit
config>redundancy>multi-chassis>peer# no shutdown
config>redundancy>multi-chassis>peer# exit
config>redundancy>multi-chassis# exit
config>redundancy#
```

The following example shows the configuration:

```
A:ALA-48>config>redundancy# info
-----
multi-chassis
  peer 10.10.10.2 create
    description "Mc-Lag peer 10.10.10.2"
  mc-lag
    no shutdown
  exit
  no shutdown
  exit
  exit
-----
A:ALA-48>config>redundancy#
```

### 8.15.3.4 Configuring Power Supply Parameters

The following is an example for the 7750 SR and 7950 XRS:

```
A:ALA-12>config>system# info
-----
..
    name "ALA-12"
    contact "Fred Information Technology"
    location "Bldg.1-floor 2-Room 201"
    clii-code "abcdefg1234"
    coordinates "N 45 58 23, W 34 56 12"
    power-supply 1 dc
    power-supply 2 dc
    lacp-system-priority 1
    sync-if-timing
        begin
        ref-order ref1 ref2 bits
        ref1
            shutdown
        exit
        ref2
            shutdown
        exit
        bits
            shutdown
            interface-type ds1 esf
        exit
    commit
exit
..
```

The following is an example for the 7450 ESS:

```
-----
A:ALA-12>config>system# info
-----
..
    name "ALA-12"
    contact "Fred Information Technology"
    location "Bldg.1-floor 2-Room 201"
    clii-code "abcdefg1234"
    coordinates "N 45 58 23, W 34 56 12"
    power-supply 1 dc
    power-supply 2 dc
    lacp-system-priority 1
    sync-if-timing
        begin
        ref-order ref1 ref2 bits
        ref1
            shutdown
        exit
        ref2
            shutdown
        exit
    commit
exit
..
```

```

      bits
      shutdown
      interface-type ds1 esf
      exit
      commit
      exit
    ..
-----
A:ALA-12>config>system#

```

### 8.15.3.5 Configuring ATM System Parameters

The ATM context configures system-wide ATM parameters for the 7750 SR.

**CLI Syntax:**

```

config>system#
atm
    atm-location-id location-id
    oam
        loopback-period period
        retry-down retries
        retry-up retries

```

**Example:**

```

config>system# atm
config>system>atm# atm-location-id
03:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
config>system>atm# oam
config>system>atm>oam# loopback-period 30
config>system>atm>oam# retry-down 5
config>system>atm>oam# retry-up 3
config>system>atm>oam# exit

```

The following example shows the ATM configuration.

```

A:ALA-12>config>system>atm# info
-----
atm-location-id 03:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
oam
    retry-up 3
    retry-down 5
    loopback-period 30
    exit
-----
A:ALA-12>config>system>atm#

```

### 8.15.3.6 Configuring Backup Copies

The `config-backup` command allows you to specify the maximum number of backup versions of 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 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. 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, then the save is performed to `xyz.cfg` and the index file is created as `xyz.ndx`. Synchronization between the active and standby SF/CPMSF/CPM is performed for all configurations and their associated persistent index files.

**CLI Syntax:** `config>system`  
`config-backup count`

**Example:** `config>system#`  
`config>system# config-backup 7`

The following example shows the `config-backup` configuration.

```
A:ALA-12>config>system>time# info
#-----
echo "System Configuration"
#-----
      name "ALA-12"
      contact "Fred Information Technology"
      location "Bldg.1-floor 2-Room 201"
      cli-code "abcdefg1234"
      coordinates "N 45 58 23, W 34 56 12"
      config-backup 7
```

```
...  
-----  
A:ALA-12>config>system>time#
```

### 8.15.3.7 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 to be run following the completion of the bootup configuration. A URL must be specified or no action is taken. The commands are persistent between router (re)boots and are included in the configuration saves (admin>save).

**CLI Syntax:**   config>system  
  boot-bad-exec *file-url*  
  boot-good-exec *file-url*

**Example:**     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

The following example shows the command output:

```
A:ALA-12>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"  
          config-backup 7  
          boot-good-exec "ftp://test:test@192.168.xx.xxx/./ok.cfg"  
          boot-bad-exec "ftp://test:test@192.168.xx.xxx/./fail.cfg"  
          power-supply 1 dc  
          power-supply 2 dc  
          lacp-system-priority 1  
          sync-if-timing  
          begin  
          ref-order ref1 ref2 bits  
..  
-----  
A:ALA-12>config>system#
```

### 8.15.3.7.1 Show Command Output and Console Messages

The **show>system>information** command shows the current value of the bad/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 or not.

The following is an example for the 7750 SR:

```
ALA-12>config>system# show system information
=====
System Information
=====
System Name           : ALA-12
System Contact        : Fred Information Technology
System Location       : Bldg.1-floor 2-Room 201
System Coordinates    : N 45 58 23, W 34 56 12
System Up Time        : 1 days, 04:59:33.56 (hr:min:sec)

SNMP Port             : 161
SNMP Engine ID        : 0000197f000000000467ff00
SNMP Max Message Size : 1500
SNMP Admin State      : Disabled
SNMP Oper State       : Disabled
SNMP Index Boot Status : Not Persistent

BOF Source            : cfl:
Image Source          : primary
Config Source         : primary
Last Booted Config File: ftp://test:test@192.168.xx.xxx/./12.cfg
Last Boot Cfg Version : THU MAR 04 22:39:03 2004 UTC
Last Boot Config Header: # TiMOS-L-14.0.B1-217 boot/
i386 Nokia 7750 SR Copyright (c)
                        2000-2016 Nokia.
                        # All rights reserved. All use subject to applicable license
                        agreements.
                        # Built on Wed Jul 13 19:08:56 PDT 2016 by builder in /
                        rel14.0/b1/B1-217/panos/main

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
Time Last Modified     : 2004/03/06 03:30:45
Max Cfg/BOF Backup Rev : 7
Cfg-OK Script          : ftp://test:test@192.168.xx.xxx/./ok.cfg
Cfg-OK Script Status   : not used
Cfg-Fail Script        : ftp://test:test@192.168.xx.xxx/./fail.cfg
Cfg-Fail Script Status : not used

Management IP Addr    : 192.168.xx.xxx/20
DNS Server            : 192.168.1.254
DNS Domain            : eng.timetra.com
BOF Static Routes     :
  To                  Next Hop
  172.16.0.0/22      192.168.1.251
```



```
ICMP Vendor Enhancement: Disabled
ATM Location ID       : 01:00:00:00:00:11:00:00:00:00:00:00:00:00:00:00
=====
ALA-12>config>system#
```

When executing a post-boot configuration extension file, status messages are output to the CONSOLE screen prior to the “Login” prompt.

Following is an example of a failed bootup 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-L-14.0.B1-217 boot/i386 Nokia 7750 SR Copyright (c) 2000-2016 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Jul 13 19:08:56 PDT 2016 by builder in /rel14.0/b1/B1-217/panos/main

Login:
```

## 8.15.4 System Timing

In the event that network timing is required for the synchronous interfaces in the router, a timing subsystem is utilized to provide a clock to all synchronous interfaces within the system.

This section describes the commands used to configure and control the timing subsystem.

### 8.15.4.1 Edit Mode

To enter the mode to edit timing references, you must enter the **begin** keyword at the **config>system>sync-if-timing#** prompt.

Use the following CLI syntax to enter the edit mode:

**CLI Syntax:**   config>system>sync-if-timing  
                  begin

The following error message shows when the you try to modify **sync-if-timing** parameters without entering the keyword **begin**.

```
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#
```

### 8.15.4.2 Configuring Timing References

Use the following CLI syntax to configure timing reference parameters. The source port specified for **ref1** and **ref2** is dependent on the router model type and chassis slot. Refer to the details in the specific command descriptions.

The following shows a timing reference configuration example for the router:

```
ALA-12>config>system>sync-if-timing# info
-----
ref-order ref2 ref1 bits
ref1
  source-port 3/1/1
  no shutdown
exit
ref2
  source-port 6/1/2
  no shutdown
exit
bits
  interface-type ds1 esf
  no shutdown
exit
-----
ALA-12>config>system>sync-if-timing#
```

### 8.15.4.3 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. When the failed reference becomes operational, it is eligible for selection.

When mode is non-revertive, a failed clock source is not selected again. If a node would enter holdover due to the references being in previous failed state, then the node will select one of the previously failed references rather than going into holdover.

**CLI Syntax:** `config>system>sync-if-timing  
revert`

If the current reference goes offline or becomes unstable the revert command allows the clock to revert to a higher-priority reference.

When revertive switching enabled a valid timing reference of the highest priority is used. If a reference with a higher priority becomes valid, a reference switch over to that reference is 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 the active reference becomes invalid, a reference switch over to a valid reference with the highest priority is initiated. The failed reference is eligible for selection once it becomes operational.

**CLI Syntax:** `config>system>sync-if-timing  
no revert`

#### 8.15.4.4 Other Editing Commands

Other editing commands include:

- `commit` — This command saves changes made to the timing references during a session. Modifications are not persistent across system boots unless this command is entered.
- `abort` — This command discards changes that have been made to the timing references during a session.

**CLI Syntax:** `config>system>sync-if-timing  
abort  
commit`

### 8.15.4.5 Forcing a Specific Reference

The debug sync-if-timing force-reference command should only be used to test and debug problems. Network synchronization problems may appear if network elements are left with this manual override setting. Once the system timing reference input has been forced, it may be cleared using the **no force-reference** command.

You can force the CPM clock to use a specific input reference using the **force-reference** command.

When the command is executed, the CPM clock on the active CPM immediately switches its input reference to that specified by the command. If the specified input is not available (shutdown), or in a disqualified state, the CPM clock shall use the next qualified input reference based on the selection rules.

This command also affects the BITS output port. If the BITS output port selection is set to line-reference and the reference being forced is not the BITS input port, then the system uses the forced reference to generate the signal out the BITS output port. If the BITS output port selection is set to internal-clock, then the system uses the output of the CPM clock to generate the signal for the BITS output port.

On a CPM activity switch, the force command is cleared and normal reference selection is determined.

Debug configurations are not saved between reboots.

```
CLI Syntax:  debug>sync-if-timing  
               force-reference {ref1 | ref2 | bits}  
  
               debug>sync-if-timing# force-reference
```

## 8.15.5 Configuring System Monitoring Thresholds

### 8.15.5.1 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 be created to record the occurrence of the event. It can also specify whether an SNMP notification (trap) be generated for the event. There are two notifications for threshold crossing events, a rising alarm and a falling alarm.

Creating an event entry in the RMON-MIB log table does not create a corresponding entry in the 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 whatever log destinations are configured: 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. 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 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 and alarms and compact flash usage warnings and alarms.

To create events, use the following CLI:

```

CLI Syntax:  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"
  
```

The following example shows the command output:

```

A:ALA-49>config>system>thresholds# info
-----
                rmon
  
```

```

        event 5 description "alarm testing" owner "Timos CLI"
        exit
        cflash-cap-warn cfl-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#

```

### 8.15.5.2 System Alarm Contact Inputs

Alarm contact inputs are physical input pins on the Alarms Interface Port of the CPM that allow the operator to monitor and report changes in external environmental conditions. In a remote or outdoor deployment, alarm inputs typically allow an operator to detect conditions such as whether a door is open or closed, an air conditioner fault has occurred, and so on.

There are four input pins, each of which can be configured with an associated severity level and normally open/normally closed state. When an input pin changes state, the router can generate log events and raise facility alarms.

There is a separate log event for each pin (for example, CHASSIS event 3003 `tmnxSasAlarminput3StateChanged` for input pin 3). The severity level of input pin 3 is controlled by configuring the severity level of the associated log event (using the **configure log event-control** command).

There is also a single +24VDC power output pin on the Alarms Interface Port of the CPM that can be used to supply power for the alarm inputs.

The alarm inputs can be powered in one of two ways:

- using the +24Vdc power output pin
- using an external power source

The power output pin provided on the CPM is monitored, and the router can report when the power source fails.

If using an external power source for the alarm inputs, then it is recommended that the **normal-state closed** configuration be used so that a failure of the external power source will trigger all the alarm pins to detect a change of state. If **normal-state open** is used, a failure of the external power source will not generate any notifications and the alarm input pins will no longer operate correctly.

---

## 8.15.6 Configuring LLDP

The following output shows LLDP defaults:

```
A:testSr1>config>system>lldp# info detail
-----
no tx-interval
no tx-hold-multiplier
no reinit-delay
no notification-interval
no tx-credit-max
no message-fast-tx
no message-fast-tx-init
no shutdown
-----
A:testSr1>config>system>lldp#
```

The following example shows an LLDP port configuration:

```
*A:ALA-48>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:ALA-48>config>port>ethernet>lldp#
```

The following example shows a global system LLDP configuration:

```
A:ALA-48>config>system>lldp# info
-----
tx-interval 10
tx-hold-multiplier 2
reinit-delay 5
notification-interval 10
-----
A:ALA-48>config>system>lldp#
```





---

## 8.16 System Command Reference

### 8.16.1 Command Hierarchies

#### 8.16.1.1 Configuration Commands

- [System Information Commands](#)
- [Satellite Commands](#)
- [System Alarm Contact Input Commands](#)
- [System Threshold Alarm Commands](#)
- [System Bluetooth Commands](#)
- [Persistence Commands](#)
- [PTP Commands](#)
- [System Time Commands](#)
- [Cron Commands](#)
- [Script Control Commands](#)
- [System Synchronization Commands](#)
- [System Administration \(Admin\) Commands](#)
- [High Availability \(Redundancy\) Commands](#)
- [LLDP System Commands](#)
- [LLDP Ethernet Port Commands](#)
- [System Router Instance Commands](#)

#### 8.16.1.2 System Information Commands

```
config
  — system
    — [no] allow-boot-license-violations
    — atm
      — atm-location-id location-id
      — no atm-location-id
      — oam
        — loopback-period period
        — no loopback-period
        — retry-down retries
        — no retry-down
```

- **retry-up** *retries*
- **no retry-up**
- **boot-bad-exec** *file-url*
- **no boot-bad-exec**
- **boot-good-exec** *file-url*
- **no boot-good-exec**
- **chassis-mode** *chassis-mode* [**force**]
- **clli-code** *clli-code*
- **no clli-code**
- **config-backup** *count*
- **no config-backup**
- **contact** *contact-name*
- **no contact**
- **cpm-http-redirect**
  - **[no] optimized-mode**
- **coordinates** *coordinates*
- **no coordinates**
- **dns**
  - **address-pref** {*ipv4-only* | *ipv6-first*}
  - **no address-pref**
  - **dnssec**
    - **ad-validation** {*fall-through* | *drop*}
    - **[no] ad-validation**
- **[no] enable-icmp-vse**
- **ip**
  - **[no] allow-qinq-network-interface**
  - **[no] enforce-unique-if-index**
  - **[no] forward-6in4**
  - **[no] forward-ip-over-gre**
  - **mpls**
    - **label-stack-statistics-count** *label-stack-statistics-count*
    - **no label-stack-statistics-count**
- **lACP-system-priority** *lACP-system-priority*
- **no lACP-system-priority**
- **load-balancing**
  - **[no] l2tp-load-balancing**
  - **[no] l4-load-balancing**
  - **lSR-load-balancing** *hashing-algorithm*
  - **no lSR-load-balancing**
  - **[no] mc-enh-load-balancing**
  - **[no] service-id-lag-hashing**
  - **[no] system-ip-load-balancing**
- **location** *location*
- **no location**
- **name** *system-name*
- **no name**
- **[no] ospf-dynamic-hostnames**
- **port-topology**
  - **port** *port-id to port-id* [**create**]
  - **no port** *port-id*
- **power-supply** *power-supply-id type*
- **software-repository** *repository-name* [**create**]
- **no software-repository** *repository-name*
  - **description** *description-string*

- **no description**
- **primary-location** *file-url*
- **no primary-location**
- **secondary-location** *file-url*
- **no secondary-location**
- **tertiary-location** *file-url*
- **no tertiary-location**
- **file-transmission-profile** *name* [create]
- **no file-transmission-profile** *name*

### 8.16.1.3 Satellite Commands

- ```

config
  — system
    — satellite
      — eth-sat sat-id [create]
      — no eth-sat sat-id
        — client-down-delay client-down-delay
        — no client-down-delay
        — description description-string
        — no description
        — [no] feature feature-name
        — mac-address mac-address
        — no mac-address
        — port-map client-port-id primary primary-uplink-port-id [secondary
          secondary-uplink-port-id]
        — port-map client-port-id system-default
        — [no] ptp-tc
        — sat-type sat-type [port-template template-name]
        — no sat-type
        — [no] shutdown
        — software-repository repository-name
        — no software-repository
        — [no] sync-e
      — local-forward local-forward-id [create]
      — no local-forward local-forward-id
        — description description-string
        — no description
        — sap sap-id [create]
        — no sap sap-id
          — description description-string
          — no description
          — [no] shutdown
      — port-template template-name sat-type sat-type [create]
      — no port-template template-name
        — description description-string
        — port port-id
          — role role-type
          — uplink port-id
          — uplink system-default
          — uplink none
  
```

- [no] **shutdown**
- **tdm-sat** *sat-id* [**create**]
- **no tdm-sat** *sat-id*
  - **description** *description-string*
  - **no description**
  - **mac-address** *mac-address*
  - **no mac-address**
  - **sat-type** *sat-type*
  - **no sat-type**
  - [no] **software-repository** *repository-name*
  - [no] **shutdown**

### 8.16.1.4 System Alarm Contact Input Commands

- ```
config
  — system
    — alarm-contact-in-power {on | off}
    — alarm-contact-input input-pin-number
      — clear-alarm-msg message-string
      — no clear-alarm-msg
      — description description-string
      — no description
      — normal-state {open | closed}
      — [no] shutdown
      — trigger-alarm-msg message-string
      — no trigger-alarm-msg
```

### 8.16.1.5 System Threshold 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-alarm-pct cflash-id rising-threshold percentage [falling-
        threshold percentage] interval seconds [rmon-event-type event-type]
        [startup-alarm alarm-type]
      — no cflash-cap-alarm-pct 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
      — cflash-cap-warn-pct cflash-id rising-threshold threshold [falling-threshold
        threshold] interval seconds [rmon-event-type rmon-event-type] [startup-
        alarm alarm-type]
      — no cflash-cap-warn-pct 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*]
- **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*

### 8.16.1.6 System Bluetooth Commands

- ```

config
  — system
    — bluetooth
      — advertising-timeout seconds
      — no advertising-timeout
      — device ieee-address [create]
      — no device ieee-address
        — description description-string
        — no description
      — module cpm-slot
        — identifier identifier
        — no identifier
      — pairing-button admin-state
      — passkey pass-key
      — power power-state
  
```

### 8.16.1.7 Persistence Commands



**Note:** The commands in this section only apply to the 7750 SR.

```

config
  — system
    — persistence
      — ancp
        — description description-string
        — no description
        — location cflash-id
        — no location
      — application-assurance
        — description description-string
        — no description
        — location cflash-id
        — no location
      — dhcp-server
        — description description-string
        — no description
        — location cflash-id
        — no location
      — nat-port-forwarding
        — description description-string
        — no description
        — location cflash-id
        — no location
      — options
        — dhcp-lease-time-threshold [days days] [hrs hours] [min minutes] [sec
          seconds]
        — no dhcp-lease-time-threshold
      — python-policy-cache
        — description description-string
        — no description
        — location cflash-id
        — no location
      — subscriber-mgmt
        — description description-string
        — no description
        — location cflash-id
        — no location

```

### 8.16.1.8 PTP Commands



**Note:** The commands in this section apply to the 7450 ESS and 7750 SR, except the 7750 SR-1e, 7750 SR-2e, and 7750 SR-3e.

```

config
  — system
    — ptp
      — anno-rx-timeout count
      — no anno-rx-timeout

```

- **clock-type** *boundary*
- **clock-type** *ordinary* {*master* | *slave*}
- **domain** *domain-value*
- **no domain**
- **local-priority** *priority*
- **log-anno-interval** *log-interval*
- **no log-anno-interval**
- **network-type** {*sdh* | *sonet*}
- **peer** *ip-address* [*create*]
- **no peer** *ip-address*
  - **local-priority** *local-priority*
  - **log-sync-interval** *log-interval*
  - **no log-sync-interval**
  - [**no**] **shutdown**
- **peer-limit** *limit*
- **no peer-limit**
- **port** *port-id* [*create*]
- **no port** *port-id*
  - **address** {*01:1b:19:00:00:00* | *01:80:c2:00:00:0e*}
  - **local-priority** *priority*
  - **log-delay-interval** *log-interval*
  - **no log-delay-interval**
  - **log-sync-interval** *log-interval*
  - **no log-sync-interval**
  - **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**

### 8.16.1.9 System Time Commands

- **admin**
  - **set-time** *date time*
- config**
  - **system**
    - **time**
      - [**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*
    - [**no**] **ntp**
      - [**no**] **authentication-check**
      - **authentication-key** *key-id key key* [*hash* | *hash2* | *custom*] *type* {*des* | *message-digest*}
      - **no authentication-key** *key-id*

- **broadcast** [**router** *router-name*] {**interface** *ip-int-name*} [**key-id** *key-id*] [**version** *version*] [**ttl** *ttl*]
- **no broadcast** [**router** *router-name*] {**interface** *ip-int-name*}
- **broadcastclient** [**router** *router-instance* | **service-name** *service-name*] {**interface** *ip-int-name*} [**authenticate**]
- **no broadcastclient** [**router** *router-instance* | **service-name** *service-name*] {**interface** *ip-int-name*}
- **multicast** [**key-id** *key-id*] [**version** *version*]
- **no multicast**
- **multicastclient** [**authenticate**]
- **no multicastclient**
- **ntp-server** [**authenticate**]
- **no ntp-server**
- **peer** [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | *ipv6-address*} [**key-id** *key-id*] [**version** *version*] [**prefer**]
- **no peer** [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | *ipv6-address*}
- **server** [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | *ipv6-address* | **ptp**} [**key-id** *key-id*] [**version** *version*] [**prefer**]
- **no server** [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | *ipv6-address* | **ptp**}
- [**no**] **shutdown**
- [**no**] **prefer-local-time**
- [**no**] **sntp**
  - [**no**] **broadcast-client**
  - **server-address** *ip-address* [**version** *version-number*] [**normal** | **preferred**] [**interval** *seconds*]
  - **no server-address** *ip-address*
  - [**no**] **shutdown**
- **zone** {*std-zone-name* | *non-std-zone-name*} [**hh** *:mm*]
- **no zone**

### 8.16.1.10 Cron Commands

- ```
config
  — system
    — cron
      — [no] schedule schedule-name [owner schedule-owner]
        — 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** *policy-name* [**owner** *policy-owner*]
- **no script-policy**
- **[no] shutdown**
- **type** *schedule-type*
- **weekday** {*weekday-number* [..*weekday-number*] | *day-name* [..*day-name*] | **all**}
- **no weekday**

### 8.16.1.11 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}
        — [no] lock-override
        — max-completed unsigned
        — results file-url
        — no results
        — script script-name [owner script-owner]
        — no script
        — [no] shutdown
  
```

### 8.16.1.12 System Synchronization Commands

- ```

config
  — system
    — sync-if-timing
      — abort
      — begin
      — bits
        — input
          — [no] shutdown
        — interface-type {ds1 [{esf | sf}] | e1 [{pcm30crc | pcm31crc]}]
        — no interface-type
        — output
  
```

- **line-length** {110 | 220 | 330 | 440 | 550 | 660}
- **ql-minimum** {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec | eec1 | eec2}
- **no ql-minimum**
- **[no] shutdown**
- **source** {line-ref | internal-clock}
- **[no] squelch**
- **ql-override** {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec}
- **no ql-override**
- **ssm-bit** *sa-bit*
- **commit**
- **ptp**
  - **ql-override** {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec}
  - **no ql-override**
  - **[no] shutdown**
- **ql-minimum** {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec | eec1 | eec2}
- **no ql-minimum**
- **[no] ql-selection**
- **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**
- **sync**
  - **ql-override** {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec}
  - **no ql-override**
  - **[no] shutdown**
- **[no] revert**
- **wait-to-restore** *minutes*
- **no wait-to-restore**

### 8.16.1.13 System Administration (Admin) Commands

- **admin**
  - **application-assurance**
    - **group** *aa-group-id*
      - **url-list** *url-list-name* **upgrade**
    - **upgrade**

- **debug-save** *[file-url]*
  - **disconnect** *[address ip-address | session-id session-id | username user-name | {console | bluetooth | telnet | ftp | ssh | netconf | grpc}]*
  - **display-config** *[detail | index]*
  - **[no] enable-tech**
  - **nat**
    - **save-deterministic-script**
  - **reboot** *[active | standby | upgrade] [now]*
  - **redundancy**
    - **force-switchover** *[now] [ignore-status]*
    - **rollback-sync**
    - **synchronize cert**
    - **synchronize** *{boot-env | config}*
  - **reset-policy-exclusive**
  - **satellite**
    - **eth-sat** *sat-id*
      - **reboot** *[now] upgrade*
      - **sync-boot-env**
      - **tech-support** *[file-url]*
  - **save** *[file-url] [detail] [index]*
  - **tech-support** *[file-url]*
- admin
- **system**
    - **license**
      - **activate** *[file-url] [now]*
      - **validate** *[file-url]*
- config
- **system**
    - **security**
      - **tech-support**
        - **ts-location** *file-url*

### 8.16.1.14 High Availability (Redundancy) Commands

- **admin**
    - **display-config** *[detail | index]*
    - **redundancy**
      - **force-switchover** *[now] [ignore-status]*
      - **rollback-sync**
      - **synchronize cert**
      - **synchronize** *{boot-env | config}*
- config
- **system**
    - **switchover-exec** *file-url*
    - **no switchover-exec**
  - **redundancy**
    - **bgp-evpn-multi-homing**

- **boot-timer** *seconds*
- **es-activation-timer** *seconds*
- **bgp-multi-homing**
  - **boot-timer** *seconds*
  - **no boot-timer**
  - **site-activation-timer** *seconds*
  - **no site-activation-timer**
  - **site-min-down-timer** *min-down-time*
  - **no site-min-down-timer**
- **[no] cert-sync**
- **mgmt-ethernet** [**revert** *seconds*]
- **no mgmt-ethernet**
- **multi-chassis**
  - **peer** *ip-address* [**create**]
  - **no peer** *ip-address*
    - **authentication-key** {*authentication-key* | *hash-key*} [**hash** | **hash2** | **custom**]
    - **no authentication-key**
    - **description** *description-string*
    - **no description**
    - **[no] mc-endpoint**
      - **[no] bfd-enable**
      - **boot-timer** *interval*
      - **no boot-timer**
      - **hold-on-neighbor-failure** *multiplier*
      - **no hold-on-neighbor-failure**
      - **keep-alive-interval** *interval*
      - **no keep-alive-interval**
      - **[no] passive-mode**
      - **[no] shutdown**
      - **system-priority** *value*
      - **no system-priority**
  - **[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* **source-bmac-lsb** **use-lacp-key**
    - **lag** *lag-id* **lacp-key** *admin-key* **system-id** *system-id* [**remote-lag** *remote-lag-id*] **system-priority** *system-priority* **source-bmac-lsb** *MAC-Lsb*
    - **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] **diameter-proxy**
- [no] **igmp**
- [no] **igmp-snooping**
- [no] **ipsec**
- [no] **l2tp**
- [no] **local-dhcp-server**
- [no] **mc-ring**
- [no] **mld-snooping**
- **pim-snooping** [saps] [spoke-sdps]
- [no] **pim-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] **python**
- **sdp** *sdp-id* [sync-tag *sync-tag*] [create]
- [no] **sdp** *sdp-id*
  - **range** *vc-id-range* **sync-tag** *sync-tag*
  - [no] **range** *vc-id-range*
- [no] **shutdown**
- [no] **srrp**
- [no] **sub-host-trk**
- **sub-mgmt** [ipoe] [pppoe]
- **no sub-mgmt**
- **warm-standby**
- [no] **rollback-sync**
- **synchronize** {boot-env | config}

### 8.16.1.15 LLDP System Commands

- configure
  - system
    - **lldp**
      - **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**

### 8.16.1.16 LLDP Ethernet Port Commands

```

configure
  — port port-id
    — ethernet
      — lldp
        — dest-mac {nearest-bridge | nearest-non-tpmr | nearest-customer}
          — admin-status {rx | tx | tx-rx | disabled}
          — [no] notification
          — port-id-subtype {tx-if-alias | tx-if-name | tx-local}
          — [no] tunnel-nearest-bridge
          — tx-mgmt-address [system] [system-ipv6]
          — no tx-mgmt-address
          — tx-tlvs [port-desc] [sys-name] [sys-desc] [sys-cap]
          — no tx-tlvs

```

### 8.16.1.17 System Router Instance Commands

```

config
  — router [router-instance] [create]
  — no router [router-instance]

```

## 8.16.2 System Command Reference

### 8.16.2.1 Generic Commands

#### shutdown

**Syntax** [no] shutdown

**Context** config>system>cron>sched  
 config>system>satellite>local-forward>sap  
 config>system>satellite>port-template  
 config>system>time>ntp  
 config>system>time>sntp  
 config>system>script-control>script-policy  
 config>system>script-control>script  
 config>system>sync-if-timing>ref1  
 config>system>sync-if-timing>ref2  
 config>system>sync-if-timing>synce  
 config>system>sync-if-timing>ptp  
 config>system>sync-if-timing>bits>input

```
config>system>sync-if-timing>bits>output
config>system>persistence>app-assure
config>system>persistence>dhcp-server
config>system>persistence>nat-port-forward
config>system>persistence>python-policy-cache
config>system>persistence>subscriber-mgmt
config>redundancy>multi-chassis>peer
config>redundancy>multi-chassis>peer>mc-lag
config>redundancy>multi-chassis>peer>sync
config>redundancy>mc>peer>mcr>node>cv
config>system>lldp
config>redundancy>multi-chassis>peer>mc-ep
```

**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** shutdown

## description

**Syntax** **description** *description-string*  
**no description**

**Context** config>redundancy>multi-chassis>peer  
config>system>cron>sched  
config>system>persistence>anccp  
config>system>persistence>app-assure  
config>system>persistence>dhcp-server  
config>system>persistence>nat-fw  
config>system>persistence>python-policy-cache  
config>system>persistence>sub-mgmt  
config>system>script-control>script

**Description** 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.

**Default** no description

**Parameters** *string* — Specifies the description character string. Allowed values are any string up to 80 characters long 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.

## 8.16.2.2 System Information Commands

### allow-boot-license-violations

**Syntax** [no] **allow-boot-license-violations**

**Context** config>system

**Description** This command configures whether the system should allow successful execution of the bootup configuration file when it contains license violations. When enabled, the system will not error on any configuration that causes a license violation and as a result permits the system to come into service. However, if violations are detected, the system will reboot after one hour if the violations are not fixed.

### atm

**Syntax** **atm**

**Context** config>system

**Description** This command enables the context to configure system-wide ATM parameters.

### atm-location-id

**Syntax** **atm-location-id** *location-id*  
**no atm-location-id**

**Context** config>system>atm

**Description** This command indicates the location ID for ATM OAM.  
  
Refer to the *7450 ESS, 7750 SR, 7950 XRS, and VSR Services Overview Guide* for information about ATM QoS policies and ATM-related service parameters.

**Default** no atm-location-id



---

**Parameters** *location-id* — Specifies the 16 octets that identifies the system loopback location ID as required by the ATM OAM Loopback capability. This textual convention is defined in ITU-T standard I.610. The loopback location ID should be entered in the following format: xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx.  
Invalid values include a location ID where the first octet is: 00, FF, 6A  
Acceptable *location-ids* include values where the first octet is: 01, 03  
Other values are not accepted.

## oam

**Syntax** **oam**

**Context** config>system>atm

**Description** This command configures system-wide ATM parameters.

## loopback-period

**Syntax** **loopback-period** *period*  
**no loopback-period**

**Context** config>system>atm>oam

**Description** This command specifies the number of seconds between periodic loopback attempts on an ATM endpoint that has periodic loopback enabled.

**Default** no loopback-period

**Parameters** *period* — Specifies the time, in seconds, between periodic loopback attempts.

|                |         |
|----------------|---------|
| <b>Values</b>  | 1 to 40 |
| <b>Default</b> | 10      |

## retry-down

**Syntax** **retry-down** *retries*  
**no retry-down**

**Context** config>system>atm>oam

**Description** This command specifies the number of OAM loopback attempts that must fail after the periodic attempt before the endpoint will transition to AIS-LOC state.

The retry values are configured on a system wide basis and are affective on the next period cycle of any ATM VC SAP using **periodic-loopback**, if changed. The timeout for receiving a loopback response from the remote peer and declaring the loopback failed is 1 second and is not configurable.

|                   |                                                                                                                                     |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b>    | no retry-down                                                                                                                       |
| <b>Parameters</b> | <i>retries</i> — Specifies the number of failed loopback attempts before an ATM VC goes down.                                       |
| <b>Values</b>     | 0 to 10 (A zero value means that the endpoint will transition to AIS-LOC state immediately if the periodic loopback attempt fails.) |
| <b>Default</b>    | 4                                                                                                                                   |

## retry-up

|                    |                                                                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>retry-up</b> <i>retries</i><br><b>no retry-up</b>                                                                                                                     |
| <b>Context</b>     | config>system>atm>oam                                                                                                                                                    |
| <b>Description</b> | This command specifies the number of consecutive OAM loopback attempts that must succeed after the periodic attempt before the endpoint will transition the state to up. |
| <b>Default</b>     | no retry-up                                                                                                                                                              |
| <b>Parameters</b>  | <i>retries</i> — Specifies the number of successful loopback replies before an ATM VC goes up.                                                                           |
| <b>Values</b>      | 0 to 10 (A zero value means that the endpoint will transition to the up state immediately if the periodic loopback attempt succeeds.)                                    |
| <b>Default</b>     | 2                                                                                                                                                                        |

## boot-bad-exec

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>           | <b>boot-bad-exec</b> <i>file-url</i><br><b>no boot-bad-exec</b>                                                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>          | config>system                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>      | Use this command to configure a URL for a CLI script to <b>exec</b> following a failure of a bootup configuration. The command specifies a URL for the CLI scripts to be run following the completion of the bootup configuration. A URL must be specified or no action is taken.<br><br>The commands are persistent between router (re)boots and are included in the configuration saves ( <b>admin&gt;save</b> ). |
| <b>Related Commands</b> |                                                                                                                                                                                                                                                                                                                                                                                                                     |

**exec** — This command executes the contents of a text file as if they were CLI 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 bootup configuration file execution. When this parameter is not specified, no CLI script file is executed.  
 Ipv6-address only applies to the 7750 SR and 7950 XRS.

**Values**

|                   |                                                                  |                                                                                                                                                                                          |
|-------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>file url</i>   | <i>local-url   remote-url</i>                                    | 255 chars max                                                                                                                                                                            |
| <i>local-url</i>  | [ <i>cflash-id</i> ][ <i>file-path</i> ]                         |                                                                                                                                                                                          |
| <i>remote-url</i> | [{ftp://} <i>login:pswd@remote-locn</i> ][ <i>file-path</i> ]    |                                                                                                                                                                                          |
|                   | <i>remote-locn</i>                                               | [ <i>hostname   ipv4-address   ipv6-address</i> ]                                                                                                                                        |
|                   | <i>ipv4-address</i>                                              | <i>a.b.c.d</i>                                                                                                                                                                           |
|                   | <i>ipv6-address</i>                                              | <i>x:x:x:x:x:x[-interface]</i><br><i>x:x:x:x:x:d.d.d.d[-interface]</i><br><i>x - [0 to FFFF]H</i><br><i>d - [0 to 255]D</i><br><i>interface - 32 chars max, for link local addresses</i> |
| <i>cflash-id</i>  | cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B: |                                                                                                                                                                                          |

**boot-good-exec**

**Syntax** **boot-good-exec** *file-url*  
**no boot-good-exec**

**Context** config>system

**Description** Use this command to configure a URL for a CLI script to **exec** following the success of a bootup configuration.

**Related Commands**

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

**Default** no boot-good-exec

**Parameters** *file-url* — Specifies the location and name of the file executed following successful completion of the bootup configuration file execution. When this parameter is not specified, no CLI script file is executed.

Ipv6-address only applies to the 7750 SR and 7950 XRS and ipv4-address applies to the 7450 ESS.

#### Values

|                   |                                                                  |                                                                                                                                                                                          |
|-------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>file url</i>   | <i>local-url   remote-url</i>                                    | 255 chars max                                                                                                                                                                            |
| <i>local-url</i>  | [ <i>cflash-id</i> ][ <i>file-path</i> ]                         |                                                                                                                                                                                          |
| <i>remote-url</i> | [{ftp://} <i>login:pswd@remote-locn</i> ][ <i>file-path</i> ]    |                                                                                                                                                                                          |
|                   | <i>remote-locn</i>                                               | [ <i>hostname   ipv4-address   ipv6-address</i> ]                                                                                                                                        |
|                   | <i>ipv4-address</i>                                              | <i>a.b.c.d</i>                                                                                                                                                                           |
|                   | <i>ipv6-address</i>                                              | <i>x:x:x:x:x:x[-interface]</i><br><i>x:x:x:x:x:d.d.d.d[-interface]</i><br><i>x</i> - [0 to FFFF]H<br><i>d</i> - [0 to 255]D<br><i>interface</i> - 32 chars max, for link local addresses |
| <i>cflash-id</i>  | cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B: |                                                                                                                                                                                          |

## chassis-mode

|                    |                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>chassis-mode</b> <i>chassis-mode</i> [ <b>force</b> ]                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | config>system                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b> | This command is retained for historic reasons, and was used to control the set of features and scaling available based on the variants of IOMs present in the node. As of release 15.0, the set of supported IOMs no longer requires this differentiation using this command. The command still exists but the mode is fixed at <b>chassis mode d</b> . |
| <b>Default</b>     | chassis-mode d                                                                                                                                                                                                                                                                                                                                          |
| <b>Parameters</b>  | <i>chassis-mode</i> — Specifies the chassis modes:<br><b>d</b> : This mode corresponds to scaling and feature set associated with iom3-xp.<br><b>force</b> — Forces an upgrade from a lesser scaling and feature set to a greater one.                                                                                                                  |

## cli-code

|                |                                                       |
|----------------|-------------------------------------------------------|
| <b>Syntax</b>  | <b>cli-code</b> <i>cli-code</i><br><b>no cli-code</b> |
| <b>Context</b> | config>system                                         |

---

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b> | <p>This command creates a Common Language Location Identifier (CLLI) code string for the SR-series 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.</p> <p>No CLLI validity checks other than truncating or padding the string to eleven characters are performed.</p> <p>Only one CLLI code can be configured, if multiple CLLI codes are configured the last one entered overwrites the previous entry.</p> <p>The <b>no</b> form of the command removes the CLLI code.</p> |
| <b>Default</b>     | no clii-code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Parameters</b>  | <i>clli-code</i> — 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

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>config-backup</b> <i>count</i><br><b>no config-backup</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Context</b>     | config>system                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b> | <p>This command configures the maximum number of backup versions maintained for configuration files and BOF.</p> <p>For example, assume the <b>config-backup</b> <i>count</i> is set to 5 and the configuration file is called <i>xyz.cfg</i>. When a <b>save</b> command is executed, the file <i>xyz.cfg</i> is saved with a 1 extension. Each subsequent <b>config-backup</b> command increments the numeric extension until the maximum count is reached.</p> <pre>xyz.cfg<br/>xyz.cfg.1<br/>xyz.cfg.2<br/>xyz.cfg.3<br/>xyz.cfg.4<br/>xyz.cfg.5<br/>xyz.ndx</pre> <p>Each persistent index file is updated at the same time as the associated configuration file. When the index file is updated, then the save is performed to <i>xyz.cfg</i> and the index file is created as <i>xyz.ndx</i>. Synchronization between the active and standby CPM is performed for all configurations and their associated persistent index files.</p> <p>The <b>no</b> form of the command returns the configuration to the default value.</p> |

---

|                   |                                                                  |
|-------------------|------------------------------------------------------------------|
| <b>Default</b>    | config-backup 5                                                  |
| <b>Parameters</b> | <i>count</i> — Specifies the maximum number of backup revisions. |
| <b>Values</b>     | 1 to 200                                                         |

## contact

|                    |                                                                                                                                                                                                                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>contact</b> <i>contact-name</i><br><b>no contact</b>                                                                                                                                                                                                                                                                |
| <b>Context</b>     | config>system                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | This command creates a text string that identifies the contact name for the device.<br><br>Only one contact can be configured, if multiple contacts are configured the last one entered will overwrite the previous entry.<br><br>The <b>no</b> form of the command reverts to default.                                |
| <b>Default</b>     | no contact                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <i>contact-name</i> — Specifies the contact name character string. The string can be up to 80 characters long. 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. |

## cpm-http-redirect

|                    |                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>cpm-http-redirect</b>                                                                                                              |
| <b>Context</b>     | config>system                                                                                                                         |
| <b>Description</b> | This command enables the context to configure <b>cpm-http-redirect</b> settings for enabling or disabling the <b>optimized-mode</b> . |

## optimized-mode

|                    |                                                                                                                                                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | [no] <b>optimized-mode</b>                                                                                                                                       |
| <b>Context</b>     | config>system>cpm-http-redirect                                                                                                                                  |
| <b>Description</b> | This command enables the <b>cpm-http-redirect optimized-mode</b> . The <b>optimized-mode</b> improves the scale of HTTP redirect sessions supported system wide. |
| <b>Default</b>     | optimized-mode                                                                                                                                                   |

---

## coordinates

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>coordinates</b> <i>coordinates</i><br><b>no coordinates</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>system                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | <p>This command creates a text string that identifies the system coordinates for the device location. For example, the command <b>coordinates</b> "37.390 -122.0550" is read as latitude 37.390 north and longitude 122.0550 west.</p> <p>Only one set of coordinates can be configured. If multiple coordinates are configured, the last one entered overwrites the previous entry.</p> <p>The <b>no</b> form of the command reverts to the default value.</p>                                                                |
| <b>Parameters</b>  | <p><i>coordinates</i> — Specifies the coordinates describing the device location character string. The string may be up to 80 characters long. 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.</p> |

## dns

|                    |                                       |
|--------------------|---------------------------------------|
| <b>Syntax</b>      | <b>dns</b>                            |
| <b>Context</b>     | config>system                         |
| <b>Description</b> | This command configures DNS settings. |

## address-pref

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>address-pref</b> { <b>ipv4-only</b>   <b>ipv6-first</b> }<br><b>no address-pref</b>                                                                                                                                                                                                                                                                                                                                           |
| <b>Context</b>     | config>system>dns                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command configures the DNS address resolving order preference. By default, DNS names are queried for A-records only (address-preference is IPv4-only).</p> <p>If the address-preference is set to IPv6-first, the DNS server will be queried for AAAA-records (IPv6) first and if a successful replied is not received, then the DNS server is queried for A-records. IPv6 applies only to the 7750 SR and 7950 XRS.</p> |
| <b>Default</b>     | address-pref ipv4-only                                                                                                                                                                                                                                                                                                                                                                                                           |

---

## dnssec

|                    |                                                                                          |
|--------------------|------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>dnssec</b>                                                                            |
| <b>Context</b>     | config>system>dns                                                                        |
| <b>Description</b> | This command configures system Domain Name System Security Extensions (DNSSEC) settings. |

## ad-validation

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ad-validation {fall-through   drop}</b><br><b>no ad-validation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>system>dns>dnssec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b> | <p>This command enables validation of the presence of the AD-bit in responses from the DNS servers, and reports a warning to the SECURITY log if DNSSEC validation was not possible.</p> <p>This command requires either the fall-through or drop parameters be configured. When the fall-through parameter is supplied, the system will allow DNS responses that do not pass DNSSEC validation to be accepted and logged. When the drop parameter is specified, the system will reject and log DNS responses that do not pass DNSSEC validation and the resolution will appear to fail.</p> |
| <b>Default</b>     | no ad-validation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <p><b>fall-through</b> — Specifies that the DNSSEC validator should allow non-DNSSEC responses to fall-through to permit resolution in case of validation failure.</p> <p><b>drop</b> — Specifies that the DNSSEC validator should drop non-DNSSEC responses in case of validation failure.</p>                                                                                                                                                                                                                                                                                              |

## enable-icmp-vse

|                    |                                                          |
|--------------------|----------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] enable-icmp-vse</b>                              |
| <b>Context</b>     | config>system                                            |
| <b>Description</b> | This command enables vendor specific extensions to ICMP. |
| <b>Default</b>     | no enable-icmp-vse                                       |

## ip

|               |           |
|---------------|-----------|
| <b>Syntax</b> | <b>ip</b> |
|---------------|-----------|



- Context** config>system
- Description** This command configures system-wide IP router parameters.

## allow-qinq-network-interface

- Syntax** [no] allow-qinq-network-interface
- Context** config>system>ip
- Description** This command is a system-wide option that allows the creation of network interfaces on a QinQ encapsulated VLAN.
- When enabled, the maximum number of allowed MPLS labels is reduced by 1 to allow for the additional VLAN tag at egress processing.
- The **no** form of this command reverts the option to the default value, which is to not allow network interfaces on QinQ encapsulated VLANs.
- Default** no allow-qinq-network-interface

## enforce-unique-if-index

- Syntax** [no] enforce-unique-if-index
- Context** config>system>ip
- Description** This command enables the options to force the creation of IP interface indexes so that they are globally unique across all routing contexts. In addition, the command ensures that any interface created using SNMP also has a system-wide unique IP interface index.
- If this command is issued but the system has previously existing interface indexes that conflict, the command will be rejected until all the conflicts are removed. Pre-existing persistency tables should also be removed before enabling this system option.
- The **no** form of the command disables this option and returns the system to the default behavior.
- Default** no enforce-unique-if-index

## forward-6in4

- Syntax** [no] forward-6in4
- Context** config>system>ip
- Description** This command enables forwarding of IPv6 traffic encapsulated in an IPv4 transport sent to the system IP address.

The **no** form of this command disables this option and returns the system to the default behavior.

**Default** no forward-6in4

## forward-ip-over-gre

**Syntax** [no] forward-ip-over-gre

**Context** config>system>ip

**Description** This command enables forwarding of IP traffic encapsulated in a GRE over IPv4 transport sent to the system IP address.

The **no** form of this command disables this option and returns the system to the default behavior.

**Default** no forward-ip-over-gre

## mpls

**Syntax** mpls

**Context** config>system>ip

**Description** This command enables the context to configure system-wide MPLS parameters.

## label-stack-statistics-count

**Syntax** label-stack-statistics-count *label-stack-statistics-count*  
no label-stack-statistics-count

**Context** config>system>ip>mpls

**Description** This command enables the system to collect traffic statistics on the specified number of labels of the MPLS label stack.

The **no** form of this command disables the collecting of traffic statistics.

**Default** label-stack-statistics-count 1

**Parameters** *label-stack-statistics-count* — Specifies the number of labels on which the system can collect statistics.

**Values** 1, 2

## lACP-system-priority

|                    |                                                                                                                                                                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>lACP-system-priority</b> <i>lACP-system-priority</i><br><b>no lACP-system-priority</b>                                                                                                                                 |
| <b>Context</b>     | config>system                                                                                                                                                                                                             |
| <b>Description</b> | 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. |
| <b>Default</b>     | lACP-system-priority 32768                                                                                                                                                                                                |
| <b>Parameters</b>  | <i>lACP-system-priority</i> — Specifies the LACP system priority.<br><b>Values</b> 1 to 65535                                                                                                                             |

## load-balancing

|                    |                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>load-balancing</b>                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>system                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | This command enables the load-balancing context to configure the interface per-flow load balancing options that will apply to traffic entering this interface and egressing over a LAG/ECMP on system-egress. This is a per interface setting. For load-balancing options that can also be enabled on the system level, the options enabled on the interface level overwrite system level configurations. |

## l2tp-load-balancing

|                    |                                                                                                                                                                                                                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] l2tp-load-balancing</b>                                                                                                                                                                                                                                                  |
| <b>Context</b>     | config>system>load-balancing                                                                                                                                                                                                                                                     |
| <b>Description</b> | This command enables the inclusion of the L2TPv2 session ID into the load-balancing hash algorithm to induce more variation and better load distribution over available links and next-hops.<br><br>The <b>no</b> form of this command disables the inclusion of the session-id. |

## l4-load-balancing

|                |                               |
|----------------|-------------------------------|
| <b>Syntax</b>  | <b>[no] l4-load-balancing</b> |
| <b>Context</b> | config>system>load-balancing  |

**Description** This command configures system-wide Layer 4 load balancing. The configuration at the system level can enable or disable load balancing based on Layer 4 fields. If enabled, the Layer 4 source and destination port fields will be included in hashing calculation for TCP/UDP packets.

The hashing algorithm addresses finer spraying granularity where many hosts are connected to the network.

To address more efficient traffic distribution between network links (forming a LAG group), a hashing algorithm extension takes into account L4 information (that is, src/dst L4-protocol port).

The hashing index can be calculated according to the following algorithm:

```

If [(TCP or UDP traffic) & enabled]
    hash (TCP/UDP ports, IP addresses)
else if (IP traffic)
    hash (IP addresses)
else
    hash (MAC addresses)
endif

```

This algorithm will be used in all cases where IP information in per-packet hashing is included (refer to “LAG and ECMP Hashing” in the *7450 ESS, 7750 SR, 7950 XRS, and VSR Interface Configuration Guide*). However, the Layer 4 information (TCP/UDP ports) will not be used for fragmented packets.

**Default** no l4-load-balancing

## lsr-load-balancing

**Syntax** **lsr-load-balancing** *hashing-algorithm*  
**no lsr-load-balancing**

**Context** config>system>load-balancing

**Description** This command configures system-wide LSR load balancing. Hashing can be enabled on the label stack and/or IP header at an LSR for spraying labeled IP packets over multiple equal cost paths and/or over multiple links of a LAG group.

The LSR hash routine operates on the label stack and the IP header if a packet is IPv4. An LSR will consider a packet to be IPv4 if the first nibble following the bottom of the label stack is 4. The hash on label and IPv4 and IPv6 headers can be enabled or disabled at the system level or incoming network IP interface level.

**Default** no lsr-load-balancing

**Parameters** **lbl-only** — Specifies that only the label is used in the hashing algorithm  
**lbl-ip** — Specifies that the IP header is included in the hashing algorithm

**ip-only** — Specifies that the IP header is used exclusively in the hashing algorithm

**eth-encap-ip** — Specifies that the hash algorithm parses down the label stack (up to 3 labels supported) and once it hits the bottom, the stack assumes Ethernet II non-tagged header follows. At the expected Ethertype offset location, the algorithm checks whether the value present is IPv4/v6 (0x0800 or 0x86DD). If the check passes, the hash algorithm checks the first nibble at the expected IP header location for IPv4/IPv6 (0x0100/0x0110). If the secondary check passes, the hash is performed using IP SA/DA fields in the expected IP header; if any of the checks fail, the label-stack hash is performed.

**lbl-ip-l4-teid** — Specifies that this hashing algorithm hashes based on label, IP header, Layer 4 header and GTP header (TEID) in order. The algorithm uses all the supported headers that are found in the header fragment of incoming traffic.

## mc-enh-load-balancing

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] mc-enh-load-balancing</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>system>load-balancing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command enables enhanced egress multicast load balancing behavior for Layer 3 multicast. When enabled, the router will spray the multicast traffic using as hash inputs from the packet based on lsr-load-balancing, l4-load-balancing and system-ip-load-balancing configurations. That is, an ingress LER or IP PE will spray traffic based on the IP hash criteria: SA/DA + optional Layer 4 port + optional system IP egress LER or LSR - will spray traffic based on label or IP hash criteria outlined above or both based on configuration of lsr-load-balancing, l4-load-balancing, and system-ip-load-balancing.</p> <p>The <b>no</b> form of the command preserves the default behavior for per flow hashing of multicast traffic.</p> |
| <b>Default</b>     | no mc-enh-load-balancing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## service-id-lag-hashing

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] service-id-lag-hashing</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | config>system>load-balancing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b> | <p>This command enables enhanced VLL LAG service ID hashing. This command improves the LAG spraying of VLL service packets and is applied only when both ECMP and LAG hashing are performed by the same router. By default, the ECMP interface and LAG link for all packets on the VLL service are selected based on a direct modulo operation of the service ID. This command enhances distribution and hashes the service ID prior to the LAG link modulo operation when an ECMP link modulo operation is performed.</p> <p>The <b>no</b> form of the command preserves the default behavior of VLL LAG service ID hashing.</p> |

---

**Default** no service-id-lag-hashing

## system-ip-load-balancing

**Syntax** [no] **system-ip-load-balancing**

**Context** config>system>load-balancing

**Description** This command enables the use of the system IP address in the ECMP hash algorithm to add a per system variable. This can help guard against cases where multiple routers, in series, will end up hashing traffic to the same ECMP/LAG path.

This command is set at a system wide basis, however if certain IOMs do not support the new load-balancing algorithm, they will continue to use the default algorithm. By default, the IPv4 system IP address is used in the hash algorithm. When no IPv4 system IP address is configured, the IPv6 system IP address, when configured, is used in the hash algorithm.

The **no** form of the command resets the system wide algorithm to default.

**Default** no system-ip-load-balancing

## location

**Syntax** **location** *location*  
**no location**

**Context** config>system

**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 the 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.

## name

**Syntax** **name** *system-name*  
**no name**

**Context** config>system

- 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.
- ```
ABC>config>system# name "ALA-1"  
ALA-1>config>system#
```
- 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 the command reverts to the default value.
- Default** no name
- Parameters** *system-name* — Specifies the system name as a character string. The string may be up to 64 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.

## ospf-dynamic-hostnames

- Syntax** **[no] ospf-dynamic-hostnames**
- Context** config>system
- Description** This command enables OSPF dynamic hostnames.
- The router receiving the new Dynamic Hostname within the OSPF Router Information (RI) LSA is instructed to process the received dynamic hostname information.
- The **no** form of this command disables OSPF dynamic hostnames.
- Default** no ospf-dynamic-hostnames

## switchover-exec

- Syntax** **switchover-exec file-url**  
**no switchover-exec**
- Context** config>system
- Description** This command specifies the location and name of the CLI script file executed following a redundancy switchover from the previously active CPM card. A switchover can happen because of a fatal failure or by manual action.
- 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.

When the *file-url* parameter is not specified, no CLI script file is executed.

<b>Default</b>	no switch-over-exec
<b>Parameters</b>	<i>file-url</i> — Specifies the location and name of the CLI script file.
	<b>Values</b>
	<i>local-url</i>   <i>remote-url</i>
	<i>local-url</i> [cflash-id][file-path] 200 chars max, including cflash-id directory length 99 chars max each
	<i>remote-url</i> [ftp://   tftp://]login:pswd@remote-locn/[file-path] 243 chars max directory length 99 chars max each
	<i>remote-locn</i> [hostname   ipv4-address   ipv6-address]
	<i>ipv4-address</i> a.b.c.d
	<i>ipv6-address</i> x:x:x:x:x:x[-interface] x:x:x:x:x:d.d.d.d[-interface]
	x - [0 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses
	<i>cflash-id</i> cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

## port-topology

<b>Syntax</b>	<b>port-topology</b>
<b>Context</b>	config>system
<b>Description</b>	This parameter creates or edits the context to configure intra-node port connections.
<b>Default</b>	disabled

## port

<b>Syntax</b>	<b>port</b> <i>port-id</i> to <i>port-id</i> [create] <b>no port</b> <i>port-id</i>
<b>Context</b>	config>system>port-topology
<b>Description</b>	This command is used for satellites. It identifies to the SR OS that there is an internal connection between two ports.



Permitted pairings of the two ports are:

<b>First port</b>	<b>Second port</b>
Router port	Satellite uplink port
Satellite uplink port	Router port

For satellites, this command configures the binding between a host port ID and the satellite uplink from the satellite chassis. The port topology can be configured with the host connected to a satellite uplink or the satellite uplink port connected to the specified host port. Both configurations are supported, as shown in the following examples:

```
*A:Dut-A# configure system port-topology port esat-1/1/u4 to 1/2/2 create
*A:Dut-A# configure system port-topology no port esat-1/1/u4
*A:Dut-A# configure system port-topology port 1/2/2 to esat-1/1/u4 create
*A:Dut-A# configure system port-topology no port 1/2/2
```

The **no** form of the command removes the internal connection.

**Default** no port port-id

**Parameters** *port-id* — Specifies one port of an internal port connection. These ports can be router ports or Ethernet satellite uplink ports. Acceptable pairings are defined in the command description.

**Values**

*port-id* (Router port)  
*slot/mda/port*

<i>slot</i>	The slot number of the card in the chassis. The maximum slot number is platform dependent. Refer to the hardware installation guides for more information.
<i>mda</i>	[1 to 2]
<i>port</i>	[1 to 160] (depending on the MDA type)

(Ethernet satellite uplink port)

*esat-id/slot/uport*

<b>esat</b>	keyword
<i>id</i>	[1 to 20]
<i>slot</i>	[1]
<b>u</b>	keyword for up-link port
<i>port</i>	[1 to 4]

**create** — Specifies the keyword required to create the binding between the two ports.

---

## power-supply

<b>Syntax</b>	<b>power-supply</b> <i>power-supply-id</i> <i>type</i>
<b>Context</b>	config>system
<b>Description</b>	This command configures information about the type of power supply used for each power feed connection on the router chassis. The information is used to populate queries made using the <b>show&gt;chassis detail</b> and <b>show&gt;chassis power-supply</b> commands.
<b>Parameters</b>	<i>power-supply-id</i> — Specifies the power feed connection. <b>Values</b> 1, 2 <i>type</i> — Specifies the type of power source that is connected to the power feed connection. <b>Values</b> dc — Specifies that a single DC power source is connected to the power feed connector. ac single — Specifies that a single AC power source is connected to the power feed connector. ac multiple — Specifies that multiple AC power sources are connected to the power feed connector. default — Reverts the configured information to the default power source type for the chassis. none — Specifies that no power source is connected to the power feed connector.

## satellite

<b>Syntax</b>	<b>satellite</b>
<b>Context</b>	config>system
<b>Description</b>	This command enables the satellite configuration context. Within the satellite context, the administrator can specify the configuration details for a satellite chassis that is hosted by the associated local system.

## eth-sat

<b>Syntax</b>	<b>eth-sat</b> <i>sat-id</i> [create] <b>no eth-sat</b> <i>sat-id</i>
<b>Context</b>	config>system>satellite
<b>Description</b>	This command enables the specified Ethernet satellite configuration context. The <b>no</b> form of the command deletes the specified Ethernet satellite.

---

**Parameters** *sat-id* — Specifies the satellite ID for the associated Ethernet satellite.  
**Values** 1 to 20  
**create** — Creates a new Ethernet satellite context.

## client-down-delay

**Syntax** **client-down-delay** *client-down-delay*  
**no client-down-delay**

**Context** config>system>satellite>eth-sat

**Description** This command sets the delay between the last available uplink becoming unavailable and the disabling of associated Ethernet satellite client ports.  
The **no** form of this command disables the delay and reverts to the current behavior.

**Default** no client-down-delay

**Parameters** *client-down-delay* — Sets the number of seconds to wait between the last available uplink becoming unavailable and the disabling of associated ethernet satellite client ports.  
**Values** 0 to 1800

## feature

**Syntax** [**no**] **feature** *feature-name*

**Context** config>system>satellite>eth-sat

**Description** This command enables specific satellite functionality that may have specific satellite requirements, such as software version.  
The **no** form of this command disables the specific satellite functionality.

**Parameters** *feature-name* — Specifies the functionality to enable.  
**Values** local-forward  
**Values** transparent-clock-eth

## local-forward

**Syntax** **local-forward** *local-forward-id* [**create**]  
**no local-forward** *local-forward-id*

**Context** config>system>satellite

- Description** This command creates a local-forward instance.
- A local-forward instance creates a traffic bypass within the Ethernet satellite, which allows traffic to be forwarded between satellite client ports.
- The **no** form of this command deletes the specified local-forward instance.
- Parameters** **local-forward-id** — Specifies the ID number for the local-forward instance.
- Values** 1 to 10240
- create** — Creates a new local-forward instance.

## sap

- Syntax** **sap** *sap-id* [**create**]  
**no sap** *sap-id*
- Context** config>system>satellite>local-forward
- Description** This command configures a Service Access Point (SAP) used in satellite local forward instances defined in the system.
- The **no** form of this command removes the satellite access point from the local-forward instance.
- Parameters** *eth-sat-id* — Specifies the satellite access point in the local-forward instance in the *esat-id/slot/port* format.
- Values**
- |      |         |
|------|---------|
| esat | keyword |
| id   | 1 to 20 |
- lag-id* — Specifies the LAG identifier, expressed as an integer,
- Values**
- |     |          |
|-----|----------|
| lag | keyword  |
| id  | 1 to 800 |
- qtag1* — Specifies the qtag value.
- Values** 1 to 4094

## port-template

- Syntax** **port-template** *template-name* **sat-type** *sat-type* [**create**]  
**no port-template** *template-name*

**Context** config>system>satellite

**Description** This command creates a new port template context to define the port usage for a specific satellite type. A port template is specific to the specified satellite type. Port templates must be configured separately using different template names for each different satellite chassis type.

The **no** form of this command deletes the specified port template.

**Parameters** *template-name* — Specifies the name for the associated port template. This value must be unique in the network.

*sat-type* — Specifies the type of satellite chassis associated with the port-template.

**Values** es24-1gb-sfp, es24-1gb-tx, es24-sass-1gb-sfp, es48-1gb-sfp, es48-1gb-tx, es48-sass-1gb-sfp, es64-10gb-sfpp+4-100gb-cfp4, es24-sasmxp-1gb-sfp

**create** — Creates a new port template.

## port

**Syntax** port *port-id*

**Context** config>system>satellite>port-template

**Description** This command specifies the satellite port to be reconfigured.

The **no** form of this command deletes the specified port configuration.

**Parameters** *port-id* — Specifies the satellite physical port ID. This must use the format *slot/mda/port*. Currently, all satellites have a single slot and a single MDA, so these values will always be 1. For example, port 10 would be specified as 1/1/10.

## role

**Syntax** role *role-type*

**Context** config>system>satellite>port-template>port

**Description** This command configures the role that the associated port is to take on.

**Parameters** **none** — Clears the role association for the associated port.

**uplink** — Specifies that the associated satellite port is assigned the role of an uplink port.

**client** — Specifies that the associated satellite port is assigned the role of a satellite client port.

**system-default** — Specifies that the associated satellite port is returned to the system default.

---

## uplink

<b>Syntax</b>	<b>uplink</b> <i>port-id</i> <b>uplink system-default</b> <b>uplink none</b>
<b>Context</b>	config>system>satellite>port-template>port
<b>Description</b>	This command configures the uplink association to be used for the associated satellite port.
<b>Parameters</b>	<i>port-id</i> — Specifies the satellite physical port ID. This must use the format <i>slot/mda/port</i> . All satellites have a single slot and a single MDA, so these values will always be 1. For example, port 10 would be specified as 1/1/10. <b>system-default</b> — Specifies that the uplink association is returned to the system default. <b>none</b> — Clears the uplink association.

## tdm-sat

<b>Syntax</b>	<b>tdm-sat</b> <i>sat-id</i> [ <b>create</b> ] <b>no tdm-sat</b> <i>sat-id</i>
<b>Context</b>	config>system>satellite
<b>Description</b>	This command enters the specified TDM satellite configuration context. The <b>no</b> form of the command deletes the specified TDM satellite.
<b>Parameters</b>	<i>sat-id</i> — Specifies the satellite ID for the associated TDM satellite. <b>Values</b> 1 to 20 <b>create</b> — The keyword used to create a new TDM satellite context. The <b>create</b> keyword requirement can be enabled/disabled in the <b>environment&gt;create</b> context.

## description

<b>Syntax</b>	<b>description</b> <i>description-string</i> <b>no description</b>
<b>Context</b>	config>system>satellite>eth-sat config>system>satellite>local-forward config>system>satellite>local-forward>sap config>system>satellite>port-template config>system>satellite>tdm-sat
<b>Description</b>	This command defines a description string for the associated satellite. The <b>no</b> form of the command deletes the associated description string.

**Default** no description

**Parameters** *description-string* — Specifies the satellite description, up to 80 characters.

## mac-address

**Syntax** **mac-address** *mac-address*  
**no mac-address**

**Context** config>system>satellite>eth-sat  
config>system>satellite>tdm-sat

**Description** This command configures the MAC address for the associated satellite chassis. This MAC address is used to validate the identity of an satellite that attempts to associate with the local host.

The **no** form of the command deletes the MAC address for the associated satellite.

**Parameters** *mac-address* — Specifies the MAC address of the associated satellite chassis; do not use a broadcast or multicast MAC. Enter the MAC address in either of the following formats: xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx.

## port-map

**Syntax** **port-map** *client-port-id* **primary** *primary-uplink-port-id* [**secondary** *secondary-uplink-port-id*]  
**port-map** *client-port-id* **system-default**

**Context** config>system>satellite>eth-sat

**Description** This command configures the mapping between a satellite client port and its associated uplink. This command allows both a primary and an optional secondary uplink to be configured.

If a secondary uplink is configured, it is used to forward traffic if the primary uplink is down for any reason.

Before an uplink can be used as either a primary or secondary uplink, it must be configured using the **port-topology** configuration command.

To return the uplink association to its default the **port-map** *client-port-id* **system-default** command should be used.

**Parameters** *client-port-id* — Specifies the satellite client port associated with the port mapping, in the format **esat-id/slot/port**.

*primary-uplink-port-id* — Specifies the primary satellite uplink to be associated with the associate client port, in the format **esat-id/slot/uport** where *id* is 1 to 20.

---

*secondary-uplink-port-id* — Specifies the secondary satellite uplink to be associated with the associate client port, in the format **esat-id/slot/uport** where *id* is 1 to 20.

**system-default** — Specifies to set the port map to the system default.

## ptp-tc

**Syntax** [no] ptp-tc

**Context** config>system>satellite>eth-sat

**Description** This command enables the ethernet satellite IEEE1588 transparent clock function. This provides increased accuracy on the PTP event messages transiting the satellite. When a IEEE1588 event message transits the ethernet satellite, the correction field of the message is updated with the residence time of that message. This is used in PTP time calculations. The ethernet satellite shall perform the transparent clock function on PTP messages with Ethernet and UDP/IP encapsulation. All ports of the satellite are enabled for this capability with the one setting. This feature must be enabled to allow the assignment of one of the satellite's client ports as a PTP port under **config>system>ptp>port**. Only PTP using Ethernet encapsulation is supported from the host.

To enable this command, the satellite must have first been configured to support the feature using the **config>system>satellite>eth-sat>feature transparent-clock-eth** and must have been enabled for synchronous ethernet with **config>system>satellite>eth-sat>sync-e**.

All host ports connecting to this satellite must support 1588 port-based timestamping.

The **no** version of this command disables the specific satellite functionality.

**Default** no ptp-tc



---

## sat-type

<b>Syntax</b>	<b>sat-type</b> <i>sat-type</i> [ <b>port-template</b> <i>template-name</i> ] <b>no sat-type</b>
<b>Context</b>	config>system>satellite>eth-sat config>system>satellite>tadm-sat
<b>Description</b>	This command configures the type of satellite variant for the associated satellite chassis.  The <b>no</b> form of the command deletes the <b>sat-type</b> configuration.
<b>Default</b>	no sat-type
<b>Parameters</b>	<i>sat-type</i> — Specifies the satellite type. Configuration of the following variants is supported:  <b>es24-1gb-sfp</b> — Specifies the 24xGE (SFP) + 4x10GE Ethernet satellite. <b>es48-1gb-sfp</b> — Specifies the 48xGE (SFP) + 4x10GE Ethernet satellite. <b>es24-sass-1gb-sfp</b> — Specifies the SAS-S 24xGE (SFP) + 4x10GE Ethernet satellite. <b>es48-sass-1gb-sfp</b> — Specifies the SAS-S 48xGE (SFP) + 4x10GE Ethernet satellite. <b>es24-1gb-tx</b> — Specifies the 24xGE (copper) + 4x10GE Ethernet satellite. <b>es48-1gb-tx</b> — Specifies the 48xGE (copper) + 4x10GE Ethernet satellite. <b>es24-1gb-tx</b> — Specifies the 24-port copper + PoE Ethernet satellite. <b>es48-1gb-tx</b> — Specifies the 48-port copper + PoE Ethernet satellite. <b>es64-10gb-sfpp+4-100gb-cfp4</b> — Specifies the 64x10GE + 4x100GE Ethernet satellite. <b>es64-10gb-sfpp+4-100gb-qsfp28</b> — Specifies the 64x10GE + 4xQSFP28 Ethernet satellite. <b>es24-sasmxp-1gb-sfp</b> — Specifies the 7210 SAS-Mxp as an ethernet satellite. <b>ts4-choc3-sfp</b> — Specifies the 4-port OC3 TDM satellite. <b>ts4-chstm1-sfp</b> — Specifies the 4-port STM1 TDM satellite. <b>ts1-choc12-sfp</b> — Specifies the 1-port OC12 TDM satellite. <b>ts1-chstm4-sfp</b> — Specifies the 1-port STM4 TDM satellite. <i>template-name</i> — Specifies the name for the associated port template.

## shutdown

<b>Syntax</b>	[no] shutdown
<b>Context</b>	config>system>satellite>eth-sat config>system>satellite>tadm-sat

---

<b>Description</b>	<p>This command disables the associated satellite.</p> <p>If the associated satellite is active, the satellite will not be reset but all satellite client ports will be shut down.</p> <p>If the satellite is not active but attempts to associate with the host, the satellite chassis will be brought up according to the satellite configuration but all client ports will be shut down.</p> <p>The <b>no</b> form of this command removes the shutdown state and all client ports on active satellites will be brought back up.</p>
<b>Default</b>	shutdown

## software-repository

<b>Syntax</b>	<p><b>software-repository</b> <i>repository-name</i></p> <p><b>no software-repository</b></p>
<b>Context</b>	<p>config&gt;system&gt;satellite&gt;eth-sat</p> <p>config&gt;system&gt;satellite&gt;tdm-sat</p>
<b>Description</b>	<p>This command binds the specified software repository to the associated satellite. The software repository is used to locate and serve the correct software image to the satellite at boot time.</p> <p>The configured software repository is only used when the satellite boots. Changing the software repository for an active satellite does not have an effect until the next time a satellite boots.</p> <p>A satellite cannot be booted if there is no software repository defined for it.</p> <p>The <b>no</b> form of the command removes the software repository.</p>
<b>Default</b>	no software-repository
<b>Parameters</b>	<p><i>repository-name</i> — Specifies a string, up to 32 characters, that uniquely identifies the software repository.</p>

## sync-e

<b>Syntax</b>	<b>[no] sync-e</b>
<b>Context</b>	config>system>satellite>eth-sat
<b>Description</b>	<p>This command enables the Ethernet satellite for synchronous Ethernet operation so that the transmit timing of the satellite access ports use the frequency of the host router's central clock.</p>

To enable this functionality, both host ports on the router that connect to the U1 and U2 ports of the satellite must be synchronous Ethernet-capable ports.

When the Ethernet satellite is configured for synchronous Ethernet, ESMC frames are enabled on the host ports. The SSM code-type used between the host and the satellite should be manually configured on the host ports to match the code-type desired on the satellite client ports. The code-type setting on the host ports does not restrict the code-type used on the satellite client ports, as those may be configured on an individual port basis.

## software-repository

**Syntax** **software-repository** *repository-name* [**create**]  
**no software-repository** *repository-name*

**Context** config>system

**Description** This command creates or deletes an instance of a software repository. The instance is identified by a repository name.

A software repository is used to obtain files to upgrade software on certain subsystems of the router (for example, Ethernet satellites).

Up to three locations can be specified within a software repository for the router to access files in the repository. The router will first attempt to access the file at the primary location. If the primary location is not configured or the files are not found at the primary location, then the router will attempt to access the files at the secondary location. If the secondary location is not configured or the files are not found at the secondary location, then the router will attempt to access the files at the tertiary location. If the tertiary location is not configured or the files are not found at the tertiary location, then the software repository access will fail.

The **no** form of the command removes the software repository.

**Parameters** *repository-name* — Specifies a string, up to 32 characters, that uniquely identifies the software repository.

**create** — Specifies the keyword required when the software-repository context is first created. Once the context is created, it can be accessed without the **create** keyword.

## description

**Syntax** **description** *description-string*  
**no description**

**Context** config>system>software-repository

**Description** This command defines a description string for the software repository.

The **no** form of the command deletes the associated description string.

<b>Default</b>	no description
<b>Parameters</b>	<i>description-string</i> — Specifies the software repository description string, up to 80 characters.

## primary-location

<b>Syntax</b>	<b>primary-location</b> <i>file-url</i> <b>no primary-location</b>
<b>Context</b>	config>system>software-repository
<b>Description</b>	This command configures the primary location for the files in the software repository. See the <b>software-repository</b> command description for more information.  The <b>no</b> form of the command removes the primary location.
<b>Parameters</b>	<i>file-url</i> — Specifies the primary location to be used to access the files in the software repository.

### Values

<i>file url</i>	<i>local-url</i>   <i>remote-url</i>	
<i>local-url</i>	[ <i>cflash-id</i> ]/[ <i>file-path</i> ]	200 chars maximum, including <i>cflash-id</i> directory length 99 characters maximum each
<i>remote-url</i>	[{ftp://} <i>login:pswd@remote-locn</i> ]/[ <i>file-path</i> ]	243 characters maximum directory length 99 characters maximum each
	<i>remote-locn</i>	[ <i>hostname</i>   <i>ipv4-address</i>   [ <i>ipv6-address</i> ]]
	<i>ipv4-address</i>	<i>a.b.c.d</i>
	<i>ipv6-address</i>	<i>x:x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x:x.d.d.d.d[-interface]</i> <i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D <i>interface</i> - 32 characters max, for link local addresses
<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:	

## secondary-location

<b>Syntax</b>	<b>secondary-location</b> <i>file-url</i> <b>no secondary-location</b>
---------------	---

<b>Context</b>	config>system>software-repository		
<b>Description</b>	This command configures the secondary location for the files in the software repository. See the <b>software-repository</b> command description for more information.		
	The <b>no</b> form of the command removes the secondary location.		
<b>Parameters</b>	<i>file-url</i> — Specifies the secondary location to be used to access the files in the software repository.		
	<b>Values</b>		
	<i>file url</i>	<i>local-url</i>   <i>remote-url</i>	
	<i>local-url</i>	<i>[cflash-id][file-path]</i>	200 chars maximum, including cflash-id directory length 99 characters maximum each
	<i>remote-url</i>	<i>[[ftp://] login:pswd@remote-locn][file-path]</i> 243 characters maximum directory length 99 characters maximum each	
		<i>remote-locn</i>	<i>[hostname   ipv4-address   [ipv6-address]]</i>
		<i>ipv4-address</i>	<i>a.b.c.d</i>
		<i>ipv6-address</i>	<i>x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x.d.d.d[-interface]</i> <i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D <i>interface</i> - 32 characters max, for link local addresses
	<i>cflash-id</i>	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:	

## tertiary-location

<b>Syntax</b>	<b>tertiary-location</b> <i>file-url</i> <b>no tertiary-location</b>		
<b>Context</b>	config>system>software-repository		
<b>Description</b>	This command configures the tertiary location for the files in the software repository. See the <b>software-repository</b> command description for more information.		
	The <b>no</b> form of the command removes the tertiary location.		
<b>Parameters</b>	<i>file-url</i> — Specifies the tertiary location to be used to access the files in the software repository.		
	<b>Values</b>		
	<i>file url</i>	<i>local-url</i>   <i>remote-url</i>	

---

<i>local-url</i>	<i>[cflash-id][file-path]</i>	up to 200 characters, including cflash-id directory length 99 characters each
<i>remote-url</i>	<i>[[ftp://] login:pswd@remote-locn/][file-path]</i>	243 characters maximum directory length, up to 99 characters each
<i>remote-locn</i>	<i>[hostname   ipv4-address   [ipv6-address]]</i>	
<i>ipv4-address</i>	<i>a.b.c.d</i>	
<i>ipv6-address</i>	<i>x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x.d.d.d[-interface]</i>	
		<i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D <i>interface</i> - up to 32 characters, for link local addresses
<i>cflash-id</i>	<i>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</i>	

## file-transmission-profile

<b>Syntax</b>	<b>file-transmission-profile</b> <i>name</i> [ <b>create</b> ] <b>no file-transmission-profile</b>
<b>Context</b>	config>system
<b>Description</b>	This command configures the file transmission profile for OCSP.  The <b>no</b> form of the command removes the profile name from the configuration.
<b>Default</b>	no file-transmission-profile
<b>Parameters</b>	<i>name</i> — Specifies the file transmission profile name, up to 32 characters. <b>create</b> — Keyword used to create the transmission profile. The <b>create</b> keyword requirement can be enabled/disabled in the <b>environment&gt;create</b> context.

### 8.16.2.3 System Alarm Contact Input Commands

#### alarm-contact-in-power

<b>Syntax</b>	<b>alarm-contact-in-power</b> { <b>on</b>   <b>off</b> }
<b>Context</b>	config>system

---

<b>Description</b>	This command allows the user to enable a supply of +24V output power on the +24VDC pin of the Alarm Interface Port of the CPM. When enabled, the power supplied through the +24VDC output pin can be used as a source voltage for the alarm contact input pins. The +24VDC output can be used to supply power for monitoring external sensor devices such as cabinet door sensors instead of using an external power source. If users want to use a separate external power source, they should disable the supply of power to the +24VDC output pin by using this CLI command.
<b>Default</b>	alarm-contact-in-power off
<b>Parameters</b>	<b>on</b> — Specifies to turn on power to the +24VDC output pin of the Alarm Interface Port of the CPM. <b>off</b> — Specifies to turn off power to the +24VDC output pin of the Alarm Interface Port of the CPM.

## alarm-contact-input

<b>Syntax</b>	<b>alarm-contact-input</b> <i>input-pin-number</i>
<b>Context</b>	config>system
<b>Description</b>	This command provides the context to configure one of four available alarm contact input pins.
<b>Parameters</b>	<i>input-pin-number</i> — Identifies the alarm contact input pin. <b>Values</b> 1 to 4

## clear-alarm-msg

<b>Syntax</b>	<b>clear-alarm-msg</b> <i>message-string</i> <b>no clear-alarm-msg</b>
<b>Context</b>	config>system>alarm-contact-input
<b>Description</b>	This command allows the user to configure a text message for use along with SNMP trap and log event messages that are sent when the system clears an alarm. The system generates the default message "Alarm Input Cleared" if no message is configured. The <b>clear-alarm-msg</b> string is included in the log event when the pin changes to the normal state.
<b>Parameters</b>	<i>message-string</i> — Specifies a printable character string, up to 160 characters.

## description

<b>Syntax</b>	<b>description</b> <i>description-string</i> <b>no description</b>
---------------	---

<b>Context</b>	config>system>alarm-contact-input
<b>Description</b>	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. The description is included in the log event when the pin changes state (the string “Pin x” is used in the log events if no description is configured).
<b>Parameters</b>	<i>description-string</i> — Specifies a printable character string, up to 80 characters.

## normal-state

<b>Syntax</b>	<b>normal-state</b> {open   closed}
<b>Context</b>	config>system>alarm-contact-input
<b>Description</b>	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 back to the normal state.  Configure the normal state as closed if an external power source is used to power the inputs.
<b>Default</b>	normal-state open
<b>Parameters</b>	<b>open</b> — Specifies that the normal state is identified as open. 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.  <b>closed</b> — Specifies that the normal state is identified as closed. When the system detects a transition to the open state, an alarm is generated. The alarm is cleared when the system detects a transition back to the closed state.

## shutdown

<b>Syntax</b>	[no] <b>shutdown</b>
<b>Context</b>	config>system>alarm-contact-input
<b>Description</b>	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, the system clears the alarm when the <b>shutdown</b> command is executed. The <b>no</b> form of the command starts tracking the state changes associated with the alarm contact input.
<b>Default</b>	shutdown



---

## trigger-alarm-msg

- Syntax** **trigger-alarm-msg** *message-string*  
**no trigger-alarm-msg**
- Context** config>system>alarm-contact-input
- Description** This command allows the user to configure a text message for use along with SNMP trap and log event messages that are sent when the system generates an alarm. The system generates the default message "Alarm Input Triggered" if no message is configured. The **trigger-alarm-msg** string is included in the log event when the pin changes from the normal state.
- Parameters** *message-string* — Specifies a printable character string, up to 160 characters.

### 8.16.2.4 System Threshold Alarm Commands

## thresholds

- Syntax** **thresholds**
- Context** config>system
- Description** This command enables the context to configure monitoring thresholds.

## 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
- 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.  
**Values** cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

**rising-threshold *threshold*** — Specifies a threshold for the sampled statistic. 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 be generated. 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 to the **falling-threshold** value.

The threshold value represents units of 512 bytes.

**Values** -2147483648 to 2147483647

**Default** 0

**falling-threshold *threshold*** — Specifies a threshold for the sampled statistic. 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 be generated. 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 to the **rising-threshold** value.

The threshold value represents units of 512 bytes.

**Values** -2147483648 to 2147483647

**Default** 0

**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 an SR OS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

**trap** — An SR OS logger event is generated. The SR OS 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 an SR OS logger event are generated.

**none** — No action is taken.

**Default** both

**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

### Configuration example

```
cflash-cap-alarm cf1-A: rising-threshold 50000000 falling-threshold 49999900  
interval 120 rmon-event-type both start-alarm rising
```

## cflash-cap-alarm-pct

**Syntax** **cflash-cap-alarm-pct** *cflash-id* **rising-threshold** *percentage* [**falling-threshold** *percentage*] **interval** *seconds* [**rmon-event-type** *event-type*] [**startup-alarm** *alarm-type*]  
**no cflash-cap-alarm-pct** *cflash-id*

**Context** config>system>thresholds

**Description** This command enables capacity monitoring of the compact flash specified in this command. The usage is monitored as a percentage of the capacity of the compact flash. 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.

**Values** cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

**rising-threshold** *percentage* — Specifies a threshold for the sampled statistic. 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 be generated. 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 to the **falling-threshold** value.

The threshold value is the percentage of used space versus capacity for the specified compact flash.

**Values** 0 to 100

**Default** 0

**falling-threshold *percentage*** — Specifies a threshold for the sampled statistic. 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 be generated. 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 to the **rising-threshold** value.

The threshold value is the percentage of used space versus capacity for the specified compact flash.

**Values** 0 to 100

**Default** 0

**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

**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 an SR OS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

**trap** — An SR OS logger event is generated. The SR OS 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 an SR OS logger event are generated.

**none** — No action is taken.

**Default** both

**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

### Configuration example

```
cflash-cap-alarm-pct cf1-A: rising-threshold 70 falling-
```

---

```
threshold 60 interval 120 rmon-event-type both start-alarm rising
```

## 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
- 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 that the *cflash-id* specifies the name of the cflash device to be monitored.
- Values** cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
- rising-threshold** *threshold* — Specifies a threshold for the sampled statistic. 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 be generated. 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 to the **falling-threshold** value. The threshold value represents units of 512 bytes.
- Values** -2147483648 to 2147483647
- Default** 0
- falling-threshold** *threshold* — Specifies a threshold for the sampled statistic. 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 be generated. 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 to the **rising-threshold** value. The threshold value represents units of 512 bytes.
- Values** -2147483648 to 2147483647
- Default** 0

*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 an SR OS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

*trap* — An SR OS logger event is generated. The SR OS 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 SR OS logger event are generated.

*none* — No action is taken.

**Default** *both*

*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*

### Configuration example

```
cflash-cap-warn cfl-B: rising-threshold 2000000 falling-threshold 1999900
interval 240 rmon-event-type trap start-alarm either
```

## cflash-cap-warn-pct

**Syntax** **cflash-cap-warn-pct** *cflash-id* **rising-threshold** *percentage* [**falling-threshold** *percentage*]  
**interval** *seconds* [**rmon-event-type** *event-type*] [**startup-alarm** *alarm-type*]  
**no cflash-cap-warn-pct** *cflash-id*

**Context** config>system>thresholds

**Description** This command enables capacity monitoring of the compact flash specified in this command. The usage is monitored as a percentage of the capacity of the compact flash.

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 that the *cflash-id* specifies the name of the *cflash* device to be monitored.
- Values** cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
- rising-threshold percentage** — Specifies a threshold for the sampled statistic. 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 be generated. 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 to the **falling-threshold** value.
- The threshold value is the percentage of used space versus capacity for the specified compact flash.
- Values** 0 to 100
- Default** 0
- falling-threshold percentage** — Specifies a threshold for the sampled statistic. 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 be generated. 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 to the **rising-threshold** value.
- The threshold value is the percentage of used space versus capacity for the specified compact flash.
- Values** 0 to 100
- Default** 0
- seconds* — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.
- Values** 1 to 2147483647
- 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 an SR OS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.
- trap — An SR OS logger event is generated. The SR OS 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 an SR OS logger event are generated.

none — No action is taken.

**Default** both

*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

### Configuration example

```
cflash-cap-warn-pct cf1-B: rising-threshold 70 falling-threshold 60
interval 240 rmon-event-type trap start-alarm either
```

## 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

**Description** This command configures memory use, in kilobytes, alarm thresholds.

The **no** form of the command removes the parameters from the configuration.

**Parameters** **rising-threshold** *threshold* — Specifies a threshold for the sampled statistic. 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 be generated. 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.

The threshold value represents units of kilobytes.

**Values** -2147483648 to 2147483647

**Default** 0



**falling-threshold** *threshold* — Specifies a threshold for the sampled statistic. 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 be generated. 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.

The threshold value represents units of kilobytes.

**Values** -2147483648 to 2147483647

**Default** 0

**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 — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence. This does not create an SR OS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — An SR OS logger event is generated. The SR OS 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 an SR OS 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, then 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**

<b>Context</b>	config>system>thresholds
<b>Description</b>	This command configures memory usage, in kilobytes, for warning thresholds
<b>Parameters</b>	<p><b>rising-threshold</b> <i>threshold</i> — Specifies a threshold for the sampled statistic. 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 be generated. 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.</p> <p>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.</p> <p>The threshold value represents units of kilobytes.</p> <p><b>Values</b> -2147483648 to 2147483647</p> <p><b>Default</b> 0</p> <p><b>falling-threshold</b> <i>threshold</i> — Specifies a threshold for the sampled statistic. 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 be generated. 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.</p> <p>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.</p> <p>The threshold value represents units of kilobytes.</p> <p><b>Values</b> -2147483648 to 2147483647</p> <p><b>Default</b> 0</p> <p><i>seconds</i> — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.</p> <p><b>Values</b> 1 to 2147483647</p> <p><i>rmon-event-type</i> — Specifies the type of notification action to be taken when this event occurs.</p> <p><b>Values</b> <i>log</i> — An entry is made in the RMON-MIB log table for each event occurrence. This does not create an SR OS logger entry. The RMON-MIB log table entries can be viewed using the show&gt;system&gt;thresholds CLI command.</p> <p><i>trap</i> — An SR OSS logger event is generated. The SR OS 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.</p>

both — Both an entry in the RMON-MIB logTable and an SR OS logger event are generated.

none — No action is taken.

**Default** both

*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, then 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

**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. 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 be generated. 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.

The threshold value represents units in bytes.

**Values** -2147483648 to 2147483647

**Default** 0

**falling-threshold** *threshold* — Specifies a threshold for the sampled statistic. 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 be generated. 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.

The threshold value represents units in bytes.

**Values** -2147483648 to 2147483647

**Default** 0

*seconds* — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

The threshold value represents units in bytes.

**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 an OS logger entry. The RMON-MIB log table entries can be viewed using the CLI command.

*trap* — An SR OS logger event is generated. The SR OS 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 an SR OS logger event are generated.

*none* — No action is taken.

**Default** *both*

*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, then 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

### Configuration example

```
memory-use-alarm rising-threshold 50000000 falling-threshold 45999999
interval 500 rmon-event-type both start-alarm either
```

## memory-use-warn

**Syntax** **memory-use-warn rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**start-alarm** *alarm-type*]  
**no memory-use-warn**

---

<b>Context</b>	config>system>thresholds
<b>Description</b>	<p>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.</p> <p>The absolute sample type method is used.</p> <p>The <b>no</b> form of this command removes the configured compact flash threshold warning.</p>
<b>Parameters</b>	<p><b>rising-threshold</b> <i>threshold</i> — Specifies a threshold for the sampled statistic. 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 be generated. 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.</p> <p>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.</p> <p>The threshold value represents units in bytes.</p> <p><b>Values</b> -2147483648 to 2147483647</p> <p><b>Default</b> 0</p> <p><b>falling-threshold</b> <i>threshold</i> — Specifies a threshold for the sampled statistic. 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 be generated. 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.</p> <p>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.</p> <p>The threshold value represents units in bytes.</p> <p><b>Values</b> -2147483648 to 2147483647</p> <p><b>Default</b> 0</p> <p><b>seconds</b> — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>rmon-event-type</b> — Specifies the type of notification action to be taken when this event occurs.</p> <p><b>Values</b> log — An entry is made in the RMON-MIB log table for each event occurrence.</p> <p>This does not create an SR OS logger entry. The RMON-MIB log table entries can be viewed using the <b>show&gt;system&gt;thresholds</b> CLI command.</p>

trap — An SR OS logger event is generated. The SR OS 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 an SR OS 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, then 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

#### Configuration example

```
memory-use-warn rising-threshold 500000 falling-threshold 400000 interval 800 rmon-
event-type log start-alarm falling
```

## rmon

**Syntax** rmon

**Context** config>system>thresholds

**Description** This command creates the context to 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

**Description** The alarm command configures an entry in the RMON-MIB alarmTable. The alarm 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 delta value), and rising and falling threshold parameters. If a sample has crossed a threshold value, the associated event is generated.

Use the **no** form of this command to remove an rmon-alarm-id from the configuration.

**Parameters** *rmon-alarm-id* — Specifies a numerical identifier for the alarm being configured. The number of alarms that can be created is limited to 1200.

**Values** 1 to 65535

**Default** none

*oid-string* — Specifies the SNMP object identifier of the particular 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, up to 255 characters, 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".

**Default** none

*seconds* — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds. When setting this interval value, care should be taken 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. Care should also be taken not to set the interval value too low to avoid creating unnecessary processing overhead.

**Values** 1 to 2147483647

**Default** none

*sample-type* — Specifies the method of sampling the selected variable and calculating the value to be compared against the thresholds.

**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.

**Default** absolute

*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**, then 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

**rising-event** *rmon-event-id* — Specifies the identifier of the **rmon>event** that 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** *rmon-event-id* has a value of zero (0), no associated event exists.

If a **rising-event** *rmon-event-id* is configured, the CLI requires a **rising-threshold** to also be configured.

**Values** 0 to 65535

**Default** 0

**rising-threshold** *threshold* — Specifies a threshold for the sampled statistic. 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 be generated. 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 identifier of the **rmon>event** that 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** 0 to 65535

**Default** 0



**falling-threshold *threshold*** — Specifies a threshold for the sampled statistic. 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 be generated. 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

**owner-string** — Specifies the owner string; 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 long.

**Default** TiMOS CLI

### Configuration example

```
alarm 3 variable-oid ifInOctets.184582144 interval 20 sample-type delta
start-alarm either rising-event 5 rising-threshold 10000 falling-event 5
falling-threshold 9000 owner "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

**Description** The event 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 SR OS 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 SR OS event logs and that is distributed to all the SR OS log destinations that are configured: CONSOLE, session, memory, file, syslog, or SNMP trap destination.

The SR OS 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.

Use the **no** form of this command to remove an rmon-event-id from the configuration.

**Parameters** *rmon-event-id* — Specifies an identifier for this event.

**Values** 1 to 65535

*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 an SR OS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

**trap** — An SR OS logger event is generated. The SR OS 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 an SR OS logger event are generated.

**none** — No action is taken.

**Default** both

*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 long. If the string contains special characters (#, \$, spaces, and so on), the entire string must be enclosed within double quotes.

*owner-string* — Specifies the owner string; 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 up to 80 characters long.

**Default** TiMOS CLI

**Configuration example:**

```
event 5 rmon-event-type both description "alarm testing" owner "TiMOS CLI"
```

---

## 8.16.2.5 System Bluetooth Commands

### bluetooth

<b>Syntax</b>	<b>bluetooth</b>
<b>Context</b>	config>system
<b>Description</b>	This command enables the context for configuring Bluetooth console attributes.

### advertising-timeout

<b>Syntax</b>	<b>advertising-timeout</b> <i>seconds</i> <b>no advertising-timeout</b>
<b>Context</b>	config>system>bluetooth
<b>Description</b>	When the power is enabled, this timer controls the amount of time the Bluetooth device will advertise that is ready to pair. If an external device does not complete the pairing within this time, then the pairing must be re-initiated.  The <b>no</b> form of this command disables the timeout.
<b>Default</b>	advertising-timeout 30
<b>Parameters</b>	<i>seconds</i> — Specifies the pairing timeout interval. <b>Values</b> 30 to 3600

### device

<b>Syntax</b>	<b>device</b> <i>ieee-address</i> [ <b>create</b> ] <b>no device</b> <i>ieee-address</i>
<b>Context</b>	config>system>bluetooth
<b>Description</b>	This command is used to add and remove devices from the Bluetooth whitelist or to enter the context to configure the MAC. The router only accepts pairing requests with devices that are in the whitelist. The devices are identified through their IEEE 802 MAC addresses. There can be up to six devices defined in the whitelist.  The <b>create</b> keyword must be used to add a new device.  The <b>no</b> form of this command removes the indicated device from the whitelist.

**Parameters** *ieee-address* — Specifies the MAC address of the external Bluetooth device.  
**Values** 6-byte unicast MAC address (*xx:xx:xx:xx:xx:xx* or *xx-xx-xx-xx-xx-xx*)

## description

**Syntax** **description** *description-string*  
**no description**

**Context** config>system>bluetooth>device

**Description** This command creates a text description for a configuration context to help identify the content in the configuration file.  
 The **no** form of this command removes any description string from the context.

**Default** no description

**Parameters** *description-string* — Specifies the description character 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.

## module

**Syntax** **module** *cpm-slot*

**Context** config>system>bluetooth

**Description** This command enters the context to define Bluetooth parameters for the specific CPM slot.

**Parameters** *cpm-slot* — Specifies the CPM slot.  
**Values** {A | B | C | D}

## identifier

**Syntax** **identifier** *identifier*  
**no identifier**

**Context** config>system>bluetooth>module

**Description** This command defines an identifier string to be used to advertise the Bluetooth module during pairing operations.  
 If there is no identifier specified by the user, the default is derived from the platform type, the CPM slot, and the serial number of the chassis.

For example, a device with a platform field of 7750, SR-12 chassis, and a CPM serial number of NS23456 would have a Bluetooth identifier of "7750-SR-12-CPM-A-NS23456." for the CPM in slot A.

The **no** form of the command resets the identifier back to the default.

**Parameters** *identifier* — Specifies string, up to 32 characters, using the values in the range 0-9, a-z, or A-Z.

## pairing-button

**Syntax** **pairing-button** *admin-state*

**Context** config>system>bluetooth

**Description** This command is used to allow or block the function of the pairing button. This can be used to block the accidental triggering of a pairing operation while there is already a paired device.

The actual behavior of the Bluetooth pairing is dependent on both this command and the **power** command.

If normal operation is to use the pairing button on the router and on the external device to initiate the Bluetooth connection, then set:

```
config>system>bluetooth>power enabled-manual
```

```
config>system>bluetooth>pairing-button enable
```

If normal operation is to only require the pairing to be initiated by the external device, then set:

```
config>system>bluetooth>power enabled-automatic
```

```
config>system>bluetooth>pairing-button disable
```

If normal operation is to not allow the local operator to connect without permission from the central management location, then set:

```
config>system>bluetooth>power enabled-manual
```

```
config>system>bluetooth>pairing-button disable
```

Then when a connection is desired, the central management station must change the configuration to one of the two options shown above for the time the local operator is connecting. The central management station can change the setting back to block local access after the operations is complete.

**Default** pairing-button disable

**Parameters** *admin-state* — Specifies the administrative state.

**Values** enable — pairing button can trigger a pairing operation

---

disable — pairing button does not trigger a pairing operation

## passkey

<b>Syntax</b>	<b>passkey</b> <i>passkey</i>
<b>Context</b>	config>system>bluetooth
<b>Description</b>	This command is used to define the Bluetooth pass key that is used during pairing. This passkey must match in both devices attempting the pairing operation.
<b>Default</b>	passkey 123456
<b>Parameters</b>	<i>passkey</i> — Must be six digits.
	<b>Values</b> 000000 to 999999

## power

<b>Syntax</b>	<b>power</b> <i>power-state</i>
<b>Context</b>	config>system>bluetooth
<b>Description</b>	This command sets the operating mode of the Bluetooth module. This can be powered off or powered on but requires the pairing button to initiate the pairing operation, or powered on and continuously pairing.  The <b>pairing-button</b> setting also impacts how pairing operations work.
<b>Default</b>	power off
<b>Parameters</b>	<i>power-state</i> — Specifies the power state.
	<b>Values</b> off — Bluetooth radio disabled enabled-manual — Bluetooth enabled (pairing requires the use of the pairing button) enabled-automatic — Bluetooth is enabled and continuously attempts to pair whenever it is not actively paired to a device

### 8.16.2.6 Persistence Commands

## persistence

<b>Syntax</b>	<b>persistence</b>
---------------	--------------------

**Context** config>system

**Description** This command enables the context to configure persistence parameters on the system.

The persistence feature enables state on information learned through DHCP snooping across reboots to be retained. This information includes data such as the IP address and MAC binding information, lease-length information, and ingress sap information (required for VPLS snooping to identify the ingress interface).

If **persistence** is enabled when there are no DHCP relay or snooping commands enabled, it will simply create an empty file.

**Default** persistence

## ancp

**Syntax** ancp

**Context** config>system>persistence

**Description** This command configures ANCP persistence parameters.

## application-assurance

**Syntax** application-assurance

**Context** config>system>persistence

**Description** This command configures application assurance persistence parameters.

## dhcp-server

**Syntax** dhcp-server

**Context** config>system>persistence

**Description** This command configures DHCP server persistence parameters.

## nat-port-forwarding

**Syntax** nat-port-forwarding

**Context** config>system>persistence

**Description** This command configures NAT port forwarding persistence parameters.

---

## options

<b>Syntax</b>	<b>options</b>
<b>Context</b>	config>system>persistence
<b>Description</b>	This command enables the CLI context to configure persistence options parameters.

## dhcp-lease-time-threshold

<b>Syntax</b>	<b>dhcp-lease-time-threshold</b> [ <i>days days</i> ] [ <i>hrs hours</i> ] [ <i>min minutes</i> ] [ <i>sec seconds</i> ] <b>no dhcp-lease-time-threshold</b>
<b>Context</b>	config>system>persistence>options
<b>Description</b>	<p>This command configures Dynamic Data Persistence (DDP) compact flash access optimization for DHCP leases.</p> <p>The DHCP lease-time threshold controls the eligibility of a DHCP lease for persistency updates when no data other than the lease expiry time is to be updated. When the offered lease time of the DHCP lease is less than the configured threshold, the lease is flagged to skip persistency updates and will be installed with its full lease time upon a persistency recovery after a reboot.</p> <p>The <b>dhcp-lease-time-threshold</b> command controls persistency updates for DHCPv4 and DHCPv6 leases for a DHCP relay or proxy and DHCPv4 leases for DHCP snooping (enabled with <b>subscriber-mgmt</b>) and a DHCP server (enabled with <b>dhcp-server</b>).</p> <p>The <b>no</b> form of the command disables the DHCP lease time threshold.</p>
<b>Default</b>	no dhcp-lease-time-threshold
<b>Parameters</b>	<p><i>days</i> — Specifies the threshold in days.</p> <p><b>Values</b> 0 to 7305</p> <p><i>hours</i> — Specifies the threshold in hours.</p> <p><b>Values</b> 0 to 23</p> <p><i>minutes</i> — Specifies the threshold in minutes.</p> <p><b>Values</b> 0 to 59</p> <p><i>seconds</i> — Specifies the threshold in seconds.</p> <p><b>Values</b> 0 to 59</p>

## python-policy-cache

<b>Syntax</b>	<b>python-policy-cache</b>
---------------	----------------------------



---

**Context** config>system>persistence

**Description** This command configures Python policy cache persistency parameters.

## subscriber-mgmt

**Syntax** subscriber-mgmt

**Context** config>system>persistence

**Description** This command configures subscriber management persistence parameters.

## location

**Syntax** location *cflash-id*  
no location

**Context** config>system>persistence>ancp  
config>system>persistence>app-assure  
config>system>persistence>dhcp-server  
config>system>persistence>nat-fw  
config>system>persistence>python  
config>system>persistence>subscriber-mgmt

**Description** This command instructs the system where to write the persistency files for the corresponding application. Each application creates two files on the flash card, one with suffix *.i<version>*, referencing an index file, and the other with suffix *.0<version>*, where *<version>* is a 2-digit number reflecting the file version. These versions are not related to the SR OS release running on the node. The *<version>* can remain the same over two major releases, for example, when no format change is made to the persistency file. On boot, the system scans the file systems looking for the corresponding persistency files, and the load begins.

For example, in the subscriber management context, the location specifies the flash device on a CPM card where the data for handling subscriber management persistency is stored.

The **no** form of this command returns the system to the default. If there is a change in file location while persistence is running, a new file will be written on the new flash, and then the old file will be removed.

**Default** no location

**Parameters** *cflash-id* — Specifies the compact flash device name.

**Values** cf1:, cf2:, cf3:

## 8.16.2.7 PTP Commands

### ptp

<b>Syntax</b>	<b>ptp</b>
<b>Context</b>	config>system
<b>Description</b>	This command enables the context to configure parameters for IEEE 1588-2008, <i>Precision Time Protocol</i> .  This command is only available on the control assemblies that support 1588.

### anno-rx-timeout

<b>Syntax</b>	<b>anno-rx-timeout</b> <i>count</i> <b>no anno-rx-timeout</b>				
<b>Context</b>	config>system>ptp				
<b>Description</b>	This command configures the announceReceiptTimeout value for all peer associations. This defines the number of Announce message intervals that must expire with no received Announce messages before declaring an ANNOUNCE_RECEIPT_TIMEOUT event.  The <b>announce-rx-timeout</b> cannot be changed unless PTP is shut down.				
<b>Default</b>	anno-rx-timeout 3				
<b>Parameters</b>	<i>count</i> — Specifies the announce packet interval, in log form.  <table> <tr> <td><b>Values</b></td> <td>2 to 10</td> </tr> <tr> <td><b>Default</b></td> <td>3</td> </tr> </table>	<b>Values</b>	2 to 10	<b>Default</b>	3
<b>Values</b>	2 to 10				
<b>Default</b>	3				

### clock-type

<b>Syntax</b>	<b>clock-type boundary</b> <b>clock-type ordinary {master   slave}</b>
<b>Context</b>	config>system>ptp
<b>Description</b>	This command configures the type of clock. The clock type can only be changed when PTP is shutdown.

The clock type cannot be changed to ordinary master if the PTP reference is no shutdown. In addition, the clock type cannot be changed to ordinary master if there are peers configured. The clock type is restricted based on the profile. See the **profile** command description for the details of the restrictions.

**Default** clock-type ordinary slave

**Parameters** **boundary** — Specifies that the system is a boundary clock, which may be anywhere in the master-slave clock hierarchy. It can obtain timing from a master clock, and provide timing to multiple slave clocks concurrently.

**ordinary master** — Specifies that the system is a grandmaster clock in the master-slave hierarchy. The system provides timing to multiple slave clocks in the network.

**ordinary slave** — Specifies that the system is always a slave clock in the master-slave hierarchy. The system derives its timing from one or more master clocks in the network.

## domain

**Syntax** **domain** *domain*  
**no domain**

**Context** config>system>ptp

**Description** This command configures the PTP domain.

The **no** form of the command reverts to the default configuration. The default value is dependent upon the configured profile, as detailed below.

Note some profiles may require a domain number in a restricted range. It is up to the operator to ensure the value aligns with what is expected within the profile.

Domain cannot be changed unless PTP is shutdown. If the PTP profile is changed, the domain is changed to the default domain for the new PTP profile.

**Default** domain 0 — profile ieee1588-2008  
domain 4 — profile g8265dot1-2010  
domain 24 — profile 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

<b>Syntax</b>	<b>local-priority</b> <i>priority</i>
<b>Context</b>	config>system>ptp config>system>ptp>peer config>system>ptp>port
<b>Description</b>	<p>This command configures the local priority used to choose between PTP masters in the best master clock algorithm (BMCA). This setting is relevant when the profile is set to either g8265dot1-2010 or g8275dot1-2014. The parameter is ignored when any other profile is selected.</p> <p>The value 1 is the highest priority and 255 is the lowest priority. The priority of a peer cannot be configured if the PTP profile is ieee1588-2008.</p> <p>For g8265dot1-2010, this parameter configures the priority used to choose between master clocks with the same quality (refer to G.8265.1 for more details).</p> <p>For g8275dot1-2014, this parameter sets the value of the <b>localPriority</b> associated with the Announce messages received from the external clocks (<b>ptp&gt;peer</b> or <b>ptp&gt;port</b>), or the local clock (<b>PTP</b>). Refer to G.8275.1 for detailed information.</p>
<b>Default</b>	local-priority 128
<b>Parameters</b>	<i>priority</i> — Specifies the value of the local priority.
	<b>Values</b> 1 to 255

## log-anno-interval

<b>Syntax</b>	<b>log-anno-interval</b> <i>log-interval</i> <b>no log-anno-interval</b>
<b>Context</b>	config>system>ptp
<b>Description</b>	<p>This command configures the announce message interval used for both unicast and multicast messages.</p> <p>For unicast messages, it defines the announce message interval that is requested during unicast negotiation to any peer. This controls the announce message rate sent from remote peers to the local node. It does not affect the announce message rate that may be sent from the local node to remote peers. Remote peers may request an announce message rate anywhere within the acceptable grant range.</p> <p>For multicast messages, used on PTP Ethernet ports, this configures the message interval used for Announce messages transmitted by the local node.</p> <p>This value also defines the interval between executions of the BMCA within the node.</p>

The announce-interval cannot be changed unless the PTP is shut down.



**Note:** In order to minimize BMCA driven reconfigurations, the IEEE recommends that the announce-interval should be consistent across the entire 1588 network.

**Default** log-anno-interval 1 (1 packet every 2 seconds) for ieee1588-2008  
log-anno-interval 1 (1 packet every 2 seconds) for g8265dot1-2010  
log-anno-interval -3 (8 packets per second) for g8275dot1-2014

**Parameters** *log-interval* — Specifies the announce packet interval, in log form.

**Values** -3 to 4

## network-type

**Syntax** **network-type** {**sdh** | **sonet**}

**Context** config>system>ptp

**Description** This command configures the codeset to be used for the encoding of QL values into PTP clockClass values when the profile is configured for G.8265.1. The codeset is defined in Table 1/G.8265.1. This setting only applies to the range of values observed in the clockClass values transmitted out of the node in Announce messages. The router will support the reception of any valid value in Table 1/G.8265.1

**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

**Description** This command configures a remote PTP peer. It provides the context to configure parameters for the remote PTP peer.

Up to 20 remote PTP peers may be configured.

The **no** form of the command deletes the specified peer. The specific address being deleted must be included.

If the **clock-type** is **ordinary slave** or **boundary**, and PTP is no shutdown, the last peer cannot be deleted. This prevents the user from having PTP enabled without any peer configured and enabled.

Peers are created within the routing instance associated with the context of this command. All configured PTP peers must use the same routing instance.

**Parameters** *ip-address* — Specifies the IP address of the remote peer.  
**create** — Creates the remote PTP peer.  
**Values** ipv4 address: a.b.c.d.

## log-sync-interval

**Syntax** **log-sync-interval** *log-interval*  
**no log-sync-interval**

**Context** config>system>ptp>peer

**Description** This command configures the message interval used for unicast event messages. It defines the message interval for both Sync and Delay\_Resp messages that are requested during unicast negotiation to the specific peer. This controls the Sync and Delay\_Resp message rate sent from remote peers to the local node. It does not affect the Sync or Delay\_Resp packet rate that may be sent from the local node to remote peers. Remote peers may request a Sync or Delay\_Resp packet rate anywhere within the acceptable grant range.

The **log-sync-interval** cannot be changed unless the peer is shutdown.

**Default** log-sync-interval -6 (64 packets per second) for 1588-2008  
log-sync-interval -6 (64 packets per second) for g8265dot1-2010  
log-sync-interval -4 (16 packets per second) for g8275dot1-2014

**Parameters** *log-interval* — Specifies the sync message interval, in log form.  
**Values** -6 to 0

## shutdown

**Syntax** **[no] shutdown**

**Context** config>system>ptp>peer

**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 shutdown, all received packets from the peer are ignored.

If the clock-type is ordinary slave or boundary, and PTP is no shutdown, the last enabled peer cannot be shutdown. This prevents the user from having PTP enabled without any peer configured and enabled.

**Default** no shutdown

## peer-limit

**Syntax** **peer-limit** *limit*  
**no peer-limit**

**Context** config>system>ptp

**Description** This command specifies an upper limit to the number of discovered peers permitted within the routing instance. This can be used to ensure that a routing instance does not consume all the possible discovered peers and blocking discovered peers in other routing instances.

If it is desired to reserve a fixed number of discovered peers per router instance, then all router instances supporting PTP should have values specified with this command and the sum of all the peer-limit values must not exceed the maximum number of discovered peers supported by the system.

If the user attempts to specify a peer-limit, and there are already more discovered peers in the routing instance than the new limit being specified, the configuration will not be accepted.

**Default** no peer-limit

**Parameters** *limit* — Specifies the maximum number of discovered peers allowed in the routing instance.

**Values** 0 to 512

**Default** 1 (The maximum number of discovered peers supported by the system.)

## port

**Syntax** **port** *port-id* [**create**]  
**no port** *port-id*

**Context** config>system>ptp

**Description** This command configures PTP over Ethernet on the physical port. The PTP process shall transmit and receive 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 (see *Annex F IEEE Std 1588™-2008*). Either address can be configured for the PTP messages sent through this port.

A PTP port may not be created if the PTP profile is set g8265dot1-2010.

If the port specified in the port-id supports 1588 port based timestamping, then a side effect of enabling PTP over Ethernet on the port shall be the enabling of Synchronous Ethernet on that port.

De-provisioning of the card or MDA containing the specified port is not permitted while the port is configured within PTP.

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 allocate an ethernet satellite client port as a PTP port, the ethernet satellite must first be enabled for the transparent clock function. For more information, see the [ptp-tc](#) command.

The SyncE/1588 ports of the CPM and CCMs can be specified as a PTP port. These use the 'A/3' and 'B/3' designation and they both must be specified as two PTP ports if both are to be used. The active CPM sends and receives messages on both ports if they are specified and enabled.

**Parameters** *port-id* — Specifies a specific physical port.

**Values** *slot/mda/port*

**create** — Creates the PTP port. This keyword is required when first creating the PTP port, if the system is configured to require it (enabled in the environment create command). Once the PTP port is created, it is possible to navigate into the context without the create keyword.

## address

**Syntax** **address** {01:1b:19:00:00:00|01:80:c2:00:00:0e}

**Context** config>system>ptp>port

**Description** This command allows for the specification of the mac-address to be used for the destination MAC address of the transmitted ptp messages.

IEEE Std 1588-2008 Annex F defines two reserved addresses for 1588 messages. These are:

- **01-1B-19-00-00-00** — all except the peer delay mechanism messages
- **01-80-C2-00-00-0E** — peer delay mechanism messages

Both addresses are supported for reception independent of the address configured by this command.



---

The **no** form of this command sets the address to the default address.

**Default** address 01-1B-19-00-00-00

## log-delay-interval

**Syntax** **log-delay-interval** *log-interval*  
**no log-delay-interval**

**Context** config>system>ptp>port

**Description** This command configures the minimum interval used for multicast Delay\_Req messages. This parameter is applied on a per port basis. For ports in a slave state, it shall be the interval used, unless the parent port indicates a longer interval. For a port in master state, it shall be the interval advertised to external slave ports as the minimum acceptable interval for Delay\_Req messages from those slave ports.

It is a requirement of the 1588 standard that a port in Slave state shall check the logMessageInterval field of received multicast Delay\_Resp messages. If the value of the logMessageInterval field of those messages is greater than the value programmed locally for the generation of Delay\_Req messages, then the Slave must change to use the greater value (i.e. longer interval) for the generation of Delay\_Req messages. This requirement is supported in the router.

The parameter is only applicable to ports and not to peers.

**Default** log-delay-interval -6 for ieee1588-2008  
log-delay-interval -6 for g8265dot1-2010  
log-delay-interval -4 for g8275dot1-2014

**Parameters** *log-interval* — Specifies the Delay\_Req message interval, in log form.

**Values** -6 to 0

**Default** -6

## log-sync-interval

**Syntax** **log-sync-interval** *log-interval*  
**no log-sync-interval**

**Context** config>system>ptp>port

**Description** This command configures the message interval used for transmission of multicast Sync messages.

For multicast messages used on PTP Ethernet ports, this configures the message interval used for Sync messages transmitted by the local node when the port is in Master state.

**Default** log-sync-interval -6 (64 packets per second) for ieee1588-2008 or  
log-sync-interval -6 (64 packets per second) for g8265dot1-2010 or  
log-sync-interval -4 (16 packets per second) for g8275dot1-2014

**Parameters** *log-interval* — Specifies the message interval, in log form.

**Values** -6 to 0 (This corresponds to a maximum rate of 64 packets per second, and a minimum rate of 1 packet per second.)

**Default** -6

## master-only

**Syntax** **master-only** {**true** | **false**}

**Context** config>system>ptp>port

**Description** This command is used to restrict the local port to never enter the slave state. Use the command to ensure that the 7750 SR never draws synchronization from the attached external device.

This parameter is only effective when the profile is set to g8275dot1-2014.



**Note:** The ITU-T G.8275.1 (07/2014) recommendation used the term notSlave for this functionality; however, the IEEE has added this capability into the next edition of the 1588 standard using the term masterOnly. These are equivalent.

**Default** master-only true

**Parameters** **true** — Enables the **master-only** parameter of the PTP port.  
**false** — Disables the **master-only** parameter of the PTP port.

## shutdown

**Syntax** [**no**] **shutdown**

**Context** config>system>ptp>port

**Description** This command disables or enables a specific PTP port. When shutdown, all PTP Ethernet messages are dropped on the IOM They will not be 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 no shutdown, the last enabled port or peer cannot be shutdown. This prevents the user from having PTP enabled without any means to synchronize the local clock to a parent clock.

**Default** no shutdown

## priority1

**Syntax** **priority1** *priority-value*  
**no priority1**

**Context** config>system>ptp

**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 Best Master Clock Algorithm to determine which clock should provide timing for the network.

This value is used for the value to advertise in the Announce messages and for the local clock value in data set comparisons.

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

**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

**Description** This command configures the priority2 value of the local clock. This parameter is only used when the profile is set to ieee1588-2008 or g8275dot1-2014. The parameter is ignored when any other profile is selected.

This value is used by the Best Master Clock algorithm to determine which clock should provide timing for the network.



**Note:** This value is used for the value to advertise in the Announce messages and for local clock value in data set comparisons.

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

<b>Default</b>	priority2 128
<b>Parameters</b>	<i>priority-value</i> — Specifies the value of the priority2 field.
<b>Values</b>	0 to 255

## profile

<b>Syntax</b>	<b>profile {g8265dot1-2010   ieee1588-2008   g8275dot1-2014}</b>
<b>Context</b>	config>system>ptp
<b>Description</b>	This command configures the profile to be used for the internal PTP clock. It defines the Best Master Clock Algorithm (BMCA) behavior.

The profile cannot be changed unless PTP is shutdown.

When you change the profile, the domain changes to the default value for the new profile. The **clock-type** is restricted based on the profile. If the profile is **ieee1588-2008**, then the **clock-type** is not restricted. If the profile is **g8265dot1-2010**, then the clock type may only be ordinary slave or ordinary master; boundary clock is not allowed. If the profile is **g8275dot1-2014**, then the **clock-type** may only be boundary clock or ordinary slave; ordinary master is not allowed.

When you change the profile, if any of the command parameters are set to default for the original profile, then the parameter will be changed to the default for the new profile. This applies to the following:

- **log-anno-interval** set for the clock
- **log-sync-interval** set for a peer or a port
- **log-delay-interval** set for a port

If the parameter is set to a value other than the default for the original profile, then its value will remain unchanged

<b>Default</b>	profile g8265dot1-2010
<b>Parameters</b>	<b>g8265dot1-2010</b> — Conforms to the ITU-T G.8265.1 specification. <b>ieee1588-2008</b> — Conforms to the 2008 version of the IEEE1588 standard. <b>g8275dot1-2014</b> — Conforms to the ITU-T G.8275.1 specification.

## shutdown

<b>Syntax</b>	<b>[no] shutdown</b>
<b>Context</b>	config>system>ptp

**Description** This command disables or enables the PTP protocol. If PTP is disabled, the router will not transmit any PTP packets, and will ignore all received PTP packets. If the user attempts execute a **no shutdown** command on hardware that does not support PTP, an alarm will be raised to indicate limited capabilities.

When PTP is shutdown, the PTP slave port is not operational. It shall not be considered as a source for system timing.

On assemblies supporting a 1 PPS output interface, this command controls the presentation of a signal on that interface. When PTP is enabled, the 1 PPS port is enabled, and it generates a pulse whose rising edge represented the second rollover of the internal PTP time scale (that is, whenever the fractional second of the time is exactly zero). When PTP is disabled, no signal is presented on the 1 PPS interface.

**Default** shutdown

## 8.16.2.8 Date and Time Commands

### set-time

**Syntax** **set-time** *date time*

**Context** admin

**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.

If SNTP or NTP is enabled (no shutdown) then this command cannot be used.

**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 reset 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

<b>Syntax</b>	<b>time</b>
<b>Context</b>	config>system
<b>Description</b>	This command enables the context to configure the system time zone and time synchronization parameters.

### 8.16.2.9 Network Time Protocol Commands

## ntp

<b>Syntax</b>	[no] ntp
<b>Context</b>	config>system>time
<b>Description</b>	This command enables the context to 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. Use the no form of the command to stop the execution of NTP and remove its configuration.
<b>Default</b>	ntp

## prefer-local-time

<b>Syntax</b>	[no] prefer-local-time
<b>Context</b>	config>system>time
<b>Description</b>	This command sets the preference to use local or UTC time in the system. This preference is applied to objects such as log file names, created and completed times reported in log files, and rollback times displayed in <b>show</b> routines.



**Note:** The format used for the date-time strings may change when the **prefer-local-time** option is enabled. For example, when enabled, all date-time strings include a suffix of three to five characters that indicates the timezone used for the presentation. This suffix may not be present if the option is not enabled.



**Note:** The time format for timestamps on log events is controlled on a per-log basis using the **config>log>log-id>time-format {utc | local}** CLI command and not via **prefer-local-time**. The operator may force the timezone used for **show** outputs during a CLI session using an environment variable in the **environment>time-display {utc | local}** command.

The **no** form of this command indicates preference for UTC time.

**Default** no prefer-local-time

## authentication-check

**Syntax** [no] authentication-check

**Context** config>system>time>ntp

**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.

**Default** authentication-check

## authentication-key

**Syntax** authentication-key *key-id* key *key* [hash | hash2 | custom] type {des | message-digest}  
no authentication-key *key-id*

**Context** config>system>time>ntp

**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 the command removes the authentication key.

**Parameters** *key-id* — Configures 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

**Default** None

**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 32 characters for message-digest (md5) or 8 characters for des (length limits are unencrypted lengths). If spaces are used in the string, enclose the entire string in quotation marks (“.”).

**hash** — Specifies the key is entered in an encrypted form. If the **hash** or **hash2** parameter is not used, the key is assumed to be in an unencrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the **hash** or **hash2** parameter specified.

**hash2** — Specifies the key is entered in a more complex encrypted form that involves more variables than the key value alone, meaning that the **hash2** encrypted variable cannot be copied and pasted. If the **hash** or **hash2** parameter is not used, the key is assumed to be in an unencrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the **hash** or **hash2** parameter specified.

**custom** — Specifies the custom encryption to management interface.

**type** — Determines if DES or message-digest authentication is used.

This is a required parameter; either DES or message-digest must be configured.

**des** — Specifies that DES authentication is used for this key. The des option is not permitted in FIPS-140-2 mode.

**message-digest** — Specifies that MD5 authentication in accordance with RFC 2104 is used for this key.

## broadcast

**Syntax** **broadcast** [**router** *router-name*] {**interface** *ip-int-name*} [**key-id** *key-id*] [**version** *version*] [**t***ttl*]

**no broadcast** [**router** *router-name*] {**interface** *ip-int-name*}

**Context** config>system>time>ntp

**Description** This command configures the node to transmit NTP packets on a given interface. Broadcast and multicast messages can easily be spoofed, thus, authentication is strongly recommended.

The **no** form of this command removes the address from the configuration.



- Parameters** *router-name* — Specifies the router name used to transmit NTP packets. Base is the default. Select management to use the management port (Ethernet port on the CPM). Note that broadcast server capability can also be enabled on an interface within a VPRN context. Refer to “NTP Within a VPRN Service” in the *7450 ESS, 7750 SR, 7950 XRS, and VSR Layer 3 Services Guide: IES and VPRN* for more information.
- 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* — Identifies the configured 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 or trap generated.
- Values** 1 to 255
- Default** none
- 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.
- Values** 2 to 4
- Default** 4
- tll* — Specifies the IP Time To Live (TTL) value.
- Values** 1 to 255
- Default** none

## broadcastclient

- Syntax** **broadcastclient** [**router** *router-instance* | **service-name** *service-name*] {**interface** *ip-int-name*} [**authenticate**]
- no broadcastclient** [**router** *router-instance* | **service-name** *service-name*] {**interface** *ip-int-name*}
- Context** config>system>time>ntp
- Description** When configuring NTP, the node can be configured to receive broadcast packets on a specified subnet. This command configures a specific interface to listen for broadcast NTP messages. The interface may exist within a VPRN service.

Broadcast and multicast messages can easily be spoofed, so authentication is strongly recommended. If broadcast is not configured, then any 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 interface from the configuration.

- Parameters** *router-instance* — Specifies the routing context that contains the interface in the form of *router-name* or *service-id*.
- Values** *router-name* — Base | Management  
*service-id* — 1 to 2147483647
- Default** Base
- service name* — Specifies the service name for the VPRN. The name can be up to 64 characters in length. Note that CPM routing instances are not supported.
- ip-int-name* — Specifies the VPRN interface on which to receive NTP broadcast packets. If the string contains special characters (such as #, \$, or spaces) 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.

## multicast

- Syntax** **multicast** [**key-id** *key-id*] [**version** *version*]  
**no multicast**
- Context** config>system>time>ntp
- Description** This command configures NTP the node to transmit multicast packets on the CPM/CCM MGMT port. Broadcast and multicast messages can easily be spoofed; authentication is strongly recommended.
- The **no** form of this command removes the multicast address from the configuration.
- Parameters** *key-id* — Specifies the configured authentication key and authentication type used by this version to transmit NTP packets. If this command is omitted from the configuration, packets are sent unencrypted.
- Values** 1 to 255
- Default** None
- 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 versions are accepted.
- Values** 2 to 4
- Default** 4

---

## multicastclient

<b>Syntax</b>	<b>multicastclient [authenticate]</b> <b>no multicastclient</b>
<b>Context</b>	config>system>time>ntp
<b>Description</b>	<p>This command configures the node to receive multicast NTP messages on the CPM MGMT port. If <b>multicastclient</b> is not configured, received NTP multicast traffic will be ignored. Use the <b>show</b> command to view the state of the configuration.</p> <p>The <b>no</b> construct of this message removes the multicast client for the specified interface from the configuration.</p>
<b>Parameters</b>	<b>authenticate</b> — Specifies to make authentication a requirement (optional). If authentication is required, the authentication key-id received must have been configured in the <b>authentication-key</b> command, and that key-id type and key value must also match.

## ntp-server

<b>Syntax</b>	<b>ntp-server [authenticate]</b> <b>no ntp-server</b>	
<b>Context</b>	config>system>time>ntp	
<b>Description</b>	<p>This command configures the node to assume the role of an NTP server. Unless the <b>server</b> command is used, this node will function as an NTP client only and will not distribute the time to downstream network elements.</p>	
<b>Default</b>	no ntp-server	
<b>Parameters</b>	<b>authenticate</b> — Specifies to make authentication a requirement (optional). If authentication is required, the authentication key-id received in a message must have been configured in the <b>authentication-key</b> command, and that key-id type and key value must also match.	The authentication key from the received messages will be used for the transmitted messages.

## peer

<b>Syntax</b>	<b>peer [router router-instance   service-name service-name] {ip-address   ipv6-address} [key-id key-id] [version version] [prefer]</b> <b>no peer [router router-instance   service-name service-name] {ip-address   ipv6-address}</b>
<b>Context</b>	config>system>time>ntp

**Description** This command configures symmetric active mode for an NTP peer. It is recommended to configure authentication and to only configure known time servers as peers. Peers may exist within a VPRN service.



**Note:** For symmetric peering to operate correctly with a peer accessible through a VPRN, local NTP server functionality must be enabled within the VPRN using the **config>service>vprn>ntp** command.

The **no** form of the command removes the configured peer.

**Parameters** *router-instance* — Specifies the routing context that contains the interface in the form of *router-name* or *service-id*.

**Values** *router-name* — Base | Management  
*service-id* — 1 to 2147483647

**Default** Base

*service name* — Specifies the service name for the VPRN. The name can be up to 64 characters. CPM routing instances are not supported.

*ip-address* — Configures the IPv4 address of the peer that requires a peering relationship to be set up.

**Values** a.b.c.d

**Default** None

*ipv6-address* — Configures the IPv6 address of the peer that requires a peering relationship to be set up.

**Values**

- x:x:x:x:x:x:x (eight 16-bit pieces)
- x:x:x:x:x:d.d.d.d
- x: [0 to FFFF] H
- d: [0 to 255] D

**Default** None

*key-id* — Specifies the key ID. Successful authentication requires that both peers must have the same authentication key-id, type, and key value.

Specify the *key-id* that identifies the configured authentication key and authentication type used by this node to transmit NTP packets to an NTP peer. If an NTP packet is received by these nodes, the authentication key-id, type, and key value must be valid, otherwise the packet will be rejected and an event or trap will be generated.

**Values** 1 to 255

**Default** None

*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 are accepted.

**Values** 2 to 4

**Default** 4

**prefer** — When configuring more than one peer, one remote system can be configured as the preferred peer. When a second peer is configured as preferred, then the new entry overrides the old entry.

## server

**Syntax** **server** [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | *ipv6-address* | **ntp**} [**key-id** *key-id*] [**version** *version*] [**prefer**]  
**no server** [**router** *router-instance* | **service-name** *service-name*] {*ip address* | *ipv6-address* | **ntp**}

**Context** config>system>time>ntp

**Description** This command configures the node to operate in client mode with the NTP server specified in the address field of this command.

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. After PTP has established a UTC traceable time from an external grandmaster then it will always be the source for time into NTP, even if PTP goes into time holdover. PTP applies only to the 7450 ESS and 7750 SR.

Use of the internal PTP time source for NTP will promote the internal NTP server to stratum 1 level, which may impact the NTP network topology.

The **no** form of this command removes the server with the specified address from the configuration.

**Parameters** *router-instance* — Specifies the routing context that contains the interface in the form of *router-name* or *service-id*.

**Values** *router-name* — Base | Management  
*service-id* — 1 to 2147483647

**Default** Base

*service name* — Specifies the service name for the VPRN. The name can be up to 64 characters. CPM routing instances are not supported.

*ip-address* — Configures the IPv4 address of an external NTP server.

**Values** a.b.c.d

**Default** None

*ipv6-address* — Configures the IPv6 address of an external NTP server.

- Values**
- x:x:x:x:x:x:x (eight 16-bit pieces)
  - x:x:x:x:x:d.d.d.d
  - x: [0 to FFFF] H
  - d: [0 to 255] D

**Default** None

*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 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. This is an optional parameter.

**Values** 1 to 255

*version* — Configures the NTP version number that is expected by this node. This is an optional parameter.

**Values** 2 to 4

**Default** 4

**ptp** — Configures the internal PTP process as a time server into the NTP process. The *prefer* parameter is mandatory with this server option.

**prefer** — Specifies that, when configuring more than one peer, one remote system can be configured as the preferred peer. When a second peer is configured as preferred, then the new entry overrides the old entry.

### 8.16.2.9.1 SNTP Commands

sntp

**Syntax** [no] sntp

**Context** config>system>time

**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 automatically adjusted at system initialization time or when the protocol first starts up.

When the time differential between the SNTP/NTP server and the system is more than 2.5 seconds, the time on the system is gradually adjusted.

---

SNTP is created in an administratively enabled state (**no shutdown**).

The **no** form of the command removes the SNTP instance and configuration. SNTP does not need to be administratively disabled when removing the SNTP instance and configuration.

**Default** sntp

## broadcast-client

**Syntax** **[no] broadcast-client**

**Context** config>system>time>sntp

**Description** This command enables listening to SNTP/NTP broadcast messages on interfaces with **broadcast client** enabled at global device level.

SNTP must be shutdown prior to changing either to or from broadcast mode.

The **no** form of the 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** *ip-address*

**Context** config>system>time>sntp

**Description** This command creates an SNTP server for unicast client mode.

**Parameters** *ip-address* — Specifies the IP address of the SNTP server.

**Values** a.b.c.d

*version-number* — Specifies the SNTP version supported by this server.

**Values** 1 to 3

**Default** 3

**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

*seconds* — Specifies the frequency at which this server is queried.

**Values** 64 to 1024

**Default** 64

### 8.16.2.9.2 System Time Commands

#### dst-zone

**Syntax** `[no] dst-zone {std-zone-name | non-std-zone-name}`

**Context** `config>system>time`

**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 the Time Zones section, then 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 the Time Zones section 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 the 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 the Time Zones section. 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, NDT, AKDT, CDT, CEST, EDT, EEST, MDT, NZDT, PDT, WEST

*non-std-zone-name* — Specifies the non-standard time zone name. Create a user-defined name created using the zone. The name can be a maximum of 5 characters in length.



---

## end

<b>Syntax</b>	<b>end</b> <i>end-week end-day end-month hours-minutes</i>
<b>Context</b>	config>system>time>dst-zone
<b>Description</b>	This command configures start of summer time settings.
<b>Default</b>	end first sunday january 00:00
<b>Parameters</b>	<i>end-week</i> — Specifies the starting week of the month when the summer time ends. <b>Values</b> first, second, third, fourth, last <b>Default</b> first <i>end-day</i> — Specifies the starting day of the week when the summer time ends. <b>Values</b> sunday, monday, tuesday, wednesday, thursday, friday, saturday <b>Default</b> sunday <i>end-month</i> — Specifies the starting month of the year when the summer time takes effect. <b>Values</b> january, february, march, april, may, june, july, august, september, october, november, december <b>Default</b> january <i>hours-minutes</i> — Specifies the time at which the summer time ends, in hh:mm format. <b>Values</b> hours: 00 to 23 minutes: 00 to 59 <b>Default</b> 00:00

## offset

<b>Syntax</b>	<b>offset</b> <i>offset</i>
<b>Context</b>	config>system>time>dst-zone
<b>Description</b>	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.
<b>Default</b>	offset 60
<b>Parameters</b>	<i>offset</i> — 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. <b>Values</b> 0 to 60 <b>Default</b> 60

---

## start

<b>Syntax</b>	<b>start</b> <i>start-week start-day start-month hours-minutes</i>
<b>Context</b>	config>system>time>dst-zone
<b>Description</b>	This command configures start of summer time settings.
<b>Default</b>	start first sunday january 00:00
<b>Parameters</b>	<p><i>start-week</i> — Specifies the starting week of the month when the summer time takes effect.</p> <p><b>Values</b> first, second, third, fourth, last</p> <p><b>Default</b> first</p> <p><i>start-day</i> — Specifies the starting day of the week when the summer time takes effect.</p> <p><b>Values</b> sunday, monday, tuesday, wednesday, thursday, friday, saturday</p> <p><b>Default</b> sunday</p> <p><i>start-month</i> — Specifies the starting month of the year when the summer time takes effect.</p> <p><b>Values</b> january, february, march, april, may, june, july, august, september, october, november, december</p> <p><b>Default</b> january</p> <p><i>hours-minutes</i> — Specifies the time at which the summer time takes effect, in hh:mm format.</p> <p><b>Values</b> hours: 00 to 23 minutes: 00 to 59</p> <p><b>Default</b> 00:00</p>

## zone

<b>Syntax</b>	<b>zone</b> { <i>std-zone-name</i>   <i>non-std-zone-name</i> } [ <i>hh</i> [: <i>mm</i> ]] <b>no zone</b>
<b>Context</b>	config>system>time
<b>Description</b>	<p>This command sets the time zone and/or time zone offset for the device.</p> <p>The SR-series router OS supports system-defined and user-defined time zones. The system-defined time zones are listed in the Time Zones section.</p> <p>For user-defined time zones, the zone and the UTC offset must be specified.</p>

The **no** form of the 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 00

**Parameters** *std-zone-name* — Specifies the standard time zone name. The standard name must be a system-defined zone in the Time Zones section. 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 do not 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.

A user-defined time zone name is case-sensitive and can be up to 5 characters in length.

**Values** A user-defined value can be up to 5 characters or one of the following values:  
GMT, WET, CET, EET, EEST, 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. The name can be up to 5 characters.

*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** hours: -11 to 12  
minutes: 0 to 59

**Default** hours: 0  
minutes: 0

## 8.16.2.10 Cron Commands

cron

**Syntax** cron

**Context** config

**Description** This command creates the context to create scripts, script parameters and schedules which 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** `[no] schedule schedule-name [owner schedule-owner]`

**Context** `config>system>cron`

**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 the command removes the context from the configuration.

**Parameters** *schedule-name* — Specifies the name of the schedule. The name can be up to 32 characters.

*schedule-owner* — Specifies the owner name of the schedule. The name can be up to 32 characters.

**Default** TiMOS CLI

## count

**Syntax** `count number`  
`no count`

**Context** `config>system>cron>sched`

**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.

**Default** no count

**Parameters** *number* — Specifies the number of times the schedule is run.

**Values** 1 to 65535

**Default** 65535

---

## day-of-month

<b>Syntax</b>	<b>day-of-month</b> { <i>day-number</i> [ <i>..day-number</i> ] <b>all</b> } <b>no day-of-month</b>
<b>Context</b>	config>system>cron>sched
<b>Description</b>	<p>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 month, weekday, hour, and minute, the event will not execute.</p> <p>Using the <b>weekday</b> command as well as the <b>day-of-month</b> 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).</p> <p>The <b>no</b> form of this command removes the specified day-of-month from the list.</p>
<b>Default</b>	no day-of-month
<b>Parameters</b>	<p><i>day-number</i> — Specifies 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 <b>day-of-month -5, 5</b> in a month that has 31 days will specify the schedule to occur on the 27th and 5th of that month.</p> <p>Integer values must map to a valid day for the month in question. For example, February 30 is not a valid date.</p> <p><b>Values</b> 1 to 31, -31 to -1 (maximum 62 day-numbers)</p> <p><b>all</b> — Specifies all days of the month.</p>

## end-time

<b>Syntax</b>	<b>end-time</b> [ <i>date</i>   <i>day-name</i> ] <i>time</i> <b>no end-time</b>
<b>Context</b>	config>system>cron>sched
<b>Description</b>	<p>This command is used concurrently with type <b>periodic</b> or <b>calendar</b>. Using the type of <b>periodic</b>, end-time determines at which interval the schedule will end. Using the type of <b>calendar</b>, end-time determines on which date the schedule will end.</p> <p>When <b>no end-time</b> is specified, the schedule runs forever.</p>
<b>Default</b>	no end-time
<b>Parameters</b>	<p><i>date</i> — Specifies the date to schedule a command.</p> <p><b>Values</b> YYYY:MM:DD in year:month:day number format</p>

*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

## hour

**Syntax**     **hour** *hour-number* [*..hour-number*] | **all**  
**no hour**

**Context**     config>system>cron>sched

**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. **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 month, weekday, day-of-month, and minute, the event will not execute.

The **no** form of this command removes the specified hour from the configuration.

**Default**     no hour

**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

**Description**     This command specifies the interval between runs of an event.

**Default**     no interval

**Parameters**     *seconds* — Specifies the interval, in seconds, between runs of an event.

**Values**     30 to 42949672

## minute

**Syntax**     **minute** {*minute-number* [*..minute-number*] | **all**}

**no minute**

- Context** config>system>cron>sched
- 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 minute, the event will not execute.
- The **no** form of this command removes the specified minute from the configuration.
- Default** no minute
- 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
- 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 month, weekday, day-of-month, and minute, the event will not execute.
- The **no** form of this command removes the specified month from the configuration.
- Default** no month
- Parameters** **month-number** — Specifies a month number.
- Values** 1 to 12 (maximum 12 month-numbers)
- month-name** — Specifies a month by name.
- Values** january, february, march, april, may, june, july, august, september, october, november, december (maximum 12 month names)
- all** — Specifies all months.

## script-policy

- Syntax** **script-policy** *policy-name* [**owner** *policy-owner*]
- no script-policy**

---

<b>Context</b>	config>system>cron>schedule
<b>Description</b>	This command is used to configure the CLI script policy.
<b>Parameters</b>	<p><i>policy-name</i> — Specifies the name of the policy. Can be up to 32 characters.</p> <p><i>policy-owner</i> — Specifies the name of the policy owner. Can be up to 32 characters.</p> <p>The owner is an arbitrary name and not necessarily a user name. Commands in the scripts are not authorized against the owner. The <b>configure system security cli-script authorization x cli-user</b> command determines the user context against which commands in the scripts are authorized.</p> <p><b>Default</b> “TiMOS CLI”</p>

## type

<b>Syntax</b>	<b>type</b> <i>schedule-type</i>
<b>Context</b>	config>system>cron>sched
<b>Description</b>	This command specifies how the system should interpret the commands contained within the schedule node.
<b>Default</b>	type periodic
<b>Parameters</b>	<p><i>schedule-type</i> — Specifies the type of schedule for the system to interpret the commands contained within the schedule node.</p> <p><b>Values</b></p> <p>periodic — Specifies a schedule which runs at a given interval. The interval must be specified for this feature to run successfully.</p> <p>calendar — Specifies a schedule which runs based on a calendar. The month, weekday, day-of-month, and minute parameters must be specified for this feature to run successfully.</p> <p>oneshot — Specifies a schedule which runs one time only. As soon as the first event specified in these parameters takes place and the associated event occurs, the schedule enters a shutdown state. The month, weekday, day-of-month, and minute parameters must be specified for this feature to run successfully.</p> <p><b>Default</b> periodic</p>

## weekday

<b>Syntax</b>	<b>weekday</b> { <i>weekday-number</i> [ <i>..weekday-number</i> ]   <i>day-name</i> [ <i>..day-name</i> ]   <b>all</b> }
	<b>no weekday</b>
<b>Context</b>	config>system>cron>sched



**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, weekday, day-of-month, and minute, 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).

The **no** form of this command removes the specified weekday from the configuration.

**Default** no weekday

**Parameters** *weekday-number* — Specifies a weekday number.

**Values** 1 to 7 (maximum 7 weekday-numbers)

*day-name* — Specifies a day by name.

**Values** sunday, monday, tuesday, wednesday, thursday, friday, saturday  
(maximum 7 weekday names)

**all** — Specifies all days of the week.

### 8.16.2.11 Script Control Commands

#### script-control

**Syntax** **script-control**

**Context** config>system

**Description** This command enables the context to configure command script parameters.

#### script-policy

**Syntax** [**no**] **script-policy** *policy-name* [**owner** *policy-owner*]

**Context** config>system>script-control

**Description** This command is used to configure the CLI script policy.

**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. The **configure system security cli-script authorization x cli-user** command determines the user context against which commands in the scripts are authorized.

**Default** "TiMOS CLI"

## expire-time

<b>Syntax</b>	<b>expire-time</b> { <i>seconds</i>   <b>forever</b> }
<b>Context</b>	config>system>script-control>script-policy
<b>Description</b>	This command is used to configure the maximum amount of time to keep the run history status entry from a script run.
<b>Default</b>	expire-time 3600
<b>Parameters</b>	<i>seconds</i> — Specifies the time to keep the run history status entry, in seconds.
	<b>Values</b> 0 to 21474836
	<b>Default</b> 3600 (1 hour)
	<b>forever</b> — Specifies to keep the run history status entry indefinitely.

## lifetime

<b>Syntax</b>	<b>lifetime</b> { <i>seconds</i>   <b>forever</b> }
<b>Context</b>	config>system>script-control>script-policy
<b>Description</b>	This command is used to configure the maximum amount of time that a script may run.
<b>Default</b>	lifetime 3600
<b>Parameters</b>	<i>seconds</i> — Specifies the maximum amount of time that a script may run, in seconds.
	<b>Values</b> 0 to 21474836
	<b>Default</b> 3600 (1 hour)
	<b>forever</b> — Specifies to allow a script to run indefinitely.

## lock-override

<b>Syntax</b>	[no] <b>lock-override</b>
<b>Context</b>	config>system>script-control>script-policy

---

**Description** This command allows a triggered EHS/CRON script to execute while there is a datastore lock, started by an MD interface, in place.

A triggered EHS/CRON script queues until an **ongoing commit** (or **confirmed-commit**) is done. When an EHS/CRON script is triggered while the **lock-override** CLI knob is on, SR OS behaves as follows.

When an exclusive session is in place:

- Keep if it is an MD-CLI session. Disconnect if it is a NETCONF session
- Lose the exclusive lock
- Lose any uncommitted configuration changes

When a global session is in place:

- Keep the MD-CLI or NETCONF session
- Keep the uncommitted configuration changes
- An update may be required after committing the EHS/CRON script configuration changes

The **no** form of this command does not allow the script to execute while there is a datastore lock in place.

**Default** lock-override

## max-completed

**Syntax** **max-completed** *unsigned*

**Context** config>system>script-control>script-policy

**Description** This command is used to configure the maximum number of script run history status entries to keep.

**Default** max-completed 1

**Parameters** *unsigned* — Specifies the maximum number of script run history status entries to keep.

**Values** 1 to 1500

**Default** 1

## results

**Syntax** **results** *file-url*  
**no results**

**Context** config>system>script-control>script-policy

---

<b>Description</b>	<p>This command is used to specify the location where the system writes the output of an event script's execution.</p> <p>The <b>no</b> form of the command removes the file location from the configuration. Scripts will not execute if there is no result location defined.</p>
<b>Default</b>	no results
<b>Parameters</b>	<p><i>file-url</i> — Specifies the location to send CLI output from script runs. The <i>file-url</i> 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:  <i>file-url_YYYYMMDD-hhmmss.uuuuuu.out</i>  where:YYYYMMDD — date  hhmmss — hours, minutes, and seconds  uuuuuu — microseconds (padded to 6 characters with leading zeros)</p> <p><b>Values</b>    <i>local-url</i>   <i>remote-url</i></p> <p><i>local-url</i> — [<i>cflash-id</i>] [<i>file-path</i>]  167 chars max, including <i>cflash-id</i>  <i>file-path</i> 166 chars max</p> <p><i>remote url</i> — [{ftp://   tftp://}<i>login:password@remote-location</i>][<i>file-path</i>]  255 characters max  directory length 99 characters max each</p> <p><i>remote-location</i> — [<i>hostname</i>   <i>ipv4-address</i>   <i>ipv6-address</i>]</p> <p><i>ipv4-address</i> — <i>a.b.c.d</i></p> <p><i>ipv6-address</i> — <i>x:x:x:x:x:x[-interface]</i>  <i>x:x:x:x:x:d.d.d.d[-interface]</i>  <i>x</i> — [0 to FFFF]H  <i>d</i> — [0 to 255]D  <i>interface</i> — 32 characters max, for link local addresses</p> <p><i>cflash-id</i> — cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</p>

## script

<b>Syntax</b>	<pre><b>script</b> <i>script-name</i> [<b>owner</b> <i>script-owner</i>]</pre> <pre><b>no script</b></pre>
<b>Context</b>	<pre>config&gt;system&gt;script-control&gt;script-policy</pre> <pre>config&gt;system&gt;script-control</pre>
<b>Description</b>	<p>This command is used to configure a script to be run.</p> <p>The <b>no</b> form of the command removes the script.</p>
<b>Default</b>	no script
<b>Parameters</b>	<i>script-name</i> — Specifies the name of the script. Can be up to 32 characters.

*script-owner* — Specifies the name of the script owner. Can be 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. The **configure system security cli-script authorization x cli-user** command determines the user context against which commands in the scripts are authorized.

**Default** "TiMOS CLI"

## location

<b>Syntax</b>	<b>location</b> <i>file-url</i> <b>no location</b>
<b>Context</b>	config>system>script-control>script
<b>Description</b>	This command is used to identify the location of a script to be scheduled.  The <b>no</b> form of the command removes the location.
<b>Default</b>	no location
<b>Parameters</b>	<i>file-url</i> — Specifies the location to search for scripts.  <b>Values</b> <i>local-url</i>   <i>remote-url</i> <i>local-url</i> — [ <i>cflash-id</i> ] [ <i>file-path</i> ] 200 chars max, including <i>cflash-id</i> directory length 99 characters max each <i>remote url</i> — [{ftp://   tftp://} <i>login:password@remote-location</i> ]/[ <i>file-path</i> ] 255 characters max directory length 99 characters max each <i>remote-location</i> — [ <i>hostname</i>   <i>ipv4-address</i>   <i>ipv6-address</i> ] <i>ipv4-address</i> — <i>a.b.c.d</i> <i>ipv6-address</i> — x:x:x:x:x:x[ <i>-interface</i> ] x:x:x:x:x:d.d.d.d[ <i>-interface</i> ] x — [0 to FFFF]H d — [0 to 255]D <i>interface</i> — 32 characters max, for link local addresses <i>cflash-id</i> — cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

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## 8.16.2.12 System Synchronization Configuration Commands

### sync-if-timing

<b>Syntax</b>	<b>sync-if-timing</b>
<b>Context</b>	config>system
<b>Description</b>	This command creates or edits the context to create or modify timing reference parameters.

### abort

<b>Syntax</b>	<b>abort</b>
<b>Context</b>	config>system>sync-if-timing
<b>Description</b>	This command is required to discard changes that have been made to the synchronous interface timing configuration during a session.

### begin

<b>Syntax</b>	<b>begin</b>
<b>Context</b>	config>system>sync-if-timing
<b>Description</b>	This command is required in order to enter the mode to create or edit the system synchronous interface timing configuration.

### bits

<b>Syntax</b>	<b>bits</b>
<b>Context</b>	config>system>sync-if-timing
<b>Description</b>	This command enables the context to configure parameters for the Building Integrated Timing Supply (BITS). The settings specified under this context apply to both the BITS input and BITS output ports.

The **bits** command subtree is only available on the 7450 ESS-7, 7450 ESS-12, 7750 SR-7, 7750 SR-12, 7750 SR-12e, 7950 XRS-20, 7950 XRS-40, 7750 SR-a4, 7750 SR-a8, 7750 SR-1e, 7750 SR-2e, and 7750 SR-3e.

---

## input

<b>Syntax</b>	<b>input</b>
<b>Context</b>	config>system>sync-if-timing>bits
<b>Description</b>	This command provides a context to enable or disable the external BITS timing reference inputs to the central clock of the router. In redundant systems with BITS ports, there are two possible BITS-in interfaces, one for each CPM or CCM.

## interface-type

<b>Syntax</b>	<b>interface-type {ds1 [{esf   sf}]   e1 [{pcm30crc   pcm31crc}]}</b> <b>no interface-type</b>
<b>Context</b>	config>system>sync-if-timing>bits
<b>Description</b>	This command configures the Building Integrated Timing Source (BITS) timing reference.  The <b>no</b> form of the command reverts to the default configuration.
<b>Default</b>	interface-type ds1 esf
<b>Parameters</b>	<b>ds1 esf</b> — 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.  <b>ds1 sf</b> — 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.  <b>e1 pcm30crc</b> — Specifies the pulse code modulation (PCM) type. PCM30CRC uses PCM to separate the signal into 30 user channels with CRC protection.  <b>e1 pcm31crc</b> — Specifies the pulse code modulation (PCM) type. PCM31CRC uses PCM to separate the signal into 31 user channels with CRC protection.

## output

<b>Syntax</b>	<b>output</b>
<b>Context</b>	config>system>sync-if-timing>bits
<b>Description</b>	This command provides a context to configure and enable or disable the external BITS timing reference output to the central clock of the router. On redundant systems, there are two possible BITS-out interfaces, one for each CPM or CCM.

---

## line-length

<b>Syntax</b>	<b>line-length</b> { <b>110</b>   <b>220</b>   <b>330</b>   <b>440</b>   <b>550</b>   <b>660</b> }
<b>Context</b>	config>system>sync-if-timing>bits>output
<b>Description</b>	This command configures the <b>line-length</b> parameter of the BITS output. This is the distance in feet between the network element and the office clock (BITS/SSU). There are two possible BITS-out interfaces, one for each CPM. They are configured together, but they are displayed separately in the show command. This command is only applicable when the interface-type is DS1.
<b>Default</b>	line-length 110
<b>Parameters</b>	<p><b>110</b> — Specifies that the distance is from 0 to 110 feet.</p> <p><b>220</b> — Specifies that the distance is from 110 to 220 feet.</p> <p><b>330</b> — Specifies that the distance is from 220 to 330 feet.</p> <p><b>440</b> — Specifies that the distance is from 330 to 440 feet.</p> <p><b>550</b> — Specifies that the distance is from 440 to 550 feet.</p> <p><b>660</b> — Specifies that the distance is from 550 to 660 feet.</p>

## ql-minimum

<b>Syntax</b>	<b>ql-minimum</b> { <b>prs</b>   <b>stu</b>   <b>st2</b>   <b>tnc</b>   <b>st3e</b>   <b>st3</b>   <b>prc</b>   <b>ssua</b>   <b>ssub</b>   <b>sec</b>   <b>eec1</b>   <b>eec2</b> } <b>no ql-minimum</b>
<b>Context</b>	config>system>sync-if-timing>bits>output
<b>Description</b>	<p>This command configures the minimum acceptable QL value that a signal must have in order to be selected for the BITSout port. This ensures that the signal has traceability to a source with at least this quality level so that attached equipment can function properly.</p> <p>The <b>no</b> form of this command disables this check.</p>
<b>Default</b>	no ql-minimum
<b>Parameters</b>	<p><b>prs</b> — Specifies the SONET Primary Reference Source.</p> <p><b>stu</b> — Specifies the SONET Synchronous Traceability Unknown.</p> <p><b>st2</b> — Specifies the SONET Stratum 2.</p> <p><b>tnc</b> — Specifies the SONET Transit Node Clock.</p> <p><b>st3e</b> — Specifies the SONET Stratum 3E.</p> <p><b>st3</b> — Specifies the SONET Stratum 3.</p> <p><b>prc</b> — Specifies the SDH Primary Reference Clock.</p>



- ssua** — Specifies the SDH Primary Level Synchronization Supply Unit.
- ssub** — Specifies the SDH Second Level Synchronization Supply Unit.
- sec** — Specifies the SDH Synchronous Equipment Clock.
- eec1** — Specifies the Ethernet Equipment Clock Option 1 (sdh).
- eec2** — Specifies the Ethernet Equipment Clock Option 2 (sonet).

## ql-minimum

<b>Syntax</b>	<b>ql-minimum</b> { <b>prs</b>   <b>stu</b>   <b>st2</b>   <b>tnc</b>   <b>st3e</b>   <b>st3</b>   <b>prc</b>   <b>ssua</b>   <b>ssub</b>   <b>sec</b>   <b>eec1</b>   <b>eec2</b> } <b>no ql-minimum</b>
<b>Context</b>	config>system>sync-if-timing
<b>Description</b>	This command configures the minimum acceptable QL value that a signal must have in order to be considered for selection by the system timing module.  The <b>no</b> form of this command disables this check.
<b>Default</b>	no ql-minimum
<b>Parameters</b>	<b>prs</b> — Specifies the SONET Primary Reference Source. <b>stu</b> — Specifies the SONET Synchronous Traceability Unknown. <b>st2</b> — Specifies the SONET Stratum 2. <b>tnc</b> — Specifies the SONET Transit Node Clock. <b>st3e</b> — Specifies the SONET Stratum 3E. <b>st3</b> — Specifies the SONET Stratum 3. <b>prc</b> — Specifies the SDH Primary Reference Clock. <b>ssua</b> — Specifies the SDH Primary Level Synchronization Supply Unit. <b>ssub</b> — Specifies the SDH Second Level Synchronization Supply Unit. <b>sec</b> — Specifies the SDH Synchronous Equipment Clock. <b>eec1</b> — Specifies the Ethernet Equipment Clock Option 1 (sdh). <b>eec2</b> — Specifies the Ethernet Equipment Clock Option 2 (sonet).

## SOURCE

<b>Syntax</b>	<b>source</b> { <b>line-ref</b>   <b>internal-clock</b> }
<b>Context</b>	config>system>sync-if-timing>bits>output

---

<b>Description</b>	This command configures the values used to identify the source of the BITS (Building Integrated Timing Supply) output. This is either the signal recovered directly from ref1, ref2 or ptp, or it is the output of the node's central clock. The directly recovered signal would be used when the BITS output signal is feeding into an external standalone timing distribution device (BITS/SASE). The specific directly recovered signal used is the best of the available signals based of the QL and/or the ref-order. The central clock output would be used when no BITS/SASE device is present and the BITS output signal is used to monitor the quality of the recovered clock within the system.
<b>Default</b>	source line-ref
<b>Parameters</b>	<b>line-ref</b> — Specifies that the BITS output timing is selected from one of the input references, without any filtering. <b>internal-clock</b> — Specifies that the BITS output timing is driven from the system timing.

## sqelch

<b>Syntax</b>	<b>[no] sqelch</b>
<b>Context</b>	config>system>sync-if-timing>bits>output
<b>Description</b>	This command configures the behavior of the BITSout port when there is no valid reference selected. When enabled with no valid reference, no signal is sent out the port. When disabled with no valid reference, an AIS signal is presented along with the QL-DNU/TL-DUS SSM code if the signal format supports SSM.
<b>Default</b>	no sqelch

## ssm-bit

<b>Syntax</b>	<b>ssm-bit sa-bit</b>
<b>Context</b>	config>system>sync-if-timing>bits
<b>Description</b>	This command configures which sa-bit to use for conveying SSM information when the interface-type is E1.
<b>Default</b>	ssm-bit 8
<b>Parameters</b>	<b>sa-bit</b> — Specifies the sa-bit value. <b>Values</b> 4 to 8

## commit

<b>Syntax</b>	<b>commit</b>
---------------	---------------

**Context** config>system>sync-if-timing

**Description** This command saves changes made to the system synchronous interface timing configuration.

## ref-order

**Syntax** **ref-order** *first second [third [fourth][fifth]]*  
**no ref-order**

**Context** config>system>sync-if-timing

**Description** The synchronous equipment timing subsystem can lock to different timing reference inputs, those specified in the **ref1**, **ref2**, **bits**, **synce**, and **ptp** command configuration. This command organizes the priority order of the timing references.

If a reference source is disabled, then 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.

For 7450 ESS and 7750 SR systems with two CPM modules, the system distinguishes between the BITS inputs on the active and standby CPMs. The active CPM will use its BITS input port providing that port is qualified. If the local port is not qualified, then the active CPM will use the BITS input port from the standby CPM as the next priority reference. For example, the normal **ref-order** of **bits ref1 ref2** will actually be **bits** (active CPM), followed by **bits** (standby CPM), followed by **ref1**, followed by **ref2**.

For 7950 XRS systems with two CPMs and two CCMs, the system distinguishes between the BITS inputs on the CCMs associated with the active and standby CPMs. The active CPM will use the BITS input port on the associated CCM, provided that the port is qualified. If the local port is not qualified, then the active CPM will use the BITS input port from the CCM associated with the standby CPM as the next priority reference. For example, the normal ref-order of **bits ref1 ref2** will actually be **bits** (active CCM), followed by **bits** (standby CCM), followed by **ref1**, followed by **ref2**.

The **no** form of the command resets the reference order to the default values.

The SyncE/1588 port of the CPM or CCM can be used as a frequency input reference. It shares internal resources with the BITS input ports and so only one can be used at a time. The BITS port shall have priority, if BITS input is enabled, then the SyncE port cannot be enabled.

Similar to the BITS input ports, when the **synce** reference is enabled and in the **ref-order**, the system distinguishes between the **synce** inputs on the active and standby CPM/CCMs. The active CPM/CCM uses its **synce** input port if that port is qualified. If the local port is not qualified, the active CPM uses the synce input port from the standby CPM/CCM as the next priority reference. For example, the **ref-order** of **synce ref1 ref2** will actually be synce (active CPM/CCM), followed by **synce** (standby CPM/CCM), followed by **ref1**, followed by **ref2**.

**Default** bits synce ref1 ref2 ptp (7750 SR-7/12/12e with CPM-5, 7950 XRS-20/20e, SR-7s/14s, and 7450 ESS-7/12)

bits ref1 ref2 ptp (7750 SR-a4/8, SR-1e/2e/3e, SR-1, SR-1s/2s)

**Parameters** *first* — Specifies the first timing reference to use in the reference order sequence.

**Values** bits, synce, ref1, ref2, ptp

*second* — Specifies the second timing reference to use in the reference order sequence.

**Values** bits, synce, ref1, ref2, ptp

*third* — Specifies the third timing reference to use in the reference order sequence.

**Values** bits, synce, ref1, ref2, ptp

*fourth* — Specifies the fourth timing reference to use in the reference order sequence.

**Values** bits, synce, ref1, ref2, ptp

*fifth* — Specifies the fifth timing reference to use in the reference order sequence.

**Values** bits, synce, ref1, ref2, ptp

## ptp

**Syntax** ptp

**Context** config>system>sync-if-timing

**Description** This command enables the context to configure parameters for system timing via IEEE 1588-2008, Precision Time Protocol.

## ql-override

**Syntax** ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec}  
no ql-override

**Context** config>system>sync-if-timing>bits  
config>system>sync-if-timing>ptp  
config>system>sync-if-timing>synce

---

<b>Description</b>	This command configures the QL value to be used for the reference for SETS input selection and BITS output selection. This value overrides any value received by that reference's SSM process.
<b>Default</b>	no ql-override
<b>Parameters</b>	<b>prs</b> — Specifies the SONET Primary Reference Source Traceable. <b>stu</b> — Specifies the SONET Synchronous Traceability Unknown. <b>st2</b> — Specifies the SONET Stratum 2 Traceable. <b>tnc</b> — Specifies the SONET Transit Node Clock Traceable. <b>st3e</b> — Specifies the SONET Stratum 3E Traceable. <b>st3</b> — Specifies the SONET Stratum 3 Traceable. <b>prc</b> — Specifies the SDH Primary Reference Clock Traceable. <b>ssua</b> — Specifies the SDH Primary Level Synchronization Supply Unit Traceable. <b>ssub</b> — Specifies the SDH Second Level Synchronization Supply Unit Traceable. <b>sec</b> — Specifies the SDH Synchronous Equipment Clock Traceable.

## ql-override

<b>Syntax</b>	<b>ql-override {prs   stu   st2   tnc   st3e   st3   prc   ssua   ssub   sec   eec1   eec2}</b> <b>no ql-override</b>
<b>Context</b>	config>system>sync-if-timing>ref1 config>system>sync-if-timing>ref2
<b>Description</b>	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.
<b>Default</b>	no ql-override
<b>Parameters</b>	<b>prs</b> — Specifies the SONET Primary Reference Source Traceable. <b>stu</b> — Specifies the SONET Synchronous Traceability Unknown. <b>st2</b> — Specifies the SONET Stratum 2 Traceable. <b>tnc</b> — Specifies the SONET Transit Node Clock Traceable. <b>st3e</b> — Specifies the SONET Stratum 3E Traceable. <b>st3</b> — Specifies the SONET Stratum 3 Traceable. <b>prc</b> — Specifies the SDH Primary Reference Clock Traceable. <b>ssua</b> — Specifies the SDH Primary Level Synchronization Supply Unit Traceable. <b>ssub</b> — Specifies the SDH Second Level Synchronization Supply Unit Traceable. <b>sec</b> — Specifies the SDH Synchronous Equipment Clock Traceable.

- eec1** — Specifies the Ethernet Equipment Clock Option 1 Traceable (sdh).  
**eec2** — Specifies the Ethernet Equipment Clock Option 2 Traceable (sonet).

## ql-selection

<b>Syntax</b>	<b>[no] ql-selection</b>
<b>Context</b>	config>system>sync-if-timing
<b>Description</b>	When enabled, the selection of system timing reference and BITS output timing reference takes into account quality level. Quality level is conveyed via the SSM or forced using the <b>ql-override</b> command.
<b>Default</b>	no ql-selection

## ref1

<b>Syntax</b>	<b>ref1</b>
<b>Context</b>	config>system>sync-if-timing
<b>Description</b>	This command enables the context to configure parameters for the first timing reference.  The restrictions on the location for the source port or source bits for <b>ref1</b> and <b>ref2</b> are listed in Ref1 and Ref2 Timing References.

## bits-interface-type

<b>Syntax</b>	<b>bits-interface-type {ds1 [{esf   sf}]   e1 [{pcm30crc   pcm31crc}]</b> <b>no bits-interface-type</b>
<b>Context</b>	config>system>sync-if-timing>ref1 config>system>sync-if-timing>ref2
<b>Description</b>	This command configures the interface type of the BITS timing reference.  The <b>no</b> form of the command reverts to the default configuration
<b>Parameters</b>	<b>ds1 esf</b> — 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.  <b>ds1 sf</b> — 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.

## source-port

<b>Syntax</b>	<b>source-port</b> <i>port-id</i> <b>no source-port</b>
<b>Context</b>	config>system>sync-if-timing>ref1 config>system>sync-if-timing>ref2
<b>Description</b>	<p>This command configures the source port for timing reference <b>ref1</b> or <b>ref2</b>. If the port is unavailable or the link is down, then the reference sources are re-evaluated according to the reference order configured in the <b>ref-order</b> command.</p> <p>In addition to physical port on the 7750 SR, T1 or E1 channels on a channelized OC3/OC12/STM1/STM4 Circuit Emulation Service port can be specified if they are using adaptive timing.</p> <p>There are restrictions on the source-port location for <b>ref1</b> and <b>ref2</b> based on platform. Refer to the description of the <b>ref1</b> command for details.</p>
<b>Default</b>	no source-port
<b>Parameters</b>	<i>port-id</i> — Identifies the physical port in the <i>slot/mda/port</i> , <i>esat-id/slot/port</i> , or <i>pxc-id.sub-port</i> format.
	<b>Values</b> <i>slot/mda/port</i> [ <i>.channel</i> ]

## ref2

<b>Syntax</b>	<b>ref2</b>
<b>Context</b>	config>system>sync-if-timing
<b>Description</b>	<p>This command enables the context to configure parameters for the second timing reference. There are restrictions on the source-port and source-bits locations for <b>ref2</b> based on the platform. The restrictions on the location for the source-port or source-bits for <b>ref1</b> and <b>ref2</b> are listed in Revertive, non-Revertive Timing Reference Switching Operation.</p>

## syncce

<b>Syntax</b>	<b>syncce</b>
<b>Context</b>	config>system>sync-if-timing

**Description** This command enters the context for attributes related to the CPM/CCM SyncE/1588 ports.

## revert

**Syntax** [no] revert

**Context** config>system>sync-if-timing

**Description** This command allows the clock to revert to a higher priority reference if the current reference goes offline or becomes unstable. When the failed reference becomes operational, it is eligible for selection. When the mode is non-revertive, a failed clock source is not selected again.

**Default** no revert

## wait-to-restore

**Syntax** wait-to-restore *minutes*  
no wait-to-restore

**Context** config>system>sync-if-timing

**Description** This command configures the time for the Wait to Restore timer. A previously failed input reference must be valid for the time specified before it is used for either the BITSout or the central clock input reference.

The **no** form of this command disables the timer.

**Default** no wait-to-restore

**Parameters** *minutes* — Specifies a value representing the number of minutes for the wait to restore timeout.

**Values** 1 to 12

### 8.16.2.13 System Administration Commands

## admin

**Syntax** admin

**Context** <root>

**Description** The context to configure administrative system commands. Only authorized users can execute the commands in the **admin** context.



## application-assurance

<b>Syntax</b>	<b>application-assurance</b>
<b>Context</b>	admin
<b>Description</b>	This command enables the context to perform application-assurance operations.

## group

<b>Syntax</b>	<b>group</b> <i>aa-group-id</i>
<b>Context</b>	admin>application-assurance
<b>Description</b>	This command enables the context to perform a group-specific upgrade.
<b>Parameters</b>	<i>aa-group-id</i> — Specifies an AA ISA group ID. <b>Values</b> 1 to 255

## url-list

<b>Syntax</b>	<b>url-list</b> <i>url-list-name</i> <b>upgrade</b>
<b>Context</b>	admin>application-assurance>group
<b>Description</b>	This command upgrades the URL list.
<b>Parameters</b>	<i>url-list-name</i> — Specifies the application assurance URL list, up to 32 characters.

## upgrade

<b>Syntax</b>	<b>upgrade</b>
<b>Context</b>	admin>app-assure
<b>Description</b>	This command loads a new protocol list from the isa-aa.tim file into the CPM. This command requires an ISA-AA reboot.

## debug-save

<b>Syntax</b>	<b>debug-save</b> [ <i>file-url</i> ]
<b>Context</b>	admin

- Description** This command saves existing debug configuration (configuration done under the debug branch of CLI). Debug configurations are not saved by the **admin save** command and not preserved across a node reboot or CPM switchover. The **debug-save** command makes the debug configuration available for the operator to execute after a reboot by using the **exec** command or after a CPM switchover by using the **switchover-exec** command, if desired.
- Parameters** *file-url* — Specifies the file URL location to save the debug configuration. If no *file-url* is specified then the debug configuration is saved at the same location as the standard configuration file (**bof>primary-config/bof>secondary-config/bof>tertiary-config**) with the same file name as the standard configuration file but with a *.dbg* suffix.



**Note:** IPv6-address applies only to 7750 SR and 7950 XRS.

### Values

<i>file url</i>	local-url   remote-url: 255 chars max
<i>local-url</i>	[ <i>cflash-id</i> ][ <i>file-path</i> ] 200 chars max, including <i>cflash-id</i> <i>file-path</i> 199 chars max
<i>remote-url</i>	[[ftp://   tftp://]{ <i>login:pswd@remote-locn</i> }/][ <i>file-path</i> ] 255 chars max
<i>remote-locn</i>	directory length 99 chars max each
<i>ipv4-address</i>	{hostname   ipv4-address   [ipv6-address]}
<i>ipv6-address</i>	<i>a.b.c.d</i> <i>x:x:x:x:x:x[-interface]</i> <i>x:x:x:x:x:d.d.d.d[-interface]</i> <i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D
<i>cflash-id</i>	interface - 32 chars max, for link local addresses 255 cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

## disconnect

- Syntax** **disconnect** [**address** *ip-address* | **session-id** *session-id* | **username** *user-name* | {**console** | **bluetooth** | **telnet** | **ftp** | **ssh** | **netconf** | **grpc**}]
- Context** admin
- Description** This command disconnects a user from a session.
- Issuing the **disconnect** command without any parameters will disconnect the session in which the command was executed.

If any of the session type options (for example, **console**, **bluetooth**, **telnet**, **FTP**, **SSH**) are specified, then only the respective sessions are affected.

If no session type options are specified, then 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** *ip-address* — Specifies the IP address to disconnect, specified in dotted decimal notation.



**Note:** IPv6 is supported on the 7750 SR and 7950 XRS.

#### Values

<i>ipv4-address</i>	<i>a.b.c.d</i>
<i>ipv6-address</i>	<i>x:x:x:x:x:x</i> (eight 16-bit pieces) <i>x:x:x:x:x:d.d.d.d</i> <i>x</i> - [0 to FFFF]H <i>d</i> - [0 to 255]D

*session-id* — The model-driven session ID. Can be obtained using the **show system management-interface datastore-locks [detail]** command.

*user-name* — Specifies the name of the user. The name can be up to 32 characters.

**console** — Disconnects the console session.

**bluetooth** — Disconnects the bluetooth session.

**telnet** — Disconnects the Telnet session.

**ftp** — Disconnects the FTP session.

**ssh** — Disconnects the SSH session.

**netconf** — Disconnects the NETCONF session.

**grpc** — Disconnects the GRPC session.

## display-config

**Syntax** **display-config [detail | index]**

**Context** admin

- 
- Description** This command displays the system's running configuration.  
By default, only non-default settings are displayed.  
Specifying the **detail** option displays all default and non-default configuration parameters.
- Parameters** **detail** — Displays default and non-default configuration parameters.  
**index** — Displays only persistent-indices.

## enable-tech

- Syntax** [no] **enable-tech**
- Context** admin
- 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).

## nat

- Syntax** **nat**
- Context** admin
- Description** This command performs NAT operations.

## save-deterministic-script

- Syntax** **save-deterministic-script**
- Context** admin>nat
- Description** This command saves the script that calculates deterministic NAT map entries.

## reboot

- Syntax** **reboot** [active | standby | upgrade] [now]
- Context** admin
- Description** This command reboots the router or one CPM and can also be used to force an upgrade of the system boot ROMs.

If no options are specified, the user is prompted to confirm the reboot operation. Answering yes (y) will result in both CPMs and all IOMs rebooting.

```
ALA-1>admin# reboot
Are you sure you want to reboot (y/n)?
```

**Parameters**    **active** — Reboots the active CPM.

**Default**    active

**standby** — Reboots the standby CPM.

**Default**    active

**upgrade** — Forces card firmware to be upgraded during chassis reboot. Normally, the SR-series router OS automatically performs firmware upgrades on CPMs and XCM/IOM cards without the need for the **upgrade** keyword. The automatic upgrade must be enabled in the SR OS7 Command Line Interface (CLI) when rebooting the system.

When the **upgrade** keyword is specified, a chassis flag is set for the BOOT Loader (boot.ldr) and on the subsequent boot of the OS on the chassis, firmware images on CPMs, XCMs, or IOMs will be upgraded automatically.

Any CPMs, XCMs, or IOMs that are installed in the chassis will be upgraded automatically. For example, if a card is inserted with down revision firmware as a result of a card hot swap with the latest OS version running, the firmware on the card will be automatically upgraded before the card is brought online.

If the card firmware is upgraded automatically, a chassis cardUpgraded (event 2032) log event is generated. The corresponding SNMP trap for this log event is tmnxEqCardFirmwareUpgraded.

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.

The time required to upgrade the firmware on the cards in the chassis depends on the number of cards to be upgraded. The progress of a firmware upgrade can be monitored at the console.

**now** — Forces a reboot of the router immediately without an interactive confirmation.

## reset-policy-exclusive

**Syntax**    **reset-policy-exclusive**

**Context**    admin

**Description** This command allows an authorized administrator to reset the exclusive policy editing lock. This will reset the lock flag and end the policy editing session in progress, discarding any policy edits.

## save

**Syntax** `save [file-url] [detail] [index]`

**Context** admin

**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.
```

An **admin save** operation initiated by a user is aborted if another user initiates another **admin save** from another session.

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

*local-url* | *remote-url*

*local-url*

*[cflash-id][file-path]* 200 chars max, including cflash-id  
directory length 99 chars max each

*remote-url*

*[[ftp:// | tftp://]login:pswd@remote-locn/][file-path]*  
243 chars max

directory length 99 chars max each

*remote-locn*

*[hostname | ipv4-address | ipv6-address]*

*ipv4-address*

*a.b.c.d*

*ipv6-address*

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

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

*x* - [0 to FFFF]H

*d* - [0 to 255]D

interface - 32 chars max, for link local addresses

*cflash-id*

*cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:*

**Default** the primary configuration file location

**detail** — Saves both default and non-default configuration parameters.

**index** — Forces 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 indices.

## satellite

<b>Syntax</b>	<b>satellite</b>
<b>Context</b>	admin
<b>Description</b>	This command performs satellite operations.

## eth-sat

<b>Syntax</b>	<b>eth-sat</b> <i>sat-id</i>
<b>Context</b>	admin>satellite
<b>Description</b>	This command can be used to perform administrative functions on the specified Ethernet-satellite chassis.
<b>Parameters</b>	<i>sat-id</i> — Specifies the Ethernet-satellite chassis. <b>Values</b> 1 to 20

## reboot

<b>Syntax</b>	<b>reboot</b> [ <b>now</b> ] <b>upgrade</b>
<b>Context</b>	admin>satellite>eth-sat
<b>Description</b>	The command initiates an administrative reboot of the specified Ethernet-satellite chassis.
<b>Parameters</b>	<b>now</b> — Causes the satellite to reboot immediately without further prompts or interactive confirmation. <b>upgrade</b> — Causes the satellite to update its firmware image during chassis reboot.

## sync-boot-env

<b>Syntax</b>	<b>sync-boot-env</b>
<b>Context</b>	admin>satellite>eth-sat
<b>Description</b>	The command forces the specified Ethernet-satellite chassis to synchronize the boot image.

## tech-support

<b>Syntax</b>	<b>tech-support</b> [ <i>file-uri</i> ]
<b>Context</b>	admin

```
admin>satellite>eth-sat
```

**Description** This command creates a system core dump. If the *file-url* is omitted, and a *ts-location* is defined, then the **tech support** file will have an automatic SR OS generated file name based on the system name and the date and time and will be saved to the directory indicated by the configured *ts-location*.

The format of the auto-generated filename is ts-XXXXX.YYYYMMDD.HHMMUTC.dat where:

- XXXXX: system name with special characters expanded to avoid problems with file systems (for example, a '.' is expanded to %2E.)
- YYYYMMDD: Date with leading zeros on year, month and day
- HHMM: Hours and Minutes in UTC time (24hr format, always 4 chars, with leading zeros on hours and minutes)



**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

*local-url* | *remote-url*

*local-url*

[*cflash-id*][*file-path*] 200 chars max, including *cflash-id* directory length 99 chars max each

*remote-url*

[[ftp:// | tftp://]login:pswd@remote-locn/][*file-path*] 199 chars max

*remote-locn*

[hostname | ipv4-address | ipv6-address]

*ipv4-address*

a.b.c.d

*ipv6-address*

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 - 32 chars max, for link local addresses

*cflash-id*

cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

## license

**Syntax** **license**

**Context** admin>system

**Description** Enters a context for administrative commands related to licensing.



---

## activate

**Syntax**    **activate** [*file-url*] [**now**]

**Context**    admin>system>license

**Description**    This command performs an activation on the license file pointed to by the command line argument. The file is first validated as described in the **admin>system>license>validate** command and upon success, replaces the existing license attributes in the system with the information in the new license file.

The license attributes that are active on a system can be viewed with the **show>licensing>entitlements** command.



**Note:** If the CLM tool is being used for license management, it shall perform the validation and activation and there is no need to enter these commands manually.

**Parameters**    *file-url* — Specifies the file URL location to read the license file.

**Values**        local-url, remote-url



**Note:** IPv6 address apply only to 7750 SR and 7950 XRS.

**now** — If the **now** keyword is not present, the operator is prompted to confirm the activation. With the **now** keyword the license file is activated without the additional prompt.

## validate

**Syntax**    **validate** [*file-url*]

**Context**    admin>system>license

**Description**    This command performs a validation on the license file pointed to by the command line argument. A validation ensures that the license is compatible with the current state of the target system but it does not change the existing license. Aspects that can cause a failure in the validation include:

- The license file was created for a different target system. The UUID encoded into the file must match that defined by the specific hardware platform.
- The license file does not include license information for the release of software currently running on the system.

- The current date/time reported to system is outside the validity period encoded in the license.
- The system is currently using a hardware upgrade license that is not included in the new file being validated.



**Note:** If the CLM tool is being used for license management, it shall perform the validation and activation and there is no need to enter these commands manually.

**Parameters** *file-url* — Specifies the file URL location to read the license file.

**Values** local-url, remote-url



**Note:** IPv6 address apply only to 7750 SR and 7950 XRS.

## ts-location

**Syntax** **ts-location** *file-url*  
**no ts-location**

**Context** config>system>security>tech-support

**Description** The **ts-location** command is used (along with an automatic system generated file name) when no *file-url* parameter is provided for the **admin tech-support** command. If **no ts-location** is defined then the operator must provide a file-url with the **admin tech-support** command itself.

The directory specified for the ts-location is not auto-created by SR OS. The operator must ensure that it exists.

See the **admin tech-support** command for more details about the system generated file name.

**Default** no ts-location

**Parameters** *file-url* — Specifies the destination directory for auto-named tech-support files (when no *file-url* is specified with the **admin tech-support** command). The *file-url* for the **ts-location** must be a directory (no filename or extension). The root directory (for example, cf1:\) is blocked for local compact flash destinations. A sub-directory (for example, cf2:\tech-support) must be used if local cf is the location.

**Values**

*local-url* | *remote-url*

*local-url* [*cflash-id*][*file-path*] 200 chars max, including cflash-id

<i>remote-url</i>	directory length 99 chars max each [ftp://login:pswd@remote-locn!][file-path] 247 chars max
<i>remote-locn</i>	directory length 99 chars max each [hostname   ipv4-address   "["ipv6-address"]" ]
<i>ipv4-address</i>	a.b.c.d
<i>ipv6-address</i>	x:x:x:x:x:x[-interface] x:x:x:x:x:d.d.d[-interface]
	x - [0 to FFFF]H d - [0 to 255]D
<i>cflash-id</i>	interface - 32 chars max, for link local addresses cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

## view

<b>Syntax</b>	<b>view</b> { <b>bootup-cfg</b>   <b>active-cfg</b>   <b>candidate-cfg</b>   <b>latest-rb</b>   <i>checkpoint-id</i>   <b>rescue</b> }
<b>Context</b>	<root>
<b>Description</b>	The context to configure administrative system viewing parameters. Only authorized users can execute the commands in the <b>admin</b> context.
<b>Parameters</b>	<b>bootup-cfg</b> — Specifies the bootup configuration. <b>active-cfg</b> — Specifies current running configuration. <b>candidate-cfg</b> — Specifies candidate configuration. <b>latest-rb</b> — Specifies the latest configuration. <i>checkpoint-id</i> — Specifies a specific checkpoint file configuration.
<b>Values</b>	1 to 9
	<b>rescue</b> — Specifies a rescue checkpoint configuration.

### 8.16.2.14 Redundancy Commands

## redundancy

<b>Syntax</b>	<b>redundancy</b>
<b>Context</b>	admin config

---

**Description** This command enters the context to allow the user to perform redundancy operations.

## cert-sync

**Syntax** [no] cert-sync

**Context** admin>redundancy  
config>redundancy

**Description** This command automatically synchronizes the certificate/CRL/key when importing or generating (for the key). If a new CF card is inserted into slot3 into the backup CPM, the system will sync the whole system-pki directory from the active CPM.

**Default** enabled

## force-switchover

**Syntax** force-switchover [now] [ignore-status]

**Context** admin>redundancy

**Description** This command forces a switchover to the standby CPM card. The primary CPM reloads its software image and becomes the secondary CPM.

**Parameters** **now** — Forces the switchover to the redundant CPM card immediately.  
**ignore-status** — Forces a switchover despite any diagnostics or conditions on the standby. For the 7950 XRS, this is true even if the standby cannot reach the extension CPMs on the extension chassis of an XRS-40 via its local CPM interconnect ports).

## rollback-sync

**Syntax** rollback-sync

**Context** admin>redundancy

**Description** This command copies the entire set of rollback checkpoint files from the active CPM CF to the standby CPM CF.

## synchronize

**Syntax** synchronize cert  
synchronize {boot-env | config}

**Context** admin>redundancy

---

<b>Description</b>	<p>This command performs a synchronization of the standby CPM's images and/or configuration files to the active CPM. Either the <b>boot-env</b> or <b>config</b> parameter must be specified.</p> <p>In the <b>admin&gt;redundancy</b> 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, XCM, and IOM images.</p> <p>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.</p> <p>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).</p> <p>The <b>no</b> form of the command removes the parameter from the configuration.</p>
<b>Default</b>	no synchronize
<b>Parameters</b>	<p><b>cert</b> — Synchronizes the imported certificate/key/CRL files to the standby CPM.</p> <p><b>boot-env</b> — Synchronizes all files required for the boot process (loader, BOF, images, and config).</p> <p><b>config</b> — Synchronizes only the primary, secondary, and tertiary configuration files.</p>

## mgmt-ethernet

<b>Syntax</b>	<b>mgmt-ethernet</b> [ <b>revert</b> <i>seconds</i> ] <b>no mgmt-ethernet</b>
<b>Context</b>	config>redundancy
<b>Description</b>	<p>If the management Ethernet port on the active CPM goes down, this command allows the active CPM to be configured to use the management Ethernet port of the standby CPM.</p> <p>The <b>revert</b> option allows the administrator to control when to revert back to the management Ethernet port of the primary CPM once it comes up again.</p> <p>The <b>no</b> form of the command disables redundancy, so that connectivity to the active CPM is lost if its Ethernet port goes down.</p> <p>This feature is not supported on the 7750 SR-a, 7750-e, and the VSR platforms.</p>
<b>Default</b>	no mgmt-ethernet

---

**Parameters**    *seconds* — Specifies the duration to wait (in seconds) before reverting back to the primary CPM's management Ethernet port.

**Values**        1 to 300

## multi-chassis

**Syntax**        **multi-chassis**

**Context**        config>redundancy

**Description**    This command enables the context to configure multi-chassis parameters.

## bgp-multi-homing

**Syntax**        **bgp-multi-homing**

**Context**        config>redundancy

**Description**    This command configures BGP multi-homing parameters.

## boot-timer

**Syntax**        **boot-timer** *seconds*  
                  **no boot-timer**

**Context**        config>redundancy>bgp-multi-homing

**Description**    This command configures the time the service manager waits after a node reboot before running the DF election algorithm. The **boot-timer** value should be configured to allow for the BGP sessions to come up and for the NLRI information to be refreshed or exchanged.

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

**Default**        no boot-timer

**Parameters**    *seconds* — Specifies the BGP multi-homing boot-timer in seconds.

**Values**        0 to 600

## site-activation-timer

**Syntax**        **site-activation-timer** *seconds*  
                  **no site-activation-timer**

**Context**        config>redundancy>bgp-multi-homing

---

<b>Description</b>	This command defines the amount of time the service manager will keep the local sites in standby status, waiting for BGP updates from remote PEs before running the DF election algorithm to decide whether the site should be unblocked. The timer is started when one of the following events occurs if the site is operationally up: <ul style="list-style-type: none"><li>• Manual site activation using the <b>no shutdown</b> command at site-id level or at member object(s) level (SAP(s) or PW(s))</li><li>• Site activation after a failure</li></ul>				
<b>Default</b>	no site-activation-timer				
<b>Parameters</b>	<i>seconds</i> — Specifies the standby status in seconds. <table><tr><td><b>Values</b></td><td>0 to 100</td></tr><tr><td><b>Default</b></td><td>2</td></tr></table>	<b>Values</b>	0 to 100	<b>Default</b>	2
<b>Values</b>	0 to 100				
<b>Default</b>	2				

## site-min-down-timer

<b>Syntax</b>	<b>site-min-down-timer</b> <i>seconds</i> <b>no site-min-down-timer</b>
<b>Context</b>	config>redundancy>bgp-multi-homing
<b>Description</b>	This command configures the BGP multi-homing site minimum down time. When set to a non-zero value, if the site goes operationally down it will remain operationally down for at least the length of time configured for the <b>site-min-down-timer</b> , regardless of whether other state changes would have caused it to go operationally up. This timer is restarted every time that the site transitions from up to down. <p>The above operation is optimized in the following circumstances:</p> <ul style="list-style-type: none"><li>• If the site goes down on the designated forwarder but there are no BGP multi-homing peers with the same site in an UP state, then the <b>site-min-down-timer</b> is not started and is not used.</li><li>• If the site goes down on the designated forwarder but there are no active BGP multi-homing peers, then the <b>site-min-down-timer</b> is not started and is not used.</li><li>• If the <b>site-min-down-timer</b> is active and a BGP multi-homing update is received from the designated forwarder indicating its site has gone down, the <b>site-min-down-timer</b> is immediately terminated and this PE becomes the designated forwarder if the BGP multi-homing algorithm determines it should be the designated forwarder.</li></ul> <p>The <b>no</b> form of the command reverts to default value.</p>
<b>Default</b>	no site-min-down-timer

<b>Parameters</b>	<i>seconds</i> — Specifies the time, in seconds, that a BGP multi-homing site remains operationally down after a transition from up to down.
<b>Values</b>	1 to 100
<b>Default</b>	0

## bgp-evpn-multi-homing

<b>Syntax</b>	<b>bgp-evpn-multi-homing</b>
<b>Context</b>	config>redundancy
<b>Description</b>	This command configures BGP EVPN multi-homing parameters.

## boot-timer

<b>Syntax</b>	<b>boot-timer</b> <i>seconds</i> <b>no boot-timer</b>
<b>Context</b>	config>redundancy>bgp-evpn-multi-homing
<b>Description</b>	This command configures the time the service manager waits after a node reboot before running the DF election algorithm. The boot-timer value should be configured to allow for the BGP sessions to come up and for the NLRI information to be refreshed/exchanged.  The <b>no</b> form of the command reverts the default.
<b>Default</b>	no boot-timer
<b>Parameters</b>	<i>seconds</i> — Specifies the BGP multi-homing boot-timer in seconds.
<b>Values</b>	1 to 600
<b>Default</b>	10

## es-activation-timer

<b>Syntax</b>	<b>es-activation-timer</b> <i>seconds</i>
<b>Context</b>	config>redundancy>bgp-evpn-multi-homing
<b>Description</b>	This command defines the amount of time the service manager will keep the local sites in standby status, waiting for BGP updates from remote PEs before running the DF election algorithm to decide whether the site should be unblocked. The timer is started when one of the following events occurs if the site is operationally up: <ul style="list-style-type: none"> <li>• Manual site activation using the <b>no shutdown</b> command at site-id level or at member object(s) level (SAP(s) or PW(s))</li> </ul>



- Site activation after a failure

**Parameters** *seconds* — Specifies the standby status in seconds.

**Values** 0 to 100

**Default** 3

## rollback-sync

**Syntax** **[no] rollback-sync**

**Context** config>redundancy

**Description** The operator can enable automatic synchronization of rollback checkpoint files between the active CPM and standby CPM. When this 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. Note that automatic sync 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.

The **config red sync {boot-env | config}** and **admin red sync {boot-env | config}** do not apply to rollback checkpoint files. These commands do not manually or automatically sync rollback checkpoint files. The dedicated **rollback-sync** commands must be used to sync rollback checkpoint files.

**Default** no rollback-sync

## synchronize

**Syntax** **synchronize {boot-env | config}**

**Context** config>redundancy

**Description** This command performs a synchronization of the standby CPMs images and/or config files to the active CPM. Either the **boot-env** or **config** parameter must be specified. In the **config>redundancy** context, this command performs an automatically 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 CPMs have identical operational parameters. This includes the saved configuration, CPM, XCM, and IOM 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).

<b>Default</b>	no synchronize
<b>Parameters</b>	<p><b>boot-env</b> — Synchronizes all files required for the boot process (loader, BOF, images, and config).</p> <p><b>config</b> — Synchronizes only the primary, secondary, and tertiary configuration files.</p> <p><b>Default</b> config</p>

#### 8.16.2.14.1 Peer Commands

##### peer

<b>Syntax</b>	<b>peer</b> <i>ip-address</i> [ <b>create</b> ] <b>no peer</b> <i>ip-address</i>		
<b>Context</b>	config>redundancy>multi-chassis		
<b>Description</b>	This command configures a multi-chassis redundancy peer.		
<b>Parameters</b>	<i>ip-address</i> — Specifies a peer IP address. Multicast addresses are not allowed. <table> <tr> <td><b>Values</b></td> <td>           ipv4-address: a.b.c.d            ipv6-address:           <ul style="list-style-type: none"> <li>• x:x:x:x:x:x:x (eight 16-bit pieces)</li> <li>• x:x:x:x:x:d.d.d.d</li> <li>• x: [0 to FFFF] H</li> <li>• d: [0 to 255] D</li> </ul> </td> </tr> </table>	<b>Values</b>	ipv4-address: a.b.c.d ipv6-address: <ul style="list-style-type: none"> <li>• x:x:x:x:x:x:x (eight 16-bit pieces)</li> <li>• x:x:x:x:x:d.d.d.d</li> <li>• x: [0 to FFFF] H</li> <li>• d: [0 to 255] D</li> </ul>
<b>Values</b>	ipv4-address: a.b.c.d ipv6-address: <ul style="list-style-type: none"> <li>• x:x:x:x:x:x:x (eight 16-bit pieces)</li> <li>• x:x:x:x:x:d.d.d.d</li> <li>• x: [0 to FFFF] H</li> <li>• d: [0 to 255] D</li> </ul>		

##### authentication-key

<b>Syntax</b>	<b>authentication-key</b> { <i>authentication-key</i>   <i>hash-key</i> } [ <b>hash</b>   <b>hash2</b>   <b>custom</b> ]
---------------	--

---

**no authentication-key**

<b>Context</b>	config>redundancy>multi-chassis>peer
<b>Description</b>	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. The <b>no</b> form of the command removes the authentication key.
<b>Default</b>	no authentication-key
<b>Parameters</b>	<p><i>authentication-key</i> — Specifies the authentication key. Allowed values are any string up to 20 characters long 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.</p> <p><i>hash-key</i> — Specifies the hash key. The key can be any combination of ASCII characters up to 33 (<i>hash1-key</i>) or 55 (<i>hash2-key</i>) characters in length (encrypted). If spaces are used in the string, enclose the entire string in quotation marks (" ").</p> <p><b>hash</b> — Specifies the key is entered in an encrypted form. If the <b>hash</b> or <b>hash2</b> parameter is not used, the key is assumed to be in an unencrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the <b>hash</b> or <b>hash2</b> parameter specified.</p> <p><b>hash2</b> — Specifies the key is entered in a more complex encrypted form that involves more variables than the key value alone, meaning that the <b>hash2</b> encrypted variable cannot be copied and pasted. If the <b>hash</b> or <b>hash2</b> parameter is not used, the key is assumed to be in an unencrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the <b>hash</b> or <b>hash2</b> parameter specified.</p> <p><b>custom</b> — Specifies the custom encryption to management interface.</p>

## diameter-proxy

<b>Syntax</b>	[no] diameter-proxy
<b>Context</b>	config>redundancy>multi-chassis>peer>sync
<b>Description</b>	This command synchronizes diameter proxy.
<b>Default</b>	no diameter-proxy

## igmp

<b>Syntax</b>	[no] igmp
<b>Context</b>	config>redundancy>multi-chassis>peer>sync
<b>Description</b>	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

**Description** This command specifies whether IGMP snooping information should be synchronized with the multi-chassis peer.

**Default** no igmp-snooping

## ipsec

**Syntax** [no] ipsec

**Context** config>redundancy>multi-chassis>peer>sync

**Description** This command synchronizes IPsec information.

**Default** no ipsec

## l2tp

**Syntax** [no] l2tp

**Context** config>redundancy>multi-chassis>peer>sync

**Description** This command synchronizes L2TP.

**Default** no l2tp

## local-dhcp-server

**Syntax** [no] local-dhcp-server

**Context** config>redundancy>multi-chassis>peer>sync

**Description** This command synchronizes DHCP server information.

**Default** no local-dhcp-server

## mc-ring

<b>Syntax</b>	<b>[no] mc-ring</b>
<b>Context</b>	config>redundancy>multi-chassis>peer>sync
<b>Description</b>	This command synchronizes multi-chassis ring information.
<b>Default</b>	no mc-ring

## mld-snooping

<b>Syntax</b>	<b>[no] mld-snooping</b>
<b>Context</b>	config>redundancy>multi-chassis>peer>sync
<b>Description</b>	This command is not supported. It is not blocked for backwards-compatibility reasons but has no effect on the system if configured.
<b>Default</b>	no mld-snooping

## peer-name

<b>Syntax</b>	<b>peer-name <i>name</i></b> <b>no peer-name</b>
<b>Context</b>	config>redundancy>multi-chassis>peer
<b>Description</b>	This command specifies a peer name.
<b>Default</b>	no peer-name
<b>Parameters</b>	<i>name</i> — Specifies the string, up to 32 characters long, consisting of 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.

## pim-snooping

<b>Syntax</b>	<b>pim-snooping [saps] [spoke-sdps]</b> <b>no pim-snooping</b>
<b>Context</b>	config>redundancy>multi-chassis>peer>sync
<b>Description</b>	This command specifies whether PIM snooping for IPv4 information should be synchronized with the multi-chassis peer. Entering only <b>pim-snooping</b> (without any parameter) results in the synchronization being applicable only to SAPs.

**Default** no pim-snooping

**Parameters** **saps** — Specifies that SAPs are to be synchronized with the multi-chassis peer relating to *sync-tags* configured on ports. This is the default when no parameters are included.

**spoke-sdps** — Specifies that spoke SDPs are to be synchronized with the multi-chassis peer according to the synchronization tags configured on spoke SDPs.

## port

**Syntax** **port** *port-id* [**sync-tag** *sync-tag*] [**create**]  
**no port** *port-id*]

**Context** config>redundancy>multi-chassis>peer>sync

**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.

**Parameters** *port-id* — Specifies the port to be synchronized with the multi-chassis peer.

### Values

<i>port-id</i>	slot/mda/port		
lag-id	lag-id		
	lag		keyword
	id		1 to 200
pw-id	<i>pw-id</i>		
	pw		keyword
	id		1 to 10239

*sync-tag* — Specifies a synchronization tag, up to 32 characters in length, to be used while synchronizing this port with the multi-chassis peer.

**create** — Creates an entry; mandatory while creating an entry.

## range

**Syntax** **range** *encap-range* **sync-tag** *sync-tag*  
**no range** *encap-range*

**Context** config>redundancy>multi-chassis>peer>sync>port

**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**

<b>Dot1Q</b>	<i>start-qtag-end-qtag</i>	
	start-qtag	0 to 4094
	end-qtag	0 to 4094
<b>QinQ</b>	<i>qtag1.start-qtag2.end-qtag2-start-qtag1.*-end-qtag1.*</i>	
	qtag1	1 to 4094
	start-qtag1	1 to 4094
	end-qtag1	1 to 4094
	start-qtag2	0 to 4094
	end-qtag2	0 to 4094

*sync-tag* — Specifies a synchronization tag up to 32 characters in length to be used while synchronizing this encapsulation value range with the multi-chassis peer.

## python

**Syntax** **python**

**Context** config>redundancy>multi-chassis>peer>sync

**Description** This command enables syncing of python-policy cached entries to the peer.  
Use the **mcs-peer** command in the python-policy to enable syncing for a specific python-policy.

**Default** no python

## sdp

**Syntax** **sdp** *sdp-id* [**sync-tag** *sync-tag*] [**create**]  
**no sdp** *sdp-id*

**Context** config>redundancy>multi-chassis>peer>sync

**Description** This command specifies the SDP to be synchronized with multi-chassis peer.

**Parameters** *sdp-id* — Specifies the SDP of the spoke SDPs to be synchronized with the multi-chassis peer.

**Values** 1 to 32767

*sync-tag* — Specifies a synchronization tag, up to 32 characters in length, to be used when synchronizing with the multi-chassis peer.

**create** — Creates an entry; mandatory while creating an entry.

## range

<b>Syntax</b>	<b>range</b> <i>vc-id-range</i> <b>sync-tag</b> <i>sync-tag</i> <b>no range</b> <i>vc-id-range</i>
<b>Context</b>	config>redundancy>multi-chassis>peer>sync>sdp
<b>Description</b>	This command configures a range of VC-ID values.
<b>Parameters</b>	<i>vc-id-range</i> — Specifies a range of VC-ID values on an to be synchronized with a multi-chassis peer.
	<b>Values</b>
	<i>vc-id-range</i>
	<i>start-vc-id-end-vc-id</i>
	start-vc-id 1 to 4294967295
	end-vc-id 1 to 4294967295

*sync-tag* — Specifies a synchronization tag up to 32 characters in length to be used while synchronizing this encapsulation value range with the multi-chassis peer.

## source-address

<b>Syntax</b>	<b>source-address</b> <i>ip-address</i> <b>no source-address</b>
<b>Context</b>	config>redundancy>multi-chassis>peer
<b>Description</b>	This command specifies the source address used to communicate with the multi-chassis peer.
<b>Default</b>	no source-address
<b>Parameters</b>	<i>ip-address</i> — Specifies the source address used to communicate with the multi-chassis peer.
	<b>Values</b>
	ipv4-address: a.b.c.d
	ipv6-address:
	• x:x:x:x:x:x (eight 16-bit pieces)
	• x:x:x:x:x:d.d.d.d
	• x - [0 to FFFF] H



- d - [0 to 255] D

## sync

<b>Syntax</b>	<b>[no] sync</b>
<b>Context</b>	config>redundancy>multi-chassis>peer
<b>Description</b>	This command enables the context to configure synchronization parameters.

## srrp

<b>Syntax</b>	<b>[no] srrp</b>
<b>Context</b>	config>redundancy>multi-chassis>peer>sync
<b>Description</b>	This command specifies whether subscriber routed redundancy protocol (SRRP) information should be synchronized with the multi-chassis peer.
<b>Default</b>	no srrp

## sub-mgmt

<b>Syntax</b>	<b>sub-mgmt [ipoe] [pppoe]</b> <b>no sub-mgmt</b>
<b>Context</b>	config>redundancy>multi-chassis>peer>sync
<b>Description</b>	This command specifies whether subscriber management information should be synchronized with the multi-chassis peer.
<b>Default</b>	no sub-mgmt
<b>Parameters</b>	<b>ipoe</b> — Specifies to synchronize IPoE subscribers. The use of the keyword must match on both nodes, otherwise the subscriber synchronization fails. <b>pppoe</b> — Specifies to synchronize PPPoE subscribers. The use of the keyword must match on both nodes, otherwise the subscriber synchronization fails.

## sub-host-trk

<b>Syntax</b>	<b>[no] sub-host-trk</b>
<b>Context</b>	config>redundancy>multi-chassis>peer>sync

---

**Description** This command specifies whether subscriber host tracking information should be synchronized with the multi-chassis peer.

**Default** no sub-host-trk

## warm-standby

**Syntax** **warm-standby**

**Context** config>redundancy>multi-chassis>peer

**Description** This command enables Oversubscribed Multi-Chassis Redundancy (OMCR). Subscriber hosts are synchronized between two chassis only in the control plane and are kept there (as part of the Multi-Chassis Synchronization (MCS) state) until the switchover occurs. Link or nodal failure will trigger the switchover at which point the subscriber hosts are being fully instantiated in the control and the forwarding plane. This approach allows oversubscription of the resources in the central standby (or protecting) node that is backing-up a number of other active nodes. The total number of protected subscribers in the OMCR cluster exceeds the forwarding capacity of the protecting node. This is achievable by not fully occupying the resources for the subscriber hosts until the failure occurs.

The restoration times depend on the amount of the subscriber hosts that are affected by the switchover and it is related to the time needed for the full instantiation of the subscribers in the forwarding plane.

Although this command is configured on a peer level, the warm-standby property is a nodal characteristic. In other words, mixing of N:1 and 1:1 (hot standby) mode in the central standby node is not supported. Consequently, all peers on the central standby node must be configured for warm-standby (N:1), or all peers must be configured for hot-standby (1:1) by omitting the **warm-standby** keyword from the configuration.

The peer of the central-backup node is not aware of the redundancy model supported. In other words, the peer of the central-backup node does not know whether it peers with a warm-standby peer or host-standby-peer. All nodes participating in this protection model must run SR OS 12.0 or higher.

This command applies only to the 7450 ESS and 7750 SR.

**Default** no warm-standby

### 8.16.2.14.2 Multi-Chassis Endpoint Commands

## mc-endpoint

**Syntax** [no] mc-endpoint

---

**Context** config>redundancy>multi-chassis>peer

**Description** This command specifies that the endpoint is multi-chassis. This value should be the same on both MC-EP peers for the pseudowires that must be part of the same group.

The **no** form of this command removes the endpoint from the MC-EP. Single chassis behavior applies.

**Default** no mc-endpoint

## bfd-enable

**Syntax** [no] **bfd-enable**

**Context** config>redundancy>multi-chassis>peer>mc-ep  
config>router>rsvp  
config>router>bgp  
config>router>bgp>group  
config>router>bgp>group>neighbor  
config>redundancy>multi-chassis>peer>mc-ep

**Description** This command enables the use of bi-directional forwarding (BFD) to control the state of the associated protocol interface. By enabling BFD on a given protocol interface, the state of the protocol interface is tied to the state of the BFD session between the local node and the remote node. The parameters used for the BFD are set via the BFD command under the IP interface.

The **no** form of this command disables BFD.

**Default** no bfd-enable

## boot-timer

**Syntax** **boot-timer** *interval*  
**no boot-timer**

**Context** config>redundancy>multi-chassis>peer>mc-ep

**Description** This command configures the boot timer interval. This command applies only when the node reboots. It specifies the time the MC-EP protocol keeps trying to establish a connection before assuming a failure of the remote peer. This is different from the keep-alives mechanism which is used just after the peer-peer communication was established. After this time interval passed all the mc-endpoints configured under services will revert to single chassis behavior, activating the best local PW.

The **no** form of this command sets the interval to default.

**Default** no boot-timer

---

**Parameters** *interval* — Specifies the boot timer interval.

**Values** 1 to 600

## hold-on-neighbor-failure

**Syntax** **hold-on-neighbor-failure** *multiplier*  
**no hold-on-neighbor-failure**

**Context** config>redundancy>multi-chassis>peer>mc-ep

**Description** This command specifies the number of keep-alive intervals that the local node will wait for packets from the MC-EP peer before assuming failure. After this time interval passed the all the mc-endpoints configured under services will revert to single chassis behavior, activating the best local pseudowire.

The **no** form of this command sets the multiplier to default value.

**Default** no hold-on-neighbor-failure

**Parameters** *multiplier* — Specifies the hold time applied on neighbor failure.

**Values** 2 to 25

## keep-alive-interval

**Syntax** **keep-alive-interval** *interval*  
**no keep-alive-interval**

**Context** config>redundancy>multi-chassis>peer>mc-ep

**Description** This command sets the interval at which keep-alive messages are exchanged between two systems participating in MC-EP when bfd is not enabled or is down. These fast keep-alive messages are used to determine remote-node failure and the interval is set in deciseconds.

The **no** form of this command sets the interval to default value.

**Default** no keep-alive-interval

**Parameters** *interval* — Specifies the time interval expressed in deciseconds.

**Values** 5 to 500 (tenths of a second)

## passive-mode

**Syntax** **[no] passive-mode**

**Context** config>redundancy>multi-chassis>peer>mc-ep

---

**Description** This command configures the passive mode behavior for the MC-EP protocol. When in passive mode the MC-EP pair will be dormant until two of the pseudowires in a MC-EP will be signaled as active by the remote PEs, being assumed that the remote pair is configured with regular MC-EP. As soon as more than one pseudowire is active, dormant MC-EP pair will activate. It will use the regular exchange to select the best pseudowire between the active ones and it will block the Rx and Tx directions of the other pseudowires.

The **no** form of this command will disable the passive mode behavior.

**Default** no passive-mode

## system-priority

**Syntax** **system-priority** *value*  
**no system-priority**

**Context** config>redundancy>multi-chassis>peer>mc-ep

**Description** This command allows the operator to set the system priority. The peer configured with the lowest value is chosen to be the master. If system-priority are equal then the one with the highest system-id (chassis MAC address) is chosen as the master.

The **no** form of this command sets the system priority to default.

**Default** no system-priority

**Parameters** *value* — Specifies the priority assigned to the local MC-EP peer.

**Values** 1 to 255

### 8.16.2.14.3 MC-LAG Commands

## mc-lag

**Syntax** [**no**] **mc-lag**

**Context** config>redundancy>multi-chassis>peer>mc-lag

**Description** This command enables the context to 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.

**Default** no mc-lag

---

## hold-on-neighbor-failure

<b>Syntax</b>	<b>hold-on-neighbor-failure</b> <i>multiplier</i> <b>no hold-on-neighbor-failure</b>
<b>Context</b>	config>redundancy>multi-chassis>peer>mc-lag
<b>Description</b>	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 <b>no</b> form of this command sets this parameter to default value.
<b>Default</b>	hold-on-neighbor-failure 3
<b>Parameters</b>	<i>multiplier</i> — Specifies the time interval that the standby node will wait for packets from the active node before assuming a redundant-neighbor node failure.  <b>Values</b> 2 to 25

## keep-alive-interval

<b>Syntax</b>	<b>keep-alive-interval</b> <i>interval</i> <b>no keep-alive-interval</b>
<b>Context</b>	config>redundancy>multi-chassis>peer>mc-lag
<b>Description</b>	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 <b>no</b> form of this command sets the interval to default value.
<b>Default</b>	keep-alive-interval 1s (10 hundreds of milliseconds means interval value of 10)
<b>Parameters</b>	<i>interval</i> — Specifies the time interval expressed in deciseconds.  <b>Values</b> 5 to 500

## lag

<b>Syntax</b>	<b>lag</b> <i>lag-id</i> <b>lacp-key</b> <i>admin-key</i> <b>system-id</b> <i>system-id</i> [ <b>remote-lag</b> <i>remote-lag-id</i> ] <b>system-priority</b> <i>system-priority</i> <b>source-bmac-lsb</b> <b>use-lacp-key</b> <b>lag</b> <i>lag-id</i> <b>lacp-key</b> <i>admin-key</i> <b>system-id</b> <i>system-id</i> [ <b>remote-lag</b> <i>remote-lag-id</i> ] <b>system-priority</b> <i>system-priority</i> <b>source-bmac-lsb</b> <i>MAC-Lsb</i> <b>lag</b> <i>lag-id</i> <b>lacp-key</b> <i>admin-key</i> <b>system-id</b> <i>system-id</i> [ <b>remote-lag</b> <i>remote-lag-id</i> ] <b>system-</b>
---------------	--

---

	<p><b>priority</b> <i>system-priority</i> <b>lag</b> <i>lag-id</i> [<b>remote-lag</b> <i>remote-lag-id</i>] <b>no lag</b> <i>lag-id</i></p>
<b>Context</b>	config>redundancy>multi-chassis>peer>mc-lag
<b>Description</b>	<p>This command defines a LAG which 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 1 peer.</p> <p>The same <b>lACP-key</b>, <b>system-id</b>, and <b>system-priority</b> must be configured on both nodes of the redundant pair in order to MC-LAG to become operational. In order MC-LAG to become operational, all parameters (<b>lACP-key</b>, <b>system-id</b>, <b>system-priority</b>) must be configured the same on both nodes of the same redundant pair.</p> <p>The partner system (the system connected to all links forming MC-LAG) will consider all ports using the same <b>lACP-key</b>, <b>system-id</b>, <b>system-priority</b> 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 the mismatch, MC-LAG is kept operationally down.</p>
<b>Parameters</b>	<p><i>lag-id</i> — Specifies the LAG identifier, expressed as a decimal integer. Specifying the <i>lag-id</i> allows the mismatch between lag-id on redundant-pair. If no <b>lag-id</b> is specified it is assumed that neighbor system uses the same <i>lag-id</i> 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.).</p> <p><b>Values</b> 1 to 800</p> <p><i>admin-key</i> — 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.</p> <p><b>Values</b> 1 to 65535</p> <p><i>system-id</i> — Specifies a 6 byte value expressed in the same notation as MAC address.</p> <p><b>Values</b> xx:xx:xx:xx:xx:xx - xx [00 to FF]</p> <p><i>remote-lag-id</i> — Specifies the LAG ID on the remote system.</p> <p><b>Values</b> 1 to 800</p> <p><i>system-priority</i> — Specifies the system priority to be used in the context of the MC-LAG. The partner system will consider all ports using the same <b>lACP-key</b>, <b>system-id</b>, and <b>system-priority</b> as part of the same LAG.</p> <p><b>Values</b> 1 to 65535</p> <p><i>MAC-Lsb</i> — Configures the last 16 bit of the MAC address to be used for all traffic ingressing the MC-LAG link(s) or if use-lACP-key option is used, it only copies the value of lACP-key (redundancy multi-chassis mc-lag lag lACP-key adminkey). The command will fail if the value is the same with any of the following configured attributes:</p> <ul style="list-style-type: none"><li>• source-bmac-lsb assigned to other MC-LAG ports</li><li>• lsb 16 bits value for the source-bmac configured at chassis or BVPLS level</li></ul>

The first 32 bits are copied from the source B-MAC of the BVPLS associated with the IVPLS for a specific IVPLS SAP mapped to the MC-LAG. The BVPLS source B-MAC can be provisioned for each BVPLS or can be inherited from the chassis PBB configuration.

**Values** 1 to 65535 or xx-xx or xx:xx

### 8.16.2.15 LLDP System Commands

#### lldp

**Syntax** `lldp`

**Context** `config>system`

**Description** This command enables the context to configure system-wide Link Layer Discovery Protocol parameters.

#### message-fast-tx

**Syntax** `message-fast-tx time`  
`no message-fast-tx`

**Context** `config>system>lldp`

**Description** This command configures the duration of the fast transmission period.

**Default** `no message-fast-tx`

**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`

**Description** This command configures the number of LLDPDUs to send during the fast transmission period.

**Default** `no message-fast-tx-init`



**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

**Description** This command configures the minimum time between change notifications.

**Default** no notification-interval

**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

**Description** This command configures the time before re-initializing LLDP on a port.

**Default** no reinit-delay

**Parameters** *time* — Specifies the time, in seconds, before re-initializing 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

**Description** This command configures the maximum consecutive LLDPDUs transmitted.

**Default** no tx-credit-max

**Parameters** *count* — Specifies the maximum consecutive LLDPDUs transmitted.

**Values** 1 to 100

**Default** 5

## tx-hold-multiplier

**Syntax** **tx-hold-multiplier** *multiplier*  
**no tx-hold-multiplier**

**Context** config>system>lldp

**Description** This command configures the multiplier of the tx-interval.

**Default** no tx-hold-multiplier

**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

**Description** This command configures the LLDP transmit interval time.

**Default** no tx-interval

**Parameters** *interval* — Specifies the LLDP transmit interval time.

**Values** 5 to 32768

**Default** 30

### 8.16.2.16 LLDP Ethernet Port Commands

#### lldp

**Syntax** **lldp**

**Context** config>port>ethernet

---

**Description** This command enables the context to configure Link Layer Discovery Protocol (LLDP) parameters on the specified port.

## dest-mac

**Syntax** **dest-mac** {**nearest-bridge** | **nearest-non-tpmr** | **nearest-customer**}

**Context** config>port>ethernet>lldp

**Description** This command configures destination MAC address parameters.

**Default** dest-mac nearest-bridge

**Parameters** **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.

## admin-status

**Syntax** **admin-status** {**rx** | **tx** | **tx-rx** | **disabled**}

**Context** config>port>ethernet>lldp>dstmac

**Description** This command specifies the administratively desired status of the local LLDP agent.

**Default** admin-status disabled

**Parameters** **rx** — Specifies 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, then the information will naturally age out.

## notification

**Syntax** [**no**] **notification**

**Context** config>port>ethernet>lldp>dstmac

**Description** This command enables LLDP notifications.

The **no** form of the command disables LLDP notifications.

**Default** no notification

## port-id-subtype

**Syntax** **pot-id-subtype** {**tx-if-alias** | **tx-if-name** | **tx-local**}

**Context** config>port>ethernet>lldp>dstmac

**Description** This command configures the encoding of the port identifier TLVs transmitted to the peer.

**Default** port-id-subtype tx-local

**Parameters** **tx-if-alias** — (1) Transmits the ifAlias IF-MIB string.  
**tx-if-name** — (5) Transmits the ifName IF-MIB string.  
**tx-local** — (7) Transmits the interface ifIndex value.

## tunnel-nearest-bridge

**Syntax** [**no**] **tunnel-nearest-bridge**

**Context** config>port>ethernet>lldp>dest-mac

**Description** The command allows LLDP packets received on the port with the destination address of the nearest bridge to be tunneled without being intercepted on the local port. The **dest-mac nearest-bridge** must be disable for tunneling to occur. This is applicable to NULL SAP Epipe and VPLS services only.

**Default** no tunnel-nearest-bridge

## tx-mgmt-address

**Syntax** **tx-mgmt-address** [**system**] [**system-ipv6**]  
**no tx-mgmt-address**

**Context** config>port>ethernet>lldp>dstmac

**Description** This command specifies which management address to transmit.

The **no** form of the command resets value to the default.

**Default** no tx-mgmt-address

**Parameters** **system** — Specifies to use the system IP address. The system address will only be transmitted once it has been configured if this parameter is specified.

---

**system-ipv6** — Specifies to use the system IPv6 address. The system address will only be transmitted once it has been configured if this parameter is specified.

## tx-tlvs

<b>Syntax</b>	<b>tx-tlvs</b> [port-desc] [sys-name] [sys-desc] [sys-cap] <b>no tx-tlvs</b>
<b>Context</b>	config>port>ethernet>lldp>dstmac
<b>Description</b>	This command specifies which LLDP TLVs to transmit.  The <b>no</b> form of the command resets the value to the default.
<b>Default</b>	no tx-tlvs
<b>Parameters</b>	<b>port-desc</b> — Indicates that the LLDP agent should transmit port description TLVs. <b>sys-name</b> — Indicates that the LLDP agent should transmit system name TLVs. <b>sys-desc</b> — Indicates that the LLDP agent should transmit system description TLVs. <b>sys-cap</b> — Indicates that the LLDP agent should transmit system capabilities TLVs.

## 8.16.2.17 System Router Instance Commands

### router

<b>Syntax</b>	<b>router</b> [router-instance] [create] <b>no router</b> [router-instance]
<b>Context</b>	config
<b>Description</b>	This command enables the context in which to configure router parameters including interfaces, route policies and protocols. This command is also used to create CPM router instances.  For CPM router instances, this command enters or creates a user-created CPM router instance. A CPM router instance is not a VPRN router instance. VPRN router instances are configured under <b>configure service vprn</b> . CPM router instances are the only type of non-VPRN router instances that can be created by a user, and have a user-defined name. CPM router instances only use CPM/CCM ethernet ports as interfaces.
<b>Parameters</b>	<i>router-instance</i> — Specifies the router name or CPM router instance.  <b>Values</b>

*router-instance: router name*

*router-name* Base | management | *cpm-vr-name*

*cpm-vr-name* up to 32 characters

**Default** Base

**create** — Keyword used to create the router instance.

## 8.17 Show, Clear, Debug, and Tools Command Reference

### 8.17.1 Command Hierarchies

- [Show Commands](#)
- [Clear Commands](#)
- [Debug Commands](#)
- [Tools Commands](#)

#### 8.17.1.1 Show Commands

```
show
  — redundancy
    — mgmt-ethernet
    — multi-chassis
      — all
      — mc-endpoint statistics
      — mc-endpoint peer [ip-address] statistics
      — mc-endpoint endpoint [mcep-id] statistics
      — mc-endpoint peer [ip-address]
      — mc-lag peer ip-address [lag lag-id]
      — mc-lag [peer ip-address [lag lag-id]] statistics
      — mc-ring peer ip-address statistics
      — mc-ring peer ip-address [ring sync-tag [detail | statistics]]
      — mc-ring peer ip-address ring sync-tag ring-node [ring-node-name [detail |
        statistics]]
      — mc-ring global-statistics
      — sync [peer ip-address]
      — sync peer ip-address detail
      — sync [peer ip-address] statistics
    — synchronization
  — time
  — system
    — alarm-contact-input {alarm-contact-input-id | all} [detail]
    — bluetooth [device-mac [ieee-address] | module [cpm-slot]]
    — connections [detail] [address ip-address] [port port-number]
    — cpu [sample-period seconds]
    — cron
      — schedule [schedule-name] [owner owner-name]
    — information
    — lldp [neighbor]
    — load-balancing-alg [detail]
    — memory-pools
```

- **ntp** [{peers | peer [router *router-instance* | service-name *service-name*] peer-address} | {servers | server [router *router-instance* | service-name *service-name*] server-address} | [all]] [detail]
- **port-topology** [uni-dir]
- **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]
  - **standby**
  - **statistics**
  - **unicast** [router *router-instance* | service-name *service-name*]
- **rollback** [rescue]
- **satellite**
  - **eth-sat** [*sat-id*]
    - **port-map** [*client-port-id*]
    - **sync-if-timing**
  - **tdm-sat** [*sat-id*]
    - **port-map** [*client-port-id*]
    - **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*]
- **sntp**
- **switch-fabric** high-bandwidth-multicast
- **switch-fabric** [exclude-sfm *sfm-list*]
- **sync-if-timing** [*cpm-slot*]
- **thresholds**
- **time**
- **uptime**

### 8.17.1.2 Clear Commands

- ```
clear
```
- **application-assurance**
    - **group** *aa-group-id* [:*partition-id*]
    - **statistics**
    - **status**
  - **redundancy**
    - **multi-chassis**
      - **mc-endpoint** endpoint [*mcep-id*] **statistics**
      - **mc-endpoint** **statistics**
      - **mc-endpoint** peer [*ip-address*] **statistics**
      - **mc-lag** [peer *ip-address* [*lag lag-id*]]
      - **mc-ring**
        - **debounce** peer *ip-address* ring *sync-tag*
        - **ring-nodes** peer *ip-address* ring *sync-tag*
        - **statistics**
          - **global**
          - **peer** *ip-address*
          - **ring** peer *ip-address* ring *sync-tag*



- **ring-node** peer *ip-address* ring *sync-tag* node *ring-node-name*
- **sync-database** peer *ip-address* all application *application*
- **sync-database** peer *ip-address* port {*port-id* | *lag-id*} [**sync-tag** *sync-tag*] application *application*
- **sync-database** peer *ip-address* sdp *sdp-id* [**sync-tag** *sync-tag*] application *application*
- **sync-database** peer *ip-address* **sync-tag** *sync-tag* application *application*
- **screen**
- **system**
  - **ptp**
    - **inactive-peers**
    - **peer** *ip-address* [*router router-instance* | **service-name** *service-name*] **statistics**
    - **port** *port-id* **statistics**
    - **statistics**
  - **script-control**
    - **script-policy**
      - **completed** [*script-policy-name*] [**owner** *owner-name*]
  - **statistics**
    - **xmpp server** *xmpp-server-name*
  - **sync-if-timing** {*ref1* | *ref2* | *bits*}

### 8.17.1.3 Debug Commands

- debug
- **sync-if-timing**
    - **force-reference** {*ref1* | *ref2* | *bits* | *bits1* | *bits2* | *bitsa* | *bitsb* | *ptp*}
    - **no force-reference**
  - [no] **system**
    - **http-connections** [*ip-address/prefix-length*]
    - **http-connections any**
    - **http-connections** [*ipv6-address/prefix-length*]
    - **no http-connections**
    - **ntp** [*router router-instance*] [**interface** *ip-int-name*]
    - **persistence** [*persistence-client*]
    - **no persistence**

### 8.17.1.4 Tools Commands

- tools
- **dump**
    - **redundancy**
      - **multi-chassis**
        - **mc-endpoint** peer *ip-address*
        - **mc-ring**
        - **mc-ring** peer *ip-address* [*ring sync-tag*]
        - **srrp-sync-database** [*instance instance-id*] [**peer** *ip-address*]

- **sync-database** [peer *ip-address*] [port *port-id* | *lag-id*] [sdp *sdp-id*] [sync-tag *sync-tag*] [application *application*] [detail] [type *type*]
    - **src-bmac-lsb**
  - **resource-usage**
    - **card** [*slot-num*]
    - **card** [*slot-num*] **all**
      - **fp** [*fp-number*]
      - **mda** [*mda-slot*]
    - **system** [**all**]
  - **system-resources** [*slot-number*]
- **perform**
  - **chassis** [*phys-chassis-id*]
    - **check-bp-eprom**
    - **link-check**
    - **set-role** {*extension* | **master** | **standalone**}
  - **redundancy**
    - [no] **forced-single-sfm-overload**
    - **issu-post-process**
    - **mgmt-ethernet**
  - **satellite**
    - **force-uplink-switch** *client-port-id*
  - **system**
    - **auto-node-provisioning**
      - **ipv4** [*timeout seconds*] [*dhcp-client-identifier* {*string ascii-string* | *hex hex-string* | *serial-number*}] [**reboot-on-success**] [**save-provision-file-destination** *file-url*]
    - **bluetooth**
      - **module** *cpm-slot* **action** {**reboot** | **disconnect**}
    - **inter-chassis**
      - **sfm-interco-test**
    - **script-control**
      - **script-policy**
        - **stop** [*script-policy-name*] [**owner** *script-policy-owner*] [**all**]
    - **snmp**
      - **walk** [**start-oid** *start-oid* [*start-oid*]] [**skip-oid** *skip-oid* [*skip-oid*]] [**output** *file-url*] [**syntax** *syntax*]
    - **xmpp**
      - **vsd-refresh**
- **system**
  - **cpm-http-redirect** **redirect** **statistics**
  - **cpm-http-redirect** **redirect** **summary**
  - **cpm-http-redirect** **tcp** **sessions**
  - **cpm-http-redirect** **tcp** **settings**
  - **cpm-http-redirect** **tcp** **statistics**

## 8.17.2 Command Descriptions

### 8.17.2.1 Show Commands

The command outputs in the following sections are examples only; actual displays may differ depending on supported functionality and user configuration.

#### alarm-contact-input

- Syntax** `alarm-contact-input {alarm-contact-input-id | all} [detail]`
- Context** show>system
- Description** This command displays the alarm contact input information.
- Parameters** *alarm-contact-input-id* — Displays the alarm contact input information for a specific pin.
- Values** 1 to 4
- all** — Displays the alarm contact input information for all pins.
- detail** — Displays detailed alarm contact input information for one or all of the pins.
- Output** The following output is an example of alarm contact input information. [Table 46](#) describes the output fields.

#### Sample Output

```
A:bkvm3# show system alarm-contact-input 1
=====
Alarm Contact Input
=====
Alarm Contact Input Power           : on
Alarm Input Pin Number              : 1
  Alarm Input Pin Current State     : Disabled
  Alarm Output Pin Used              : major
  Alarm Raised                       : No
=====

A:bkvm3# show system alarm-contact-input 1 detail
=====
Alarm Contact Input
=====
Alarm Contact Input Power           : on
Alarm Input Pin Number              : 2
  Description                        : (Not Specified)
  Alarm Input Pin Current State     : Enabled
  Alarm Output Pin Used              : major
  Alarm Raised                       : No
  Last State Change                 : 12/15/2014 13:11:32
```

```
A:bkvm3# show system alarm-contact-input all
=====
Alarm Contact Input
=====
Alarm Contact Input Power           : on
Alarm Input Pin Number             : 1
  Description                       : cabinet door
  Alarm Input Pin Current State     : Enabled
  Alarm Output Pin Used             : major
  Alarm Raised                      : Yes
  Last State Change                 : 12/17/2014 20:12:02
Alarm Input Pin Number             : 2
  Description                       : (Not Specified)
  Alarm Input Pin Current State     : Disabled
  Alarm Output Pin Used             : minor
  Alarm Raised                      : No
  Last State Change                 : 12/17/2014 20:12:02
Alarm Input Pin Number             : 3
  Description                       : (Not Specified)
  Alarm Input Pin Current State     : Disabled
  Alarm Output Pin Used             : major
  Alarm Raised                      : No
  Last State Change                 : 12/17/2014 20:12:02
Alarm Input Pin Number             : 4
  Description                       : (Not Specified)
  Alarm Input Pin Current State     : Disabled
  Alarm Output Pin Used             : critical
  Alarm Raised                      : No
  Last State Change                 : 12/17/2014 20:12:02
```

**Table 46 Alarm Contact Input Field Descriptions**

| Label                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alarm Contact Input Power | Indicates if the +24VDC output pin (optionally used to provide power for the alarm inputs) is enabled.                                                                                                                                                                                                                                                                                                                                |
| Current State             | Indicates the configured administrative state of the input.<br>Disabled —The alarm-contact-input is disabled ( <b>shutdown</b> ) and log events will not be generated for changes to the input pin status.<br>Enabled — The alarm-contact-input is enabled ( <b>no shutdown</b> ) and log events will be generated for changes to the input pin status (as long as the log events are not suppressed in event-control configuration). |
| Alarm Output Pin Used     | Indicates the configured severity of the associated CHASSIS log event (for example, for pin 3: <b>configure log event-control chassis" tmnxSasAlarminput3StateChanged</b> ).                                                                                                                                                                                                                                                          |
| Alarm Raised              | Indicates if the input pin is triggered or not.                                                                                                                                                                                                                                                                                                                                                                                       |
| Last State Change         | Indicates when the input pin last changed state.                                                                                                                                                                                                                                                                                                                                                                                      |

## bluetooth

|                    |                                                                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>bluetooth</b> [device-mac [ <i>ieee-address</i> ]   <b>module</b> [ <i>cpm-slot</i> ]]                                                                                                 |
| <b>Context</b>     | show>system                                                                                                                                                                               |
| <b>Description</b> | This command displays detailed information about the Bluetooth configuration on the CPM or chassis.                                                                                       |
| <b>Parameters</b>  | <i>ieee-address</i> — Specifies the source MAC address.<br><b>Values</b> xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx<br><i>cpm-slot</i> — Specifies the CPM slot.<br><b>Values</b> A , B, C, D |
| <b>Output</b>      | The following is an example of Bluetooth configuration information. <a href="#">Table 47</a> describes the output fields.                                                                 |

### Sample Output

```
*A:bkvm18>show>system# bluetooth
=====
System-wide Bluetooth Configuration
=====
Passkey           : 123456           Advertising Timeout: 30
Power State       : off             Pairing Button     : Disabled
=====
*A:bkvm18>show>system# bluetooth device
=====
System-wide Bluetooth Configuration
=====
Passkey           : 123456           Advertising Timeout: 30
Power State       : off             Pairing Button     : Disabled
=====
Bluetooth Devices
=====
Device            : 00:22:33:44:55:66
Description       : peter's ipad
Device            : 11:22:33:44:55:66
Description       : (Not Specified)
Device            : 22:22:33:44:55:66
Description       : description
-----
Number of Devices : 3
=====
*A:bkvm18>show>system# bluetooth device 00:22:33:44:55:66
=====
System-wide Bluetooth Configuration
=====
Passkey           : 123456           Advertising Timeout: 30
Power State       : off             Pairing Button     : Disabled
=====
Bluetooth Devices
=====
```

```

Device           : 00:22:33:44:55:66
Description      : peter's ipad
=====
*A:bkvm18>show>system# bluetooth module
=====
System-wide Bluetooth Configuration
=====
Passkey          : 123456             Advertising Timeout: 30
Power State      : off               Pairing Button     : Disabled
=====
Bluetooth Modules
=====
Module           : A
Connected Device : Yes
Device Mac       : 00:22:33:44:55:66
Device Description : peter's ipad
Configured Identifier : (Not Configured)
Operational Identifier: 7750-SR-14s-CPM-A-NS123456
Module           : B
Connected Device : No
Device Mac       :
Device Description :
Configured Identifier : (Not Configured)
Operational Identifier: 7750-SR-14s-CPM-B-NS654321
=====
*A:bkvm18>show>system# bluetooth module "A"
=====
System-wide Bluetooth Configuration
=====
Passkey          : 123456             Advertising Timeout: 30
Power State      : off               Pairing Button     : Disabled
=====
Bluetooth Modules
=====
Module           : A
Connected Device : Yes
Device Mac       : 00:22:33:44:55:66
Device Description : peter's ipad
Configured Identifier : (Not Configured)
Operational Identifier: 7750-SR-14s-CPM-A-NS123456
=====*
```

**Table 47 System Bluetooth Field Descriptions**

| Label               | Description                                                               |
|---------------------|---------------------------------------------------------------------------|
| Passkey             | The Bluetooth passkey in use by the system.                               |
| Advertising Timeout | The amount of time the Bluetooth will advertise that it is ready to pair. |
| Power State         | The operating mode for Bluetooth.                                         |
| Pairing Button      | Displays whether the pairing button is enabled for use.                   |

**Table 47 System Bluetooth Field Descriptions (Continued)**

| Label                  | Description (Continued)                                          |
|------------------------|------------------------------------------------------------------|
| Device                 | The MAC address of the Bluetooth device.                         |
| Description            | The customer-entered description for the Bluetooth device.       |
| Module                 | Displays which CPM module contains the Bluetooth device.         |
| Connected Device       | Displays if there is a device actively paired to the module.     |
| Device MAC             | The MAC address of the Bluetooth device connected to the module. |
| Device Description     | The description associated with the connected Bluetooth device.  |
| Configured Identifier  | The customer-defined Bluetooth identifier for the module.        |
| Operational Identifier | The Bluetooth identifier in use for the module.                  |

cpu

**Syntax** `cpu [sample-period seconds]`

**Context** `show>system`

**Description** This command displays CPU utilization per task over a sample period.

**Parameters** `seconds` — Specifies the number of seconds over which to sample CPU task utilization.

**Values** 1 to 300

**Default** 1

**Output** The following output is an example of CPU information, and [Table 48](#) 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)
-----
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%  |        |
| Usage                    | 69,648    | 3.45%   |        |
| Busiest Core Utilization | 69,648    | 3.45%   |        |

=====  
\*A:cses-E11#

\*A:ALA-1# show card 4 cpu

=====  
Card 4 CPU Utilization (Sample period: 1 second)  
=====

| Name                     | CPU Time<br>(uSec) | CPU Usage | Capacity<br>Usage |
|--------------------------|--------------------|-----------|-------------------|
| HQoS Algorithm           | 70                 | ~0.00%    | ~0.00%            |
| HQoS Statistics          | 124                | ~0.00%    | 0.83%             |
| IOM                      | 15,904             | 0.79%     | 0.94%             |
| -----                    |                    |           |                   |
| Total                    | 2,003,678          | 100.00%   |                   |
| Idle                     | 1,987,580          | 99.19%    |                   |
| Usage                    | 16,098             | 0.80%     |                   |
| Busiest Core Utilization | 8,192              | 0.81%     |                   |

=====

**Table 48 System CPU Field Descriptions**

| Label           | Description                   |
|-----------------|-------------------------------|
| CPU Utilization | The total amount of CPU time. |



**Table 48 System CPU Field Descriptions (Continued)**

| Label                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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           | 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.<br><br>This column does not reflect the true CPU utilization value; that data is still available in the <b>CPU Usage</b> column. This column is the <b>busiest</b> task in each group, where <b>busiest</b> is defined as either actually running or blocked attempting to acquire a lock. |
| Idle                     | The current CPU utilization for the system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Usage                    | The overall percentage of CPU idleness over the specified sample time.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Busiest Core Utilization | The utilization percentage of the busiest processor core over the specified sample time. On single core CPUs, this is the overall system utilization percentage over the specified sample time.                                                                                                                                                                                                                                                                                                                         |

connections

**Syntax** `connections [detail] [address ip-address] [port port-number]`

**Context** `show>system`

**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[-interface]  
 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, mandatory for link local addresses

*port-number* — Displays only the connection information for the specified port number.

**Values** 0 to 65535

**detail** — Appends TCP statistics to the display output.

**Output** The following output is an example of system connections information, and [Table 49](#) describes the output fields.

**Sample Output**

```
A:ALA-12# show system connections
=====
Connections
=====
Prot RecvQ  TxmtQ  Local Address          State
      MSS  Remote Address          vRtrID
-----
TCP      0      0 0.0.0.0.21             LISTEN
      1024 0.0.0.0.0               0
TCP      0      0 0.0.0.0.22             LISTEN
      1024 0.0.0.0.0               0
TCP      0      0 0.0.0.0.23             LISTEN
      1024 0.0.0.0.0               0
TCP      0      0 0.0.0.0.830            LISTEN
      1024 0.0.0.0.0               0
TCP      0      0 0.0.0.0.6068           LISTEN
      1024 0.0.0.0.0               0
TCP      0      0 0.0.0.0.47806          LISTEN
      1024 0.0.0.0.0               0
TCP      0      0 ::.21                  LISTEN
      1024 ::.0                      0
TCP      0      0 ::.22                  LISTEN
      1024 ::.0                      0
TCP      0      0 ::.830                  LISTEN
      1024 ::.0                      0
TCP      0      0 ::.47806                LISTEN
      1024 ::.0                      0
TCP      0      0 192.168.0.11.21        LISTEN
      1024 0.0.0.0.0               4095
TCP      0      0 192.168.0.11.21059     LISTEN
      1024 0.0.0.0.0               4095
TCP      0      0 172.31.129.98.22       LISTEN
      1024 0.0.0.0.0               4095
TCP      0      0 172.31.129.98.23       ESTABLISH
      1024 192.168.140.149.59042   4095
TCP      0      1149 172.31.129.98.23       ESTABLISH
      1024 192.168.140.244.58579   4095
TCP      0      0 172.31.129.98.830       LISTEN
      1024 0.0.0.0.0               4095
TCP      0      0 2001:db8::8779:8163.22 LISTEN
      1024 ::.0                      4095
TCP      0      0 2001:db8::8779:8163.830 LISTEN
```

```

1024  :::0 4095
UDP    0    0 0.0.0.0.67  --- 0
        0.0.0.0.0
UDP    0    0 0.0.0.0.68  --- 0
        0.0.0.0.0
UDP    0    0 0.0.0.0.123 --- 0
        0.0.0.0.0
UDP    0    0 0.0.0.0.319 --- 0
        0.0.0.0.0
UDP    0    0 0.0.0.0.320 --- 0
        0.0.0.0.0
UDP    0    0 0.0.0.0.514 --- 0
        0.0.0.0.0
UDP    0    0 0.0.0.0.50055 --- 0
        0.0.0.0.0
UDP    0    0 :::123  --- 0
        :::0
UDP    0    0 :::50056 --- 0
        :::0
UDP    0    0 0.0.0.0.1025 --- 1
        0.0.0.0.0
UDP    0    0 0.0.0.0.123  --- 4095
        0.0.0.0.0
UDP    0    0 0.0.0.0.49152
-----
No. of Connections: 18
=====
A:ALA-12#

```

**Sample Detailed Output**

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 unsend 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
connections dropped by bad md5 digest : 0
connections dropped by enhanced auth : 0
path mtu discovery backoff        : 0
=====
A:ALA-12#

```

**Table 49 System Connections Field Descriptions**

| Label          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Proto          | The socket protocol, either TCP or UDP.                                                                                                                                                                                                                                                                                                                                                                                                        |
| RecvQ          | The number of input packets received by the protocol.                                                                                                                                                                                                                                                                                                                                                                                          |
| TxmtQ          | The number of output packets sent by the application.                                                                                                                                                                                                                                                                                                                                                                                          |
| Local Address  | The local address of the socket. The socket port is separated by a period.                                                                                                                                                                                                                                                                                                                                                                     |
| Remote Address | The remote address of the socket. The socket port is separated by a period.                                                                                                                                                                                                                                                                                                                                                                    |
| State          | Listen — The protocol state is in the listen mode.<br>Established — The protocol state is established.<br>vRtrID — The virtual router identifier. <ul style="list-style-type: none"> <li>• vRtrID 0 — listens for connections in all routing instances including the Base and Management VRFs.</li> <li>• vRtrID 1 — Base routing instance</li> <li>• vRtrID 4095 — Management routing instance</li> </ul> MSS — The TCP maximum segment size. |

cpu

- Syntax**    cpu [sample-period seconds]
- Context**   show>system
- Description** This command displays CPU utilization per task over a sample period.

**Parameters**    *seconds* — Specifies the number of seconds over which to sample CPU task utilization.

**Values**     1 to 300

**Default**    1

**Output**        The following is an example of system CPU information. [Table 50](#) 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)
-----
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%
  Usage                             69,648       3.45%
Busiest Core Utilization            69,648       3.45%
=====
*A:cses-E11#

*A:ALA-1# show card 4 cpu
```

```

=====
Card 4 CPU Utilization (Sample period: 1 second)
=====
Name                      CPU Time      CPU Usage      Capacity
                          (uSec)                Usage
-----
HqoS Algorithm              70             ~0.00%         ~0.00%
HqoS Statistics            124            ~0.00%         0.83%
IOM                         15,904         0.79%          0.94%
-----
Total                       2,003,678     100.00%
  Idle                      1,987,580     99.19%
  Usage                      16,098        0.80%
Busiest Core Utilization    8,192         0.81%
=====
    
```

**Table 50** System CPU Field Descriptions

| 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  | <p>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.</p> <p>This column does not reflect the true CPU utilization value; that data is still available in the <b>CPU Usage</b> column. This column is the <b>busiest</b> task in each group, where <b>busiest</b> is defined as either actually running or blocked attempting to acquire a lock.</p> |

## memory-pools

- Syntax**    `memory-pools`
- Context**    `show>system`
- Description**    This command displays the memory pools for the card.

## cron

- Syntax**    `cron`

---

**Context** show>system  
**Description** This command enters the show CRON context.

## schedule

**Syntax** **schedule** [*schedule-name*] [*owner owner-name*]  
**Context** show>system>cron  
**Description** This command displays cron schedule parameters.  
**Parameters** *schedule-name* — Specifies the scheduler name, up to 32 characters.  
*owner-name* — Specifies the scheduler owner name, up to 32 characters.  
**Output** The following is an example of cron schedule information. [Table 51](#) describes the output fields.

### Sample Output

```
A:sim1>show>cron schedule test
=====
CRON Schedule Information
=====
Schedule                   : test
Schedule owner             : TiMOS CLI
Description                 : none
Administrative status      : enabled
Operational status        : enabled
Action                     : test
Action 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)
Next scheduled run        : 0d 00:00:42
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
=====
A:sim1>show>cron
```

**Table 51 Cron Schedule Field Descriptions**

| Label                    | Description                                                                                                                                                                              |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Schedule                 | 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.<br>Disabled — Administratively disabled.                                                                                                 |
| Operational status       | Enabled — The operational status is enabled.<br>Disabled — Operationally disabled.                                                                                                       |
| Action                   | Displays the action name.                                                                                                                                                                |
| Action owner             | Displays the name of action owner.                                                                                                                                                       |
| Script                   | Displays the name of the script.                                                                                                                                                         |
| Script owner             | 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.<br>Calendar — Displays a schedule which ran based on a calendar.<br>Oneshot — Displays a schedule which ran one time only. |
| Interval                 | Displays the interval between runs of an event.                                                                                                                                          |
| Next scheduled run       | Displays the time for the next scheduled run.                                                                                                                                            |
| 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.                                                                                                                                                          |
| Number of scheduled runs | Displays the number of scheduled sessions.                                                                                                                                               |
| Last scheduled run       | Displays the last scheduled session.                                                                                                                                                     |



**Table 51 Cron Schedule Field Descriptions (Continued)**

| Label                        | Description (Continued)                                           |
|------------------------------|-------------------------------------------------------------------|
| 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.                     |

information

- Syntax** information
- Context** show>system
- Description** This command displays general system information including basic system, SNMP server, last boot and DNS client information.
- Output** The following is an example of system information. [Table 52](#) describes the output fields.

**Sample Output**

```
A:Dut-F>show system information
...
Primary DNS Server      : 192.168.252.56
Secondary DNS Server   : 192.168.252.48
Tertiary DNS Server    : 192.168.252.49
DNS Domain              : labs.ca.nokia.com
DNS Resolve Preference : ipv4-only
DNSSEC                  AD Validated      : False
DNSSEC Response Control: drop
BOF Static Routes      :
```

The following is an example of the 7750 SR:

```
A:Dut-F# show system information
=====
System Information
=====
System Name           : Dut-F
System Type           : 7750 SR-7 7450 ESS-7
System Version        : B-6.0.B1-6
System Contact        :
System Location       :
System Coordinates    :
System Active Slot    : A
System Up Time        : 0 days, 03:42:01.29 (hr:min:sec)

SNMP Port             : 161
SNMP Engine ID        : 0000197f00008c6cff000000
```

```

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

BOF Source              : ftp://test:test@xxx.xxx.xx.xxx/./images
Image Source            : primary
Config Source           : primary
Last Booted Config File: ftp://*:*@xxx.xxx.xx.xxx/./images/dut-f.cfg
Last Boot Cfg Version  : N/A
Last Boot Index Version: N/A
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://*:@[2001:db8::8acb:466d]/./images/env.cfg
Cfg-OK Script Status   : failed
Cfg-Fail Script        : N/A
Cfg-Fail Script Status : not used
Management IP Addr     : xxx.xxx.xx.xxx/23
Primary DNS Server     : xxx.xxx.xx.xxx
Secondary DNS Server   : xxx.xxx.xx.xxx
Tertiary DNS Server    : N/A
DNS Domain             : sh.bel.nokia.be
DNS Resolve Preference : ipv4-only
BOF Static Routes      :
  To                    Next Hop
  192.168.0.0/16       xxx.xxx.xx.xxx
  172.16.0.0/8         xxx.xxx.xx.xxx
ICMP Vendor Enhancement: Disabled
ATM Location ID        : 01:00:00:00:00:00:00:00:00:00:00:00:00:00:00
ATM OAM Retry Up       : 2
ATM OAM Retry Down    : 4
ATM OAM Loopback Period: 10
=====
A:Dut-F#

```

**Table 52 System Information Field Descriptions**

| Label           | Description                                                                                                  |
|-----------------|--------------------------------------------------------------------------------------------------------------|
| System Name     | The configured system name.                                                                                  |
| System Type     | The system is administratively configured to function as a Nokia SR OS Ethernet Service Switch (ESS) or not. |
| System Version  | The software product release version number for the software image currently running.                        |
| System Contact  | A text string that describes the system contact information.                                                 |
| System Location | A text string that describes the system location.                                                            |

**Table 52 System Information Field Descriptions (Continued)**

| Label                  | Description (Continued)                                                                                                                                                                                                                                                                                                                      |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System Coordinates     | A text string that describes the system coordinates.                                                                                                                                                                                                                                                                                         |
| 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 Max Message Size  | The maximum SNMP packet size generated by this node.                                                                                                                                                                                                                                                                                         |
| SNMP Admin State       | Enabled — SNMP is administratively enabled and running.<br>Disabled — SNMP is administratively shutdown and not running.                                                                                                                                                                                                                     |
| SNMP Oper State        | Enabled — SNMP is operationally enabled.<br>Disabled — SNMP is operationally disabled.                                                                                                                                                                                                                                                       |
| SNMP Index Boot Status | Persistent — System indexes are saved between reboots.<br>Not Persistent — System indexes are not saved between reboots.                                                                                                                                                                                                                     |
| Telnet/SSH/FTP Admin   | Displays the administrative state of the Telnet, SSH, and FTP sessions.                                                                                                                                                                                                                                                                      |
| Telnet/SSH/FTP Oper    | Displays the operational state of the Telnet, SSH, and FTP sessions.                                                                                                                                                                                                                                                                         |
| 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.<br>Secondary — Indicates that the directory location for runtime image file was loaded from the secondary source.<br>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.<br>Secondary — Indicates that the directory location for configuration file was loaded from the secondary source.<br>Tertiary — Indicates that the directory location for configuration file was loaded from the tertiary source. |
| DNS Resolve Preference | ipv4-only — Dns-names are queried for A-records only.<br>ipv6-first — Dns-server will be queried for AAAA-records first and a successful reply is not received, the dns-server is queried for A-records.                                                                                                                                     |

**Table 52 System Information Field Descriptions (Continued)**

| Label                   | Description (Continued)                                                                                                                                             |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 | The header information such as image version, date built, date generated.                                                                                           |
| Last Boot Index Version | The version of the persistence index file read when this card was last rebooted.                                                                                    |
| Last Boot Index Header  | The header of the persistence index file read when this card was last rebooted.                                                                                     |
| Last Saved Config       | The location and filename of the last saved configuration file.                                                                                                     |
| 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.<br>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 bootup 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.<br>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 bootup configuration file execution.<br>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.<br>Not used — No CLI script file was executed. |
| Management IP Addr      | The management IP address and mask.                                                                                                                                 |
| DNS Server              | The IP address of the DNS server.                                                                                                                                   |
| DNS Domain              | The DNS domain name of the node.                                                                                                                                    |

**Table 52 System Information Field Descriptions (Continued)**

| Label             | Description (Continued)                                                                                                                                                                                                               |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BOF Static Routes | To — The static route destination.<br>Next Hop — The next hop IP address used to reach the destination.<br>Metric — Displays the priority of this static route versus other static routes.<br>None — No static routes are configured. |

lldp

- Syntax** `lldp [neighbor]`
- Context** `show>system`
- Description** This command displays neighbor information for all configured ports without having to specify each individual port ID.
- Parameters** `neighbor` — Displays LLDP neighbor information.
- Output** The following is an example of LLDP neighbor information.

**Sample Output**

```
*A:Dut-C# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information
=====
NB = nearest-bridge   NTMPR = nearest-non-tpmr   NC = nearest-customer
=====
Port      Scope  Chassis ID           Index  Port ID  System Name
-----
1/1/1     NB     16:2f:ff:00:00:00    1      35717120  Dut-A
2/1/2     NB     16:34:ff:00:00:00    1      35782656  Dut-D
2/1/1     NB     16:36:ff:00:00:00    2      35684352  Dut-E
1/1/2     NB     16:30:ff:00:00:00    2      35749888  Dut-B
1/1/3     NB     16:30:ff:00:00:00    3      35782656  Dut-B
2/1/3     NB     16:30:ff:00:00:00    3      35815424  Dut-B
=====
Number of neighbors : 6
*A:Dut-C#
```

```
A:GHR-API# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information
=====
NB = nearest-bridge   NTMPR = nearest-non-tpmr   NC = nearest-customer
=====
Port      Scope  Chassis ID           Index  Port ID  System Name
-----
1/1/6     NTPMR 00:21:05:1b:bc:17    1      36044800  RXI-AMI
1/1/8     NTPMR 00:21:06:6d:bd:53    2      36110336  YOY-WOW
1/1/9     NTPMR 00:21:08:2b:ab:81    3      36143104  FRI-MON
```

```
=====
Number of neighbors : 3
```

## load-balancing-alg

- Syntax** `load-balancing-alg [detail]`
- Context** `show>system`
- Description** This command displays system load balancing settings.
- Parameters** `detail` — Displays port settings.
- Output** The following output is an example of load balancing information.

### Sample Output

```
*A:bkvm15# show system load-balancing-alg
=====
System-wide Load Balancing Algorithms
=====
L4 Load Balancing           : exclude-L4
LSR Load Balancing          : lbl-ip-14-teid
System IP Load Balancing    : disabled
Multicast Enhanced Load Balancing : disabled
Service ID LAG Hashing     : disabled
=====
*A:bkvm15#
```

## memory-pools

- Syntax** `memory-pools`
- Context** `show>system`
- Description** This command displays system memory status.
- Output** The following output is an example of memory pool information, and [Table 53](#) 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          |
| BGP       | No limit   | 2,097,152   | 2,097,152   | 1,624,800   |
| BGP       | No limit   | 2,097,152   | 2,097,152   | 1,624,800   |
| 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         |
| CFLOWD    | No limit   | 0           | 1,048,576   | 0           |
| CFLOWD    | No limit   | 0           | 1,048,576   | 0           |
| IGMP      | No limit   | 0           | 0           | 0           |
| PIM       | No limit   | 0           | 0           | 0           |
| ATM       | No limit   | 2,872,648   | 2,872,648   | 2,790,104   |
| PIM       | 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#

**Table 53 System Memory-Pools Field Descriptions**

| Label              | Description                                                               |
|--------------------|---------------------------------------------------------------------------|
| Name               | The name of the system or process.                                        |
| Max Allowed        | Integer — The maximum allocated memory size.<br>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 [router router-instance | service-name service-name] peer-address} | {servers | server [router router-instance | service-name service-name] server-address} | [all]] [detail]

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Context</b>     | show>system                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b> | This command displays NTP protocol configuration and state.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Parameters</b>  | <p><b>peers</b> — Generates a list of known peers.</p> <p><i>peer-address</i> — Specifies the address of a specific peer.</p> <p><b>Values</b>    ipv4-address: a.b.c.d<br/>                       ipv6-address:<br/>                       • x:x:x:x:x:x:x<br/>                       • x:x:x:x:x:d.d.d.d<br/>                       • x – [0 to FFFF] H<br/>                       • d – [0 to 255] D</p> <p><b>servers</b> — Generates a list of known servers.</p> <p><i>server-address</i> — Specifies the address of a specific server.</p> <p><b>Values</b>    ipv4-address: a.b.c.d<br/>                       ipv6-address:<br/>                       • x:x:x:x:x:x:x<br/>                       • x:x:x:x:x:d.d.d.d<br/>                       • x – [0 to FFFF] H<br/>                       • d – [0 to 255] D</p> <p><b>ptp</b>: shows information about the internal PTP server.</p> <p><i>router-instance</i> — Specifies the routing context that contains the interface in the form of <i>router-name</i> or <i>service-id</i>.</p> <p><b>Values</b>    <i>router-name</i> — Base   Management<br/>                       <i>service-id</i> — 1 to 2147483647</p> <p><b>Default</b>    Base</p> <p><i>service name</i> — Specifies the service name for the VPRN. The name can be up to 64 characters in length. Note that CPM routing instances are not supported.</p> <p><b>all</b> — Generates information for all clients, servers, and peers.</p> <p><b>detail</b> — Provides detailed information.</p> |
| <b>Output</b>      | The following output is an example of NTP information, and <a href="#">Table 54</a> describes the output fields.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

**Sample Output**

```
*A:Dut-A# show system ntp
=====
NTP Status
=====
Configured      : Yes                Stratum          : 4
```



```

Admin Status      : up                Oper Status      : up
Server Enabled   : No                 Server Authenticate : No
Clock Source     : 2001:db8:3333:4444:5555:10:100:2
Auth Check       : Yes
Current Date & Time: 2015/07/10 12:46:30 UTC
  
```

```

=====
*A:Dut-A# show system ntp all
=====
  
```

NTP Status

```

=====
Configured       : Yes                Stratum          : 4
Admin Status     : up                 Oper Status      : up
Server Enabled   : No                 Server Authenticate : No
Clock Source     : 2001:db8:3333:4444:5555:10:100:2
Auth Check       : Yes
Current Date & Time: 2015/07/10 12:46:32 UTC
=====
  
```

NTP Active Associations

```

=====
State            Reference ID   St Type  A  Poll Reach  Offset(ms)
  Router         Remote
-----
invalid          192.168.193.198 2  srvr  y  8  YYYYYYYY -35.396
  Base          2001:db8:3333:4444:5555:40:1:3
invalid          192.168.193.198 2  srvr  y  8  YYYYYYYY -30.850
  Base          2001:db8:3333:4444:5555:40:2:3
invalid          192.168.193.198 2  srvr  y  8  YYYYYYYY -35.654
  Base          2001:db8:3333:4444:5555:40:3:3
invalid          192.168.193.198 2  srvr  y  8  YYYYYYYY -30.939
  Base          2001:db8:3333:4444:5555:40:4:3
invalid          192.168.193.198 2  srvr  y  8  YYYYYYYY -35.206
  67890         2001:db8:3333:4444:5555:40:5:3
chosen           192.168.193.198 2  srvr  y  8  YYYYYYYY -49.405
  67890         2001:db8:3333:4444:5555:70:1:4
candidate        192.168.193.198 2  srvr  y  8  YYYYYYYY -49.054
  67890         2001:db8:3333:4444:5555:70:2:4
outlyer         192.168.193.198 2  srvr  y  8  YYYYYYYY -48.682
  Base          2001:db8:3333:4444:5555:70:3:4
candidate        192.168.193.198 2  srvr  y  8  YYYYYYYY -49.897
  Base          2001:db8:3333:4444:5555:70:4:4
candidate        192.168.193.198 2  srvr  y  8  YYYYYYYY -48.991
  Base          2001:db8:3333:4444:5555:70:5:4
candidate        192.168.193.198 2  bclnt y  8  YYYYYYYY -48.991
  67890         2001:db8:3333:4444:5555:70:5:4
  
```

NTP Clients

```

=====
vRouter          Time Last Request Rx
  Address
-----
Base
  10.10.100.1          03/06/2013 21:32:35
  2001:db8:3333:4444:5555:10:100:1 03/06/2013 21:32:30
=====
  
```

```

*A:Dut-A# show system ntp detail
=====
NTP Status
=====
Configured      : Yes           Stratum           : 4
Admin Status    : up             Oper Status       : up
Server Enabled  : No             Server Authenticate : No
Clock Source    : 2001:db8:3333:4444:5555:10:100:2
Auth Check      : Yes
Auth Errors     : 0             Auth Errors Ignored : 0
Auth Key Id Errors : 0         Auth Key Type Errors : 0
Current Date & Time: 2015/07/10 12:46:34 UTC
=====

=====
NTP Configured Broadcast/Multicast Interfaces
=====
vRouter      Interface      Address          Type   Auth   Poll
-----
=====

=====
NTP Active Associations
=====
State      Reference ID   St Type  A  Poll Reach  Offset(ms)
-----
Router      Remote
-----
invalid    192.168.193.198 2  srvr  y  8  YYYYYYYY -30.563
  Base     2001:db8:3333:4444:5555:40:1:3
invalid    192.168.193.198 2  srvr  y  8  YYYYYYYY -35.233
  Base     2001:db8:3333:4444:5555:40:2:3
invalid    192.168.193.198 2  srvr  y  8  YYYYYYYY -35.808
  Base     2001:db8:3333:4444:5555:40:3:3
invalid    192.168.193.198 2  srvr  y  8  YYYYYYYY -34.563
  Base     2001:db8:3333:4444:5555:40:4:3
invalid    192.168.193.198 2  srvr  y  8  YYYYYYYY -35.507
  Base     2001:db8:3333:4444:5555:40:5:3
candidate  192.168.193.198 2  srvr  y  8  YYYYYYYY -49.990
  Base     2001:db8:3333:4444:5555:70:1:4
candidate  192.168.193.198 2  srvr  y  8  YYYYYYYY -49.926
  Base     2001:db8:3333:4444:5555:70:2:4
chosen     192.168.193.198 2  srvr  y  8  YYYYYYYY -49.803
  Base     2001:db8:3333:4444:5555:70:3:4
candidate  192.168.193.198 2  srvr  y  8  YYYYYYYY -49.897
  Base     2001:db8:3333:4444:5555:70:4:4
outlyer    192.168.193.198 2  srvr  y  8  YYYYYYYY -50.180
  Base     2001:db8:3333:4444:5555:70:5:4
=====

=====
NTP Clients
=====
vRouter      Time Last Request Rx
Address
-----
Base
10.10.100.1      03/06/2013 21:33:31
2001:db8:3333:4444:5555:10:100:1 03/06/2013 21:33:32
=====

```

```

*A:Dut-B# show system ntp all detail
=====
NTP Status
=====
Configured      : Yes           Stratum           : 4
Admin Status    : up             Oper Status       : up
Server Enabled  : No             Server Authenticate : No
Clock Source    : 2001:db8:3333:4444:5555:10:100:2
Auth Check      : Yes
Auth Errors     : 0             Auth Errors Ignored : 0
Auth Key Id Errors : 0         Auth Key Type Errors : 0
Current Date & Time: 2015/07/10 12:46:36 UTC
=====

NTP Configured Broadcast/Multicast Interfaces
=====
vRouter      Interface      Address          Type   Auth   Poll
-----
vprn16       ies-16-10.60.1.3      Host-ones       bcast yes    8
vprn16       ies-16-10.60.2.3      Host-ones       bcast yes    8
vprn16       ies-16-10.60.3.3      Host-ones       bcast yes    8
vprn16       ies-16-10.60.4.3      Host-ones       bcast yes    8
vprn16       ies-16-10.60.5.3      Host-ones       bcast yes    8
vprn16       ies-16-10.60.6.3      Host-ones       bcast yes    8
vprn16       ies-16-10.60.7.3      Host-ones       bcast yes    8
vprn16       ies-16-10.60.8.3      Host-ones       bcast yes    8
vprn16       ies-16-10.60.9.3      Host-ones       bcast yes    8
vprn16       ies-16-10.60.10.3     Host-ones       bcast yes    8
vprn17       ies-10.40.17.3        Host-ones       bcast no     8
vprn18       ies-10.40.18.3        Host-ones       bcast no     8
vprn19       ies-10.40.19.3        Host-ones       bcast no     8
vprn20       ies-10.40.20.3        Host-ones       bcast no     8
.....
vprn996      ies-10.43.228.3       Host-ones       bcast no     8
vprn997      ies-10.43.229.3       Host-ones       bcast no     8
vprn998      ies-10.43.230.3       Host-ones       bcast no     8
vprn999      ies-10.43.231.3       Host-ones       bcast no     8
vprn1000     ies-10.43.232.3       Host-ones       bcast no     8
management  management            192.0.2.1       mcast yes    8
Base         ip-10.60.1.5          Host-ones       bclnt yes    n/a
Base         ip-10.60.2.5          Host-ones       bclnt yes    n/a
Base         ip-10.60.3.5          Host-ones       bclnt yes    n/a
Base         ip-10.60.4.5          Host-ones       bclnt yes    n/a
67890       ip-10.60.5.5          Host-ones       bclnt yes    n/a
67890       ip-10.60.6.5          Host-ones       bclnt yes    n/a
67890       ip-10.60.7.5          Host-ones       bclnt yes    n/a
67890       ip-10.60.8.5          Host-ones       bclnt yes    n/a
67890       ip-10.60.9.5          Host-ones       bclnt yes    n/a
67890       ip-10.60.10.5         Host-ones       bclnt yes    n/a
=====

NTP Active Associations
=====
State          Reference ID   St Type  A  Poll Reach  Offset(ms)
-----
Remote
-----
invalid       192.168.193.198 2  srvr  y  8  YYYYYYYY -30.563
Base         2001:db8:3333:4444:5555:40:1:3
invalid       192.168.193.198 2  srvr  y  8  YYYYYYYY -35.233

```

```

      Base      2001:db8:3333:4444:5555:40:2:3
invalid      192.168.193.198 2  srvr  y  8  YYYYYYYY  -35.808
      Base      2001:db8:3333:4444:5555:40:3:3
invalid      192.168.193.198 2  srvr  y  8  YYYYYYYY  -34.563
      Base      2001:db8:3333:4444:5555:40:4:3
invalid      192.168.193.198 2  srvr  y  8  YYYYYYYY  -35.507
      Base      2001:db8:3333:4444:5555:40:5:3
candidate    192.168.193.198 2  srvr  y  8  YYYYYYYY  -49.990
      Base      2001:db8:3333:4444:5555:70:1:4
candidate    192.168.193.198 2  srvr  y  8  YYYYYYYY  -49.926
      Base      2001:db8:3333:4444:5555:70:2:4
chosen       192.168.193.198 2  srvr  y  8  YYYYYYYY  -49.803
      Base      2001:db8:3333:4444:5555:70:3:4
candidate    192.168.193.198 2  srvr  y  8  YYYYYYYY  -49.897
      Base      2001:db8:3333:4444:5555:70:4:4
outlyer     192.168.193.198 2  srvr  y  8  YYYYYYYY  -50.180
      Base      2001:db8:3333:4444:5555:70:5:4

```

=====  
NTP Clients  
=====

| vRouter<br>Address               | Time Last Request Rx |
|----------------------------------|----------------------|
| Base<br>10.10.100.1              | 03/06/2013 21:33:31  |
| 2001:db8:3333:4444:5555:10:100:1 | 03/06/2013 21:33:32  |

=====

\*A:Dut-C# show system ntp peers

=====  
NTP Active Associations  
=====

| State     | Router | Remote          | Reference ID                    | St | Type  | A | Poll | Reach    | Offset(ms) |
|-----------|--------|-----------------|---------------------------------|----|-------|---|------|----------|------------|
| candidate |        | 192.168.193.198 | 2001:db8:3333:4444:5555:50:1:4  | 2  | actpr | y | 8    | YYYYYYYY | -20.918    |
| candidate |        | 192.168.193.198 | 2001:db8:3333:4444:5555:50:2:4  | 2  | actpr | y | 8    | YYYYYYY. | -19.940    |
| candidate |        | 192.168.193.198 | 2001:db8:3333:4444:5555:50:3:4  | 2  | actpr | y | 8    | YYYYYYYY | -19.970    |
| candidate |        | 192.168.193.198 | 2001:db8:3333:4444:5555:50:4:4  | 2  | actpr | y | 8    | YYYYYYYY | -20.505    |
| candidate |        | 192.168.193.198 | 2001:db8:3333:4444:5555:50:5:4  | 2  | actpr | y | 8    | YYYYYYY. | -21.143    |
| candidate |        | 192.168.193.198 | 2001:db8:3333:4444:5555:50:8:4  | 2  | paspr | y | 8    | YYYYYYY. | -19.598    |
| candidate |        | 192.168.193.198 | 2001:db8:3333:4444:5555:50:7:4  | 2  | paspr | y | 8    | YYYYYYY. | -19.038    |
| candidate |        | 192.168.193.198 | 2001:db8:3333:4444:5555:50:9:4  | 2  | paspr | y | 8    | YYYYYYY. | -20.427    |
| candidate |        | 192.168.193.198 | 2001:db8:3333:4444:5555:50:10:4 | 2  | paspr | y | 8    | YYYYYYYY | -20.709    |
| candidate |        | 192.168.193.198 | 2001:db8:3333:4444:5555:50:6:4  | 2  | paspr | y | 8    | YYYYYYY. | -19.729    |

=====

=====  
NTP Clients  
=====

```

=====
vRouter                                     Time Last Request Rx
  Address
-----
vprn1
  2001:db8:3333:4444:5555:40:1:2          03/06/2013 21:35:22
vprn2
  2001:db8:3333:4444:5555:40:2:2          03/06/2013 21:35:27
vprn3
  2001:db8:3333:4444:5555:40:3:2          03/06/2013 21:35:30
vprn4
  2001:db8:3333:4444:5555:40:4:2          03/06/2013 21:35:24
=====
  
```

\*B:SR\_ORDINARY\_MASTER# show system ntp peers detail

NTP Active Associations

```

=====
State           Reference ID   St Type  A  Poll Reach   Offset(ms)
  Router         Remote
-----
candidate       192.168.193.198 2 actpr y 8  YYYYYYYY -20.918
  Base          2001:db8:3333:4444:5555:50:1:4
candidate       192.168.193.198 2 actpr y 8  YYYYYYYY. -19.940
  Base          2001:db8:3333:4444:5555:50:2:4
candidate       192.168.193.198 2 actpr y 8  YYYYYYYY. -19.970
  Base          2001:db8:3333:4444:5555:50:3:4
candidate       192.168.193.198 2 actpr y 8  YYYYYYYY. -20.505
  Base          2001:db8:3333:4444:5555:50:4:4
candidate       192.168.193.198 2 actpr y 8  YYYYYYYY. -21.143
  Base          2001:db8:3333:4444:5555:50:5:4
candidate       192.168.193.198 2 paspr y 8  YYYYYYYY. -19.598
  Base          2001:db8:3333:4444:5555:50:8:4
candidate       192.168.193.198 2 paspr y 8  YYYYYYYY. -19.038
  Base          2001:db8:3333:4444:5555:50:7:4
candidate       192.168.193.198 2 paspr y 8  YYYYYYYY. -20.427
  Base          2001:db8:3333:4444:5555:50:9:4
candidate       192.168.193.198 2 paspr y 8  YYYYYYYY. -20.709
  Base          2001:db8:3333:4444:5555:50:10:4
candidate       192.168.193.198 2 paspr y 8  YYYYYYYY. -19.729
  Base          2001:db8:3333:4444:5555:50:6:4
=====
  
```

NTP Clients

```

=====
vRouter                                     Time Last Request Rx
  Address
-----
vprn1
  2001:db8:3333:4444:5555:40:1:2          03/06/2013 21:35:22
vprn2
  2001:db8:3333:4444:5555:40:2:2          03/06/2013 21:35:27
vprn3
  2001:db8:3333:4444:5555:40:3:2          03/06/2013 21:35:30
vprn4
  2001:db8:3333:4444:5555:40:4:2          03/06/2013 21:35:24
=====
  
```

\*A:Dut-C# show system ntp peer router Base 2001:db8:3333:4444:5555:50:1:4

```

=====
NTP Peer
=====
State          Reference ID   St Type  A  Poll Reach  Offset(ms)
  Router      Remote
-----
candidate      192.168.193.198 2  actpr y  8  YYYYYYYY -24.164
  Base         2001:db8:3333:4444:5555:50:1:4
=====

*B:SR_ORDINARY_MASTER# show system ntp peer router Base 2001:db8:3333:4444:5555:50:1
:4 detail
=====
NTP Peer
=====
State          Reference ID   St Type  A  Poll Reach  Offset(ms)
  Router      Remote
-----
candidate      192.168.193.198 2  actpr y  8  YYYYYYYY -24.164
  Base         2001:db8:3333:4444:5555:50:1:4
=====

*A:Dut-B# show system ntp servers
=====
NTP Active Associations
=====
State          Reference ID   St Type  A  Poll Reach  Offset(ms)
  Router      Remote
-----
invalid        192.168.193.198 2  srvr  y  8  YYYYYYYY -25.124
  Base         2001:db8:3333:4444:5555:40:1:3
invalid        192.168.193.198 2  srvr  y  8  YYYYYYYY -19.409
  vprn20       2001:db8:3333:4444:5555:40:2:3
invalid        192.168.193.198 2  srvr  y  8  YYYYYYYY -26.174
  vprn20       2001:db8:3333:4444:5555:40:3:3
invalid        192.168.193.198 2  srvr  y  8  YYYYYYYY -25.193
  vprn20       2001:db8:3333:4444:5555:40:4:3
invalid        192.168.193.198 2  srvr  y  8  YYYYYYYY -19.499
  vprn20       2001:db8:3333:4444:5555:40:5:3
candidate      192.168.193.198 2  srvr  y  8  YYYYYYYY -49.050
  vprn20       2001:db8:3333:4444:5555:70:1:4
chosen         192.168.193.198 2  srvr  y  8  YYYYYYYY -48.754
  vprn20       2001:db8:3333:4444:5555:70:2:4
candidate      192.168.193.198 2  srvr  y  8  YYYYYYYY -48.891
  vprn20       2001:db8:3333:4444:5555:70:3:4
candidate      192.168.193.198 2  srvr  y  8  YYYYYYYY -48.562
  vprn20       2001:db8:3333:4444:5555:70:4:4
candidate      192.168.193.198 2  srvr  y  8  YYYYYYYY -48.687
  vprn20       2001:db8:3333:4444:5555:70:5:4
=====

NTP Clients
=====
vRouter                                     Time Last Request Rx
  Address
-----
Base
  10.10.100.1                               03/06/2013 21:39:27
  2001:db8:3333:4444:5555:10:100:1         03/06/2013 21:39:21

```

=====

\*A:Dut-B# show system ntp servers detail

=====

NTP Active Associations

=====

| State     | Router | Remote                         | Reference ID    | St | Type | A | Poll | Reach    | Offset (ms) |
|-----------|--------|--------------------------------|-----------------|----|------|---|------|----------|-------------|
| invalid   | Base   | 2001:db8:3333:4444:5555:40:1:3 | 192.168.193.198 | 2  | srvr | y | 8    | YYYYYYYY | -25.124     |
| invalid   | vprn20 | 2001:db8:3333:4444:5555:40:2:3 | 192.168.193.198 | 2  | srvr | y | 8    | YYYYYYYY | -19.409     |
| invalid   | vprn20 | 2001:db8:3333:4444:5555:40:3:3 | 192.168.193.198 | 2  | srvr | y | 8    | YYYYYYYY | -26.174     |
| invalid   | vprn20 | 2001:db8:3333:4444:5555:40:4:3 | 192.168.193.198 | 2  | srvr | y | 8    | YYYYYYYY | -25.193     |
| invalid   | vprn20 | 2001:db8:3333:4444:5555:40:5:3 | 192.168.193.198 | 2  | srvr | y | 8    | YYYYYYYY | -19.499     |
| candidate | vprn20 | 2001:db8:3333:4444:5555:70:1:4 | 192.168.193.198 | 2  | srvr | y | 8    | YYYYYYYY | -49.050     |
| chosen    | vprn20 | 2001:db8:3333:4444:5555:70:2:4 | 192.168.193.198 | 2  | srvr | y | 8    | YYYYYYYY | -48.754     |
| candidate | vprn20 | 2001:db8:3333:4444:5555:70:3:4 | 192.168.193.198 | 2  | srvr | y | 8    | YYYYYYYY | -48.891     |
| candidate | vprn20 | 2001:db8:3333:4444:5555:70:4:4 | 192.168.193.198 | 2  | srvr | y | 8    | YYYYYYYY | -48.562     |
| candidate | vprn20 | 2001:db8:3333:4444:5555:70:5:4 | 192.168.193.198 | 2  | srvr | y | 8    | YYYYYYYY | -48.687     |

=====

NTP Clients

=====

| vRouter Address                  | Time Last Request   | Rx |
|----------------------------------|---------------------|----|
| Base                             |                     |    |
| 10.10.100.1                      | 03/06/2013 21:39:27 |    |
| 2001:db8:3333:4444:5555:10:100:1 | 03/06/2013 21:39:21 |    |

\*A:Dut-B# show system ntp server service-name vprn20 2001:db8:3333:4444:5555:40:1:3

=====

NTP Server

=====

| State   | Router | Remote                         | Reference ID    | St | Type | A | Poll | Reach    | Offset (ms) |
|---------|--------|--------------------------------|-----------------|----|------|---|------|----------|-------------|
| invalid | vprn20 | 2001:db8:3333:4444:5555:40:1:3 | 192.168.193.198 | 2  | srvr | y | 8    | YYYYYYYY | -19.679     |

=====

\*

A:Dut B# show system ntp server servicename vprn20 2001:db8:3333:4444:5555:40:1:3 detail

=====

NTP Server

=====

| State | Reference ID | St | Type | A | Poll | Reach | Offset (ms) |
|-------|--------------|----|------|---|------|-------|-------------|
|-------|--------------|----|------|---|------|-------|-------------|

```

Router          Remote
-----
invalid          192.168.193.198 2  srvr  y  8  YYYYYYYY  -19.679
vprn20          2001:db8:3333:4444:5555:40:1:3
=====

*A:Dut-C# show system ntp peer router 20 2001:db8:3333:4444:5555:50:1:4
=====
NTP Peer
=====
State          Reference ID  St Type  A  Poll Reach  Offset(ms)
Router          Remote
-----
candidate      192.168.193.198 2  actpr y  8  YYYYYYYY  -24.164
vprn20        2001:db8:3333:4444:5555:50:1:4
=====

*B:SR_ORDINARY_MASTER# show system ntp peer router 20 2001:db8:3333:4444:5555:50:1:4
detail
=====
NTP Peer
=====
State          Reference ID  St Type  A  Poll Reach  Offset(ms)
Router          Remote
-----
candidate      192.168.193.198 2  actpr y  8  YYYYYYYY  -24.164
vprn20        2001:db8:3333:4444:5555:50:1:4
=====

*A:Dut-B# show system ntp server router 20 2001:db8:3333:4444:5555:40:1:3
=====
NTP Server
=====
State          Reference ID  St Type  A  Poll Reach  Offset(ms)
Router          Remote
-----
invalid          192.168.193.198 2  srvr  y  8  YYYYYYYY  -19.679
vprn20          2001:db8:3333:4444:5555:40:1:3
=====

A:Dut-B# show system ntp server router 20 2001:db8:3333:4444:5555:40:1:3 detail
=====
NTP Server
=====
State          Reference ID  St Type  A  Poll Reach  Offset(ms)
Router          Remote
-----
invalid          192.168.193.198 2  srvr  y  8  YYYYYYYY  -19.679
vprn20          2001:db8:3333:4444:5555:40:1:3
=====

```

**Table 54 Show NTP Field Description**

| Label      | Description                                             |
|------------|---------------------------------------------------------|
| Configured | yes — NTP is configured.<br>no — NTP is not configured. |



**Table 54 Show NTP Field Description (Continued)**

| Label                | Description                                                                                                                                           |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Admin Status         | yes — Administrative state is enabled.<br>no — Administrative state is disabled.                                                                      |
| Server Enabled       | yes — This node is configured to serve external clients.<br>no — This node is not configured to server external clients.                              |
| Stratum              | Displays stratum level of this node.                                                                                                                  |
| Oper Status          | yes — The operational state is enabled.<br>no — The operational state is disabled.                                                                    |
| Auth Check           | Displays the authentication requirement.                                                                                                              |
| Server Authenticate  | Yes — Authentication is mandatory on received requests.<br>No — Authentication is not mandatory on received requests.                                 |
| Clock Source         | Address of the chosen server.                                                                                                                         |
| Auth Errors          | 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.                                                                                                |
| Current Date & Time  | Current date and time as determined by the NTP process in the node.                                                                                   |
| vRouter              | The router instance containing the interface.                                                                                                         |
| Router               | The router instance containing the address.                                                                                                           |
| Interface            | The interface configured in NTP.                                                                                                                      |
| Address              | The address used for transmitted messages.                                                                                                            |
| Type                 | bcast — broadcast interface<br>mcast — multicast interface<br>bcInt — broadcast client<br>svr — server<br>actpr — active peer<br>paspr — passive peer |
| Auth                 | Yes — Authentication in use.<br>No — Authentication not in use.                                                                                       |
| Poll                 | # — Current poll interval used on the interface.                                                                                                      |

**Table 54 Show NTP Field Description (Continued)**

| Label  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| State  | <p>Reject — The peer is rejected and will not be used for synchronization. Rejection reasons could be 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.</p> <p>Invalid — The peer is not maintaining an accurate clock. This peer will not be used for synchronization.</p> <p>Excess — The peer's synchronization distance is greater than ten other peers. This peer will not be used for synchronization.</p> <p>Outlier — The peer is discarded as an outlier. This peer will not be used for synchronization.</p> <p>Candidate — The peer is accepted as a possible source of synchronization.</p> <p>Selected — The peer is an acceptable source of synchronization, but its synchronization distance is greater than six other peers.</p> <p>Chosen — The peer is chosen as the source of synchronization.</p> <p>ChosenPPS — The peer is chosen as the source of synchronization, but the actual synchronization is occurring from a pulse-per-second (PPS) signal.</p> |
| Remote | The IP address of the remote NTP server or peer with which this local host is exchanging NTP packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**Table 54 Show NTP Field Description (Continued)**

| Label        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reference ID | <p>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:</p> <p>Peer Codes:</p> <p>ACST — The association belongs to any cast server.</p> <p>AUTH — Server authentication failed. Wait while the association is restarted.</p> <p>AUTO — Autokey sequence failed. Wait while the association is restarted.</p> <p>BCST — The association belongs to a broadcast server.</p> <p>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.</p> <p>DENY — Access denied by remote server. No further messages will be sent to the server.</p> <p>DROP — Lost peer in symmetric mode. Wait while the association is restarted.</p> <p>RSTR — Access denied due to local policy. No further messages will be sent to the server.</p> <p>INIT — The association has not yet synchronized for the first time.</p> <p>MCST — The association belongs to a manycast server.</p> <p>NKEY — No key found. Either the key was never installed or is not trusted.</p> <p>RATE — Rate exceeded. The server has temporarily denied access because the client exceeded the rate threshold.</p> <p>RMOT — The association from a remote host running ntpdc has had unauthorized attempted access.</p> <p>STEP — A step change in system time has occurred, but the association has not yet resynchronized.</p> <p>System Codes:</p> <p>INIT — The system clock has not yet synchronized for the first time.</p> <p>STEP — A step change in system time has occurred, but the system clock has not yet resynchronized.</p> |
| St           | Stratum level of this node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**Table 54 Show NTP Field Description (Continued)**

| Label                | Description                                                                                                                                                                                        |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A                    | y — Authentication is enabled.<br>n — Authentication is disabled.                                                                                                                                  |
| Poll                 | Polling interval.                                                                                                                                                                                  |
| Reach                | Shows the reachability for the most recent polls (up to 8):<br>Y — The NTP peer or server did respond in the indicated poll.<br>No — The NTP peer or server did not respond in the indicated poll. |
| Offset               | The time between the local and remote UTC time, in milliseconds.                                                                                                                                   |
| Time Last Request Rx | The time at which the last request was received from the client.                                                                                                                                   |

## port-topology

**Syntax** `port-topology [uni-dir]`

**Context** `show>system`

**Description** This command generates a listing of the internal connections within the router. These include connections to satellite ports. Use of the **uni-dir** keyword will list each connection twice; once for each direction.

**Parameters** **uni-dir** — Specifies to list each direction as a separate row.

**Output** The following output is an example of port topology information.

### Sample Output

```
*A:Dut-A# show system port-topology
=====
Port Topology
=====
Port Far-end
Id Port Id
-----
esat-1/1/u1 1/1/1
esat-1/1/u2 1/1/2
esat-1/1/u3 1/2/1
esat-1/1/u4 1/2/2
esat-20/1/u1 1/1/3
esat-20/1/u2 1/2/3
esat-20/1/u3 2/1/3
esat-20/1/u4 2/2/3
-----
No. of Number of port-topology associations: 8
=====
```

ptp

- Syntax** ptp
- Context** show>system
- Description** This command displays Precision Time Protocol (PTP) configuration and state information. This information can be displayed for the entire node or on a per router instance basis.
- Output** The following output is an example of PTP information, and [Table 55](#) describes the output fields.

**Sample Output**

```
B:NS082761964# show system ptp
=====
IEEE 1588/PTP Clock Information
=====
-----
Local Clock
-----
Clock Type       : boundary           PTP Profile       : ITU-T G.8275.1
Domain           : 0                 Network Type      : sdh
Admin State      : up                 Oper State        : up
Announce Interval : 1 pkt/2 s         Announce Rx Timeout : 3 intervals
Peer Limit       : none (Base Router) G.8275.1 Priority : 128
Clock Id         : 001af0fffeb2fead   Clock Class       : 255 (slave-only)
Clock Accuracy   : 0xfe (unknown)    Clock Variance    : ffff (not computed)
Clock Priority1  : 128                Clock Priority2    : 128
PTP Recovery State: locked           Last Changed      : 08/24/2010 13:17:37
Frequency Offset : +231.920 ppb
-----
Parent Clock
-----
IP Address       : 10.1.1.1           Router            : Base
Port             : 1/2/8             Remote MAC Address: 01:02:03:04:05:06
Local Clock is Parent Clock
Parent Clock Id  : 001af0fffeab36ad   Parent Port Number: 2
GM Clock Id     : 00b0aefffe011ca6   GM Clock Class    : 13
GM Clock Accuracy : 0xfe (unknown)    GM Clock Variance : 0x6400 (3.7E-09)
GM Clock Priority1: 128                GM Clock Priority2: 128
-----
Time Information
-----
Timescale        : PTP
Current Time     : 2011-08-30 15:31:42.99 UTC
Frequency Traceable : yes
Time Traceable  : yes
Time Source      : gps
=====
```

**Table 55 System PTP Field Descriptions**

| Label               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Local Clock         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Clock Type          | <p>The type of clock of the network element.</p> <ul style="list-style-type: none"> <li>• ordinarySlave — The system is always a slave clock in the master-slave hierarchy. The system derives its timing from one or more master clocks in the network.</li> <li>• ordinaryMaster — The system is a grandmaster clock in the master-slave hierarchy. The system provides timing to multiple slave clocks in the network.</li> <li>• boundary — The system is a boundary clock, which may be anywhere in the master-slave clock hierarchy. It can obtain timing from a master clock, and provide timing to multiple slave clocks.</li> </ul> |
| PTP Profile         | <p>The Precision Time Protocol (PTP) profile specifies the standard to which PTP conforms.</p> <ul style="list-style-type: none"> <li>• g8265dot1-2010 — The PTP profile specified in the ITU-T G.8265.1 recommendation.</li> <li>• ieee1588-2008 — The default PTP profile specified in the IEEE 1588-2008 standard.</li> <li>• g8275dot1-2014 — The PTP profile specified in the ITU-T G.8275.1 recommendation.</li> </ul>                                                                                                                                                                                                                 |
| Domain              | The domain in which PTP 1588 runs on the system.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Network Type        | The SR OS is configured to use PTP clock classes corresponding to either SONET or SDH quality levels.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Admin State         | The administrative state of PTP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Oper State          | The operational state of PTP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Announce Interval   | The packet rate requested in REQUEST_UNICAST_TRANSMISSION signaling messages for announce packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Announce Rx Timeout | The number of announce intervals that have to occur without receiving a PTP announce message before the PTP event ANNOUNCE_RECEIPT_TIMEOUT_EXPIRES occurs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Peer Limit          | The maximum number of PTP peers that may be automatically created by the system on this router instance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| G.8275.1 Priority   | The priority used in the best master clock algorithm for the local (internal) PTP port when Clock Profile is g8275dot1-2014.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Clock ID            | The clock Identity value of the local PTP clock (defaultDS).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Clock Class         | The clockClass value of the local PTP clock (defaultDS).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

**Table 55 System PTP Field Descriptions (Continued)**

| Label              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Clock Accuracy     | The clockAccuracy value accuracy of the local PTP clock (defaultDS).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Clock Variance     | The offsetScaledLogVariance value of the local PTP clock (defaultDS).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Clock Priority1    | The priority1 value of the local PTP clock (defaultDS).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Clock Priority2    | The priority2 value of the local PTP clock (defaultDS).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| PTP Recovery State | The state of the frequency recovery algorithm. <ul style="list-style-type: none"> <li>• notApplicable — The system is not attempting to recover a clock.</li> <li>• initial — The system is configured to recover a clock, but not enough information has yet been received to adjust the local clock to match a master clock.</li> <li>• acquiring — The system has enough information to attempt clock recovery, and has started the process of adjusting its local clock frequency to match the master clock.</li> <li>• phaseTracking — The system has adjusted its local clock to the approximate frequency of the master clock, and is adjusting the local clock to minimize the phase difference between the two clocks.</li> <li>• holdover — The system has stopped receiving useful information from the chosen master clock, and is maintaining the last estimated frequency for its local clock.</li> <li>• locked — The system is locked to the chosen master clock and the phase error between the master clock and the local clock is relatively small.</li> </ul> |
| Last Changed       | The date and time of the last change of the PTP Recovery State.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Frequency Offset   | The offset computed by the frequency recovery algorithm required to align the local oscillator to the frequency of the parent clock. The value is provided in parts per billion. Positive values indicate that the recovered clock is faster than nominal, and negative values indicate that the recovered clock is slower than nominal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Parent Clock       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| IP Address         | The IP address of the parent clock that was last chosen by the local PTP clock.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Router             | The name of the routing instance that contains the parent clock IP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Port               | The local port used for communication with the parent clock.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**Table 55 System PTP Field Descriptions (Continued)**

| Label                       | Description                                                                                                                              |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Remote MAC Address          | The MAC address of the parent clock port sending PTP message to the local PTP clock                                                      |
| Local Clock is Parent Clock | Displayed if there is no external parent clock.                                                                                          |
| Parent Clock ID             | The clockIdentity of the parent clock.                                                                                                   |
| Parent Port Number          | The portNumber of the PTP port on the parent clock that is used to communicate with the local PTP clock.                                 |
| GM Clock Id                 | The clockIdentity value of the grandmaster clock advertised by the parent clock.                                                         |
| GM Clock Class              | The clockClass value of the grandmaster clock advertised by the parent clock.                                                            |
| GM Clock Accuracy           | The clockAccuracy value of the grandmaster clock advertised by the parent clock.                                                         |
| GM Clock Variance           | The offsetScaledLogVariance value of the grandmaster clock advertised by the parent clock.                                               |
| GM Clock Priority1          | The priority1 value of the grandmaster clock advertised by the parent clock.                                                             |
| GM Clock Priority2          | The priority2 value of the grandmaster clock advertised by the parent clock.                                                             |
| Time Information            |                                                                                                                                          |
| Timescale                   | The time scale of the time distributed by PTP.                                                                                           |
| Current Time                | The date and time. If the timescale is PTP, then the time is converted to UTC time based on the current offset between UTC and PTP time. |
| Frequency Traceable         | Indicates if the time distributed by PTP is traceable a primary reference.                                                               |
| Time Traceable              | Indicates if the time distributed by PTP is traceable to a primary reference.                                                            |
| Time Source                 | The source of time used by the grandmaster clock.                                                                                        |

peer

**Syntax** peer *ip-address* [**router** *router-instance* | **service-name** *service-name*] [**detail**]



- Context** show>system>ptp
- 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* — Shows only the information for a specific router instance.  
**Values** router-name – Base  
vprn-svc-id – 1 to 2147483647
- service-name* — Specifies the service name used to identify the router instance. The name can be up to 64 characters long.
- detail** — Displays detailed information.
- Output** The following output is an example of PTP information for a single peer.

**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
  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
=====

```

## peers

**Syntax** `peers [router router-instance | service-name service-name] [detail]`

**Context** `show>system>ptp`

**Description** This command displays summary information for all the PTP peers.

**Parameters** *router-instance* — Shows only the information for a specific router instance.

**Values** *router-name* – Base  
*vprn-svc-id* – 1 to 2147483647

*service-name* — Specifies the service name used to identify the router instance. The name can be up to 64 characters long.

**detail** — Displays detailed information.

**Output** The following output is an example of PTP information for all peers.

### 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
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    : ac5effffffe000000 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:bkxsim1618# 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       : ac5effffffe000000 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       : ac5dfffffe0000000 Remote PTP Port    : 1
GM Clock Id    : ac5dfffffe0000000 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
=====
```

## port

- Syntax**     **port** *port-id* [**detail**]
- Context**    show>system>ptp
- Description** This command displays port information.
- 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.

### Sample Output

```
A:bkxsim1618# 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
```

```
A:bksim1618# show system ptp port 1/1/1 detail
=====
IEEE 1588/PTP Ethernet Port Information
=====
Port          : 1/1/2
Local MAC Addr : 02:43:BA:01:00:03  Multicast MAC Addr : 01:1b:19:00:00:00
PTP Admin State : up                PTP Oper State      : up
PTP Port Number : 3                PTP Port State     : Slave
Tx Sync/Delay Rate : 64 pkt/s        Tx Anno Rate       : 1 pkt/2 s
Neighbor Clocks  : 4                Timestamp Point    : port
=====
IEEE 1588/PTP Neighbor Clocks
=====
  MAC Address      Clock Id          Port Num    Rx Packet Rate
-----
  01:02:03:04:05:06  ac65ffffffe000001    65535      64
  01:02:03:04:05:07  ac65ffffffe000002         1          0
  01:02:03:04:05:08  ac65ffffffe000003         2          64
  01:02:03:04:05:09  ac65ffffffe000004        99          0
=====
IEEE 1588/PTP Packet Statistics
=====
                                     Input          Output
-----
PTP Packets                          253           11
  Announce                            243           1
  Sync                                 0             0
  Follow Up                            0             0
  Delay Request                        0             0
  Delay Response                       0             0
  Signaling                            10            10
  Other                                 0             0
Discards                               0             0
  Bad PTP domain                      0             0
  Alternate Master                    0             0
  Out Of Sequence                     0             0
  Other                                 0             0
=====
```

```
A:bksim1620# show system ptp peer 10.1.1.2 router 5 detail
=====
IEEE 1588/PTP Peer Information
=====
Router Instance : 5
IP Address      : 10.1.1.2          Announce Direction : rx+tx
Admin State     : up                G.8265.1 Priority  : n/a
Sync Interval   : 64 pkt/s
Local PTP Port  : 2                PTP Port State     : passive
Clock Id       : ac5dffffffe000000 Remote PTP Port    : 2
GM Clock Id    : ac5cffffffe000000 GM Clock Class     : 13
GM Clock Accuracy : 0xfe (unknown) GM Clock Variance  : ffff (not computed)
GM Clock Priority1: 128           GM Clock Priority2 : 128
Steps Removed   : 1                Parent Clock       : no
Tx Timestamp Point: port          Rx Timestamp Point : port
Last Tx Port    : 1/1/2           Last Rx Port      : 1/1/2
Asym Factor Tx  : 456 ns          Asym Factor Rx    : 456 ns
=====
```

---

## standby

- Syntax**     **standby**
- Context**    show>system>ptp
- Description** This command displays information for PTP on the standby control module.
- Output**     The following output is an example of PTP standby information.

### Sample Output

```

B:NS082761964# show system ptp standby
=====
IEEE 1588/PTP Clock Information
=====
-----
Local Clock
-----
Clock Type       : ordinary,slave   PTP Profile      : ieee1588-2008
Domain          : 0
Admin State      : up                Oper State       : up
Announce Interval : 1 pkt/2 s      Announce Rx Timeout : 3 intervals
Clock Id         : 001af0fffeb2fead  Clock Class      : 255 (slave-only)
Clock Accuracy   : 0xfe (unknown)    Clock Variance   : ffff (not computed)
Clock Priority1  : 128                Clock Priority2   : 128
PTP Port State   : listening         Last Changed     : 02/11/2013 18:09:58
PTP Recovery State: locked           Last Changed     : 08/24/2010 13:17:37
Frequency Offset : +231.920 ppb
-----
Parent Clock
-----
IP Address       : 10.1.1.1
Parent Clock Id  : 001af0fffeab36ad  Remote PTP Port Number: 2
GM Clock Id     : 00b0aefffe011ca6   GM Clock Class    : 13
GM Clock Accuracy : 0xfe (unknown)    GM Clock Variance : 0x6400 (3.7E-09)
GM Clock Priority1: 128                GM Clock Priority2: 128
-----
Time Information
-----
Timescale       : PTP
Current Time    : 2011-08-30 15:31:42.99 UTC
Frequency Traceable : yes
Time Traceable  : yes
Time Source     : gps
=====

```

## statistics

- Syntax**     **statistics**
- Context**    show>system>ptp

**Description** This command displays the message and error statistics for the node.

**Output** The following output is an example of PTP statistics information.

**Sample Output**

```
A:bksim1619# show system ptp statistics
=====
IEEE 1588/PTP Packet Statistics
=====
```

|                                   | Input   | Output  |
|-----------------------------------|---------|---------|
| PTP Packets                       | 2910253 | 2393354 |
| Announce                          | 9015    | 22682   |
| Sync                              | 1153275 | 622585  |
| Follow Up                         | 0       | 0       |
| Delay Request                     | 594036  | 1153568 |
| Delay Response                    | 1153044 | 593614  |
| Signaling                         | 883     | 905     |
| Request TLVs                      | 428     | 598     |
| Announce                          | 304     | 350     |
| Sync                              | 62      | 124     |
| Delay Response                    | 62      | 124     |
| Grant TLVs (Granted)              | 514     | 428     |
| Announce                          | 272     | 304     |
| Sync                              | 121     | 62      |
| Delay Response                    | 121     | 62      |
| Grant TLVs (Rejected)             | 0       | 0       |
| Announce                          | 0       | 0       |
| Sync                              | 0       | 0       |
| Delay Response                    | 0       | 0       |
| Cancel TLVs                       | 3       | 0       |
| Announce                          | 1       | 0       |
| Sync                              | 1       | 0       |
| Delay Response                    | 1       | 0       |
| Ack Cancel TLVs                   | 0       | 3       |
| Announce                          | 0       | 1       |
| Sync                              | 0       | 1       |
| Delay Response                    | 0       | 1       |
| Other TLVs                        | 0       | 0       |
| Other                             | 0       | 0       |
| Event Packets timestamped at port | 215523  | 215371  |
| Event Packets timestamped at cpm  | 0       | 0       |
| Discards                          | 0       | 0       |
| Bad domain value                  | 0       | 0       |
| Alternate Master Flag Set         | 0       | 0       |
| Other                             | 0       | 0       |

```
=====
IEEE 1588/PTP Clock Recovery State Statistics
=====
```

| State          | Seconds |
|----------------|---------|
| Initial        | 136     |
| Acquiring      | 0       |
| Phase-Tracking | 0       |
| Locked         | 0       |
| Hold-over      | 0       |

```

=====
IEEE 1588/PTP Clock Recovery Event Statistics
=====
Event  Count
-----
Packet Loss   0
Excessive Packet Loss                                   0
Excessive Phase Shift Detected                          0
Too Much Packet Delay Variation                         0
=====
IEEE 1588/PTP Message Rates Per Second
                                Unicast                Multicast
                                Input          Output          Input          Output
-----
Announce                        0.50          1024              0             1024
Sync                            64           1024              0             1024
Delay_Req                       1024           64              1024           0
Delay_Resp                       64           1024              0             1024
Total                          1153          3136              1024           3072

```

## unicast

**Syntax** `unicast [router router-instance | service-name service-name]`

**Context** `show>system>ptp`

**Description** This command displays unicast negotiation information.

**Parameters** *router-instance* — Shows only the information for a specific router instance.

**Values** *router-name* – Base  
*vrn-svc-id* – 1 to 2147483647

*service-name* — Specifies the service name used to identify the router instance. The name can be up to 64 characters.

**Output** The following output is an example of PTP unicast information.

### 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
=====

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#

```

## rollback

- Syntax** `rollback [rescue]`
- Context** `show>system`
- Description** This command displays rollback configuration and state.
- Parameters** `rescue` — Specifies the rescue configuration.
- Output** The following output is an example of system rollback information.

### Sample Output

```

A:dut-a_a># show system rollback
=====
Rollback Information
=====
Rollback Location      : cf1:/Rollback
Save
  Last Rollback Save Result : In Progress, Successful or Failed
  Last Save Completion Time : 10/15/2010 21:24:06
Revert

```

```

In Progress                : Yes, No
Last Revert Initiated Time : 10/15/2010 21:26:23
Last Revert Initiated User : xyz
Last Initiated Checkpoint  : cf1:/Rollback.rb.3
Last Completed Revert Result : Successful or Failed
Last Revert Completion Time : 10/15/2010 21:27:19
=====
Rollback Files
=====
Idx      Suffix  Creation time      Release  User
      Comment
-----
latest  .rb      2010/10/15 21:24:02  9.0.R4  fred
      This checkpoint was saved after the 3 VPLS services were created
1       .rb.1    2010/10/15 21:23:58  9.0.R4  John
      John's checkpoint on Sunday
2       .rb.2    2010/10/15 21:23:52  9.0.R4  admin
      A long checkpoint comment that an operator is using to summarize
      various some of the changes that were made. They may even have so
      much to say that they use the maximum comment size. Notice that
      words are not chopped.
...
9       .rb.9    2010/10/14 22:00:01  9.0.R4  admin
      VPLS services 1000-2000 created
...
53      .rb.53   2010/10/14 22:10:10  9.0.R4  admin
-----
No. of Rollback Files: 10
=====

```

## satellite

- Syntax**     **satellite**
- Context**    show>system
- Description** This command displays a list of configured satellites including information about the satellite's esat-ID or tsat-ID, satellite type, and state.
- Output**     The following output is an example of satellite information.

### Sample Output

```

A:Dut-A# show system satellite

=====
Satellite Information
=====
SatID      Provisioned Type      Admin      Oper
           Equipped Type (if different)  State      State
-----
esat-1     es48-1gb-sfp         up         provisioned
           (not equipped)
esat-20    es48-1gb-sfp         up         up
tsat-2     ts4-choc3-sfp        up         up

```

```
tsat-3    ts4-choc3-sfp                                up          up
-----
No. of Satellites: 4
=====
```

## eth-sat

- Syntax**    **eth-sat** [*sat-id*]
- Context**    show>system>satellite
- Description** This command displays information about configured Ethernet satellites. If a *sat-id* is specified, this command displays information only about the specified Ethernet satellite.
- Parameters** *sat-id* — Specifies the Ethernet satellite chassis.
- Output**     The following output is an example of Ethernet satellite information.

### Sample Output

```
A:Dut-A# show system satellite eth-sat 1
=====
Satellite Information
=====
SatID      Provisioned Type          Admin      Oper
           Equipped Type (if different) State      State
-----
esat-1     es48-1gb-sfp             up         up
Description      : (Not Specified)
MAC Address       : e4:81:84:24:2e:e5
Software Repository : repl
SyncE             : Disabled
Client-Down-Delay : Disabled | 5-1800sec
Hardware Data
  Platform type   : N/A
  Part number     : 82-0825-01
  CLEI code      :
  Serial number   : 01154100020
  Manufacture date :
  Manufacturing deviations : (Not Specified)
  Manufacturing assembly number :
  Administrative state : up
  Operational state  : up
  Temperature      : 51C
  Temperature threshold : 85C
  Software boot (rom) version : X-9.0.S222 on Thu Feb 16 03:29:00 IST 2017
                               by builder
  Software version  : TiMOS-B-8.0.R9 both/hops Nokia SAS-Sx
                               46F2C4SFP+ 7210 Copyright (c) 2000-2016
                               Nokia.
                               All rights reserved. All use subject to
                               applicable license agreements.
                               Built on Mon Oct 31 10:10:30 IST 2016 by
                               builder in /home/builder/8.0B1/R9/panos/
                               main
```

```

Time of last boot           : 2017/02/28 13:02:41
Current alarm state        : alarm cleared
Base MAC address           : e4:81:84:24:2e:e5
=====

```

## tdm-sat

- Syntax** `tdm-sat [sat-id]`
- Context** `show>system>satellite`
- Description** This command displays information about configured TDM satellites. If a sat-id is specified, this command displays information only about the specified TDM satellite.
- Parameters** `sat-id` — Specifies the TDM satellite chassis.
- Output** The following output is an example of TDM satellite information.

### Sample Output

```

*A:Dut-A# show system satellite tdm-sat 1
=====
Satellite Information
=====
SatID      Provisioned Type          Admin      Oper
           Equipped Type (if different)  State     State
-----
tsat-1     ts4-choc3-sfp            up         up
Description      : (Not Specified)
MAC Address       : 90:3a:a0:f0:71:97
Software Repository : tsat-1
SyncE             : Enabled
Hardware Data
  Platform type   : N/A
  Part number     : 3HE10328AARC0103
  CLEI code       : INMAT00FRA
  Serial number   : NS16361M001
  Manufacture date : 09082016
  Manufacturing deviations : (Not Specified)
  Manufacturing assembly number :
  Administrative state : up
  Operational state   : up
  Software boot (rom) version : X-8.0.B1-105 on Tue Feb 14 22:51:10 EST
                               2017 by builder
  Software version   : TiMOS-B-0.0.I3066 both/hops NOKIA SAR 7705
                               Copyright (c) 2000-2017 Nokia.
                               All rights reserved. All use subject to
                               applicable license agreements.
                               Built on Sat Feb 25 00:03:24 EST 2017 by
                               builder in /rel0.0/I3066/panos/main
  Time of last boot   : 2017/02/27 14:43:46
  Current alarm state : alarm cleared
  Base MAC address    : 90:3a:a0:f0:71:97
=====

```

---

## port-map

- Syntax** `port-map [client-map-id]`
- Context** `show>system>satellite>eth-sat`  
`show>system>satellite>tdm-sat`
- Description** This command displays information about configured satellites port maps.
- Parameters** *client-map-id* — Specifies the client map to display.
- Output** The following output is an example of TDM satellite port map information.

### Sample Output

```
A:Dut-A# show system satellite tdm-sat 1 port-map
=====
Satellite Port Mapping Information
=====
Client Port      Adm  State  Uplink Port      Adm  State  Host Port  Adm  State
-----
tsat-1/1/1      Down Down  tsat-1/1/u1      Up   Up     1/1/4      Up   Up
tsat-1/1/2      Down Down  tsat-1/1/u1      Up   Up     1/1/4      Up   Up
tsat-1/1/3      Down Down  tsat-1/1/u1      Up   Up     1/1/4      Up   Up
tsat-1/1/4      Down Down  tsat-1/1/u1      Up   Up     1/1/4      Up   Up
=====
```

## sync-if-timing

- Syntax** `sync-if-timing`
- Context** `show>system>satellite>eth-sat`  
`show>system>satellite>tdm-sat`
- Description** This command displays synchronous interface timing operational information.
- Output** The following output is an example of TDM satellite synchronous interface timing information.

### Sample Output

```
A:Dut-A# show system satellite tdm-sat 1 sync-if-timing
=====
Satellite tsat-1 Synchronous Interface Timing Operational Information
=====
System Status                : Master Locked
System Quality Level         : eec2
Current Frequency Offset (ppm) : +0
Reference Input 1
  Admin Status                : up
  Rx Quality Level            : eec2
  Qualified For Use           : yes
  Selected For Use            : yes
  Source Port                 : tsat-1/1/u1
```

```
Reference Input 2
  Admin Status           : down
  Rx Quality Level      : unknown
  Qualified For Use      : no
    Not Qualified Due To : disabled
  Selected For Use       : no
    Not Selected Due To  : disabled
  Source Port           : none
=====
```

## sntp

- Syntax**     **sntp**
- Context**    show>system
- Description** This command displays SNTP protocol configuration and state.
- Output**     The following output is an example of SNTP information, and [Table 56](#) describes the output fields.

### Sample Output

```
A:ALA-1# show system sntp
=====
SNTP
=====
SNTP Server            Version            Preference            Interval
-----
10.10.20.253           3                    Preferred            64
=====
A:ALA-1#
```

**Table 56**     **System SNTP Field Descriptions**

| Label       | Description                                                                                                                                                                                 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SNTP Server | The SNTP server address for SNTP unicast client mode.                                                                                                                                       |
| Version     | The SNTP version number, expressed as an integer.                                                                                                                                           |
| Preference  | Normal — When more than one time server is configured, one server can be configured to have preference over another.<br>Preferred — Indicates that this server has preference over another. |
| Interval    | The frequency, in seconds, that the server is queried.                                                                                                                                      |

## thresholds

- Syntax**     **thresholds**

- Context** show>system
- Description** This command displays system monitoring thresholds. The Threshold Events Log table will keep only the last 201 entries.
- Output** The following output is an example of system threshold information, and [Table 57](#) describes the output fields.

**Sample Output**

```
A:bkvm3# show system thresholds
=====
Threshold Alarms
=====
Variable: tmnxCpmFlashUsed.1.10.1
Alarm Id      : 1      Last Value : 3192120
Rising Event Id : 1      Threshold  : 10
Falling Event Id : 0      Threshold  : 0
Sample Interval : 1      SampleType : absolute
Startup Alarm  : either  Owner       : TiMOS CLI

Variable: tmnxCpmFlashUsed.1.10.2
Alarm Id      : 2      Last Value : 0
Rising Event Id : 2      Threshold  : 20
Falling Event Id : 3      Threshold  : 30
Sample Interval : 2      SampleType : absolute
Startup Alarm  : either  Owner       : TiMOS CLI

Variable: tmnxCpmFlashPercentageUsed.1.10.1
Alarm Id      : 3      Last Value : 19
Rising Event Id : 4      Threshold  : 30
Falling Event Id : 0      Threshold  : 0
Sample Interval : 3      SampleType : absolute
Startup Alarm  : either  Owner       : TiMOS CLI

Variable: tmnxCpmFlashPercentageUsed.1.10.2
Alarm Id      : 4      Last Value : 0
Rising Event Id : 5      Threshold  : 40
Falling Event Id : 6      Threshold  : 50
Sample Interval : 4      SampleType : absolute
Startup Alarm  : either  Owner       : TiMOS CLI

=====
Threshold Events
=====
Description: TiMOS CLI - cflash capacity alarm rising event
using percentages
Event Id      : 1      Last Sent   : 07/23/2015 18:15:46
Action Type   : both   Owner       : TiMOS CLI

Description: TiMOS CLI - cflash capacity warning rising event
Event Id      : 2      Last Sent   : never
Action Type   : both   Owner       : TiMOS CLI

Description: TiMOS CLI - cflash capacity warning falling event
Event Id      : 3      Last Sent   : 07/23/2015 18:15:46
```

```

Action Type      : both      Owner       : TiMOS CLI

Description: TiMOS CLI - cflash capacity warning rising event
              using percentages
Event Id         : 4          Last Sent  : never
Action Type      : both      Owner       : TiMOS CLI

Description: TiMOS CLI - cflash capacity alarm rising event
              using percentages
Event Id         : 5          Last Sent  : never
Action Type      : both      Owner       : TiMOS CLI

Description: TiMOS CLI - cflash capacity alarm falling event
              using percentages
Event Id         : 6          Last Sent  : 07/23/2015 18:15:46
Action Type      : both      Owner       : TiMOS CLI

=====
Threshold Events Log
=====
Description      : TiMOS CLI - cflash capacity alarm rising
                  event using percentages : value=3192120,
                  >=10 : alarm-index 1, event-index 1 alarm-
                  variable OID tmnxCpmFlashUsed.1.10.1
Event Id         : 1          Time Sent   : 07/23/2015 18:15:46

Description      : TiMOS CLI - cflash capacity warning falling
                  event : value=0, <=30 : alarm-index 2, event-
                  index 3 alarm-variable OID tmnxCpmFlashUsed.
                  1.10.2
Event Id         : 3          Time Sent   : 07/23/2015 18:15:46

Description      : TiMOS CLI - cflash capacity alarm falling
                  event using percentages : value=0, <=50 :
                  alarm-index 4, event-index 6 alarm-variable
                  OID tmnxCpmFlashPercentageUsed.1.10.2
Event Id         : 6          Time Sent   : 07/23/2015 18:15:46

=====

```

**Table 57 System Thresholds Field Descriptions**

| 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.    |



**Table 57 System Thresholds Field Descriptions (Continued)**

| Label           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.                                                                                                                                                                                                                                                                                                                                        |
| SampleType      | 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.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 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.<br>trap — An SR OS logger event is generated. The SR OS 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.<br>both — Both an entry in the RMON-MIB logTable and an SR OS logger event are generated.<br>none — No action is taken. |
| Owner           | Displays the owner of the event.                                                                                                                                                                                                                                                                                                                                                                                                                                      |

time

**Syntax** time

**Context** show>system

**Description** This command displays the system time and zone configuration parameters.

**Output** The following output is an example of system time information, and [Table 58](#) 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
Zone type         : standard
-----
DST Zone          : PDT                    Offset from Non-DST : 01:00
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 58 System Time Field Descriptions**

| Label               | Description                                                                                                                                                          |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date & Time         | The system date and time using the current time zone.                                                                                                                |
| DST Active          | Yes — Daylight Savings Time is currently in effect.<br>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.                                                                               |
| Current Time Zone   | Indicates the process currently controlling the system time. SNTP, NTP, PTP or NONE.                                                                                 |
| Zone type           | Non-standard — The zone is user-defined.<br>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 to 1) and minutes (0 to 59) 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**
- Context**     show
- 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
```

## redundancy

- Syntax**     **redundancy**
- Context**     show
- Description**   This command enables the context to show redundancy information.

## mgmt-ethernet

- Syntax**     **mgmt-ethernet**
- Context**     show>redundancy
- Description**   This command shows the management Ethernet port redundancy status. The show router “management” interface command also shows the CPM Ethernet port used by the management interface. If the primary CPM’s port is active, then it shows “A/1” under the Port field,. If the secondary CPM’s port is active, then it shows “B/1 -> A/1”in the Port field.
- Output**       The following output is an example of redundancy mgmt-Ethernet information, and [Table 59](#) describes the output fields.

### Sample Output

```
A:SR12# show redundancy mgmt-ethernet
=====
Management Ethernet Redundancy
=====
Admin Status   : Enabled
Oper Status    : Management port operating on active CPM
Revert Time    : 5 seconds
```

=====

**Show Router "Management" Interface Detail Output**

The following is a sample output that shows "A/1" when the primary CPM's Ethernet port is active and "B/1 ->A/1" if the secondary CPM's port is active.

```
*B:Dut-A# show router "management" interface
=====
Interface Table (Router: management)
=====
Interface-Name          Adm      Opr (v4/v6)  Mode     Port/SapId
  IP-Address              PfxState
-----
management              Up       Up/Up        Network  B/1 -> A/1
  192.168.186.219/24      n/a
  2001:db8::8a78:badb/96  PREFERRED
  fe80::221:5ff:fece:df49/64  PREFERRED
-----
Interfaces : 1
=====
```

```
*B:Dut-A# show router "management" interface detail
=====
Interface Table (Router: management)
=====
Interface
-----
If Name          : management
Admin State     : Up
Oper (v4/v6)    : Up/Up
Protocols       : None
IP Addr/mask    : 192.168.186.219/24  Address Type   : Primary
IGP Inhibit     : Disabled
Broadcast Address : Host-ones
HoldUp-Time     : 0
Track Srrp Inst : 0
IPv6 Address    : 2001:db8::8a78:badb/96
IPv6 Addr State : PREFERRED
CGA modifier    : (Not Specified)
HoldUp-Time     : 0
Track Srrp Inst : 0
Link Lcl Address : fe80::221:5ff:fece:df49/64
Link Lcl State  : PREFERRED
-----
Details
-----
Description     : (Not Specified)
If Index        : 1280
Virt. If Index  : 1280
Last Oper Chg  : 06/16/2015 21:01:07
Global If Index : 16384
Lag Link Map Prof: none
Port Id         : B/1 -> A/1
TOS Marking     : Trusted
If Type         : Network
Egress Filter   : none
Ingress Filter  : none
Egr IPv6 Flt   : none
Ingr IPv6 Flt  : none
BGP IP FlowSpec : Disabled
BGP IPv6 FlowSpec: Disabled
SNTP B.Cast    : True
Network QoS Policy: 1
MAC Address     : 00:21:05:ce:df:49
Mac Accounting  : Disabled
```

**Table 59 Redundancy Mgmt-Ethernet Field Descriptions**

| Label             | Description                                                                                                                                                                                                                                                                                                                          |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Admin Status      | Enabled — Administrative status is enabled.<br>Disabled — Administratively disabled.                                                                                                                                                                                                                                                 |
| Oper Status       | The CPM on which the management Ethernet port is operating                                                                                                                                                                                                                                                                           |
| Revert Time       | The revert time                                                                                                                                                                                                                                                                                                                      |
| Interface Name    | The interface name                                                                                                                                                                                                                                                                                                                   |
| Adm/Admin State   | Up — The interface is administratively enabled<br>Down — The interface is administratively shutdown                                                                                                                                                                                                                                  |
| Opr (v4/v6)/Oper  | Up — The interface is operationally enabled<br>Down — The interface is operationally shutdown                                                                                                                                                                                                                                        |
| Port/SAP Id       | The physical network port or the SAP identifier associated with the interface                                                                                                                                                                                                                                                        |
| IP-Address        | The IP address                                                                                                                                                                                                                                                                                                                       |
| PfxState          | The prefix state associated with the interface                                                                                                                                                                                                                                                                                       |
| If Name           | The interface name                                                                                                                                                                                                                                                                                                                   |
| Protocols         | Protocols associated with the interface                                                                                                                                                                                                                                                                                              |
| IP Addr/mask      | The IP address and mask                                                                                                                                                                                                                                                                                                              |
| Address Type      | The address type of the IP address.<br>n/a — No IP address has been assigned to the IP interface, so the IP address type is not applicable<br>Primary — The IP address for the IP interface is the Primary address on the IP interface<br>Secondary — The IP address for the IP interface is a secondary address on the IP interface |
| IGP Inhibit       | IGP inhibit enabled or disabled                                                                                                                                                                                                                                                                                                      |
| Broadcast Address | The broadcast address used by the IP interface when sourcing IP broadcasts on the IP interface                                                                                                                                                                                                                                       |
| HoldUp-Time       | The number of seconds to wait before notifying clients monitoring this group when its operational status transitions from down to up                                                                                                                                                                                                 |
| Track Srrp Inst   | The SRRP instance identification                                                                                                                                                                                                                                                                                                     |
| IPv6 Address      | The IPv6 address                                                                                                                                                                                                                                                                                                                     |
| IPv6 Addr State   | The IPv6 address state                                                                                                                                                                                                                                                                                                               |

**Table 59 Redundancy Mgmt-Ethernet Field Descriptions (Continued)**

| Label              | Description                                                              |
|--------------------|--------------------------------------------------------------------------|
| CGA modifier       | The CGA modifier for the link-local addresses                            |
| Link Lcl Address   | The link local IP address of the virtual router interface                |
| Link Lcl State     | The address state of the virtual router interface                        |
| Description        | The text string description of the interface                             |
| If Index           | The interface index                                                      |
| Virt. If Index     | The virtual interface index                                              |
| Last Oper Chg      | The date and time of the last operational change                         |
| Global If Index    | The global interface index                                               |
| Lag Link Map Prof  | The LAG link map profile identifier                                      |
| Port Id            | The port ID of the interface                                             |
| TOS Marking        | The ToS trusted state                                                    |
| If Type            | The interface type                                                       |
| Egress Filter      | The egress filter associated with the interface                          |
| Ingress Filter     | The ingress filter associated with the interface                         |
| Egr IPv6 Flt       | The egress IPv6 filter associated with the interface                     |
| Ingr IPv6 Flt      | The ingress IPv6 filter associated with the interface                    |
| BGP IP FlowSpec    | BGP IP FlowSpec enabled or disabled                                      |
| BGP IPv6 FlowSpec  | BGP IPv6 FlowSpec enabled or disabled                                    |
| SNTP B.Cast        | Whether or not NTP/SNTP broadcasts are received on this interface        |
| Network QoS Policy | The network QoS policy name                                              |
| MAC Address        | The IEEE MAC address                                                     |
| Mac Accounting     | Whether or not MAC accounting functionality for the interface is enabled |

## multi-chassis

**Syntax** multi-chassis**Context** show>redundancy

**Description** This command enables the context to show multi-chassis redundancy information.

all

**Syntax** all

**Context** show>redundancy>multi-chassis

**Description** This command displays brief multi-chassis redundancy information.

**Output** The following output is an example of multi-chassis all information, and [Table 60](#) 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
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 60 Redundancy multi-chassis all Field Descriptions**

| Label             | Description                                                                            |
|-------------------|----------------------------------------------------------------------------------------|
| Peer IP Address   | 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 | The source address used to communicate with the MC peer.                               |
| Admin State       | The administrative state of the peer.                                                  |

## mc-endpoint

**Syntax** **mc-endpoint statistics**  
**mc-endpoint peer [ip-address] statistics**  
**mc-endpoint endpoint [mcep-id] statistics**  
**mc-endpoint peer [ip-address]**

**Context** show>redundancy>multi-chassis



- Description** This command displays multi-chassis endpoint information.
- Parameters**
- statistics** — Displays the global statistics for the MC endpoint.
  - peer** — Displays information for a single peer.
  - ip-address** — Specifies the IP address of multi-chassis end-point peer.
    - Values**
      - ipv4-address: a.b.c.d
      - ipv6-address:
        - x:x:x:x:x:x:x (eight 16-bit pieces)
        - x:x:x:x:x:d.d.d.d
        - x – [0 to FFFF] H
        - d – [0 to 255] D
  - endpoint** — Displays multi-chassis endpoint information.
  - mcep-id** — Specifies the multi-chassis endpoint.
    - Values** 1 to 4294967295

**Output** The following output is an example of multi-chassis endpoint information.

**Sample Output**

```
*A:Dut-B# show redundancy multi-chassis mc-endpoint statistics
=====
Multi-Chassis Endpoint Global Statistics
=====
Packets Rx                               : 533
Packets Rx Keepalive                     : 522
Packets Rx Config                         : 3
Packets Rx Peer Config                   : 1
Packets Rx State                          : 7
Packets Dropped Keep-Alive Task          : 7
Packets Dropped Too Short                 : 0
Packets Dropped Verify Failed            : 0
Packets Dropped Tlv Invalid Size         : 0
Packets Dropped Out Of Seq               : 0
Packets Dropped Unknown Tlv              : 0
Packets Dropped Tlv Invalid MC-Endpoint Id : 0
Packets Dropped MD5                      : 0
Packets Dropped Unknown Peer             : 0
Packets Dropped MC Endpoint No Peer      : 0
Packets Tx                               : 26099
Packets Tx Keepalive                     : 8221
Packets Tx Config                         : 2
Packets Tx Peer Config                   : 17872
Packets Tx State                          : 4
Packets Tx Failed                         : 0
=====
*A:Dut-B#

*A:Dut-B# show redundancy multi-chassis mc-endpoint peer 10.1.1.3 statistics
=====
Multi-Chassis MC-Endpoint Statistics
=====
```

```

=====
Peer Addr                      : 10.1.1.3
-----
Packets Rx                     : 597
Packets Rx Keepalive           : 586
Packets Rx Config              : 3
Packets Rx Peer Config         : 1
Packets Rx State               : 7
Packets Dropped State Disabled : 0
Packets Dropped Packets Too Short : 0
Packets Dropped Tlv Invalid Size : 0
Packets Dropped Tlv Invalid LagId : 0
Packets Dropped Out of Seq     : 0
Packets Dropped Unknown Tlv    : 0
Packets Dropped MD5            : 0
Packets Tx                     : 636
Packets Tx Keepalive           : 600
Packets Tx Peer Config         : 30
Packets Tx Failed              : 0
Packets Dropped No Peer        : 0
=====
*A:Dut-B#

*A:Dut-B# show redundancy multi-chassis mc-endpoint endpoint 1 statistics
=====
Multi-Chassis Endpoint Statistics
=====
MC-Endpoint Id 1
=====
Packets Rx Config              : 3
Packets Rx State               : 7
Packets Tx Config              : 2
Packets Tx State               : 4
Packets Tx Failed              : 0
=====
Number of Entries 1
=====

```

## mc-lag

- Syntax** **mc-lag peer** *ip-address* [**lag** *lag-id*]  
**mc-lag** [**peer** *ip-address* [**lag** *lag-id*]] **statistics**
- Context** show>redundancy>multi-chassis
- Description** This command displays multi-chassis LAG information.
- Parameters** *lag-id* — Shows information for the specified LAG identifier.  
**Values** 1 to 800
- ip-address* — Shows peer information about the specified IP address.  
**Values** ipv4-address: a.b.c.d  
ipv6-address:

- x:x:x:x:x:x:x (eight 16-bit pieces)
- x:x:x:x:x:d.d.d.d
- x – [0 to FFFF] H
- d – [0 to 255] D

**statistics** — Displays multi-chassis statistics.

**Output** See the following sections for show command output:

- [MC-Lag Peer Sample Output](#)
- [MC-Lag Peer Statistics Sample Output](#)

The following output is an example of mc-lag peer information, and [Table 61](#) describes the output fields.

**MC-Lag Peer Sample Output**

```
A:subscr_mgt# show redundancy multi-chassis mc-lag peer 10.10.10.30
=====
Multi-Chassis MC-Lag Peer 10.10.10.30
=====
Last Changed      : 01/23/2007 18:20:13
Admin State       : Up
Oper State        : Up
KeepAlive         : 10 deci-seconds
Hold On Ngbr Failure : 3
-----
Lag Id Lacp Key Remote Lag Id System Id          Sys Prio Last Changed
-----
1      1      1          00:00:00:00:00:01  1          01/23/2007 18:20:13
2      2      2          00:00:00:00:00:02  2          01/24/2007 08:53:48
-----
Number of LAGs : 2
=====
A:subscr_mgt#

A:subscr_mgt# show redundancy multi-chassis mc-lag peer 10.10.10.30 lag 1
=====
Multi-Chassis MC-Lag Peer 10.10.10.30
=====
Last Changed      : 01/23/2007 18:20:13
Admin State       : Up
Oper State        : Up
KeepAlive         : 10 deci-seconds
Hold On Ngbr Failure : 3
-----
Lag Id Lacp Key Remote Lag Id System Id          Sys Prio Last Changed
-----
1      1      1          00:00:00:00:00:01  1          01/23/2007 18:20:13
-----
Number of LAGs : 1
=====
A:subscr_mgt#
```

**Table 61 Redundancy Multi-chassis MC-Lag Peer Field Descriptions**

| Label                | Description                                                                                                                                           |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Last Changed         | Displays date and time of the last mc-lag peer.                                                                                                       |
| Admin State          | Displays the administrative state of the mc-lag peer.                                                                                                 |
| Oper State           | Displays the operation state of the mc-lag peer.                                                                                                      |
| KeepAlive            | Displays the length of time to keep alive the mc-lag peer.                                                                                            |
| Hold On Ngbr Failure | Specifies how many “keepalive” intervals the standby SR will wait for packets from the active node before assuming a redundant-neighbor node failure. |

The following output is an example of multi-chassis mc-lag peer statistics information, and [Table 62](#) describes the output fields.

**MC-Lag Peer Statistics Sample Output**

```
A:subscr_mgt# show redundancy multi-chassis mc-lag statistics
=====
Multi-Chassis Statistics
=====
Packets Rx                : 52535
Packets Rx Keepalive      : 52518
Packets Rx Config         : 2
Packets Rx Peer Config    : 4
Packets Rx State          : 6
Packets Dropped KeepaliveTask : 0
Packets Dropped Packet Too Short : 0
Packets Dropped Verify Failed : 0
Packets Dropped Tlv Invalid Size : 0
Packets Dropped Out of Seq : 0
Packets Dropped Unknown Tlv : 0
Packets Dropped Tlv Invalid LagId : 0
Packets Dropped MD5       : 0
Packets Dropped Unknown Peer : 0
Packets Tx                : 52583
Packets Tx Keepalive      : 52519
Packets Tx Config         : 2
Packets Tx Peer Config    : 54
Packets Tx State          : 8
Packets Tx Failed         : 0
=====
A:subscr_mgt#

B:Dut-B# show redundancy multi-chassis mc-lag peer 10.10.10.2 statistics
=====
Multi-Chassis Statistics, Peer 10.10.10.2
=====
Packets Rx                : 231
Packets Rx Keepalive      : 216
Packets Rx Config         : 1
```

```

Packets Rx Peer Config          : 2
Packets Rx State                : 12
Packets Dropped State Disabled  : 0
Packets Dropped Packets Too Short : 0
Packets Dropped Tlv Invalid Size : 0
Packets Dropped Tlv Invalid LagId : 0
Packets Dropped Out of Seq      : 0
Packets Dropped Unknown Tlv     : 0
Packets Dropped MD5             : 0
Packets Tx                      : 235
Packets Tx Keepalive            : 216
Packets Tx Peer Config          : 3
Packets Tx Failed               : 0
=====
B:Dut-B#

```

**Table 62 Redundancy Multi-chassis MC-Lag Peer Statistics Field Descriptions**

| Label                             | Description                                                                                                           |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Packets Rx                        | Indicates the number of MC-Lag packets received from the peer.                                                        |
| Packets Rx Keepalive              | Indicates the number of MC-Lag keepalive packets received from the peer.                                              |
| Packets Rx Config                 | Indicates the number of received MC-Lag configured packets from the peer.                                             |
| Packets Rx Peer Config            | Indicates the number of received MC-Lag packets configured by the peer.                                               |
| Packets Rx State                  | Indicates the number of MC-Lag “lag” state packets received from the peer.                                            |
| Packets Dropped State Disabled    | Indicates the number of packets that were dropped because the peer was administratively disabled.                     |
| Packets Dropped Packets Too Short | Indicates the number of packets that were dropped because the packet was too short.                                   |
| Packets Dropped Tlv Invalid Size  | Indicates the number of packets that were dropped because the packet size was invalid.                                |
| Packets Dropped Tlv Invalid LagId | Indicates the number of packets that were dropped because the packet referred to an invalid or non multi-chassis lag. |
| Packets Dropped Out of Seq        | Indicates the number of packets that were dropped because the packet size was out of sequence.                        |
| Packets Dropped Unknown Tlv       | Indicates the number of packets that were dropped because the packet contained an unknown TLV.                        |
| Packets Dropped MD5               | Indicates the number of packets that were dropped because the packet failed MD5 authentication.                       |

**Table 62 Redundancy Multi-chassis MC-Lag Peer Statistics Field Descriptions (Continued)**

| Label                  | Description (Continued)                                                                     |
|------------------------|---------------------------------------------------------------------------------------------|
| Packets Tx             | Indicates the number of packets transmitted from this system to the peer.                   |
| Packets Tx Keepalive   | Indicates the number of keepalive packets transmitted from this system to the peer.         |
| Packets Tx Peer Config | Indicates the number of configured packets transmitted from this system to the peer.        |
| Packets Tx Failed      | Indicates the number of packets that failed to be transmitted from this system to the peer. |

## mc-ring

**Syntax** `mc-ring peer ip-address statistics`  
`mc-ring peer ip-address [ring sync-tag [detail | statistics]]`  
`mc-ring peer ip-address ring sync-tag ring-node [ring-node-name [detail | statistics]]`  
`mc-ring global-statistics`

**Context** show>redundancy>multi-chassis

**Description** This command displays multi-chassis ring information.

**Parameters** *ip-address* — Specifies the address of the multi-chassis peer to display.

**Values** ipv4-address: a.b.c.d  
 ipv6-address:  
 • x:x:x:x:x:x:x (eight 16-bit pieces)  
 • x:x:x:x:x:d.d.d.d  
 • x – [0 to FFFF] H  
 • d – [0 to 255] D

**statistics** — Displays statistics for the multi-chassis ring.

**sync-tag** — Specifies a synchronization tag to be displayed that was used while synchronizing this port with the multi-chassis peer. 32 characters maximum.

**ring-node-name** — Specifies a ring-node name. 32 characters maximum.

**global-statistics** — Displays global statistics for the multi-chassis ring.

**detail** — Displays detailed peer information for the multi-chassis ring.

**Output** See the following sections for show command output:

The following output is an example of ip-address ring information, and [Table 63](#) describes the output fields.

### Mc-ring peer IP-address Ring Sample Output

```
*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2 ring ring11 detail
=====
Multi-Chassis MC-Ring Detailed Information
=====
Peer           : 10.0.0.2
Sync Tag       : ring11
Port ID        : 1/1/3
Admin State    : inService
Oper State     : connected
Admin Change   : 01/07/2008 21:40:07
Oper Change    : 01/07/2008 21:40:24
Failure Reason : None
-----
In Band Control Path
-----
Service ID     : 10
Interface Name : to_an1
Oper State     : connected
Dest IP        : 10.10.0.2
Src IP         : 10.10.0.1
-----
VLAN Map B Path Provisioned
-----
range 13-13
range 17-17
-----
VLAN Map Excluded Path Provisioned
-----
range 18-18
-----
VLAN Map B Path Operational
-----
range 13-13
range 17-17
-----
VLAN Map Excluded Path Operational
-----
range 18-18
=====
*A:ALA-48>show>redundancy>multi-chassis#

*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 192.168.10.104
=====
MC Ring entries
=====
Sync Tag                Oper State      Failure Reason
-----
No. of MC Ring entries: 0
=====
*A:ALA-48>show>redundancy>multi-chassis#
```

```
*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2
=====
MC Ring entries
=====
Sync Tag                               Oper State      Failure Reason
-----
ring11                                 connected      None
ring12                                 shutdown       None
-----
No. of MC Ring entries: 4
=====
*A:ALA-48>show>redundancy>multi-chassis#
```

```
*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2 ring ring11 ring-
node an1 detail
=====
Multi-Chassis MC-Ring Node Detailed Information
=====
Peer           : 10.0.0.2
Sync Tag       : ring11
Node Name      : an1
Oper State Loc : connected
Oper State Rem : notTested
In Use         : True
Admin Change   : 01/07/2008 21:40:07
Oper Change    : 01/07/2008 21:40:25
Failure Reason : None
-----
```

```
Ring Node Connectivity Verification
-----
Admin State    : inService
Service ID     : 11
VLAN Tag       : 11
Dest IP        : 10.11.3.1
Src IP         : None
Interval       : 1 minutes
Src MAC        : None
=====
*A:ALA-48>show>redundancy>multi-chassis#
```

```
*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2 ring ring11 ring-node
=====
MC Ring Node entries
=====
Name           Loc Oper St.      Failure Reason
  In Use       Rem Oper St.
-----
an1            connected         None
  Yes          notTested
an2            connected         None
  Yes          notTested
-----
No. of MC Ring Node entries: 2
=====
*A:ALA-48>show>redundancy>multi-chassis#
```



**Table 63 Mc-ring peer ip-address Ring Field Descriptions**

| Label                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sync Tag               | Displays the synchronization tag that was used while synchronizing this port with the multi-chassis peer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Oper State             | <p>noPeer — The peer has no corresponding ring configured.</p> <p>connected — The in-band control connection with the peer is operational.</p> <p>broken — The in-band control connection with the peer has timed out.</p> <p>conflict — The in-band control connection with the peer has timed out but the physical connection is still OK; the failure of the in-band signaling connection is caused by a misconfiguration. For example, a conflict between the configuration of this system and its peer, or a misconfiguration on one of the ring access node systems.</p> <p>testingRing — The in-band control connection with the peer is being set up. Waiting for result.</p> <p>waitingForPeer — Verifying if this ring is configured on the peer.</p> <p>configErr — The ring is administratively up, but a configuration error prevents it from operating properly.</p> <p>halfBroken — The in-band control connection indicates that the ring is broken in one direction (towards the peer).</p> <p>localBroken — The in-band control connection with the peer is known to be broken due to local failure or local administrative action.</p> |
| Oper state             | shutdown — The ring is shutdown.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Failure Reason         | Displays the reason of the failure of the operational state of a MC ring.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| No. of MC Ring entries | Displays the number of MC ring entries.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

The following output is an example of multi-chassis ring peer statistics information, and [Table 64](#) describes the output fields.

**Redundancy Multi-Chassis Ring Peer Statistics Sample Output**

```
*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 192.168.10.104 statistics
=====
MC Ring statistics for peer 192.168.10.104
=====
Message                               Received      Transmitted
-----
MCS ID Request                         0             0
```

```

MCS ID Response                0          0
Ring Exists Request            0          0
Ring Exists Response           0          0
Keepalive                      0          0
-----
Total                          0          0
=====
*A:ALA-48>show>redundancy>multi-chassis#
    
```

**Table 64 Redundancy Multi-Chassis Ring Peer Statistics Field Descriptions**

| Label                | Description                                                                                           |
|----------------------|-------------------------------------------------------------------------------------------------------|
| Message              | Displays the message type.                                                                            |
| Received             | Indicates the number of valid MC-ring signaling messages received from the peer.                      |
| Transmitted          | Indicates the number of valid MC-ring signaling messages transmitted from the peer.                   |
| MCS ID Request       | Displays the number of valid MCS ID requests were received from the peer.                             |
| MCS ID Response      | Displays the number of valid MCS ID responses were received from the peer.                            |
| Ring Exists Request  | Displays the number of valid 'ring exists' requests were received from the peer.                      |
| Ring Exists Response | Displays the number of valid ring exists' responses were received from the peer.                      |
| Keepalive            | Displays the number of valid MC-ring control packets of type 'keepalive' were received from the peer. |

The following output is an example of MC-ring information, and [Table 65](#) and [Table 66](#) describe the output fields.

**Show mc-ring fields**

```

*A:ALA-48>show>redundancy>multi-chassis# mc-ring global-statistics
=====
Global MC Ring statistics
=====
Rx                : 0
Rx Too Short      : 0
Rx Wrong Authentication : 0
Rx Invalid TLV    : 0
Rx Incomplete     : 0
Rx Unknown Type   : 0
Rx Unknown Peer   : 0
    
```

```

Rx Unknown Ring           : 0
Rx Unknown Ring Node     : 0
Tx                        : 36763
Tx No Buffer               : 0
Tx Transmission Failed    : 0
Tx Unknown Destination    : 0
Missed Configuration Events : 0
Missed BFD Events         : 0
=====
*A:ALA-48>show>redundancy>multi-chassis#

```

**Table 65 Mc-ring ring-node Command Field Descriptions**

| Label      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oper State | <p>Displays the state of the connection verification (both local and remote).</p> <p>notProvisioned — Connection verification is not provisioned.</p> <p>configErr — Connection verification is provisioned but a configuration error prevents it from operating properly.</p> <p>notTested — Connection verification is administratively disabled or is not possible in the current situation.</p> <p>testing — Connection Verification is active, but no results are yet available.</p> <p>connected — The ring node is reachable.</p> <p>disconnected — Connection verification has timed out.</p> |
| In Use     | <p>Displays “True” if the ring node is referenced on an e-pipe or as an inter-dest-id on a static host or dynamic lease.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

**Table 66 Mc-ring global-statistics Command Field Descriptions**

| Label                   | Description                                                                                                       |
|-------------------------|-------------------------------------------------------------------------------------------------------------------|
| Rx                      | <p>Displays the number of MC-ring signaling packets were received by this system.</p>                             |
| Rx Too Short            | <p>Displays the number of MC-ring signaling packets were received by this system that were too short.</p>         |
| Rx Wrong Authentication | <p>Displays the number of MC-ring signaling packets were received by this system with invalid authentication.</p> |
| Rx Invalid TLV          | <p>Displays the number of MC-ring signaling packets were received by this system with invalid TLV.</p>            |
| Rx Incomplete           | <p>Displays the number of MC-ring signaling packets were received by this system that were incomplete.</p>        |

**Table 66** Mc-ring global-statistics Command Field Descriptions

| Label                       | Description                                                                                                               |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Rx Unknown Type             | Displays the number of MC-ring signaling packets were received by this system that were of unknown type.                  |
| Rx Unknown Peer             | Displays the number of MC-ring signaling packets were received by this system that were related to an unknown peer.       |
| Rx Unknown Ring             | Displays the number of MC-ring signaling packets were received by this system that were related to an unknown ring.       |
| Rx Unknown Ring Node        | Displays the number of MC-ring signaling packets were received by this system that were related to an unknown ring node.  |
| Tx                          | Displays the number of MC-ring signaling packets were transmitted by this system.                                         |
| Tx No Buffer                | Displays the number of MC-ring signaling packets could not be transmitted by this system due to a lack of packet buffers. |
| Tx Transmission Failed      | Displays the number of MC-ring signaling packets could not be transmitted by this system due to a transmission failure.   |
| Tx Unknown Destination      | Displays the number of MC-ring 'unknown destination' signaling packets were transmitted by this system.                   |
| Missed Configuration Events | Displays the number of missed configuration events on this system.                                                        |
| Missed BFD Events           | Displays the number of missed BFD events on this system.                                                                  |

## sync

**Syntax** `sync [peer ip-address]`  
`sync peer ip-address detail`  
`sync [peer ip-address] statistics`

**Context** show>redundancy>multi-chassis

**Description** This command displays synchronization information.

**Parameters** *ip-address* — Shows peer information about the specified IP address.

**Values** ipv4-address: a.b.c.d  
 ipv6-address:  
 • x:x:x:x:x:x:x (eight 16-bit pieces)  
 • x:x:x:x:x:d.d.d.d

- x – [0 to FFFF] H
- d – [0 to 255] D

**detail** — Displays detailed peer information.

**statistics** — Displays peer statistics.

**Output** See the following sections for sample output:

- [Multi-Chassis Sync Sample Output](#)
- [Redundancy Multi-Chassis Sync Peer Sample Output](#)
- [Redundancy Multi-Chassis Sync Peer Detail Sample Output](#)

The following output is an example of multi-chassis sync information, and [Table 67](#) describes the output fields.

**Multi-Chassis Sync 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 67 Redundancy Multi-chassis Sync Field Descriptions**

| Label           | Description                                 |
|-----------------|---------------------------------------------|
| Peer IP Address | Displays the multi-chassis redundancy peer. |
| Description     | The text string describing the peer.        |

**Table 67 Redundancy Multi-chassis Sync Field Descriptions (Continued)**

| Label                   | Description                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------|
| 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 SRs.                                |
| 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.                                               |
| 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.                                                      |

The following output is an example of multi-chassis sync peer information, and [Table 68](#) describes the output fields.

### Redundancy Multi-Chassis Sync Peer Sample Output

```
*A:subscr_mgt_2# show redundancy multi-chassis sync peer 10.10.10.20
=====
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
=====
MCS Application Stats
=====
Application        : igmp
Num Entries        : 0
Lcl Deleted Entries : 0
Alarm Entries      : 0
-----
Rem Num Entries    : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries  : 0
-----
Application        : igmpSnooping
Num Entries        : 0
Lcl Deleted Entries : 0
Alarm Entries      : 0
-----
Rem Num Entries    : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries  : 0
-----
Application        : subMgmt
Num Entries        : 1
Lcl Deleted Entries : 0
Alarm Entries      : 0
-----
Rem Num Entries    : 1
Rem Lcl Deleted Entries : 0
Rem Alarm Entries  : 0
-----
Application        : srrp
Num Entries        : 0
Lcl Deleted Entries : 0
Alarm Entries      : 0
-----
Rem Num Entries    : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries  : 0
=====
*A:subscr_mgt_2#

```

**Table 68** Redundancy Multi-chassis Sync Peer Field Descriptions

| Label           | Description                                 |
|-----------------|---------------------------------------------|
| Peer IP Address | Displays the multi-chassis redundancy peer. |
| Description     | The text string describing the peer.        |

**Table 68 Redundancy Multi-chassis Sync Peer Field Descriptions**

| Label                   | Description                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------|
| 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 SRs.                                |
| 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.                                               |
| 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.                                                      |

The following output is an example of multi-chassis sync detail information, and [Table 69](#) describes the output fields.

#### Redundancy Multi-Chassis Sync Peer Detail Sample Output

```
*A:subscr_mgt_2# show redundancy multi-chassis sync peer 10.10.10.20 detail
=====
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
=====
MCS Application Stats
=====
Application        : igmp
Num Entries        : 0
Lcl Deleted Entries : 0
Alarm Entries      : 0
-----
Rem Num Entries    : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries  : 0
-----
Application        : igmpSnooping
Num Entries        : 0
Lcl Deleted Entries : 0
Alarm Entries      : 0
-----
Rem Num Entries    : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries  : 0
-----
Application        : subMgmt
Num Entries        : 1
Lcl Deleted Entries : 0
Alarm Entries      : 0
-----
Rem Num Entries    : 1
Rem Lcl Deleted Entries : 0
Rem Alarm Entries  : 0
-----
Application        : srrp
Num Entries        : 0
Lcl Deleted Entries : 0
Alarm Entries      : 0
-----
Rem Num Entries    : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries  : 0
=====
Ports synced on peer 10.10.10.20
=====
Port/Encap          Tag
-----
lag-1                test123
=====
*A:subscr_mgt_2#
```

**Table 69 Redundancy Multi-chassis Sync Peer Detail Field Descriptions**

| 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 routers.                            |
| 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.                                               |
| 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`

**Description** This command displays redundancy synchronization times.

**Output** The following output is an example of redundancy synchronization information.

### 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#
```

## script-control

- Syntax** `script-control`
- Context** `show>system`
- Description** This command enables the context to display script information.

## script

- Syntax** `script [script-name] [owner script-owner]`
- Context** `show>system>script-control`
- Description** This command displays script parameters.
- Parameters** *script-name* — Displays information for the specified script. 32 characters maximum.  
*script-owner* — Displays information for the specified script owner. 32 characters maximum.
- Output** The following output is an example of show script command information, and [Table 70](#) describes the output fields.

### Sample Output

```
A:sim1>show>system>script-control# script
=====
Script Information
=====
Script           : test
Owner name       : TiMOS CLI
Description      : asd
Administrative status : enabled
Operational status : enabled
Script source location : ftp://*****:*****@192.168.100.1/home/testlab_bgp/test1.cfg
Last script error  : none
Last change      : 2015/01/07 17:10:03
```

```
=====
A:sim1>show>cron#
```

**Table 70 Show Script Output**

| Label                  | Description                                                                          |
|------------------------|--------------------------------------------------------------------------------------|
| Script                 | Displays the name of the script.                                                     |
| Script owner           | Displays the owner name of script.                                                   |
| Administrative status  | Enabled — Administrative status is enabled.<br>Disabled — Administratively disabled. |
| Operational status     | Enabled — Operational status is enabled.<br>Disabled — Operationally disabled.       |
| Script source location | Displays the location of 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

**Description** This command displays script policy information.

**Parameters** *script-policy-name* — Displays policy information for the specified script. 32 characters maximum.

*owner-name* — Displays information for the specified script owner. 32 characters maximum.

**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 71](#) describes the output fields.

### Sample Output

```
*A:Redundancy# 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
=====
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:Redundancy#

*A:Redundancy# 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:Redundancy#
    
```

**Table 71 Script Policy Output**

| 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.<br>Disabled — Administrative status is disabled. |
| Script                      | Displays the name of the script.                                                             |
| Script owner                | Displays the name of the script owner.                                                       |
| Script source location      | Displays the location of 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 amount 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 executing.                                 |

**Table 71 Script Policy Output (Continued)**

| Label                      | Description (Continued)                                                                                                                                                      |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initializing run histories | Displays the number of sessions ready to run/queued but not executed.                                                                                                        |
| Max time tun history saved | Displays the maximum amount of time to keep the results from a script run.                                                                                                   |
| Last change                | Displays the system time a change was made to the configuration.                                                                                                             |
| Script start error         | Displays the error found while executing the script.                                                                                                                         |
| Max row empire time        | Reserved for SNMP.                                                                                                                                                           |
| Last application           | Displays the last application used to execute the script.                                                                                                                    |
| Last auth. user account    | Displays the last user used to execute the script. If no user is specified in “configure system cli-script authorization event-handler/cron” then the user is not specified. |

## uptime

**Syntax** uptime

**Context** show

**Description** This command displays the time since the system started.

**Output** The following output is an example of uptime information, and [Table 72](#) describes the output field.

### Sample Output

```
A:ALA-1# show uptime
System Up Time      : 11 days, 18:32:02.22 (hr:min:sec)

A:ALA-1#
```

**Table 72 Uptime Output**

| Label          | Description                                                                    |
|----------------|--------------------------------------------------------------------------------|
| System Up Time | Displays the length of time the system has been up in days, hr:min:sec format. |

## switch-fabric

- Syntax** **switch-fabric** [**exclude-sfm** *sfm-list*]  
**switch-fabric high-bandwidth-multicast**
- Context** show>system
- Description** This command displays switch fabric information. When an MDA is not provisioned in an XCM, no information will be displayed relating to that MDA. In order to display the forwarding capacity and multicast planes corresponding to that MDA, regardless of whether an XMA is equipped, an **mda-type** must be provisioned for that MDA.
- Parameters** *sfm-list* — Specifies which SFMs to exclude from the displayed information.  
**Values** “A”, “B”, “A,B”, “1”, “2”, and “1,2”  
**high-bandwidth-multicast** — Displays MDA information about the switch-fabric plane’s high bandwidth multicast traffic tap allocation.
- Output** The following output is an example of switch fabric information for 12-slot and 7-slot chassis models, and [Table 73](#) describes the output fields.

**Sample Output**

The following is an example for the 7750 SR:

```
A:ALA-7# show system switch-fabric
=====
Switch Fabric
=====
Slot/Mda      Min. Forwarding Capacity    Max. Forwarding Capacity
-----
1/1           100%                        100%
1/2           100%                        100%
2/1           100%                        100%
2/2           100%                        100%
3/1           100%                        100%
3/2           100%                        100%
4/1           100%                        100%
4/2           100%                        100%
5/1           100%                        100%
5/2           100%                        100%
A             100%                        100%
B             100%                        100%
=====
A:ALA-7#

A:ALA-12# show system switch-fabric
```



**Table 73 Switch Fabric Output**

| Label                    | Description                                                                                                                                               |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Slot/MDA                 | Displays the fabric slot within a chassis in the system. The CPM cards and XCM/IOM cards cannot be physically inserted into the switch fabric card slots. |
| Min. Forwarding Capacity | Displays the minimum forwarding capacity of the slot and XMA/MDA as a percentage.                                                                         |
| Max. Forwarding Capacity | Displays the maximum forwarding capacity of the slot and XMA/MDA as a percentage.                                                                         |

## sync-if-timing

- Syntax** `sync-if-timing [cpm-slot]`
- Context** `show>system`
- Description** This command displays synchronous interface timing operational information.
- Parameters** `cpm-slot` — Specifies the system CPM slot.
  - Values** standby, A, B
- Output** The following output is an example of sync-if-timing information, and [Table 74](#) describes the output fields.

### Sample Output

The following system example shows:

- **sync-if timing**, or
- **sync-if-timing "A"** when the SETS reference on the active CPM-A locks to BITS A, or
- **sync-if-timing "B"** when the SETS reference on the active CPM-B locks to BITS A



**Note:** The following output applies only to the 7750 SR-1e/2e/3e and 7950 XRS-16/20/40 platforms.

```
*A:Dut-B# show system sync-if-timing or show system sync-if-timing "A"
=====
System Interface Timing Operational Info
=====
System Status CPM A           : Master Locked
Reference Input Mode         : Revertive
```

```

Quality Level Selection      : Disabled
Reference Selected          : BITS A
System Quality Level        : prc
Current Frequency Offset (ppm) : +0
Input Minimum Quality Level  : st3
Wait to Restore Timer       : Disabled

Reference Order              : bits ref1 ref2

Reference Input 1
  Admin Status               : up
  Rx Quality Level           : prc
  Quality Level Override     : none
  Qualified For Use          : Yes
  Selected For Use           : No
  Not Selected Due To       :      on standby
  Source Port                : 1/1/5

Reference Input 2
  Admin Status               : up
  Rx Quality Level           : prc
  Quality Level Override     : none
  Qualified For Use          : Yes
  Selected For Use           : No
  Not Selected Due To       :      on standby
  Source Port                : 3/1/5

Reference BITS A
  Input Admin Status         : up
  Rx Quality Level           : prc
  Quality Level Override     : none
  Qualified For Use          : Yes
  Selected For Use           : Yes
  Interface Type             : E1
  Framing                    : PCM31 CRC
  Line Coding                 : HDB3
  SSM Bit                    : 8
  Output Admin Status        : up
  Output Minimum Quality Level : st2
  Output Source              : line reference
  Output Reference Selected  : ref1
  Output Squelch             : Disabled
  Tx Quality Level           : prc

Reference BITS B
  Input Admin Status         : up
  Rx Quality Level           : prc
  Quality Level Override     : none
  Qualified For Use          : Yes
  Selected For Use           : No
  Not Selected Due To       :      on standby
  Interface Type             : E1
  Framing                    : PCM31 CRC
  Line Coding                 : HDB3
  SSM Bit                    : 8
  Output Admin Status        : up
  Output Minimum Quality Level : st2
  Output Source              : line reference
  Output Reference Selected  : ref1

```

```
Output Squelch           : Disabled
Tx Quality Level         : prc
=====
```

The following system example shows:

- **sync-if timing** standby, or
- **sync-if-timing "B"** when the SETS reference on the standby CPM-B locks to Mate CPM (BITS A), or
- **sync-if-timing "A"** when the SETS reference on the standby CPM-A locks to Mate CPM (BITS A)



**Note:** The following output applies only to the 7750 SR-1e/2e/3e and 7950 XRS-16/20/40 platforms.

```
-----
*A:Dut-B# show system sync-if-timing standby or show system sync-if-timing "B"
=====
System Interface Timing Operational Info
=====
System Status CPM B           : Master Locked
  Reference Input Mode        : Revertive
  Quality Level Selection     : Disabled
  Reference Selected          : Mate CPM (BITS A)
  System Quality Level        : prc
  Current Frequency Offset (ppm) : +0sync-if-timing "A"
  Input Minimum Quality Level  : st3
  Wait to Restore Timer       : Disabled

Reference Order                : bits ref1 ref2

Reference Mate CPM
  Qualified For Use            : Yes
  Selected For Use             : Yes

Reference Input 1
  Admin Status                 : up
  Rx Quality Level             : prc
  Quality Level Override       : none
  Qualified For Use            : Yes
  Selected For Use             : No
  Not Selected Due To         :      on standby
  Source Port                  : 1/1/5

Reference Input 2
  Admin Status                 : up
  Rx Quality Level             : prc
  Quality Level Override       : none
  Qualified For Use            : Yes
  Selected For Use             : No
  Not Selected Due To         :      on standby
  Source Port                  : 3/1/5
```

```

Reference BITS A
  Input Admin Status      : up
  Rx Quality Level       : prc
  Quality Level Override  : none
  Qualified For Use      : Yes
  Selected For Use       : No
    Not Selected Due To   :      on standby
  Interface Type         : E1
  Framing                : PCM31 CRC
  Line Coding            : HDB3
  SSM Bit                : 8
  Output Admin Status    : up
  Output Minimum Quality Level : st2
  Output Source          : line reference
  Output Reference Selected : ref1
  Output Squelch        : Disabled
  Tx Quality Level       : prc

```

```

Reference BITS B
  Input Admin Status      : up
  Rx Quality Level       : prc
  Quality Level Override  : none
  Qualified For Use      : Yes
  Selected For Use       : No
    Not Selected Due To   :      on standby
  Interface Type         : E1
  Framing                : PCM31 CRC
  Line Coding            : HDB3
  SSM Bit                : 8
  Output Admin Status    : up
  Output Minimum Quality Level : st2
  Output Source          : line reference
  Output Reference Selected : ref1
  Output Squelch        : Disabled
  Tx Quality Level       : prc

```

=====

The following system example shows:

- **sync-if timing**, or
- **sync-if-timing "A"** when the SETS reference on the active CPM-A locks to BITS B, or
- **sync-if-timing "B"** when the SETS reference on the active CPM-B locks to BITS B



**Note:** The following output applies only to the 7750 SR-1e/2e/3e and 7950 XRS-16/20/40 platforms.

```

-----
*A:Dut-B# show system sync-if-timing or show system sync-if-timing "A"
-----
System Interface Timing Operational Info

```

```
=====
System Status CPM A           : Master Locked
  Reference Input Mode        : Non-revertive
  Quality Level Selection     : Disabled
  Reference Selected          : BITS B
  System Quality Level        : prc
  Current Frequency Offset (ppm) : +0
  Input Minimum Quality Level : st3
  Wait to Restore Timer       : Disabled

Reference Order                : bits ref1 ref2

Reference Input 1
  Admin Status                 : up
  Rx Quality Level             : prc
  Quality Level Override       : none
  Qualified For Use            : Yes
  Selected For Use             : No
  Not Selected Due To         : on standby
  Source Port                  : 1/1/5

Reference Input 2
  Admin Status                 : up
  Rx Quality Level             : prc
  Quality Level Override       : none
  Qualified For Use            : Yes
  Selected For Use             : No
  Not Selected Due To         : on standby
  Source Port                  : 3/1/5

Reference BITS A
  Input Admin Status           : up
  Rx Quality Level             : prc
  Quality Level Override       : none
  Qualified For Use            : Yes
  Selected For Use             : No
  Not Selected Due To         : previous failure
  Interface Type               : E1
  Framing                      : PCM31 CRC
  Line Coding                   : HDB3
  SSM Bit                      : 8
  Output Admin Status          : up
  Output Minimum Quality Level : st2
  Output Source                 : line reference
  Output Reference Selected    : refl
  Output Squelch               : Disabled
  Tx Quality Level             : prc

Reference BITS B
  Input Admin Status           : up
  Rx Quality Level             : prc
  Quality Level Override       : none
  Qualified For Use            : Yes
  Selected For Use             : Yes
  Interface Type               : E1
  Framing                      : PCM31 CRC
  Line Coding                   : HDB3
  SSM Bit                      : 8
  Output Admin Status          : up
```

```

Output Minimum Quality Level : st2
Output Source                 : line reference
Output Reference Selected    : ref1
Output Squelch               : Disabled
Tx Quality Level             : prc

```

The following system example shows:

- **sync-if timing** standby, or
- **sync-if-timing "B"** when the SETS reference on the standby CPM-B locks to Mate CPM (BITS B), or
- **sync-if-timing "A"** when the SETS reference on the standby CPM-A locks to Mate CPM (BITS B)



**Note:** The following output applies only to the 7750 SR-1e/2e/3e and 7950 XRS-16/20/40 platforms.

```

-----
*A:Dut-B# show system sync-if-timing standby or show system sync-if-timing "B"
-----
System Interface Timing Operational Info
-----
System Status CPM B                : Master Locked
  Reference Input Mode              : Non-revertive
  Quality Level Selection           : Disabled
  Reference Selected                 : Mate CPM (BITS B)
  System Quality Level              : prc
  Current Frequency Offset (ppm)   : +0
  Input Minimum Quality Level       : st3
  Wait to Restore Timer             : Disabled

Reference Order                     : bits ref1 ref2

Reference Mate CPM
  Qualified For Use                  : Yes
  Selected For Use                   : Yes

Reference Input 1
  Admin Status                      : up
  Rx Quality Level                  : prc
  Quality Level Override            : none
  Qualified For Use                  : Yes
  Selected For Use                   : No
  Not Selected Due To               : on standby
  Source Port                       : 1/1/5

Reference Input 2
  Admin Status                      : up
  Rx Quality Level                  : prc
  Quality Level Override            : none
  Qualified For Use                  : Yes

```

```
Selected For Use           : No
  Not Selected Due To     :      on standby
Source Port                : 3/1/5

Reference BITS A
Input Admin Status        : up
Rx Quality Level          : prc
Quality Level Override    : none
Qualified For Use         : Yes
Selected For Use          : No
  Not Selected Due To     :      previous failure
Interface Type            : E1
Framing                   : PCM31 CRC
Line Coding               : HDB3
SSM Bit                   : 8
Output Admin Status       : up
Output Minimum Quality Level : st2
Output Source             : line reference
Output Reference Selected : ref1
Output Squelch           : Disabled
Tx Quality Level          : prc

Reference BITS B
Input Admin Status        : up
Rx Quality Level          : prc
Quality Level Override    : none
Qualified For Use         : Yes
Selected For Use          : No
  Not Selected Due To     :      on standby
Interface Type            : E1
Framing                   : PCM31 CRC
Line Coding               : HDB3
SSM Bit                   : 8
Output Admin Status       : up
Output Minimum Quality Level : st2
Output Source             : line reference
Output Reference Selected : ref1
Output Squelch           : Disabled
Tx Quality Level          : prc
```

=====

**Table 74 System Timing Output**

| Label                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System Status CPM A/B   | <p>Indicates the present status of the synchronous timing equipment subsystem (SETS).</p> <p>Not Present — Only shown on systems without central clocks</p> <p>Master Freerun — The clock is in free-run because it hasn't had a qualified input reference to lock to</p> <p>Master Holdover — The clock was locked to an input reference but has lost all qualified input references and is in holdover.</p> <p>Master Locked — The clock is locked to an input reference</p> <p>Acquiring — The clock is training to a qualified input reference.</p> |
| Reference Input Mode    | <p>Revertive — Indicates that for a re-validated or a newly validated reference source which has a higher priority than the currently selected reference has reverted to the new reference source.</p> <p>Non-revertive — The clock cannot revert to a higher priority clock if the current clock goes offline.</p>                                                                                                                                                                                                                                     |
| Quality Level Selection | <p>Indicates whether the ql-selection command has been enabled or disabled. If this command is enabled, then the reference is selected first using the QL value, then by the priority reference order. If this command is not enabled, then the reference is selected by the priority reference order.</p>                                                                                                                                                                                                                                              |
| Reference Selected      | <p>Indicates which reference has been selected:</p> <ul style="list-style-type: none"> <li>• ref1, ref2 — (for all chassis)</li> <li>• BITS A, BITS B: <ul style="list-style-type: none"> <li>– 7450 ESS-7/12</li> <li>– 7750 SR-7/12</li> <li>– 7750 SR-12e</li> <li>– 7750 SR-1e/2e/3e</li> <li>– 7750 SR-a4/8</li> <li>– 7950 XRS-16/20</li> <li>– 7950 XRS-40</li> </ul> </li> <li>• BITS C, BITS D - (7950 XRS-40)</li> </ul>                                                                                                                      |



**Table 74 System Timing Output (Continued)**

| Label                    | Description (Continued)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | <ul style="list-style-type: none"> <li>• Mate CPM (BITS A), Mate CPM (BITS B) — <b>show&gt;system&gt;sync-if-timing&gt;standby:</b> <ul style="list-style-type: none"> <li>– 7450 ESS-7/12</li> <li>– 7750 SR-7/12</li> <li>– 7750 SR-12e</li> <li>– 7750 SR-1e/2e/3e</li> <li>– 7750 SR-a4/8</li> <li>– 7950 XRS-16/20</li> <li>– 7950 XRS-40</li> </ul> </li> <li>• Mate CPM (BITS A), Mate CPM (BITS B) — <b>show&gt;system&gt;sync-if-timing:</b> <ul style="list-style-type: none"> <li>– 7450 ESS-7/12</li> <li>– 7750 SR-7/12</li> <li>– 7750 SR-12e</li> <li>– 7750 SR-a4/8</li> </ul> </li> <li>• Mate CPM (none) - <b>show&gt;system&gt;sync-if-timing&gt;standby</b> when standby locked to active which is freerun or holdover - (for all chassis)</li> <li>• Mate CPM (ref1), Mate CPM (ref2) - <b>show&gt;system&gt;sync-if-timing&gt;standby</b> when standby locked to active which is locked to ref1 or ref2:                             <ul style="list-style-type: none"> <li>– 7750 SR-7/12</li> <li>– 7450 ESS-7/12</li> <li>– 7750 SR-12e</li> <li>– 7750 SR-1e/2e/3e</li> <li>– 7750 SR-a4/8</li> <li>– 7950 XRS-16/20/40</li> </ul> </li> </ul> |
| System Quality Level     | Indicates the quality level being generated by the system clock.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Current Frequency Offset | <p>This value indicates the offset that is applied within the central clock to align the local oscillator to the frequency of the selected input reference. The units for this value are parts per million (ppm).</p> <p>This value should not be misinterpreted as an indicator of the frequency accuracy of the output of the central clock.</p> <p>If the central clock is locked to a true Primary Reference Clock or Stratum 1 frequency reference, this value should report a number within the range [-5, +5] ppm.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

**Table 74 System Timing Output (Continued)**

| Label                       | Description (Continued)                                                                                                                                                                                                                                     |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Minimum Quality Level | The configured minimum acceptable QL to consider for use by the central clock.                                                                                                                                                                              |
| Wait to Restore Timer       | The configured timeout to use for the Wait to Restore timer.                                                                                                                                                                                                |
| Reference Order             | ref1, ref2, bits — Indicates that the priority order of the timing references.                                                                                                                                                                              |
| Reference Mate CPM          | Data within this block represents the status of the timing reference provided by the Mate CPM. This will be the BITS input from the standby CPM.                                                                                                            |
| Admin Status                | down — The <b>ref1</b> or <b>ref2</b> configuration is administratively shutdown.<br>up — The <b>ref1</b> or <b>ref2</b> configuration is administratively enabled.<br>diag — Indicates the reference has been forced using the force-reference command.    |
| Quality Level Override      | Indicates whether the QL value used to determine the reference was configured directly by the user.                                                                                                                                                         |
| Rx Quality Level            | Indicates the QL value received on the interface. <ul style="list-style-type: none"> <li>• inv — SSM received on the interface indicates an invalid code for the interface type.</li> <li>• unknown — No QL value was received on the interface.</li> </ul> |
| Qualified for Use           | Indicates whether the reference has been qualified to be used as a source of timing for the node.                                                                                                                                                           |
| Not Qualified Due To        | Indicates the reason why the reference has not been qualified: <ul style="list-style-type: none"> <li>• disabled</li> <li>• LOS</li> <li>• OOPIR</li> <li>• OOF</li> </ul>                                                                                  |
| Selected for Use            | Indicates whether the method is presently selected.                                                                                                                                                                                                         |

**Table 74 System Timing Output (Continued)**

| Label                        | Description (Continued)                                                                                                                                                                                                                                                   |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Not Selected Due To          | Indicates the reason why the method is not selected: <ul style="list-style-type: none"> <li>• disabled</li> <li>• not qualified</li> <li>• previous failure</li> <li>• LOF</li> <li>• AIS-L</li> <li>• validating</li> <li>• on standby</li> <li>• ssm quality</li> </ul> |
| Source Port                  | Identifies the Source port for the reference.                                                                                                                                                                                                                             |
| 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.<br>up — The BITS output is administratively enabled.                                                                                                                                                                 |
| Output Minimum Quality Level | The configured minimum acceptable QL to use for the BITSout signal.                                                                                                                                                                                                       |
| Output Source                | The source to be used to provide the signal on the BITS output port.<br>line reference — unfiltered recovered line reference.<br>internal clock — filtered node clock output.                                                                                             |
| Output Reference Selected    | The reference selected as the source for the BITS output signal (ref1, ref2, or PTP).                                                                                                                                                                                     |
| Output Squelch               | Indicates whether the squelch function for BITSout is enabled or disabled.                                                                                                                                                                                                |
| TX Quality Level             | QL value for BITS output signal.                                                                                                                                                                                                                                          |

## synchronization

**Syntax** `synchronization`

**Context** `show>redundancy>synchronization`

**Description** This command displays redundancy synchronization times.

**Output** The following output is an example of redundancy synchronization information, and [Table 75](#) describes the output fields.

### Sample Output

```
A:ALA-1>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-1>show>redundancy#
```

**Table 75 Synchronization Output**

| Label                      | Description                                                                                                                                                                                                                                        |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standby Status             | Displays the status of the standby CPM.                                                                                                                                                                                                            |
| Last Standby Failure       | Displays the timestamp of the last standby failure.                                                                                                                                                                                                |
| Standby Up Time            | Displays the length of time the standby CPM has been up.                                                                                                                                                                                           |
| Failover Time              | Displays the timestamp when the last redundancy failover occurred causing a switchover from active to standby CPM. If there is no redundant CPM 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 CPMs 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 CPMs.                                                                                                                                                 |
| Last Config File Sync Time | Displays the timestamp of the last successful synchronization of the configuration files.                                                                                                                                                          |

**Table 75 Synchronization Output (Continued)**

| Label                   | Description                                                                                  |
|-------------------------|----------------------------------------------------------------------------------------------|
| Last Boot Env Sync Time | Displays the timestamp of the last successful synchronization of the boot environment files. |

### 8.17.2.2 Debug Commands

#### sync-if-timing

- Syntax** `sync-if-timing`
- Context** `debug`
- Description** The context to debug synchronous interface timing references.

#### force-reference

- Syntax** `force-reference {ref1 | ref2 | bits | bits1 | bits2 | bitsa | bitsb | ptp}`  
`no force-reference`
- Context** `debug>sync-if-timing`
- Description** This command allows an operator to force the system synchronous timing output to use a specific reference.
- The **debug sync-if-timing force-reference** command should only be used to test and debug problems. Network synchronization problems may appear if network elements are left with this manual override setting. Once the system timing reference input has been forced, it may be cleared using the **no force-reference** command.
- This command also clears the Wait-to-Restore state of the reference so that the reference can be selected.
- The CPM clock can be forced to use a specific input reference using the force-reference command.
- When the command is executed, the CPM clock on the active CPM immediately switches its input reference to that specified by the command. If the specified input is not available (shutdown), or in a disqualified state, the CPM clock shall use the next qualified input reference based on the selection rules.

This command also affects the BITS output port on the active CPM. If the BITS output port selection is set to line-reference and the reference being forced is not the BITS input port, then the system uses the forced reference to generate the signal out the BITS output port. If the BITS output port selection is set to internal-clock, then the system uses the output of the CPM clock to generate the signal for the BITS output port.

On a CPM activity switch, the force command is cleared and normal reference selection is determined.

Debug configurations are not saved between reboots.

- Parameters**
- ref1** — Specifies that the clock will use the first timing reference.
  - ref2** — Specifies that the clock will use the second timing reference.
  - bits** — Specifies that the clock will use the external network interface on the active CPM to be the highest priority input.
  - bitsa** — Specifies that the clock will use the bitsa timing reference.
  - bitsb** — Specifies that the clock will use the bitsb timing reference.
  - ptp** — Specifies that the clock will use the PTP slave as the timing reference (applies to the 7450 ESS and 7750 SR).

## system

- Syntax** [no] **system**
- Context** debug
- Description** This command displays system debug information.

## http-connections

- Syntax** **http-connections** [*ip-address/prefix-length*]  
**http-connections any**  
**http-connections** [*ipv6-address/prefix-length*]  
**no http-connections**
- Context** debug>system
- Description** This command displays HTTP connections debug information.
- Parameters** *ip-address/prefix-length* — Displays information for the specified host IP address and prefix length.
- Values** ip-address: a.b.c.d  
prefix-length: 0 to 32
- any** — Specifies that any address can be used.

---

*ipv6-address/prefix-length* — Displays information for the specified host IPv6 address and prefix length.

**Values**    *ipv6-address*:

- x:x:x:x:x:x:x:x: (eight 16-bit pieces)
- x:x:x:x:x:d.d.d.d
- x [0 to FFFFF] H
- d [0 to 255] D

*prefix-length*: 0 to 128

## ntp

**Syntax**    **ntp** [**router** *router-instance*] [**interface** *ip-int-name*]

**Context**    debug>system

**Description**    This command enables and configures debugging for NTP.  
The **no** form of the command disables debugging for NTP.

**Parameters**    *router-instance* — Specifies the router name or CPM router instance.

**Values**    *router-name* | *vprn-svc-id*  
                                  *router-name* – “Base”, “management”  
                                  *vprn-svc-id* – 1 to 2147483647

**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, etc.), the entire string must be enclosed within double quotes.

## persistence

**Syntax**    **persistence** [*persistence-client*]  
              **no persistence**

**Context**    debug>system

**Description**    This command displays persistence debug information.

**Parameters**    *persistence-client* — Displays persistence debug information.

**Values**

|                       |                       |
|-----------------------|-----------------------|
| ancp                  | ANCP                  |
| application-assurance | application-assurance |
| dhcp-server           | local DHCP server     |

---

|                     |                       |
|---------------------|-----------------------|
| nat-fwds            | NAT port forwarding   |
| python-policy-cache | Python Cache          |
| submgt              | subscriber management |

### 8.17.2.3 Tools Commands

#### redundancy

|                    |                                                                 |
|--------------------|-----------------------------------------------------------------|
| <b>Syntax</b>      | <b>redundancy</b>                                               |
| <b>Context</b>     | tools>dump                                                      |
| <b>Description</b> | This command enables the context to dump redundancy parameters. |

#### multi-chassis

|                    |                                                                    |
|--------------------|--------------------------------------------------------------------|
| <b>Syntax</b>      | <b>multi-chassis</b>                                               |
| <b>Context</b>     | tools>dump>redundancy                                              |
| <b>Description</b> | This command enables the context to dump multi-chassis parameters. |

#### mc-endpoint

|                    |                                                                                |
|--------------------|--------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>mc-endpoint peer <i>ip-address</i></b>                                      |
| <b>Context</b>     | tools>dump>redundancy>multi-chassis                                            |
| <b>Description</b> | This command dumps multi-chassis endpoint information.                         |
| <b>Parameters</b>  | <i>ip-address</i> — Specifies the peer's IP address.                           |
| <b>Output</b>      | The following output is an example of multi-chassis peer endpoint information. |

#### Sample Output

```
*A:Dut-B# tools dump redundancy multi-chassis mc-endpoint peer 10.1.1.3
MC Endpoint Peer Info
  peer addr           : 10.1.1.3
  peer name           : Dut-C
  peer name refs      : 1
  src addr conf       : Yes
  source addr         : 10.1.1.2
  num of mcep         : 1
  num of non-mcep     : 0
```



```
own sess num           : 58ba0d39
mc admin state         : Up
tlv own mc admin state : Up
tlv peer mc admin state : Up
reachable              : Yes

own sys priority       : 50
own sys id             : 00:03:fa:72:c3:c0
peer sys priority      : 21
peer sys id           : 00:03:fa:c6:31:f8
master                 : No

conf boot timer        : 300
boot timer active      : No
conf ka intv          : 10
conf hold on num of fail : 3
tlv own ka intv       : 10
tlv peer ka intv      : 10
ka timeout tmr active  : Yes
ka timeout tmr intvl  : 20
ka timeout tmr time left : 4
peer ka intv          : 10
mc peer timed out     : No

initial peer conf rx   : Yes
peer-mc disabled       : No
initial peer conf sync : Yes
peer conf sync         : Yes

own passive mode       : Disable
peer passive mode      : No

retransmit pending     : No
non-mcep retransmit pending : No
retransmit intvl      : 5
last tx time          : 1437130
last rx time          : 1437156

own bfd                : Enable
peer bfd               : Enable
bfd vrtr if           : 2
bfd handle             : 1
bfd state              : 3
bfd code               : 0
```

\*A:Dut-B#

## mc-ring

- Syntax** `mc-ring`  
`mc-ring peer ip-address [ring sync-tag]`
- Context** `tools>dump>redundancy>multi-chassis`
- Description** This command dumps multi-chassis ring information.

- Parameters** *ip-address* — Specifies the peer IP address.
- sync-tag* — Specifies the ring's synchronization tag created in the **config>redundancy>mc>peer>mcr> ring** context. The tag can be up to 32 characters.

## srrp-sync-database

- Syntax** **srrp-sync-database** [**instance** *instance-id*] [**peer** *ip-address*]
- Context** tools>dump>redundancy>multi-chassis
- Description** This command dumps SRRP database information and applies to the 7450 ESS.
- Parameters** *ip-address* — Specifies the peer's IP address.
- Values** ipv4-address: a.b.c.d  
ipv6-address:
- x:x:x:x:x:x:x (eight 16-bit pieces)
  - x:x:x:x:x:d.d.d.d
  - x – [0 to FFFF] H
  - d – [0 to 255] D
- instance-id* — Dumps information for the specified Subscriber Router Redundancy Protocol instance configured on this system.
- Values** 1 to 4294967295

## sync-database

- Syntax** **sync-database** [**peer** *ip-address*] [**port** *port-id* | *lag-id*] [**sdp** *sdp-id*] [**sync-tag** *sync-tag*] [**application** *application*] [**detail**] [**type** *type*]
- Context** tools>dump>redundancy>multi-chassis
- Description** This command dumps MCS database information.
- Parameters** *ip-address* — Specifies the peer's IP address.
- Values** ipv4-address: a.b.c.d  
ipv6-address:
- x:x:x:x:x:x:x (eight 16-bit pieces)
  - x:x:x:x:x:d.d.d.d
  - x – [0 to FFFF] H
  - d – [0 to 255] D

*port-id* | *lag-id* — Indicates the port or LAG ID to be synchronized with the multi-chassis peer.

**Values** port-id: *slot/mda/port*  
lag-id: *lag-id*

- lag: keyword
- id: 1 to 800
- pw-id: *pw-id*
- pw: keyword
- id: 1 to 32767

*sdp-id* — Specifies the SDP identifier.

**Values** 1 to 32767

*sync-tag* — Specifies a synchronization tag to be used while synchronizing this port with the multi-chassis peer, up to 32 characters.

*application* — Specifies a particular multi-chassis peer synchronization protocol application.

**Values**

|                |                                                 |
|----------------|-------------------------------------------------|
| dhcp-server:   | local dhcp server                               |
| igmp:          | Internet group management protocol              |
| igmp-snooping: | igmp-snooping                                   |
| mc-ring        | multi-chassis ring                              |
| l2tp           | L2TP                                            |
| mld            | multicast listener discovery                    |
| mld-snooping:  | multicast listener discovery-snooping           |
| srrp:          | simple router redundancy protocol               |
| sub-host-trk:  | subscriber host tracking                        |
| sub-mgmt-ipoe: | subscriber management for IPEoE                 |
| sub-mgmt-pppoe | subscriber management for PPPoE                 |
| mc-ipsec       | multi-chassis IPsec                             |
| python         | Python cache                                    |
| diameter-proxy | diameter proxy                                  |
| pim-snpg-sap   | protocol independent multicast snooping for SAP |
| pim-snpg-sdp   | protocol independent multicast snooping for SDP |

*type* — Indicates the locally deleted or alarmed deleted entries in the MCS database per multi-chassis peer.

**Values** alarm-deleted, local-deleted, global-deleted, omcr-standby, omcr-alarmed

---

**detail** — Displays detailed information.

## src-bmac-lsb

**Syntax** **src-bmac-lsb**

**Context** tools>dump>redundancy

**Description** This command dumps PBB source Backbone MAC address LSB information.

## resource-usage

**Syntax** **resource-usage**

**Context** tools>dump

**Description** This command enables the context to display system resource information, such as policers, including data for total, available, and free numbers for each resource.

## card

**Syntax** **card** [*slot-num*]  
**card** [*slot-num*] **all**

**Context** tools>dump>resource-usage

**Description** This command displays resource information for cards.

**Parameters** *slot-num* — Specifies a card slot.

**Values** 1 to 10

**all** — Displays all available information for the card, including resource usage information for all child objects of the card such as FPs and MDAs.

## fp

**Syntax** **fp** [*fp-number*]

**Context** tools>dump>resource-usage>card

**Description** This command displays resource information for FPs.

**Parameters** *fp-number* — Specifies an FP.

**Values** 1 to 8

## mda

|                    |                                                                  |
|--------------------|------------------------------------------------------------------|
| <b>Syntax</b>      | <b>mda</b> [ <i>mda-slot</i> ]                                   |
| <b>Context</b>     | tools>dump>resource-usage>card                                   |
| <b>Description</b> | This command displays resource information for MDAs.             |
| <b>Parameters</b>  | <i>mda-slot</i> — Specifies an MDA slot.<br><b>Values</b> 1 to 2 |

## system

|                    |                                                                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>system</b> [ <b>all</b> ]                                                                                                                   |
| <b>Context</b>     | tools>dump>resource-usage                                                                                                                      |
| <b>Description</b> | This command displays resource information for resources that are managed at the system level.                                                 |
| <b>Parameters</b>  | <b>all</b> — Displays all system resource usage information, as well as resource usage information for all cards, FPs, and MDAs in the system. |

## system-resources

|                    |                                                                                                                                                                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>system-resources</b> [ <i>slot-number</i> ]                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | tools>dump                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | The <b>system-resources</b> command has been deprecated and replaced by the <b>tools&gt;dump&gt;resource-usage</b> command. The <b>system-resources</b> command continues to be supported, but it is recommended to use the <b>resource-usage</b> command instead.<br><br>This command displays system resource information. |
| <b>Parameters</b>  | <i>slot-number</i> — Specifies a specific slot to view system resources information.<br><b>Values</b> 1 to 10                                                                                                                                                                                                                |

## chassis

|                    |                                                                |
|--------------------|----------------------------------------------------------------|
| <b>Syntax</b>      | <b>chassis</b> [ <i>phys-chassis-id</i> ]                      |
| <b>Context</b>     | tools>perform                                                  |
| <b>Description</b> | The following command performs chassis maintenance operations. |

---

**Parameters** *phys-chassis-id* — The identifier of the physical chassis for the tools perform context.

**Values** 1

## check-bp-eprom

**Syntax** **check-bp-eprom**

**Context** tools>perform>chassis

**Description** This command checks the chassis BP EPROM. The function reads the EPROM and is corrected with one of the following:

- for each SEEP that is found to be acceptable or can be corrected:  
“BP eprom X: ok” with X = seep number
- for each SEEP that is found to be unacceptable and cannot be corrected:  
“BP eprom X: not ok”

## link-check

**Syntax** **link-check**

**Context** tools>perform>chassis

**Description** This command checks the connection between an XCM and XMA cards on a SR-2/7/14s chassis. The function checks the connection between all XCM and XMA cards present in the system and outputs one of the following for each XMA:

- OK — the connection is good and no action is required
- NOK — the connection is suspect, re-seat the XMA to determine if this corrects the issue. If this issue persists, contact Nokia support.

## set-role

**Syntax** **set-role {extension | master | standalone}**

**Context** tools>perform>chassis

**Description** This command sets the role of the 7950 XRS chassis from which the command is invoked.

- When run on a standalone chassis this will update the EEPROM on the (one) Chassis backplane.
- Master and Extension chassis are blocked if any SFMs are configured as type **sfm-x20** (must be **sfm-x20-b**). The following message displays:
- When the **extension** option is specified, the chassis will immediately reboot as part of the command. The following warning and prompt will be provided:

---

WARNING: You are about to provision the chassis as an XRS-40 Extension chassis. This chassis will immediately reboot after the command is executed. No CLI shell is available directly on an Extension chassis. An Extension chassis will not completely boot up unless it is properly cabled to and controlled by an XRS-40 Master chassis. Do you wish to proceed (yes/no) ?

- When the **master** option is specified, the chassis will immediately reboot as part of the command. The Operational mode is not changed until a reboot is performed. The following warning and prompt will be provided:

WARNING: You are about to provision the chassis as an XRS-40 Master chassis. This chassis will immediately reboot after the command is execute

Do you wish to proceed (yes/no) ?

- When the **master** or **extension** options are specified and the chassis has any SFM slots with a configured type of sfm-x20, then the command will fail with the following message:

Configured sfm-type of sfm-x20 is not compatible with XRS-40 mode operation.

If you want to change the role of the chassis anyways, you can deconfigure the SFMs and then change the role.

## redundancy

|                    |                                                                     |
|--------------------|---------------------------------------------------------------------|
| <b>Syntax</b>      | <b>redundancy</b>                                                   |
| <b>Context</b>     | tools>perform                                                       |
| <b>Description</b> | This command enables the context to display redundancy information. |

## forced-single-sfm-overload

|                    |                                                              |
|--------------------|--------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] forced-single-sfm-overload</b>                       |
| <b>Context</b>     | tools>perform>redundancy                                     |
| <b>Description</b> | This command forces the single-sfm-overload state on or off. |

## issu-post-process

|                    |                                            |
|--------------------|--------------------------------------------|
| <b>Syntax</b>      | <b>issu-post-process</b>                   |
| <b>Context</b>     | tools>perform>redundancy                   |
| <b>Description</b> | This command allows requests for new LSPs. |

---

## mgmt-ethernet

|                    |                                                                                                                                                                                                                                 |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>mgmt-ethernet</b>                                                                                                                                                                                                            |
| <b>Context</b>     | tools>perform>redundancy                                                                                                                                                                                                        |
| <b>Description</b> | This command triggers redundancy mode, just as if the management Ethernet port of the primary CPM has gone down. The router will revert if the management Ethernet port of the primary CPM has been up for the revert duration. |

## force-uplink-switch

|                    |                                                                                                                                                                            |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>force-uplink-switch</b> <i>client-port-id</i>                                                                                                                           |
| <b>Context</b>     | tools>perform>satellite                                                                                                                                                    |
| <b>Description</b> | This command forces traffic associated with the specified satellite client port to be switched away from the current uplink depending on which uplink is currently active. |
| <b>Parameters</b>  | <i>client-port-id</i> — Specifies the satellite client port associated with the port mapping, in the format <b>esat-id/slot/port force</b> .                               |

## system

|                    |                                                    |
|--------------------|----------------------------------------------------|
| <b>Syntax</b>      | <b>system</b>                                      |
| <b>Context</b>     | tools>perform                                      |
| <b>Description</b> | This command is a tool for controlling the system. |

## auto-node-provisioning

|                    |                                                                                                                            |
|--------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>auto-node-provisioning</b>                                                                                              |
| <b>Context</b>     | tools>perform>system                                                                                                       |
| <b>Description</b> | This command initiates auto-provisioning of the node on all ports that are operationally up but do not have an IP address. |

## bluetooth

|                    |                                                                                        |
|--------------------|----------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>bluetooth</b>                                                                       |
| <b>Context</b>     | tools>perform>system                                                                   |
| <b>Description</b> | This command enters the context for tools commands related to the Bluetooth interface. |



---

## module

|                    |                                                                                                                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>module</b> <i>cpm-slot</i> <b>action</b> { <b>reboot</b>   <b>disconnect</b> }                                                                                                                                                    |
| <b>Context</b>     | tools>perform>system>bluetooth                                                                                                                                                                                                       |
| <b>Description</b> | This command performs reboots or disconnects on the Bluetooth module on the specified CPM.                                                                                                                                           |
| <b>Parameters</b>  | <i>cpm-slot</i> — Specifies the CPM slot<br><b>Values</b> {A   B   C   D}<br><b>reboot</b> — triggers a reboot of the Bluetooth subsystem on the module.<br><b>disconnect</b> — forces a disconnect of any active Bluetooth session. |

## ipv4

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                                           |                  |                                                                  |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------|------------------|------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ipv4</b> [ <b>timeout</b> <i>seconds</i> ] [ <b>dhcp-client-identifier</b> { <b>string</b> <i>ascii-string</i>   <b>hex</b> <i>hex-string</i>   <b>serial-number</b> }] [ <b>reboot-on-success</b> ] [ <b>save-provision-file-destination</b> <i>file-url</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                  |                                           |                  |                                                                  |
| <b>Context</b>     | tools>perform>system>auto-node-provisioning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                  |                                           |                  |                                                                  |
| <b>Description</b> | This command initiates the IPv4 auto-provisioning of the node on all the ports that have an operationally up port but no IP address.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                                           |                  |                                                                  |
| <b>Parameters</b>  | <i>seconds</i> — DHCP request timeout period, before the system tries the next interface. Within this timeout, the DHCP client tries to retransmit the DHCP request with randomized exponential backoff (RFC 2131). This randomized exponential backoff begins at 2 s and goes to 64 s (2,4,8,32,64,64,64,64). After 64 seconds, the system will retry every 64 s.<br><b>Values</b> 1 to 65535 seconds<br><b>Default</b> 10<br><i>ascii-string</i> — DHCP client identifier in ASCII format, up to 127 characters long.<br><i>hex-string</i> — DHCP client identifier in hexadecimal format, up to 254 hexadecimal nibbles long.<br><b>Values</b> 0x0 to 0xFFFFFFFF<br><i>file-url</i> — The file URL as a <i>local-url</i> . The local file or folder name should not exceed 99 characters).<br><table><tr><td><i>local-url</i></td><td>[<i>cflash-id</i>]/[<i>file-path</i>]</td></tr><tr><td><i>cflash-id</i></td><td>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</td></tr></table> | <i>local-url</i> | [ <i>cflash-id</i> ]/[ <i>file-path</i> ] | <i>cflash-id</i> | cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B: |
| <i>local-url</i>   | [ <i>cflash-id</i> ]/[ <i>file-path</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                  |                                           |                  |                                                                  |
| <i>cflash-id</i>   | cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                  |                                           |                  |                                                                  |

---

## sfm-interco-test

**Syntax** `sfm-interco-test [sfm x]`

**Context** `tools>perform>system>inter-chassis>`

**Description** Use this command to run inter-chassis SFM loopback tests for the 7950 XRS.

Run on an out-of-service standalone chassis that will later become the Extension chassis of an XRS-40 system. The out of service chassis (Chassis 1 – future Master chassis) must be connected by means of SFM interconnect links (cable bundles) before this test is run. This test operates without requiring any XCMs in either chassis, but they can be present.

The test should not be initiated from Chassis 1.

The following conditions must be satisfied for the test to be permitted:

- The system must be in standalone mode; error message:  
`The test can only be performed on a standalone system`
- The system must have only XRS-40 compatible SFMs provisioned; error message:

`The chassis can not have SFMs with a configured type of sfm-x20s-b when performing the test`

- All provisioned SFMs must be operational; error message:

`All provisioned SFMs must be operational before performing the test`

- The same test cannot be running in another session (that is, only one test can be executed at a time); error message:

`The test is already in-progress in another session`

Other notes (which are also relayed to the operator when the test is attempted):

- All provisioned XCMs will be reset at the start of the test and will be held in the *booting* state until the test has completed.
- All SFMs will be cleared when the operator exits the test. This will trigger a reset of the XCMs and the standby CPM.

**Output** The following output is an example of SFM interconnection test information.

### Sample Output

```
*A:Dut-A# tools perform system inter-chassis sfm-interco-test
WARNING: This test is intended for an out-of-service standalone chassis that is
going to later become the extension chassis of an XRS-40 system.
```

```
At the start of the test, all provisioned IOMs will be reset and will be held
```

in the 'booting' state until the test has completed.

While the test is running avoid altering this system or the attached system (e.g. do not shutdown, clear, or remove the CPMs/SFMs/IOMs and do not issue CPM switchovers)

Once testing has completed all SFMs in this system will be cleared.

Do you wish to proceed (y/n)? y  
Clearing provisioned IOMs ...  
Test executing ...  
Displaying results

=====  
SFM Interconnect Port Summary  
=====

| SFM | SFM Oper State | IcPort Num | IcPort Oper State | Module Inserted | Degrade State | Miscon Info SFM IcPort |
|-----|----------------|------------|-------------------|-----------------|---------------|------------------------|
| 1   | up             | 1          | up                | yes             | none          |                        |
| 1   | up             | 2          | up                | yes             | none          |                        |
| 1   | up             | 3          | up                | yes             | none          |                        |
| 1   | up             | 4          | up                | yes             | none          |                        |
| 1   | up             | 5          | up                | yes             | none          |                        |
| 1   | up             | 6          | up                | yes             | none          |                        |
| 1   | up             | 7          | up                | yes             | none          |                        |
| 1   | up             | 8          | up                | yes             | none          |                        |
| 1   | up             | 9          | up                | yes             | none          |                        |
| 1   | up             | 10         | up                | yes             | none          |                        |
| 1   | up             | 11         | up                | yes             | none          |                        |
| 1   | up             | 12         | up                | yes             | none          |                        |
| 1   | up             | 13         | up                | yes             | none          |                        |
| 1   | up             | 14         | up                | yes             | none          |                        |
| 2   | up             | 1          | up                | yes             | none          |                        |
| 2   | up             | 2          | up                | yes             | none          |                        |
| 2   | up             | 3          | up                | yes             | none          |                        |
| 2   | up             | 4          | up                | yes             | none          |                        |
| 2   | up             | 5          | up                | yes             | none          |                        |
| 2   | up             | 6          | up                | yes             | none          |                        |
| 2   | up             | 7          | up                | yes             | none          |                        |
| 2   | up             | 8          | up                | yes             | none          |                        |
| 2   | up             | 9          | up                | yes             | none          |                        |
| 2   | up             | 10         | up                | yes             | none          |                        |
| 2   | up             | 11         | up                | yes             | none          |                        |
| 2   | up             | 12         | up                | yes             | none          |                        |
| 2   | up             | 13         | up                | yes             | none          |                        |
| 2   | up             | 14         | up                | yes             | none          |                        |
| 3   | up             | 1          | up                | yes             | none          |                        |
| 3   | up             | 2          | up                | yes             | none          |                        |
| 3   | up             | 3          | up                | yes             | none          |                        |
| 3   | up             | 4          | up                | yes             | none          |                        |
| 3   | up             | 5          | up                | yes             | none          |                        |
| 3   | up             | 6          | up                | yes             | none          |                        |
| 3   | up             | 7          | up                | yes             | none          |                        |
| 3   | up             | 8          | up                | yes             | none          |                        |
| 3   | up             | 9          | up                | yes             | none          |                        |
| 3   | up             | 10         | up                | yes             | none          |                        |
| 3   | up             | 11         | up                | yes             | none          |                        |
| 3   | up             | 12         | up                | yes             | none          |                        |

---

|   |    |    |    |     |      |
|---|----|----|----|-----|------|
| 3 | up | 13 | up | yes | none |
| 3 | up | 14 | up | yes | none |
| 4 | up | 1  | up | yes | none |
| 4 | up | 2  | up | yes | none |
| 4 | up | 3  | up | yes | none |
| 4 | up | 4  | up | yes | none |
| 4 | up | 5  | up | yes | none |
| 4 | up | 6  | up | yes | none |
| 4 | up | 7  | up | yes | none |
| 4 | up | 8  | up | yes | none |
| 4 | up | 9  | up | yes | none |
| 4 | up | 10 | up | yes | none |
| 4 | up | 11 | up | yes | none |
| 4 | up | 12 | up | yes | none |
| 4 | up | 13 | up | yes | none |
| 4 | up | 14 | up | yes | none |
| 5 | up | 1  | up | yes | none |
| 5 | up | 2  | up | yes | none |
| 5 | up | 3  | up | yes | none |
| 5 | up | 4  | up | yes | none |
| 5 | up | 5  | up | yes | none |
| 5 | up | 6  | up | yes | none |
| 5 | up | 7  | up | yes | none |
| 5 | up | 8  | up | yes | none |
| 5 | up | 9  | up | yes | none |
| 5 | up | 10 | up | yes | none |
| 5 | up | 11 | up | yes | none |
| 5 | up | 12 | up | yes | none |
| 5 | up | 13 | up | yes | none |
| 5 | up | 14 | up | yes | none |
| 6 | up | 1  | up | yes | none |
| 6 | up | 2  | up | yes | none |
| 6 | up | 3  | up | yes | none |
| 6 | up | 4  | up | yes | none |
| 6 | up | 5  | up | yes | none |
| 6 | up | 6  | up | yes | none |
| 6 | up | 7  | up | yes | none |
| 6 | up | 8  | up | yes | none |
| 6 | up | 9  | up | yes | none |
| 6 | up | 10 | up | yes | none |
| 6 | up | 11 | up | yes | none |
| 6 | up | 12 | up | yes | none |
| 6 | up | 13 | up | yes | none |
| 6 | up | 14 | up | yes | none |
| 7 | up | 1  | up | yes | none |
| 7 | up | 2  | up | yes | none |
| 7 | up | 3  | up | yes | none |
| 7 | up | 4  | up | yes | none |
| 7 | up | 5  | up | yes | none |
| 7 | up | 6  | up | yes | none |
| 7 | up | 7  | up | yes | none |
| 7 | up | 8  | up | yes | none |
| 7 | up | 9  | up | yes | none |
| 7 | up | 10 | up | yes | none |
| 7 | up | 11 | up | yes | none |
| 7 | up | 12 | up | yes | none |
| 7 | up | 13 | up | yes | none |
| 7 | up | 14 | up | yes | none |
| 8 | up | 1  | up | yes | none |

|   |    |    |    |     |      |
|---|----|----|----|-----|------|
| 8 | up | 2  | up | yes | none |
| 8 | up | 3  | up | yes | none |
| 8 | up | 4  | up | yes | none |
| 8 | up | 5  | up | yes | none |
| 8 | up | 6  | up | yes | none |
| 8 | up | 7  | up | yes | none |
| 8 | up | 8  | up | yes | none |
| 8 | up | 9  | up | yes | none |
| 8 | up | 10 | up | yes | none |
| 8 | up | 11 | up | yes | none |
| 8 | up | 12 | up | yes | none |
| 8 | up | 13 | up | yes | none |
| 8 | up | 14 | up | yes | none |

=====  
 Correct any mis-cabling and replace any suspected faulty equipment. Press Q to quit the test or any other key to run the test again. q  
 Test complete, clearing the SFMs to return them to normal operational state.  
 Done. Exiting test.

## script-control

- Syntax** `script-control`
- Context** `tools>perform>system`
- Description** This command performs script-control operations.

## script-policy

- Syntax** `script-policy`
- Context** `tools>perform>system>script-control`
- Description** This command performs script-policy operations.

## stop

- Syntax** `stop [script-policy-name] [owner script-policy-owner] [all]`
- Context** `tools>perform>system>script-control>script-policy`
- Description** This command stops the execution of scripts.
- Parameters**
  - script-policy-name* — Specifies to only stop scripts with the specified script-policy, up to 32 characters.
  - script-policy-owner* — Specifies to only stop scripts that are associated with script-policies with the specified owner, up to 32 characters.
- Default** TiMOS CLI

**all** — Specifies to stop all running scripts.

## snmp

**Syntax** **snmp**

**Context** tools>perform>system

**Description** This command displays SNMP information.

## walk

**Syntax** **walk** [**start-oid** *start-oid* [*start-oid*]] [**skip-oid** *skip-oid* [*skip-oid*]] [**output** *file-url*] [**syntax** *syntax*]

**Context** tools>perform>system>snmp

**Description** This command performs SNMP MIB walk.

**Parameters** *start-oid* — Specifies the starting SNMP MIB object identifier for the MIB walk, up to 256 characters, and up to twenty MIB objects can be specified in a single statement.

**Default** 1.3

*skip-oid* — Specifies the MIB object identifier to be skipped during MIB walk, up to 256 characters, and up to twenty MIB objects can be specified in a single statement.

*file-url* — Specifies the URL for the local file.

**Values** *file-url*: local-url | remote-url  
*local-url*: [*cflash-id*/] [*file-path*] 200 characters max, including *cflash-id* directory length 99 characters max each  
*remote-url*: [{*ftp://* | *tftp://*}*login:pswd@remote-locn/*] [*filepath*]  
*remote-locn*: [*hostname* | *ipv4-address* | *ipv6-address*]  
*ipv4-address*: a.b.c.d  
*ipv6-address*:  

- x:x:x:x:x:x [-*interface*]
- x:x:x:x:x:d.d.d.d [-*interface*]
- x – [0 to FFFFF] H
- d – [0 to 255] D

• *interface*: 32 characters max, for link local addresses  
*cflash-id*: cf1: | cf1-A: | cf1-B: | cf2: | cf2-A: | cf2-B: | cf3: | cf3-A: | cf3-B:

*syntax* — Specifies the syntax for the addresses.

**Values** hexString, inetAddress

## xmpp

|                    |                                         |
|--------------------|-----------------------------------------|
| <b>Syntax</b>      | <b>xmpp</b>                             |
| <b>Context</b>     | tools>perform>system                    |
| <b>Description</b> | This command displays XMPP information. |

## vsd-refresh

|                    |                                               |
|--------------------|-----------------------------------------------|
| <b>Syntax</b>      | <b>vsd-refresh</b>                            |
| <b>Context</b>     | tools>perform>system>xmpp                     |
| <b>Description</b> | This command performs VSD refresh operations. |

## cpm-http-redirect

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>cpm-http-redirect redirect statistics</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Context</b>     | tools>dump>system                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b> | <p>This command displays system level statistics for all redirected TCP sessions in <b>optimized-mode</b>. These include the following:</p> <ul style="list-style-type: none"><li>• Close requests to TCP: TCP layer requested to send a FIN</li><li>• Abort requests to TCP: error in the received packet and the TCP layer needs to send a RST</li><li>• Data requests to TCP: number of redirects sent to the TCP layer</li><li>• Connections deleted: number of connections closed without a successful redirect performed</li><li>• HTTP GET parse errors: formatting error in the HTTP request</li><li>• HTTP GET process errors: HTTP GET is formatted properly but the redirect still fails. Example: system unable to find a corresponding host</li><li>• HTTP Response dropped: communication error; the redirect failed to be sent to the TCP layer</li></ul> |
| <b>Parameters</b>  | <b>redirect statistics</b> — Specifies system level statistics for all redirected TCP sessions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Output</b>      | The following output shows an example:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### Sample Output

```
A# tools dump system cpm-http-redirect redirect statistics
=====
CPM HTTP Redirect statistics
=====
```

---

```

Close requests to TCP           : 2
Abort requests to TCP          : 0
Data requests to TCP           : 2
Requests rejected - out of memory : 0
Connections deleted            : 0
HTTP GET parse errors          : 0
HTTP GET process errors        : 0
HTTP Response dropped          : 0

```

## cpm-http-redirect

- Syntax** **cpm-http-redirect redirect summary**
- Context** tools>dump>system
- Description** This command displays the summary statistics of **cpm-http-redirect optimized-mode** for the total number of hosts and connections currently in use. This output, can, also, be used to compare the current system utilization with the maximum system scale.
- Parameters** **redirect summary** — Specifies summary statistics of **cpm-http-redirect optimized-mode** for the total number of host and connections currently in use.
- Output** The following output shows an example:

### Sample Output

```

A# tools dump system cpm-http-redirect summary
=====
CPM HTTP Redirect summary
=====
Actual number of hosts           : 0
Actual number of connections     : 0
Number of hosts created in the last second : 0
Number of connections created in the last second : 0
=====

```

## cpm-http-redirect

- Syntax** **cpm-http-redirect tcp sessions**
- Context** tools>dump>system
- Description** This command displays the system level TCP session state information of the **cpm-http-redirect optimized-mode** for currently opened sessions. Specifically, the following are displayed:
- New: Syn received and Syn-Ack not sent
  - SYN: Syn-Ack sent and waiting for Ack
  - ESTABLISHED: Ack received and waiting for data
  - FIN: FIN sent and waiting for Fin-Ack



- Delete: Sum of all currently open connections at this time, representing the connections to be deleted
- HTTP Response dropped: communication error; the redirect failed to be sent to the TCP layer

All current sessions are counted both in the state where they belong, such as 'New', 'Syn', 'Established', 'Fin', and in the sum 'Delete' count.

**Parameters** **tcp** — Specifies system level TCP information of the **cpm-http-redirect** in **optimized-mode**.  
**sessions** — Specifies system level TCP session state information of the **cpm-http-redirect** in **optimized-mode**.

**Output** The following output shows an example:

### Sample Output

```
A# tools dump system cpm-http-redirect tcp sessions
=====
CPM HTTP Redirect TCP session information
=====
TCP sessions in new state                : 0
TCP sessions in state SYN                 : 0
TCP sessions in state ESTABLISHED        : 0
TCP sessions in state FIN                 : 0
TCP sessions in delete state              : 0
=====
```

## cpm-http-redirect

**Syntax** **cpm-http-redirect tcp settings**

**Context** tools>dump>system

**Description** This command displays the system level TCP settings of the **cpm-http-redirect optimized-mode**. These settings can be further controlled using **tools perform** commands.

**Parameters** **tcp** — Specifies system level TCP information of the **cpm-http-redirect** in **optimized-mode**.  
**settings** — Specifies system level TCP session settings.

**Output** The following output shows an example:

### Sample Output

```
Dut-A# tools dump system cpm-http-redirect tcp settings
data-retransmissions 1
data-timeout 20
established-timeout 100
```

```

fin-ack-retransmissions 1
fin-ack-timeout 15
max-connections 500
max-connections-per-host 20
max-hosts 500
syn-ack-retransmissions 1
syn-ack-timeout 20
    
```

## cpm-http-redirect

- Syntax**    **cpm-http-redirect tcp statistics**
- Context**    tools>dump>system
- Description** This command displays the system level TCP statistics of the **cpm-http-redirect optimized-mode** for all sessions.
- Parameters**
  - tcp** — Specifies system level TCP information of the **cpm-http-redirect** in **optimized-mode**.
  - statistics** — Specifies system level TCP statistics of the **cpm-http-redirect optimized-mode** for all sessions.
- Output**    The following output shows an example:

### Sample Output

```

A# tools dump system cpm-http-redirect tcp statistics
=====
CPM HTTP Redirect TCP statistics (only nonzero values shown)
=====
Packets forwarded                               : 25
TCP segments received                           : 8
Not a TCP segment                               : 17
Packets offered to redirect                     : 2
SYN received                                    : 2
FIN,ACK received                               : 2
ACK received                                    : 4
Valid TCP packets received                     : 8
Received packets                               : 25
Received packets with a connection             : 8
Connection creations                           : 2
Connection deletions                           : 2
SYN processed                                   : 2
SYN,ACK processed                              : 2
SYN,ACK with data processed                    : 2
FIN,ACK processed                              : 2
FIN,ACK with wrong sequence number            : 2
=====
    
```

## 8.17.2.4 Clear Commands

### application-assurance

|                    |                                                     |
|--------------------|-----------------------------------------------------|
| <b>Syntax</b>      | <b>application-assurance</b>                        |
| <b>Context</b>     | clear                                               |
| <b>Description</b> | This command clears application assurance commands. |

### group

|                    |                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>group</b> <i>aa-group-id</i> [:: <i>partition-id</i> ]                                                                                                                    |
| <b>Context</b>     | clear>application-assurance                                                                                                                                                  |
| <b>Description</b> | This command clears application assurance group data.                                                                                                                        |
| <b>Parameters</b>  | <i>aa-group-id</i> — Specifies a group of ISA MDAs.<br><b>Values</b> 1 to 255<br><br><i>partition-id</i> — Specifies a partition within a group.<br><b>Values</b> 1 to 65535 |

### statistics

|                    |                                                       |
|--------------------|-------------------------------------------------------|
| <b>Syntax</b>      | <b>statistics</b>                                     |
| <b>Context</b>     | clear>application-assurance>group                     |
| <b>Description</b> | This command clears application assurance statistics. |

### status

|                    |                                                              |
|--------------------|--------------------------------------------------------------|
| <b>Syntax</b>      | <b>status</b>                                                |
| <b>Context</b>     | clear>application-assurance>group                            |
| <b>Description</b> | This command clears application assurance system statistics. |

---

## redundancy

|                    |                                                                  |
|--------------------|------------------------------------------------------------------|
| <b>Syntax</b>      | <b>redundancy</b>                                                |
| <b>Context</b>     | clear                                                            |
| <b>Description</b> | This command enables the context to clear redundancy parameters. |

## multi-chassis

|                    |                                                                     |
|--------------------|---------------------------------------------------------------------|
| <b>Syntax</b>      | <b>multi-chassis</b>                                                |
| <b>Context</b>     | clear>redundancy                                                    |
| <b>Description</b> | This command enables the context to clear multi-chassis parameters. |

## mc-endpoint

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>mc-endpoint endpoint [<i>mcep-id</i>] statistics</b><br><b>mc-endpoint statistics</b><br><b>mc-endpoint peer [<i>ip-address</i>] statistics</b>                                                                                                                                                                                                                                                                                                                                                             |
| <b>Context</b>     | clear>redundancy>multi-chassis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b> | This command clears multi-chassis endpoint statistics.                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Parameters</b>  | <i>mcep-id</i> — Clears information for the specified multi-chassis endpoint ID.<br><b>Values</b> 1 to 4294967295<br><i>ip-address</i> — Clears information for the specified peer IP address.<br><b>Values</b> ipv4-address: a.b.c.d<br>ipv6-address:<br><ul style="list-style-type: none"> <li>• x:x:x:x:x:x:x (eight 16-bit pieces)</li> <li>• x:x:x:x:x:d.d.d.d</li> <li>• x – [0 to FFFF] H</li> <li>• d – [0 to 255] D</li> </ul> <b>statistics</b> — Clears statistics for this multi-chassis endpoint. |

## mc-lag

|                |                                                            |
|----------------|------------------------------------------------------------|
| <b>Syntax</b>  | <b>mc-lag [peer <i>ip-address</i> [<i>lag lag-id</i>]]</b> |
| <b>Context</b> | clear>redundancy>multi-chassis                             |

---

**Description** This command clears multi-chassis Link Aggregation Group (LAG) information.

**Parameters** *ip-address* — Clears the specified address of the multi-chassis peer.

**Values** ipv4-address: a.b.c.d  
ipv6-address:  
• x:x:x:x:x:x:x (eight 16-bit pieces)  
• x:x:x:x:x:d.d.d.d  
• x – [0 to FFFF] H  
• d – [0 to 255] D

*lag-id* — Clears the specified LAG on this system.

**Values** 1 to 200

## mc-ring

**Syntax** **mc-ring**

**Context** clear>redundancy>multi-chassis

**Description** This command clears multi-chassis ring data.

## debounce

**Syntax** **debounce peer *ip-address* ring *sync-tag***

**Context** clear>redundancy>multi-chassis>mcr

**Description** This command clears multi-chassis ring operational state debounce history.

**Parameters** *ip-address* — Clears debounce history for the specified IP address.

**Values** ipv4-address: a.b.c.d  
ipv6-address:  
• x:x:x:x:x:x:x (eight 16-bit pieces)  
• x:x:x:x:x:d.d.d.d  
• x – [0 to FFFF] H  
• d – [0 to 255] D

*sync-tag* — Clears debounce history for the specified sync tag.

## ring-nodes

**Syntax** **ring-nodes peer *ip-address* ring *sync-tag***

|                    |                                                                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Context</b>     | clear>redundancy>multi-chassis>mcr                                                                                                                                                                                   |
| <b>Description</b> | This command clears multi-chassis ring unreferenced ring nodes.                                                                                                                                                      |
| <b>Parameters</b>  | <i>ip-address</i> — Clears ring statistics for the specified IP address.                                                                                                                                             |
| <b>Values</b>      | ipv4-address: a.b.c.d<br>ipv6-address: <ul style="list-style-type: none"> <li>• x:x:x:x:x:x:x (eight 16-bit pieces)</li> <li>• x:x:x:x:x:d.d.d.d</li> <li>• x – [0 to FFFF] H</li> <li>• d – [0 to 255] D</li> </ul> |
|                    | <i>sync-tag</i> — Clears ring statistics for the specified sync tag.                                                                                                                                                 |

## statistics

|                    |                                         |
|--------------------|-----------------------------------------|
| <b>Syntax</b>      | <b>statistics</b>                       |
| <b>Context</b>     | clear>redundancy>multi-chassis>mcr      |
| <b>Description</b> | This command clears multi-chassis ring. |

## global

|                    |                                                           |
|--------------------|-----------------------------------------------------------|
| <b>Syntax</b>      | <b>global</b>                                             |
| <b>Context</b>     | clear>redundancy>multi-chassis>mcr>statistics             |
| <b>Description</b> | This command clears multi-chassis ring global statistics. |

## peer

|                    |                                                                                                                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>peer</b> <i>ip-address</i>                                                                                                                                                            |
| <b>Context</b>     | clear>redundancy>multi-chassis>mcr>statistics                                                                                                                                            |
| <b>Description</b> | This command clears multi-chassis ring peer statistics.                                                                                                                                  |
| <b>Parameters</b>  | <i>ip-address</i> — Clears ring peer statistics for the specified IP address.                                                                                                            |
| <b>Values</b>      | ipv4-address: a.b.c.d<br>ipv6-address: <ul style="list-style-type: none"> <li>• x:x:x:x:x:x:x (eight 16-bit pieces)</li> <li>• x:x:x:x:x:d.d.d.d</li> <li>• x – [0 to FFFF] H</li> </ul> |

- d – [0 to 255] D

## ring

|                    |                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ring peer</b> <i>ip-address</i> <b>ring</b> <i>sync-tag</i>                                                                                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | clear>redundancy>multi-chassis>mcr>statistics                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b> | This command clears multi-chassis ring statistics.                                                                                                                                                                                                                                                                                                                                                    |
| <b>Parameters</b>  | <i>ip-address</i> — Clears ring statistics for the specified IP address.<br><b>Values</b> ipv4-address: a.b.c.d<br>ipv6-address: <ul style="list-style-type: none"><li>• x:x:x:x:x:x:x (eight 16-bit pieces)</li><li>• x:x:x:x:x:d.d.d.d</li><li>• x – [0 to FFFF] H</li><li>• d – [0 to 255] D</li></ul> <i>sync-tag</i> — Clears ring statistics for the specified sync tag. 32 characters maximum. |

## ring-node

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ring-node peer</b> <i>ip-address</i> <b>ring</b> <i>sync-tag</i> <b>node</b> <i>ring-node-name</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Context</b>     | clear>redundancy>multi-chassis>mcr>statistics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | This command clears multi-chassis ring statistics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <i>ip-address</i> — Clears ring-node peer statistics for the specified IP address.<br><b>Values</b> ipv4-address: a.b.c.d<br>ipv6-address: <ul style="list-style-type: none"><li>• x:x:x:x:x:x:x (eight 16-bit pieces)</li><li>• x:x:x:x:x:d.d.d.d</li><li>• x – [0 to FFFF] H</li><li>• d – [0 to 255] D</li></ul> <i>sync-tag</i> — Clears ring-node peer statistics for the specified synchronization tag. The tag can be up to 32 characters.<br><i>ring-node-name</i> — Clears ring-node peer statistics for the specified ring node name. The ring node name can be up to 32 characters. |

---

## sync-database

**Syntax** **sync-database peer** *ip-address* **all** **application** *application*  
**sync-database peer** *ip-address* **port** {*port-id* | *lag-id*} [**sync-tag** *sync-tag*] **application** *application*  
**sync-database peer** *ip-address* **sdp** *sdp-id* [**sync-tag** *sync-tag*] **application** *application*  
**sync-database peer** *ip-address* **sync-tag** *sync-tag* **application** *application*

**Context** clear>redundancy>multi-chassis

**Description** This command clears multi-chassis sync database information.

**Parameters** *ip-address* — Clears the specified address of the multi-chassis peer.

**Values** ipv4-address: a.b.c.d  
 ipv6-address:  
 • x:x:x:x:x:x:x (eight 16-bit pieces)  
 • x:x:x:x:x:d.d.d.d  
 • x – [0 to FFFF] H  
 • d – [0 to 255] D

*port-id* — Clears the specified port ID of the multi-chassis peer.

**Values** *slot/mda/port*

*lag-id* — Clears the specified Link Aggregation Group (LAG) on this system.

**Values** *lag-lag-id*

**all** — Clears all ports and synchronization tags.

*sync-tag* — Clears the synchronization tag used while synchronizing this port with the multi-chassis peer. The synchronization tag can be up to 32 characters.

*sdp-id* — Specifies the SDP identifier.

**Values** 1 to 32767

*application* — Clears the specified application information that was synchronized with the multi-chassis peer.

**Values** The following are values for the 7750 SR and 7950 XRS:



|                |                                       |
|----------------|---------------------------------------|
| all:           | All supported applications            |
| dhcp-server:   | local dhcp server                     |
| igmp:          | internet group management protocol    |
| igmp-snooping: | igmp-snooping                         |
| mc-ring:       | multi-chassis ring                    |
| mld-snooping:  | multicast listener discovery-snooping |
| srrp:          | simple router redundancy protocol     |
| sub-host-trk   | subscriber host tracking              |
| sub-mgmt:      | subscriber management                 |

**Values** The following are values for the 7450 ESS:

|               |                                       |
|---------------|---------------------------------------|
| all           | All supported applications            |
| igmp-snooping | igmp-snooping                         |
| mc-ring       | multi-chassis ring                    |
| mld-snooping  | multicast listener discovery-snooping |
| sub-host-trk  | subscriber host tracking              |
| sub-mgmt      | subscriber management                 |

## screen

|                    |                                                                        |
|--------------------|------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>screen</b>                                                          |
| <b>Context</b>     | clear                                                                  |
| <b>Description</b> | This command allows an operator to clear the Telnet or console screen. |

## system

|                    |                                                              |
|--------------------|--------------------------------------------------------------|
| <b>Syntax</b>      | <b>system</b>                                                |
| <b>Context</b>     | clear                                                        |
| <b>Description</b> | This command allows an operator to clear system information. |

## ptp

|                |              |
|----------------|--------------|
| <b>Syntax</b>  | <b>ptp</b>   |
| <b>Context</b> | clear>system |

**Description** This command enables the context to clear Precision Timing Protocol (PTP) information.

## inactive-peers

**Syntax** **inactive-peers**

**Context** clear>system>ptp

**Description** This command clears inactive peer information.

## peer

**Syntax** **peer** *ip-address* [**router** *router-instance* | **service name** *service-name*] **statistics**

**Context** clear>system>ptp

**Description** This command clears PTP peer information.

**Parameters** *ip-address* — Clears information specific to the address of the PTP 1588 peer.

**Values** a.b.c.d

*router-instance* — Clears information that is specific to a virtual router instance. The router instance can be up to 32 characters.

*service-name* — Clears information that is specific to a service name. The service name can be up to 64 characters.

**statistics** — Clears statistics information of the specified IP address.

## port

**Syntax** **port** *port-id* **statistics**

**Context** clear>system>ptp

**Description** This command clears PTP port information.

**Parameters** *port-id* — Clears the specified port ID.

**Values** *slot/mda/port*

**statistics** — Clears statistics information of the specified port ID.

## statistics

**Syntax** **statistics**

**Context** clear>system>ptp

**Description** This command clears all PTP statistics.

## script-control

**Syntax** **script-control**

**Context** clear>system

**Description** This command enables the context to clear script information.

## script-policy

**Syntax** **script-policy**

**Context** clear>system>script-control

**Description** This command enables the context to clear script policy information.

## completed

**Syntax** **completed** [*script-policy-name*] [**owner** *owner-name*]

**Context** clear>system>script-control>script-policy

**Description** This command clears completed script run history entries.

**Parameters** *script-policy-name* — Specifies to only clear history entries for the specified script-policy. 32 characters maximum.

*owner-name* — Specifies to only clear history entries for script-policies with the specified owner. 32 characters maximum.

**Default** TiMOS CLI

## statistics

**Syntax** **statistics**

**Context** clear>system

**Description** This command clears system specific statistics.

## xmpp

- Syntax** `xmpp server xmpp-server-name`
- Context** `clear>system>statistics`
- Description** This command clears XMPP server statistics.
- Parameters** *xmpp-server-name* — Specifies the XMPP server, up to 32 characters in length.

## sync-if-timing

- Syntax** `sync-if-timing {ref1 | ref2 | bits}`
- Context** `clear>system`
- Description** This command allows an operator to individually clear (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 revertive mode which causes a re-evaluation of all available references.
- This command also clears the Wait-to-Restore state of the reference so that it can be selected.
- Parameters** **ref1** — Clears the first timing reference.  
**ref2** — Clears the second timing reference.  
**bits** — Clears the bits timing reference.

## 9 Standards and Protocol Support



**Note:** The information presented is subject to change without notice.

Nokia assumes no responsibility for inaccuracies contained herein.

### Access Node Control Protocol (ANCP)

draft-ietf-ancp-protocol-02, *Protocol for Access Node Control Mechanism in Broadband Networks*

RFC 5851, *Framework and Requirements for an Access Node Control Mechanism in Broadband Multi-Service Networks*

### Application Assurance (AA)

3GPP Release 12 (ADC rules over Gx interfaces)

RFC 3507, *Internet Content Adaptation Protocol (ICAP)*

### Asynchronous Transfer Mode (ATM)

AF-ILMI-0065.000, *Integrated Local Management Interface (ILMI) Version 4.0*

AF-PHY-0086.001, *Inverse Multiplexing for ATM (IMA) Specification Version 1.1*

AF-TM-0121.000, *Traffic Management Specification Version 4.1*

AF-TM-0150.00, *Addendum to Traffic Management v4.1 optional minimum desired cell rate indication for UBR*

GR-1113-CORE, *Asynchronous Transfer Mode (ATM) and ATM Adaptation Layer (AAL) Protocols Generic Requirements, Issue 1*

GR-1248-CORE, *Generic Requirements for Operations of ATM Network Elements (NEs), Issue 3*

ITU-T I.432.1, *B-ISDN user-network interface - Physical layer specification: General characteristics (02/99)*

ITU-T I.610, *B-ISDN operation and maintenance principles and functions (11/95)*

RFC 1626, *Default IP MTU for use over ATM AAL5*

RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*

### Bidirectional Forwarding Detection (BFD)

RFC 5880, *Bidirectional Forwarding Detection (BFD)*

RFC 5881, *Bidirectional Forwarding Detection (BFD) IPv4 and IPv6 (Single Hop)*

RFC 5883, *Bidirectional Forwarding Detection (BFD) for Multihop Paths*

RFC 7130, *Bidirectional Forwarding Detection (BFD) on Link Aggregation Group (LAG) Interfaces*

RFC 7880, *Seamless Bidirectional Forwarding Detection (S-BFD)*

RFC 7881, *Seamless Bidirectional Forwarding Detection (S-BFD) for IPv4, IPv6, and MPLS*

## **Border Gateway Protocol (BGP)**

draft-hares-idr-update-attr-low-bits-fix-01, *Update Attribute Flag Low Bits Clarification*

draft-ietf-idr-add-paths-guidelines-08, *Best Practices for Advertisement of Multiple Paths in IBGP*

draft-ietf-idr-best-external-03, *Advertisement of the best external route in BGP*

draft-ietf-idr-bgp-flowspec-oid-03, *Revised Validation Procedure for BGP Flow Specifications*

draft-ietf-idr-bgp-gr-notification-01, *Notification Message support for BGP Graceful Restart*

draft-ietf-idr-bgp-ls-app-specific-attr-01, *Application Specific Attributes Advertisement with BGP Link-State (IS-IS)*

draft-ietf-idr-bgp-optimal-route-reflection-10, *BGP Optimal Route Reflection (BGP-ORR)*

draft-ietf-idr-error-handling-03, *Revised Error Handling for BGP UPDATE Messages*

draft-ietf-idr-flowspec-interfaceset-03, *Applying BGP flowspec rules on a specific interface set*

draft-ietf-idr-flowspec-path-redirect-05, *Flowspec Indirection-id Redirect (localised ID)*

draft-ietf-idr-flowspec-redirect-ip-02, *BGP Flow-Spec Redirect to IP Action*

draft-ietf-idr-link-bandwidth-03, *BGP Link Bandwidth Extended Community*

draft-ietf-sidr-origin-validation-signaling-04, *BGP Prefix Origin Validation State Extended Community*

draft-uttaro-idr-bgp-persistence-03, *Support for Long-lived BGP Graceful Restart*

RFC 1772, *Application of the Border Gateway Protocol in the Internet*

RFC 1997, *BGP Communities Attribute*

RFC 2385, *Protection of BGP Sessions via the TCP MD5 Signature Option*

RFC 2439, *BGP Route Flap Damping*

RFC 2545, *Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing*

RFC 2858, *Multiprotocol Extensions for BGP-4*

RFC 2918, *Route Refresh Capability for BGP-4*

RFC 3107, *Carrying Label Information in BGP-4*

RFC 3392, *Capabilities Advertisement with BGP-4*

RFC 4271, *A Border Gateway Protocol 4 (BGP-4)*  
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