7210 Service Access System

Release 26.9.R1

7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Basic System Configuration Guide

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Table of contents

List of tables **11**

List of figures **15**

1 Getting started **17**

1.1 About this guide 17

1.1.1 Document structure and content 18

1.2 7210 SAS modes of operation 18

1.3 7210 SAS port modes 20

1.4 7210 SAS system configuration process 22

1.5 Conventions 23

1.5.1 Precautionary and information messages 23

1.5.2 Options or substeps in procedures and sequential workflows 24

2 CLI usage **25**

2.1 CLI structure 25

2.2 Navigating in the CLI 26

2.2.1 CLI contexts 26

2.2.2 Basic CLI commands 27

2.2.3 CLI environment commands 29

2.2.4 CLI monitor commands 30

2.3 Getting help in the CLI 30

2.4 The CLI command prompt 33

2.5 Displaying configuration contexts 33

2.6 EXEC files 35

2.7 Entering CLI commands 35

2.7.1 Command completion 36

2.7.2 Unordered parameters 36

2.7.3 Editing keystrokes 36

2.7.4 Absolute paths 37

2.7.5 History 38

2.7.6 Entering numerical ranges 39

2.7.7 Pipe/match 40

2.7.8 Redirection 43

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2.8 Basic command reference 43
2.8.1 Command hierarchies 43
2.8.1.1 Global CLI commands 43
2.8.1.2 Monitor commands 44
2.8.1.3 Environment commands 44
2.8.1.4 Show commands 44
2.8.2 Command descriptions 44
2.8.2.1 Global commands 45
2.8.2.2 Environment commands 63
2.8.2.3 Show commands 70
2.8.2.4 Monitor commands 71

3 File system management 89
3.1 The file system 89
3.1.1 Compact flash devices 89
3.1.2 USB storage device 91
3.1.3 URLs 91
3.1.4 Wildcards 93
3.2 File management tasks 93
3.2.1 Modifying file attributes 94
3.2.2 Creating directories 94
3.2.3 Copying files 95
3.2.4 Moving files 95
3.2.5 Removing files and deleting directories 96
3.2.6 Displaying directory and file information 96
3.3 File command reference 97
3.3.1 Command hierarchy 97
3.3.1.1 Configuration commands 97
3.3.2 Configuration commands 97
3.3.2.1 File commands 97

4 Boot options 113
4.1 System initialization 113
4.1.1 Contents of factory-shipped 7210 SAS systems 114
4.1.2 System boot option modes 115
4.1.2.1 Auto-init mode 116

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4.1.2.2 Secure download of files during auto-init ... 117
4.1.2.3 Manual mode ... 117
4.1.2.4 Configuration guidelines for use of auto-init and manual mode ... 118
4.1.2.5 Secure download of image and configuration files using SFTP ... 119
4.1.2.6 Using SFTP and PKI on a subsequent reboot ... 125
4.1.2.7 BOF parameter for key files during bootup ... 126
4.1.2.8 Using SFTP and PKI for the BOF configuration in the TiMOS context ... 126
4.1.2.9 Using SFTP and PKI with the admin>save command ... 127
4.1.2.10 Configuration guidelines for SFTP with auto-init with the bof>save and admin>save commands ... 127
4.1.3 BOF and configuration file encryption ... 128
4.1.4 Bootstrap load process ... 128
4.1.5 Boot options on 7210 SAS platforms ... 130
4.1.5.1 System boot options on 7210 SAS-D and 7210 SAS-Dxp devices ... 130
4.1.5.2 System boot options on 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C devices ... 130
4.2 Configuration file and TiMOS image loading ... 132
4.2.1 Boot sequence and image loading ... 132
4.3 Persistence ... 137
4.4 Configuration guidelines for use of software images on the 7210 SAS-D with 128MB ... 138
4.5 BOF password ... 138
4.6 Resetting the node to the factory default setting ... 139
4.7 Security for console port and Ethernet management port ... 142
4.8 Initial system startup process flow ... 142
4.9 Configuration notes ... 143
4.10 Configuring boot file options with CLI ... 143
4.10.1 BOF configuration overview ... 143
4.10.2 Basic BOF configuration ... 143
4.10.3 Common configuration tasks ... 144
4.10.3.1 Searching for the BOF ... 145
4.10.3.2 Accessing the CLI ... 145
4.10.3.3 Configuring BOF encryption ... 145
4.10.3.4 Configuring the BOF interactive menu password ... 145
4.10.3.5 Configuring configuration file encryption ... 146
4.11 Service management tasks ... 146
4.11.1 System administration commands ... 146
4.11.1.1 Viewing the current configuration ... 146

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4.11.1.2 Modifying and saving a configuration 147
4.11.1.3 Deleting BOF parameters 148
4.11.1.4 Saving a configuration to a different filename 149
4.11.1.5 Rebooting 149
4.12 BOF command reference 151
4.12.1 Command hierarchies 151
4.12.1.1 Configuration commands 151
4.12.1.2 Show commands 152
4.12.2 Command descriptions 152
4.12.2.1 Configuration commands 152
4.12.2.2 Show commands 180

5 Secure Boot 187
5.1 Secure Boot chain 187
5.2 Activate Secure Boot 188
5.3 Operational commands and logs 189
5.3.1 Secure Boot state 189
5.3.2 Software update 190
5.3.3 Update Secure Boot variables 190
5.4 Secure Boot command reference 190
5.4.1 Command hierarchies 190
5.4.1.1 Secure Boot administration commands 190
5.4.1.2 Secure Boot tools commands 191
5.4.2 Command descriptions 191
5.4.2.1 Secure Boot administration commands 191
5.4.2.2 Secure Boot tools commands 195

6 System management 196
6.1 System management parameters 196
6.1.1 System information 196
6.1.1.1 System name 196
6.1.1.2 System contact 196
6.1.1.3 System location 196
6.1.1.4 System coordinates 196
6.1.1.5 Naming objects 197
6.1.1.6 CLLI 197

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6.1.2 System time....197
6.1.2.1 Time zones....197
6.1.2.2 Network Time Protocol (NTP)....199
6.1.2.3 SNTP time synchronization....200
6.1.2.4 CRON....201
6.2 High availability....202
6.2.1 HA features....202
6.2.1.1 Redundancy....202
6.3 Temperature threshold alarm and fan speed....204
6.4 Network synchronization....204
6.4.1 Central synchronization subsystem....206
6.4.2 Synchronization options available on 7210 SAS platforms....207
6.4.3 Synchronization status messages (SSM)....208
6.4.4 Synchronous Ethernet....209
6.4.4.1 Clock source quality level definitions....210
6.4.5 IEEE 1588v2 PTP....212
6.4.5.1 PTP clock synchronization....218
6.4.5.2 Performance considerations....220
6.4.5.3 PTP capabilities....221
6.4.5.4 PTP ordinary timeReceiver clock for frequency....222
6.4.6 PTP boundary clock for frequency and time....222
6.4.7 IEC/IEEE 61850-9-3 and C37.238-2017....223
6.4.8 Configuration guidelines and restrictions for PTP....224
6.4.9 Configuration to change reference from SyncE to PTP on 7210 SAS-D ETR....225
6.5 Link Layer Discovery Protocol (LLDP)....227
6.6 System resource allocation....229
6.6.1 Allocation of ingress internal TCAM resources....229
6.6.2 Allocation of egress internal TCAM resources....231
6.6.2.1 System resource allocation examples....231
6.7 System configuration process overview....233
6.8 Configuration notes....233
6.8.1 General....234
6.9 Configuring system management with CLI....234
6.10 Saving configurations....234
6.11 Basic system configuration....234
6.12 Common configuration tasks....235

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6.12.1 System information....235
6.12.1.1 System information parameters....235
6.12.1.2 System time elements....237
6.12.2 Configuring backup copies....253
6.13 System administration parameters....254
6.13.1 Validating the golden bootstrap image....255
6.13.2 Updating the golden bootstrap image....255
6.13.3 Disconnect....255
6.13.4 Set-time....256
6.13.5 Display-config....256
6.13.6 Tech-support....257
6.13.7 Save....257
6.13.8 Reboot....258
6.13.9 Post-boot configuration extension files....259
6.13.9.1 Show command output and console messages....260
6.14 System timing....261
6.14.1 CLI command syntax for 7210 SAS platforms....261
6.14.1.1 CLI syntax for 7210 SAS-D....261
6.14.1.2 CLI syntax for 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C....262
6.14.2 Entering edit mode....262
6.14.3 Configuring timing references....263
6.14.4 Using the revert command....263
6.14.5 Other editing commands....264
6.14.6 Forcing a specific reference....264
6.15 Configuring system monitoring thresholds....265
6.15.1 Creating events....265
6.15.2 Configuring an alarm input....266
6.16 Configuring system resource profile....267
6.17 Configuring LLDP....267
6.18 System command reference....268
6.18.1 Command hierarchies....268
6.18.1.1 Configuration commands....269
6.18.1.2 Show commands....276
6.18.1.3 Clear commands....277
6.18.1.4 Debug commands....277

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6.18.1.5 Tools commands....278
6.18.2 Command descriptions....278
6.18.2.1 Configuration commands....278
6.18.2.2 Show commands....426
6.18.2.3 Clear commands....488
6.18.2.4 Debug commands....491
6.18.2.5 Fan controller debug commands....493
6.18.2.6 Tools commands....494

7 Appendix: 7210 SAS boot procedures....496
7.1 Procedure to boot using auto-init mode....497
7.1.1 Procedure to boot with auto-init mode using SFTP for secure download of files....501
7.2 Procedures to boot using manual mode....506
7.2.1 Procedure to boot from the image on flash in manual mode....506
7.2.2 Procedure to boot from the network in manual mode using uplink ports....511
7.2.3 Procedure to boot from the network in manual mode using the OOB Ethernet management port....517
7.3 Procedure to boot when the BOF is present locally....524
7.4 Procedure to boot in the satellite mode....527
7.5 Procedure to boot in the standalone-VC mode....531

8 Standards and protocol support....540
8.1 BGP....540
8.2 Certificate Management....542
8.3 Ethernet....542
8.4 EVPN....543
8.5 Fast Reroute....544
8.6 Internet Protocol (IP) — General....544
8.7 IP — Multicast....547
8.8 IP — Version 4....548
8.9 IP — Version 6....549
8.10 IPsec....550
8.11 IS-IS....551
8.12 Management....552
8.13 MPLS — General....555
8.14 MPLS — GMPLS....555
8.15 MPLS — LDP....556

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8.16 MPLS — MPLS-TP 556
8.17 MPLS — OAM 557
8.18 MPLS — RSVP-TE 557
8.19 OSPF 557
8.20 Pseudowire 559
8.21 Quality of Service 559
8.22 RIP 560
8.23 Timing 560
8.24 VPLS 561

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List of tables

Table 1: Supported modes of operation and configuration methods..... 19

Table 2: Supported port modes by mode of operation..... 21

Table 3: 7210 SAS platforms supporting port modes..... 22

Table 4: Configuration process..... 23

Table 5: Console control commands..... 27

Table 6: Command syntax symbols..... 29

Table 7: CLI environment commands..... 29

Table 8: CLI monitor command contexts..... 30

Table 9: Online help commands..... 31

Table 10: Command editing keystrokes..... 36

Table 11: CLI range use limitations..... 39

Table 12: Regular expression symbols..... 41

Table 13: Special characters..... 42

Table 14: Output fields: alias..... 71

Table 15: Encapsulation type values..... 85

Table 16: Storage locations on 7210 SAS platforms..... 89

Table 17: URL types and syntax..... 92

Table 18: File command local and remote file system support..... 93

Table 19: Contents shipped with the system on 7210 SAS..... 115

Table 20: Output fields: BOF..... 183

Table 21: System-defined time zones..... 198

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Table 22: Over-temperature threshold for 7210 SAS devices..... 204

Table 23: Revertive, non-revertive timing reference switching operation.....207

Table 24: Synchronization options on 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C..... 208

Table 25: Synchronization message coding and source priorities – SSM received.....210

Table 26: Synchronization message coding and source priorities – SSM transmitted.....211

Table 27: IP/UDP unicast and Ethernet multicast support.....213

Table 28: PTP profile support on 7210 SAS platforms.....215

Table 29: Local clock parameters when profile is set to ieee1588-2008..... 215

Table 30: Local clock parameters when profile is set to itu-telecom-freq..... 216

Table 31: Local clock parameters when profile is set to g8275dot1-2014..... 217

Table 32: Support message rates for timeReceiver and timeTransmitter clock states.....221

Table 33: System-defined time zones.....238

Table 34: PD power requirements..... 291

Table 35: ACL SAP egress resource values..... 399

Table 36: IPv6 128-bit match resource values.....402

Table 37: MAC IPv4 match resource values..... 405

Table 38: MAC IPv6 64-bit match resource values..... 406

Table 39: ACL SAP ingress resource values.....409

Table 40: IPv4 and IPv6 128-bit match resource values..... 410

Table 41: IPv4 MAC match resource values..... 413

Table 42: ACL IPv4 match resource values..... 414

Table 43: QoS IPv4 match resource values..... 416

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Table 44: ACL IPv6 64-bit only match resource values....417

Table 45: ACL MAC match resource values....418

Table 46: QoS MAC match resource values....419

Table 47: ETH-CFM resource values....420

Table 48: QoS IPv6 IPv4 match resource values....421

Table 49: QoS ingress SAP resource values....423

Table 50: SAP aggregate meter resource values....425

Table 51: Output fields: system connections....427

Table 52: Output fields: system CPU....430

Table 53: Output fields: CRON schedule....432

Table 54: Output fields: system information....434

Table 55: Output fields: script....438

Table 56: Output fields: script policy....440

Table 57: Output fields: memory pool....442

Table 58: Output fields: NTP....444

Table 59: Output fields: oper-group....448

Table 60: Output fields: resource profile....450

Table 61: Output fields: system PTP....453

Table 62: Output fields: PTP peer....456

Table 63: Output fields: PTP peers....459

Table 64: Output fields: PTP port....462

Table 65: Output fields: PTP statistics....464

Table 66: Output fields: PTP unicast....466

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Table 67: Output fields: system SNTP....467

Table 68: Output fields: system threshold....469

Table 69: Output fields: system time....471

Table 70: Output fields: TOD suite failed associations....474

Table 71: Output fields: system timing....477

Table 72: Output fields: synchronous interface timing....479

Table 73: Output fields: chassis....482

Table 74: Output fields: chassis power-supply on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p....484

Table 75: Output fields: chassis power-supply on the 7210 SAS-K 3SFP+ 8C DC variant....486

Table 76: Output fields: alarm contact input....488

Table 77: Output fields: show fan statistics....494

Table 78: 7210 SAS boot procedure overview....496

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List of figures

Figure 1: Root commands....25

Figure 2: Operational root commands....26

Figure 3: Files on the flash....114

Figure 4: System initialization: bootstrap load process....129

Figure 5: System initialization: bootstrap process overview....133

Figure 6: System initialization: bootstrap process for manual mode....134

Figure 7: System initialization: Bootstrap process for auto-init mode with partial BOF....135

Figure 8: System initialization: bootstrap process for auto-init mode....136

Figure 9: System initialization: TiMOS boot....137

Figure 10: System startup process flow....142

Figure 11: Secure boot chain of trust....188

Figure 12: Conventional network timing architecture (North American nomenclature)....205

Figure 13: A logical model of the synchronization reference selection on 7210 SAS platforms....206

Figure 14: Peer clocks....214

Figure 15: Ethernet multicast ports....214

Figure 16: Messaging sequence between the PTP timeReceiver clock and PTP timeTransmitter clocks..218

Figure 17: PTP timeReceiver clock and timeTransmitter clock synchronization timing computation....219

Figure 18: Logical model for using PTP/1588 for network synchronization on 7210 SAS platforms....220

Figure 19: timeReceiver clock....222

Figure 20: Boundary clock....223

Figure 21: LLDP internal architecture for a network node....228

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Figure 22: Customer use example for LLDP..... 229

Figure 23: System configuration and implementation flow..... 233

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1 Getting started

This chapter provides process flow information to configure basic router and system parameters, perform operational functions with directory and file management, and boot option tasks. It also provides an overview of the document organization and content, and describes the terminology used in this guide.

1.1 About this guide

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

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

- 7210 SAS-D
- 7210 SAS-Dxp 12p (2SFP+ 4SFP 6Tx)
- 7210 SAS-Dxp 16p (2SFP+ 4SFP 10Tx)
- 7210 SAS-Dxp 24p (2SFP+ 6SFP 16Tx)
- 7210 SAS-K 2F1C2T
- 7210 SAS-K 2F6C4T
- 7210 SAS-K 3SFP+ 8C

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

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

- access-uplink mode of operation

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

- network mode of operation

  7210 SAS-K 2F6C4T and 7210 SAS-K 3SFP+ 8C

When configured in the access-uplink or network mode of operation, the 7210 SAS platform implicitly operates in the standalone mode.

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1.1.1 Document structure and content

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

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

- This guide is organized into functional chapters and provides concepts and descriptions of the implementation flow. Each chapter describes a software area and provides CLI syntax and command usage to configure parameters for the functional area.
- Command outputs shown in this guide are examples only; actual displays may differ depending on supported functionality and user configuration.
- Unless explicitly noted, the CLI commands and their configuration is similar for both network and access-uplink operating modes for features applicable to both modes of operation.

1.2 7210 SAS modes of operation

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

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

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

- **access-uplink**

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

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

- **network**

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

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

- **satellite**

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

See the *7210 SAS-Mxp, R6, R12, S, Sx, T Basic System Configuration Guide* for boot options to configure the satellite mode of operation on the router. See the 7750 SR software user guides for information about service and protocol provisioning, and operating the 7210 SAS router in satellite mode.

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

- **standalone**

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

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

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

- **standalone-VC**

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

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

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

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

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

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

Table 1: Supported modes of operation and configuration methods

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

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

1.3 7210 SAS port modes

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

- **access port mode**

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

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

- **access-uplink port mode**

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

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

3 Implicitly operates innetwork mode whenstandalone mode of operation is configured

4 Supports MPLS uplinks only and implicitly operates in network mode

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

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

- **network port mode**

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

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

- **hybrid port mode**

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

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

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

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

Table 2: Supported port modes by mode of operation

Mode of operation	Supported port mode			
	Access	Network	Hybrid	Access-uplink
Access-Uplink	✓			✓
Network	✓	✓	✓	
Satellite[5]				
Standalone	✓	✓	✓	
Standalone-VC	✓	✓	✓	

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

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

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Table 3: 7210 SAS platforms supporting port modes

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

1.4 7210 SAS system configuration process

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

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

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

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

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Table 4: Configuration process

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

1.5 Conventions

This section describes the general conventions used in this guide.

1.5.1 Precautionary and information messages

The following information symbols are used in the documentation.



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



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



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



Note: Note provides additional operational information.

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Tip: Tip provides suggestions for use or best practices.

1.5.2 Options or substeps in procedures and sequential workflows

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

Example: Options in a procedure

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

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

Example: Substeps in a procedure

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

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2 CLI usage

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

2.1 CLI structure

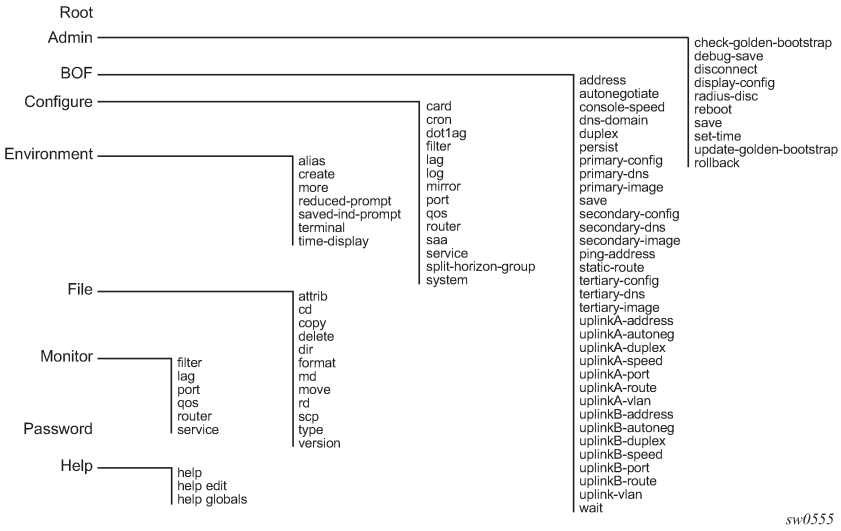
The Nokia Operating System (OS) CLI is a command-driven interface accessible through the console, Telnet, and secure shell (SSH). The CLI can be used for configuration and management of routers.

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

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

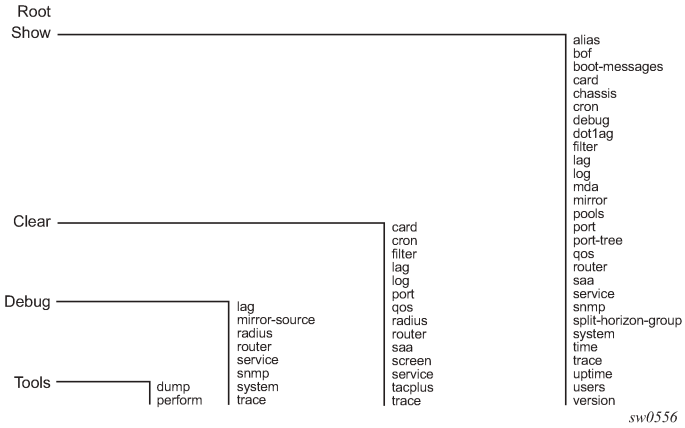
The following figures show the major contexts for router configuration. The figures are sample representations of high-level commands; not all commands are included.

Figure 1: Root commands



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Figure 2: Operational root commands



2.2 Navigating in the CLI

The following sections describe additional navigational and syntax information.

2.2.1 CLI contexts

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

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

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

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

The following examples show two methods to navigate to a service SAP ingress level.

Example: Method 1

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

Example: Method 2

```
A:ALU-7210# configure
A:ALU-7210>config# service
A:ALU-7210>config>service# epipe 6
```


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

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

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

2.2.2 Basic CLI commands

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

Table 5: Console control commands

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

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Command	Description
oam	Provides OAM test suite options. See "OAM and SAA" in the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C OAM and Diagnostics Guide* for more information about OAM test suite options.
password	Changes the user CLI login password. The password can only be changed at the ROOT level.
ping	Verifies the reachability of a remote host.
pwc	Displays the present or previous working context of the CLI session.
sleep	Causes the console session to pause operation (sleep) for one second or for the specified number of seconds. Primary use is to introduce a pause within the execution of an exec file.
ssh	Opens a secure shell connection to a host.
telnet	Telnet to a host.
traceroute	Determines the route to a destination address.
tree	Displays a list of all commands at the current level and all sublevels.
write	Sends a console message to a specific user or to all users with active console sessions.

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

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

The following table describes command syntax symbols.

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Table 6: Command syntax symbols

Symbol	Description
|	A vertical line indicates that one of the parameters within the brackets or braces is required. **tcp-ack** {**true** | **false**}
[ ]	Brackets indicate optional parameters. **redirects** [**number seconds**]
< >	Angle brackets in the CLI indicate that you must enter text based on the parameter inside the brackets (in the 7210 SAS manuals, italics are used to indicate the same rule. **interface** <*interface-name*>
{ }	Braces indicate that one of the parameters must be selected. **default-action** {**drop** | **forward**}
[{ }]	Braces within square brackets indicates that you must choose one of the optional parameters. **sdp** *sdp-id* [{**mpls**}] **vpls** *service-id* [**svc-sap-type** {**null-star|dot1q|dot1q-preserve**}]
Bold	Commands in **bold** indicate commands and keywords.
Italic	In the 7210 SAS manuals, commands in *italics* indicate parameters that you must enter a value for.

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 following table describes the CLI environment commands.

Table 7: CLI environment commands

Command	Description
alias	Enables the substitution of a command line by an alias.
create	Enables or disables the use of a **create** parameter check.
kernel	Enables **kernel** commands for Nokia technical support.
more	Configures whether CLI output should be displayed one screen at a time awaiting user input to continue.

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Command	Description
reduced-prompt	Configures the maximum number of higher-level CLI context nodes to display by name in the CLI prompt for the current CLI session.
saved-ind-prompt	Saves the indicator in the prompt.
shell	Enables **shell** commands for Nokia technical support.
terminal	Configures the terminal screen length for the current CLI session.
time-display	Specifies whether time should be displayed in local time or UTC.

2.2.4 CLI monitor commands

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

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

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

The following table describes the CLI monitor command contexts.

Table 8: CLI monitor command contexts

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

2.3 Getting help in the CLI

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

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Table 9: Online help commands

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

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

Example

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

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


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

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


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

2.4 The CLI command prompt

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

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

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

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

Example

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

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

2.5 Displaying configuration contexts

The **info** and **info detail** commands display configuration for the current level. The **info** command displays non-default configurations. The **info detail** command displays the entire configuration for the current level, including defaults.

Example

The following example shows the output that displays using the **info** command and the output that displays using the **info detail** command.

```
*A:ALA>config>service>vpls# info
----------------------------------------------
```


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```
            stp
                shutdown
            exit
            sap 1/1/14:100 create
            exit
            sap 1/1/15:100 create
            exit
            no shutdown
-----------------------------------------------
*A:ALA>config>service>vpls# info detail
-----------------------------------------------
            no description
            no disable-learning
            no disable-aging
            no discard-unknown
            fdb-table-size 250
            fdb-table-high-wmark 95
            fdb-table-low-wmark 90
            local-age 300
            stp
                shutdown
                priority 32768
                hello-time 2
                forward-delay 15
                max-age 20
                hold-count 6
                mode rstp
            exit
            mac-move
                move-frequency 2
                retry-timeout 10
                shutdown
            exit
            sap 1/1/14:100 create
                no description
                no tod-suite
                limit-mac-move blockable
                no disable-aging
                no max-nbr-mac-addr
                no discard-unknown-source
                no mac-pinning
                stp
                    path-cost 10
                    priority 128
                    no edge-port
                    auto-edge
                    link-type pt-pt
                    no root-guard
                    no shutdown
                exit
                dot1ag
                exit
                no authentication-policy
                no l2pt-termination
                no bpdu-translation
                ingress
                    qos 1
                    no match-qinq-dot1p
                    no filter
                exit
                egress
                    no qinq-mark-top-only
                    no filter
                    no agg-rate-limit
```


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```
            exit
            no collect-stats
            no accounting-policy
            no shutdown
        exit
        sap 1/1/15:100 create
            no description
            no tod-suite
            limit-mac-move blockable
            no disable-aging
            no max-nbr-mac-addr
            no discard-unknown-source
            no mac-pinning
            stp
                path-cost 10
                priority 128
                no edge-port
                auto-edge
                link-type pt-pt
                no root-guard
                no shutdown
            exit
            dot1ag
            exit
            no authentication-policy
            no l2pt-termination
            no bpdu-translation
            ingress
                qos 1
                no match-qinq-dot1p
                no filter
            exit
            egress
                no qinq-mark-top-only
                no filter
                no agg-rate-limit
            exit
            no collect-stats
            no accounting-policy
            no shutdown
        exit
```

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.

2.7 Entering CLI commands

This section provides information about entering CLI commands and parameters.

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2.7.1 Command completion

The CLI supports both command abbreviation and command completion. If the keystrokes entered are enough to match a valid command, the CLI displays the remainder of the command syntax when the <Tab> key or space bar is pressed. When typing a command, the <Tab> key or space bar invokes auto-completion. If the keystrokes entered are definite, auto-completion 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.

2.7.2 Unordered parameters

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

Example

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

```
*A:ALA-1>config>router# static-route
  - [no] static-route {<ip-prefix/prefix-length>|<ip-prefix> <netmask>}
    [preference <preference>] [metric <metric>] [enable|disable] next-hop
    <gateway>
  - [no] static-route {<ip-prefix/prefix-length>|<ip-prefix> <netmask>}
    [preference <preference>] [metric <metric>] [enable|disable] black-hole
```

2.7.3 Editing keystrokes

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

Table 10: Command editing keystrokes

Editing action	Keystrokes
Delete current character	<Ctrl-d>
Delete text up to cursor	<Ctrl-u>
Delete text after cursor	<Ctrl-k>
Move to beginning of line	<Ctrl-a>
Move to end of line	<Ctrl-e>
Get prior command from history	<Ctrl-p>
Get next command from history	<Ctrl-n>
Move cursor left	<Ctrl-b>

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Editing action	Keystrokes
Move cursor right	<Ctrl-f>
Move back one word	<Esc><b>
Move forward one word	<Esc><f>
Convert rest of word to uppercase	<Esc><c>
Convert rest of word to lowercase	<Esc><l>
Delete remainder of word	<Esc><d>
Delete word up to cursor	<Ctrl-w>
Transpose current and previous character	<Ctrl-t>
Enter command and return to root prompt	<Ctrl-z>
Refresh input line	<Ctrl-l>

2.7.4 Absolute paths

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

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

The command may or may not change the current context depending on whether it is a leaf command.

Example

This is the same behavior the CLI performs when CLI commands are entered individually, as shown in the following 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.

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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 ies 5 create
```

becomes

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

2.7.5 History

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

Example

```
*A:ALA-1# history
   1 environment terminal length 48
   2 environment no create
   3 show version
   4 configure port 1/1/1
   5 info
   6 \configure router isis
   7 \port 1/1/1
   8 con port 1/1/1
   9 \con port 1/1/1
  10 \configure router bgp
  11 info
  12 \configure system login-control
  13 info
  14 history
  15 show version
  16 history
*A:ALA-1# !3
A:cses-E11#  show version
TiMOS-B-0.0.I2838 both/i386 NOKIA SR 7750 Copyright (c) 2016 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Mon Jan 10 18:33:16 PST 2016 by builder in /rel0.0/I2838/panos/main
A:cses-E11#
TiMOS-B-0.0.I232 both/i386 NOKIA SAS-D 7210 Copyright (c) 2016 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Sat Oct 11 18:15:40 IST 2016 by panosbld in /panosbld/ws/panos/main
*A:ALU-7210#
```


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2.7.6 Entering numerical ranges

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

[*x..y*]

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

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

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

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

The following table describes CLI range use limitations.

Table 11: CLI range use limitations

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

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Limitation	Description
Command completion may cease to work when entering a range.	After entering a range in a CLI command, command and key completion, which occurs by pressing the <Tab> or spacebar, may cease to work. If the command line entered is correct and unambiguous, the command works correctly; otherwise, an error is returned.

2.7.7 Pipe/match

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

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

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

  admin display-config | match "echo" > cf3cf1**:\echo_list.txt**

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

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

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

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

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

  admin display-config | match post-lines 999999 interface

Command syntax:

match *pattern* **context** {**parents** | **children** | **all**} [**ignore-case**] [**max-count** *lines-count*] [**expression**]

match *pattern* [**ignore-case**] [**invert-match**] [**pre-lines** *pre-lines*] [**post-lines** *lines-count*] [**max-count** *lines-count*] [**expression**]

where:

```
pattern         string or regular expression
context         keyword:  display context associated with the matching line
parents         keyword:  display parent context information
children        keyword:  display child context information
all             keyword:  display both parent and child context information
ignore-case     keyword
max-count       keyword:  display only a specific number of instances of
                matching lines
lines-count     1 — 2147483647
expression      keyword:  pattern is interpreted as a regular expression
invert-match    keyword
pre-lines       keyword:  display some lines prior to the matching line
pre-lines       0 — 100
post-lines      keyword:  display some lines after the matching line
lines-count     1 — 2147483647
```


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Example

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


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

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

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

Table 12: Regular expression symbols

String	Description
.	Matches any single character.
[ ]	Matches a single character that is contained within the brackets. [abc] matches "a", "b", or "c". [a-z] matches any lowercase letter. [A-Z] matches any uppercase letter. [0-9] matches any number.
[^]	Matches a single character that is not contained within the brackets. [^abc] matches any character other than "a", "b", or "c". [^a-z] matches any single character that is not a lowercase letter.
^	Matches the start of the line (or any line, when applied in multiline mode).
$	Matches the end of the line (or any line, when applied in multiline mode).
()	Defines a "marked subexpression". Every matched instance is available to the next command as a variable.
*	A single character expression followed by "*" matches zero or more copies of the expression.

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String	Description
{m,n}	Matches at least m and at most n repetitions of the term.
{m}	Matches exactly m repetitions of the term.
{m,}	Matches m or more repetitions of the term.
?	The preceding item is optional and matched once, at most.
+	The preceding item is matched one or more times.
-	Used between start and end of a range.
\	An escape character to indicate that the following character is a match criteria and not a grouping delimiter.
>	Redirect output.

Table 13: Special characters

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

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2.7.8 Redirection

The 7210 SAS 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).

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

Example

In some cases only part of the output may be applicable. The pipe/match and redirection commands can be combined, as shown in the following example.

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

2.8 Basic command reference

2.8.1 Command hierarchies

- Global CLI commands
- Environment commands
- Show commands
- Monitor commands

2.8.1.1 Global CLI commands

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


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```
    - tree [detail]
    - write {user | broadcast} message-string
```

2.8.1.2 Monitor commands

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

2.8.1.3 Environment commands

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

2.8.1.4 Show commands

```
show
    - alias
```

2.8.2 Command descriptions

- Global commands

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- Monitor commands
- Environment commands
- Show commands

2.8.2.1 Global commands

enable-admin

Syntax

enable-admin

Context

<global>

Description

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

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

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

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

Example: Password configuration

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

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

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

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Output example

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

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

back

Syntax

back

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

clear

Syntax

clear

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

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

Parameters

cron

Clears CRON history.

filter

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

lag

Clears LAG-related entities.

log

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

port

Clears port statistics.

qos

Clears QoS statistics.

radius

Clears the RADIUS server state.

router

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

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

saa

Clears the SAA test results.

screen

Clears the console or telnet screen.

service

Clears service ID and statistical entities.

system

Clears or re-enables a previously failed reference.

tacplus

Clears the TACACS+ server state.

trace

Clears the trace log.

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echo

Syntax

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

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

Parameters

text-to-echo

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

extra-text-to-echo

Specifies more text to be echoed, up to 256 characters.

more-text

Specifies more text to be echoed, up to 256 characters.

exec

Syntax

exec [**-echo**] [**-syntax**] {*file-name* | [*eof_string*]}

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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

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

- boot-bad-exec

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

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- boot-good-exec

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

Parameters

-echo

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

Default echo disabled

-syntax

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

Default execute file commands

file-name

Specifies the text file, up to 256 characters, with CLI commands to execute.

<<

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

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

eof_string

Specifies the ASCII printable string, up to 254 characters, used to indicate the end of the exec file when stdin is used as the exec file source. <Ctrl-C> and EOF can always be used to terminate an exec file sourced from stdin.

Default <Ctrl-C>, EOF

exit

Syntax

exit [**all**]

Context

<GLOBAL>

Platforms

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Description

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

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

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

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

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

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

Parameters

all

Keyword to exit back to the root CLI context.

help

Syntax

help

help edit

help global

help special-characters

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

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

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

Parameters

edit

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

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

global

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

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


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

special-characters

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

?

Lists all commands in the current context.

string?

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

command ?

Displays command syntax and associated keywords.

string<Tab> or string<Space>

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

history

Syntax

history

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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

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"
```


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

info

Syntax

info [**detail**]

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays the running configuration for the configuration context.

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

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

Parameters

detail

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

logout

Syntax

logout

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Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command logs out of the router session.

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

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

password

Syntax

password

Context

<ROOT>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command changes a user CLI login password.

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

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

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

ping

Syntax

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

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Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

Parameters

ip-address* | *dns-name

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

Values

ipv4-address - a.b.c.d

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

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

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

x: 0 — FFFF H

d: 0 — 255 D

rapid | detail

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

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

The following is a sample configuration output.

```
*A:ALU-7210# ping 192.xxx.xxx.xxx
PING 192.xxx.xxx.xxx 56 data bytes
64 bytes from 192.xxx.xxx.xxx: icmp_seq=1 ttl=64 time<10ms.
64 bytes from 1192.xxx.xxx.xxx: icmp_seq=2 ttl=64 time<10ms.
64 bytes from 192.xxx.xxx.xxx: icmp_seq=3 ttl=64 time<10ms.
64 bytes from 192.xxx.xxx.xxx: icmp_seq=4 ttl=64 time<10ms.
64 bytes from 192.xxx.xxx.xxx: icmp_seq=5 ttl=64 time<10ms.

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


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

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

Values 0 to128

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

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

Values 0 to 255

size ***bytes***

Specifies the size in bytes of the ping request packets.

Values 0 to 65507

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

pattern ***pattern***

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

Values 0 to 65535

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:x[-interface]

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

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

x: 0 — FFFF H

d: 0 — 255 D

Default the IP address of the egress IP interface

interval ***seconds***

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

Values 1 to 10000

Default 1

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next-hop *ip-address*

Disregards the routing table and sends 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:x[-interface]

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

x - [0..FFFF]H

d - [0..255]D

Default per the routing table

interface *interface-name*

Specifies the interface name.

bypass-routing

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

count *requests*

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

Values 1 to 10000

Default 5

do-not-fragment

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

router *router-instance*

Specifies the router name or service ID.

Values

router-name:	Base, management
service-id:	1 to 2147483647

Default Base

timeout *timeout*

Specifies the timeout in seconds.

Values 1 to 10

Default 5

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service-name *service-name*

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

pwc

Syntax

pwc [**previous**]

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

Example: Configuration output

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

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

Parameters

previous

Keyword to display the previous present working context.

sleep

Syntax

sleep [*seconds*]

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Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

Parameters

seconds

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

Values 1 to 100

Default 1

ssh

Syntax

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

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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

Parameters

ip-address* | *host-name

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

-l *user*

Specifies the username to use when opening the SSH session.

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router *router-instance*

Specify the router name or service ID.

Values Base, management

Default Base

telnet

Syntax

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

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

Parameters

ip-address

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

Values

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

dns-name

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

port

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

Values 1 to 65535

Default 23

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router *router-instance*

Specifies the router name or service ID.

Values *router-name*: Base, management

Default Base

traceroute

Syntax

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

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

Example

The following is a sample configuration output.

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

Parameters

ip-address* | *dns-name

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

Values

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

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ttl ***ttl***

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

Values 1 to 255

wait ***milliseconds***

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

Values 1 to 60000

Default 5000

no-dns

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

Default DNS lookups are performed

source ***ip-address***

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

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

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

Values 0 to 255

router ***router-instance***

Specifies the router name or service ID.

Values

router-name:	Base, management
service-id:	1 to 2147483647

Default Base

tree

Syntax

tree [**detail**]

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

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

Parameters

detail

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

write

Syntax

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

Context

<GLOBAL>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

Parameters

user

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

Values any valid CLI username

broadcast

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

message-string

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

2.8.2.2 Environment commands

alias

Syntax

alias *alias-name alias-command-line*

no alias *alias-name*

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Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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

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

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

alias soi "show router ospf interface"

Parameters

alias-name

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

alias-command-line

Specifies the command line to be associated with the alias.

create

Syntax

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

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document

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

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kernel

Syntax

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

no kernel

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document, except the 7210 SAS-D

Description

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

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

Default

no kernel

Parameters

password

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

token

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

more

Syntax

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

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document

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 using the terminal command.

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The following prompt appears at the end of each screen of paginated output:

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

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

Default

more

reduced-prompt

Syntax

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

no reduced-prompt

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

By default, the CLI prompt displays the system name and the complete context in the CLI.

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

Example: Configuration output

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

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

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

Default

no reduced-prompt

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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

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command enables a 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.

Example

The following is a sample configuration output.

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

shell

Syntax

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

no shell

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document, except the 7210 SAS-D

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Description

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

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

Default

no shell

Parameters

password

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

token

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

terminal

Syntax

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

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

length

Syntax

length *lines*

Context

environment>terminal

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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Default

24

Parameters

lines

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

Values 1 to 512

width

Syntax

width *width*

Context

environment>terminal

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

Default

80

Parameters

width

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

Values 1 to 512

time-display

Syntax

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

Context

environment

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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

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

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

Default

time-display local

time-stamp

Syntax

time-stamp

Context

environment

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays timestamps in the CLI session.

2.8.2.3 Show commands

alias

Syntax

alias

Context

<root>

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays a list of existing aliases.

Output

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

Sample output: show alias

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

Table 14: Output fields: alias

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

2.8.2.4 Monitor commands

filter

Syntax

filter

Context

monitor

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

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

ip

Syntax

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

Context

monitor>filter

monitor>management-access-filter

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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

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

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

Parameters

ip-filter-id

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

Values 1 to 65535

entry-id

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

Values 1 to 65535

seconds

Specifies the interval for each display in seconds.

Values 3 to 60

Default 5 seconds

repeat

Specifies how many times the command is repeated.

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Values 1 to 999

Default 10

absolute

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

rate

The rate per second for each statistic is displayed instead of the delta.

Output

The following output is an example of filter IP statistics.

Sample output

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


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


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ipv6

Syntax

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

Context

monitor>filter

monitor>management-access-filter

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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

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

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

Parameters

iv6p-filter-id

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

Values 1 to 65535

entry-id

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

Values 1 to 65535

seconds

Specifies the interval for each display in seconds.

Values 3 to 60

Default 10 seconds

repeat

Specifies how many times the command is repeated.

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Values 1 to 999

Default 10

absolute

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

rate

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

Output

Sample output

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

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

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

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

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

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

mac

Syntax

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

Context

monitor>filter

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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

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

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

Parameters

mac-filter-id

Specifies the MAC filter policy ID.

Values 1 to 65535

entry-id

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

Values 1 to 65535

seconds

Specifies the interval for each display in seconds.

Values 3 to 60

Default 5 seconds

repeat

Specifies how many times the command is repeated.

Values 1 to 999

Default 10

absolute

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

rate

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

Output

The following output is an example of MAC filter statistics.

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

Context

monitor

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

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

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

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

Monitor commands are similar to **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.

Values 1 to 6

seconds

Specifies the interval for each display in seconds.

Values 3 to 60

Default 5 seconds

repeat

Specifies how many times the command is repeated.

Values 1 to 999

Default 10

absolute

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

rate

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

Output

The following output is an example of LAG statistics.

Sample output

```
A:ALA-12# monitor lag 2
===============================================================================
Monitor statistics for LAG ID 2
===============================================================================
Port-id Input Input Output Output Input Output
Bytes Packets Bytes Packets Errors Errors
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
1/1/1 2168900 26450 64 1 0 0
```


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```
1/1/2 10677318 125610 2273750 26439 0 0
1/1/3 2168490 26445 0 0 0 0
-------------------------------------------------------------------------------
Totals 15014708 178505 2273814 26440 0 0
-------------------------------------------------------------------------------
At time t = 5 sec (Mode: Delta)
-------------------------------------------------------------------------------
1/1/1 0 0 0 0 00
1/1/2 258 3 86 1 0 0
1/1/3 82 1 0 0 0 0
-------------------------------------------------------------------------------
Totals 340 4 86 1 0 0
===============================================================================
A:ALA-12#
```

management-access-filter

Syntax

management-access-filter

Context

monitor

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context 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

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command monitors statistics for the MAF IP filter entry.

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Parameters

entry *entry-id*

Specifies an existing IP MAF entry ID.

Values 1 to 9999

interval *seconds*

Specifies the interval for each display in seconds.

Values 3 to 60

Default 10

repeat *repeat*

Specifies how many times the command is repeated.

Values 1 to 999

Default 10

absolute

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

rate

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

ipv6

Syntax

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

Context

monitor>management-access-filter

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command monitors statistics for the MAF IPv6 filter entry.

Parameters

entry *entry-id*

Specifies an existing IP MAF entry ID.

Values 1 to 9999

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interval *seconds*

Configures the interval for each display in seconds.

Values 3 to 60

Default 10

repeat *repeat*

Configures how many times the command is repeated.

Values 1 to 999

Default 10

absolute

The raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

rate

The rate-per-second for each statistic is displayed instead of the delta.

port

Syntax

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

Context

monitor

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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

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

Monitor commands are similar to **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 5 port IDs.

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seconds

Specifies the interval for each display in seconds.

Values 3 to 60

Default 5 seconds

repeat

Specifies how many times the command is repeated.

Values 1 to 999

Default 10

absolute

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

rate

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

Output

The following output is an example of port statistics.

Sample output

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


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

service

Syntax

service

Context

monitor

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

id

Syntax

id *service-id*

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Context

monitor>service

Platforms

Supported on all 7210 SAS platforms as described in this document

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 of the service in the service domain.

sap

Syntax

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

Context

monitor>service>id

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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

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

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

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

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Parameters

sap-id

Specifies the physical port identifier portion of the SAP definition.

Values

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

port-id

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

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

qtag1, qtag2

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

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

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

Table 15: Encapsulation type values

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. A 0 qtag1 value also accepts untagged packets on the dot1q port.
Ethernet	QinQ	qtag1: 0 to 4094 qtag2: 0 to 4094	The SAP is identified by two 802.1Q tags on the port. A 0 qtag1 value also accepts untagged packets on the dot1q port.

interval *seconds*

Specifies the interval for each display in seconds.

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Values 11 to 60

Default 11 seconds

repeat *repeat*

Specifies how many times the command is repeated.

Values 1 to 999

Default 10

absolute

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

rate

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

Output

The following output is an example of SAP statistics.

Sample output

```
A:7210SAS-D>monitor>service>id# sap 1/1/1:100
===============================================================================
Monitor statistics for Service 10000 SAP 1/1/1:100
===============================================================================
-------------------------------------------------------------------------------
At time t = 110 sec (Mode: Delta)
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Ingress QoS Classifier Usage
-------------------------------------------------------------------------------
Classifiers Allocated: 16 Meters Allocated : 8
Classifiers Used : 2 Meters Used : 2
-------------------------------------------------------------------------------
Sap Statistics
-------------------------------------------------------------------------------
Packets Octets
Ingress Stats: 1013264 0
Egress Stats: 163674 0
-------------------------------------------------------------------------------
Sap STP Statistics
-------------------------------------------------------------------------------
Forward transitions : 0 Bad BPDUs rcvd : 0
Cfg BPDUs rcvd : 0 Cfg BPDUs tx : 0
TCN BPDUs rcvd : 0 TCN BPDUs tx : 0
RST BPDUs rcvd : 0 RST BPDUs tx : 0
MST BPDUs rcvd : 0 MST BPDUs tx : 0
-------------------------------------------------------------------------------
Sap per Meter Stats
-------------------------------------------------------------------------------
Packets Octets
Ingress Meter 1 (Unicast)
For. InProf : 0 0
For. OutProf :  210645 0
Ingress Meter 11 (Multipoint)
For. InProf :  0 0
For. OutProf :  87238 0
===============================================================================
```


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```
A:7210SAS-D>monitor>service>id#
```

sdp

Syntax

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

Context

monitor>service>id

Platforms

7210 SAS-K 2F6C4T and 7210 SAS-K 3SFP+ 8C

Description

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

Parameters

sdp-id

Specifies the SDP identifier.

Values 1 to 17407

absolute

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

far-end *ip-address*

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

interval *seconds*

Specifies the interval for each display in seconds.

Values 11 to 60

Default 11 seconds

rate

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

repeat *repeat*

Specifies how many times the command is repeated.

Values 1 to 999

Default 10

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Output

The following output is an example of SDP statistics.

Sample output

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


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3 File system management

This chapter provides information about file system management.

3.1 The file system

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

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

3.1.1 Compact flash devices

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

The following compact flash devices are supported:

- SD slot, USB slot, or internal flash, `cf1:\`
- external USB slot, `uf1:\`

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

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

Table 16: Storage locations on 7210 SAS platforms

7210 SAS platforms	Storage locations	
	`cf1:\`	`uf1:\`[9]
7210 SAS-D	✓[10]	
7210 SAS-Dxp	✓[11]	
7210 SAS-K 2F1C2T	✓[12]	✓

9 USB port located on the front panel; allows a supported USB device to be plugged in

10 Supports an internal flash

11 SD card slot located on the front panel

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7210 SAS platforms	Storage locations	
	cf1:\	uf1:\[9]
7210 SAS-K 2F6C4T	✓[13]	✓
7210 SAS-K 3SFP+ 8C	✓[13]	✓

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

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

Example

Use the **file dir cf1:** command to determine the number of entries (files or directories) present in the root directory, as shown in the following output example.

In the following listing, the total number of entries in the root directory (files and directories) is 14 files + 2 directories = 16.

```
*A:7210-SAS #

*A:7210-SAS #file dir

 Volume in drive cf1 on slot A is /flash.

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

Directory of cf1:\

10/12/2011  10:37p             4248394 boot.tim
10/17/2011  07:28a                 524 sasm.sdx
10/26/2011  10:06p                 828 bof.cfg
10/27/2011  09:04p      <DIR>          act-collect
10/27/2011  09:06p      <DIR>          act
10/17/2011  07:30a                   0 test1.txt
```

9 USB port located on the front panel; allows a supported USB device to be plugged in

12 Depending on the 7210 SAS-K 2F1C2T model, the cf1:\ storage location is either an SD card slot or USB slot. The slot is located on the rear panel and allows the use of a supported SD card or USB device. Secure access to the SD card or USB device is also supported.

13 SD card slot located on the rear panel; allows the use of a supported SD card. Secure access to the SD card is also supported.

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```
10/26/2011  10:43p                5360 sasm.cfg
10/11/2011  06:42a            28821599 both.tim
10/26/2011  10:42p               14597 bootlog.txt
10/19/2011  04:22a                 832 bof.cfg.1
10/17/2011  07:37a                 827 test1
10/17/2011  07:38a                 827 tes2
10/17/2011  07:38a                 827 tes3
10/17/2011  07:39a                 827 tes3567
10/17/2011  07:38a                 827 tes356
10/18/2011  10:46p                5481 sasm.cfg.1

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

*A:7210-SAS #
```

3.1.2 USB storage device

Note:
USB devices are supported on all 7210 SAS platforms as described in this document, except the 7210 SAS-D and 7210 SAS-Dxp.

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

The 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C provide an option to load the boot loader (`boot.tim`) from the USB storage device plugged into any one of the USB ports.

Note:

- The USB devices and capacities that are supported for use with 7210 SAS are listed in the *7210 SAS Software Release Notes 26.x.Rx*.
- When a USB device is unplugged or removed from the system, a major alarm is raised. The alarm can be cleared using the shutdown command.
- 7210 SAS also auto-detects the device type when any of the supported devices are connected to the USB interface. Only approved USB mass storage devices and optical clip-on devices can be plugged in to the USB port and are recognized as valid devices. All other unsupported devices result in an error log being printed.
- Nokia recommends using the **shutdown** command before removing the USB storage device.

3.1.3 URLs

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

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

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Table 17: URL types and syntax

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

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

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

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

Table 18: File command local and remote file system support

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

3.1.4 Wildcards

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

Example

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

3.2 File management tasks

The following sections contain information about the basic system tasks.

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

3.2.1 Modifying file attributes

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

Use the following CLI syntax to modify file attributes.

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

Example: Modifying file attributes command syntax

```
# file
    file cf3:\ # attrib
    file cf3:\ # attrib +r BOF.SAV
    file cf3:\ # attrib
```

Example: File configuration

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

3.2.2 Creating directories

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

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

Use the following CLI syntax to create a new directory:

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

Example: Creating directories command syntax

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


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```
    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 following format: user@host:file-name. The destination does not need to be local.

Use the following CLI syntax to copy files.

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

Example: Copy command syntax

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

3.2.4 Moving files

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

Use the following CLI syntax to move files.

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

Example: Move command syntax

```
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\ #
```


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3.2.5 Removing files and deleting directories

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

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

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

Example: Command syntax

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

3.2.6 Displaying directory and file information

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

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

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

Example: Command syntax

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

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

Directory of cf1:\

10/22/2008  10:30a                8849 bootlog.txt
10/22/2008  10:30a                 733 bof.cfg
10/22/2008  10:29a                5531 bootlog_prev.txt
02/01/2001  09:25a             3528373 boot.tim
02/01/2001  09:21a                4860 config.cfg
10/22/2008  11:07a      <DIR>          test1
10/17/2008  07:32p                 724 env.cfg
10/15/2008  03:38p                9499 snake.cfg
               7 File(s)               3558569 bytes.
               1 Dir(s)               53135360 bytes free.
```


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3.3 File command reference

3.3.1 Command hierarchy

3.3.1.1 Configuration commands

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

3.3.2 Configuration commands

3.3.2.1 File commands

shutdown

Syntax

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

Context

file

Platforms

7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C

Description

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

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

Default

no shutdown

Parameters

cflash-id

Specifies the device identifier.

Values cf1:, uf1:

attrib

Syntax

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

attrib

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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

Parameters

file-url

Specifies the URL for the local file.

Values

file-url — *local-url* | *remote-url*

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

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

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

ipv4-address — a.b.c.d

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

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x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

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

cflash-id or usb-flash-id — cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1:, uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

+r

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

-r

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

cd

Syntax

cd [*file-url*]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

Parameters

file-url

Specifies the URL for the local file.

Values

file-url — *local-url* | *remote-url*

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

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

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

ipv4-address — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

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

cflash-id or usb-flash-id — cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1:, uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

none

Displays the current working directory.

..

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

directory-url

Specifies the destination directory.

checksum

Syntax

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

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command computes and displays a checksum for a file.

Parameters

md5

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

sha256

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

file-url

Specifies the location of the file.

Values

local-url	[*cflash-id/*][*file-path*] up to 200 characters, including cflash-id directory length 99 chars max each
remote-url	[{ftp | tftp | sftp}://*login*:*pswd@remote-locn/*][*file-path*]
	up to 247 characters
	directory length up to 199 characters

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remote-locn	[*hostname* | *ipv4-address* | [*ipv6-address*]]
ipv4-address	*a.b.c.d*
ipv6-address	*x:x:x:x:x:x:x:x*[*-interface*]
	x:x:x:x:x:x:d.d.d.d[*-interface*]
	x - [0 to FFFF]H
	d - [0 to 255]D
	interface - up to 32 characters, for link local addresses
cflash-id	cf1: | cf2:

router-instance

Specifies the router name or the service ID.

Values

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

copy

Syntax

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

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command copies a file or all files in a directory from a source URL to a destination URL. At least one of the specified URLs should be a local URL. The optional wild-card (*) can be used to copy multiple files that share a common (partial) prefix and/or (partial) suffix. When a file is copied to a destination with the same file name, the original file is overwritten by the new file specified in the operation. The following prompt appears if the destination file already exists:

"Overwrite destination file (y/n)?"

For example:

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

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

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

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

Parameters

source-file-url

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

dest-file-url

Specifies the destination of the copied file or directory.

Values

file-url — *local-url* | *remote-url*

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

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

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

ipv4-address — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

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

cflash-id or usb-flash-id — cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1:, uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

force

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

delete

Syntax

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

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command deletes the specified file.

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

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

Parameters

file-url

Specifies the file name to delete.

Values

file-url — *local-url* | *remote-url*

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

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

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

ipv4-address — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

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

cflash-id or usb-flash-id — cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1:, uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

force

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

dir

Syntax

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

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

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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.

Values

file-url — *local-url* | *remote-url*

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

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

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

ipv4-address — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

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

cflash-id or usb-flash-id — cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1:, uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

sort-order {d | n | s}

Specifies the sort order.

Values d — date

n — name

s — size

reverse

Specifies to reverse the sort order.

file

Syntax

file

Context

root

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context 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.

format

Syntax

format cflash *cflash-id*

Context

root>file

Platforms

7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C

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:, uf1:

md

Syntax

md *file-url*

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command creates a new directory in a file system.

Directories can only be created one level at a time.

Parameters

file-url

Specifies the directory name to be created.

Values

file-url — *local-url* | *remote-url*

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

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

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

ipv4-address — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

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

cflash-id or usb-flash-id — cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1:, uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

move

Syntax

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

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

The following prompt appears if the destination file already exists:

"Overwrite destination file (y/n)?"

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Parameters

old-file-url

Specifies the file or directory to be moved.

new-file-url

Specifies the new destination to place the *old-file-url*.

Values

file-url — *local-url* | *remote-url*

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

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

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

ipv4-address — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

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

cflash-id or usb-flash-id — cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1:, uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

force

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

rd

Syntax

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

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command is used to delete a directory.

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

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Parameters

file-url

Specifies the directory to be removed.

Values

file-url — *local-url* | *remote-url*

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

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

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

ipv4-address — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

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

cflash-id or usb-flash-id — cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1:, uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

rf

Specifies that the parameter forces a recursive delete.

force

Keyword to force an immediate deletion of the specified directory.

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

repair

Syntax

repair [*cflash-id*]

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

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

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Parameters

cflash-id

Specifies the compact flash slot ID.

Values cf1: (7210 SAS-D, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

Default the current compact flash device

scp

Syntax

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

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

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.

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

cflash-id or *usb-flash-id*	cf1: (7210 SAS-D, 7210 SAS-Dxp)
—	cf1:, uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

destination-file-url

Specifies the destination file.

user

Specifies the SSH user.

host

Specifies the remote host IP address of DNS name.

file-path

Specifies the destination path.

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router-instance

Specifies the router name or service ID.

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

user — up to 32 characters

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

ipv4-address — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

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

dns-name — up to 128 characters

file-path — up to 200 characters

directory length, up to 99 characters each

router-name — Base, Management

Default - Base

force

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

type

Syntax

type *file-url*

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays the contents of a text file.

Parameters

file-url

Specifies the file name of the target file.

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Values

file-url — *local-url* | *remote-url*

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

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

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

ipv4-address — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

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

cflash-id or usb-flash-id — cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1:, uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

version

Syntax

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

Context

file

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays the version of a -TiMOS file.

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

Parameters

file-url

Specifies the file name of the target file.

Values

file-url — *local-url* | *remote-url*

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

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

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

ipv4-address — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

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

cflash-id or usb-flash-id — cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1:, uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C)

check

Keyword to validate the `.tim` file.

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4 Boot options

This chapter provides information about configuring boot option parameters.

4.1 System initialization

When the 7210 SAS device is powered on, the system executes the `boot.tim` file (also known as the boot loader or the bootstrap image) from the file system located on a flash device (cf1:\) or the USB (on the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C) available on the 7210 SAS platform. The `boot.tim` file is the image that reads and executes the system initialization commands configured in the Boot Option File (BOF).

Note:
Some 7210 SAS platforms (including the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C) do not ship with an image. It is expected that the user will use the external flash or the USB device with boot-loader image (`boot.tim`) to boot the system. Insert the device containing the bootstrap image in the specified storage media location before powering on the system, as follows:

- **external flash**

  Insert the compact flash into the external compact flash slot.
- **SD card**

  Insert the SD card into the SD card slot.
- **USB device**

  Insert the USB storage device into the USB port.

See the appropriate 7210 SAS chassis installation guide for more information about the prerequisites for specific 7210 SAS platforms.

If the `boot.tim` file is absent or invalid, and cannot be loaded, the platform-specific handling is as follows:

- **7210 SAS-D**

  On this platform, the boot ROM loads the golden bootstrap image. The golden bootstrap image is equivalent to a `boot.tim` file, but it is present outside the file system, and can be updated and checked using special CLI commands.
- **7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C**

  On these platforms, if the system cannot find the bootstrap image in the default location (`cf:\boot.tim`), the system searches other storage locations (such as `uf1:\`) for the file and uses the `boot.tim` file in these locations to boot the system.
- **7210 SAS-Dxp**

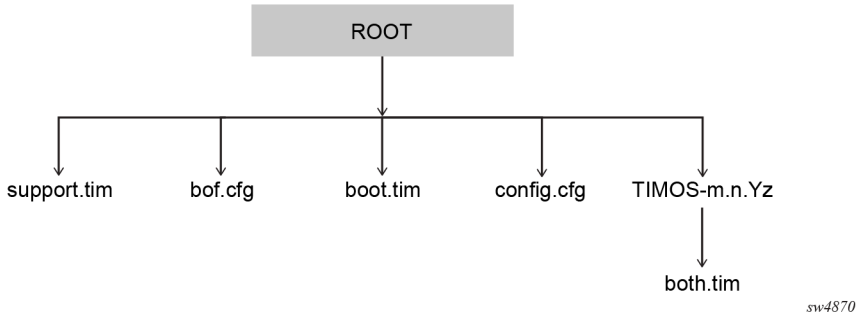
  The 7210 SAS-Dxp supports the use of a single replaceable storage medium in the SD card slot. The user must ensure that the image files are available on the medium and can be read by the system. If the

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system fails to boot, the medium can be replaced with another working medium containing the correct images.

The following figure shows the typical flash directory structure and filenames when the node is shipped from the factory.

Figure 3: Files on the flash



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

Files on the compact flash are the following:

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

4.1.1 Contents of factory-shipped 7210 SAS systems

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

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Table 19: Contents shipped with the system on 7210 SAS

7210 SAS platforms	System contents				
	boot.tim file	Golden bootstrap image	BOF	TiMOS image	support.tim file
7210 SAS-D	✓	✓		✓	
7210 SAS-Dxp[14]	✓		✓	✓	✓
7210 SAS-K 2F1C2T[14]	✓		✓	✓	✓
7210 SAS-K 2F6C4T[14]	✓		✓	✓	✓
7210 SAS-K 3SFP+ 8C[14]	✓		✓	✓	

4.1.2 System boot option modes

When the system executes the `boot.tim` file, the bootstrap image searches for and processes the BOF. The user has the option to modify the BOF manually and save it (see Manual mode for more information), or boot the 7210 SAS node using the existing BOF (see Auto-init mode for more information).

Depending on whether the node is factory-shipped with the BOF, the user can obtain and use the BOF as follows:

- On 7210 SAS nodes that are factory-shipped with the BOF, use one of the following options:
  - boot the system by using the starter BOF
  - boot the system by interrupting the default boot process and manually edit the contents of the BOF to create a new BOF (manual mode)

  See the appropriate 7210 SAS chassis installation guide for more information about editing and creating a new BOF for the specific 7210 SAS platform.
- On 7210 SAS nodes that are factory-shipped without a BOF, the file is not present when the system is powered on for the first time. Use one of the following options to obtain a BOF for the system:
  - boot the system by manually creating a BOF (manual mode)
  - boot the system by retrieving the BOF from the network, using DHCP to retrieve the network location of the BOF (auto-init mode); auto-init mode is the default boot procedure if there is no manual intervention during the first boot of the node

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

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

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Note:
If the operator executes the **reset** command in the boot loader prompt or the **admin reboot auto-init** command in the TiMOS CLI, 7210 SAS resets the current BOF and reboots.

4.1.2.1 Auto-init mode

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

Note:
Only IPv4 address assignments and parameters are supported with DHCP. DHCPv6 is not supported with auto-init.

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

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

- the uplink ports to use
- VLAN ID used
- link speed
- duplex setting for the link
- auto-negotiation capability for the link

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

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

Caution:
The parameter values in the BOF downloaded from the network must match those configured in the partial BOF. If there is a mismatch between the values retrieved from the network (that is, the network BOF is not configured to match the new values) and the user-configured values in the partial BOF, the next reboot of the system will fail. For example, specifying different auto-

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negotiate values in the two BOFs may cause the system to fail to bring up the link, which will cause the auto-init procedure and subsequent reboots to fail.

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

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

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

If the image fails to download through the auto-init process, the system loads the TiMOS image by using the `both.tim` file located on the local flash (that is, `cf1:\both.tim` on 7210 SAS-D and 7210 SAS-Dxp, and `cf1:\both.tim`, `uf1:\both.tim`, `cf1:\*TIMOS*\both.tim`, and `uf1:\*TIMOS*\both.tim` on the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C). After a successful bootup using the TiMOS image, the user can choose to continue using the same image by entering the **admin>auto-init stop** command within a fixed amount of time, as prompted. Running the **admin>auto-init stop** command creates a BOF and saves it on the local flash, with the image location pointing to the image on the flash. If the user does not run this command, the system reboots again and attempts to find an image through the auto-init process (that is, by sending out DHCP requests).

4.1.2.1.1 Ping check in auto-init mode

If the system is booted using the Auto-init mode procedure, the runtime image performs a ping check to make sure that the system has IP connectivity. The runtime image, after loading the configurations from the configuration file, tries three times to ping the IP address specified in the ping-address parameter in the BOF, at a 2, 8, and 16 minute interval. If the ping check does not succeed, the system is rebooted with the BOF reset after 1 minute and the boot process is repeated. If the address in the BOF is zero or the ping address is not specified, the ping check is not performed.

4.1.2.2 Secure download of files during auto-init

Note:
This feature is only supported on the 7210 SAS-Dxp.

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

4.1.2.3 Manual mode

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

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- image path
- configuration file path
- uplinkA parameters (port number, vlan ID, IP/mask, static route)
- uplinkB parameters (port number, vlan ID, IP/mask, static route)

Provisions to configure two uplinks is supported in the BOF for port redundancy. If the image path and configuration file path are local, the IP address and routing information for uplinkA and uplinkB is not required. If the image path and configuration file path are remote, users must provide the IPv4 or IPv6 address and static routing information for uplinkA and uplinkB.

Optionally, the user can obtain IPv4 parameters through DHCP by configuring 0 (zero) for the IPv4 address of the uplink port. In this case, the DHCP server should be configured to grant the IPv4 address and the default gateway information used to reach the server where the image and configuration files are located.

Note:
IPv6 address and parameter assignment is not supported using DHCP.

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

The 7210 SAS-D, 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP + 8C do not support the out-of-band Ethernet management port. On a 7210 SAS node where a previous version of the BOF exists, the boot process uses the existing parameter values for uplinkA and uplinkB ports to boot the TIMOS image.

4.1.2.4 Configuration guidelines for use of auto-init and manual mode

The following configuration guidelines apply to auto-init and manual modes:

- The use of DHCP to obtain the BOF from the network and other system parameters is currently not supported on Ethernet management ports. Consequently, the Ethernet management port does not support auto-init mode.
- In auto-init mode, DHCP requests sent out by the node are in two formats. The system attempts communication with the DHCP server in these two formats, one after another (if necessary), in the following order:
  - Initially, DHCP requests are sent out to the DHCP server with a priority VLAN tag (VLAN ID = 0, dot1p PCP bits set to 7).
  - If no response is received from the DHCP server during the preceding request period, DHCP requests are sent without VLAN tags (that is, null-tagged packets).
- In auto-init mode, the BOF can be downloaded through SFTP, FTP, or TFTP based on the information a client receives from the DHCP server. The DHCP client tries the following options to obtain the BOF name and the server IPv4 address:
  - **using the vendor-specific option**

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

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If option 43 is not found in the DHCP reply, a URL is formed by using the TFTP server name and the BOF retrieved via TFTP. The IPv4 address of the TFTP server is obtained from DHCP option 66 or the "sname" field of a DHCP message, and the filename on the TFTP server is obtained from DHCP option 67 or the "file" field of a DHCP message.

- The 7210 SAS-D, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T try ports 1/1/1 and 1/1/2 to boot in the auto-init mode.
- The 7210 SAS-Dxp 12p tries ports in the following order to boot in the auto-init mode:
  1. 1/1/11 and 1/1/12 (10GE fiber ports)
  2. 1/1/7 and 1/1/8 (1GE fiber ports)
- The 7210 SAS-Dxp 16p tries ports in the following order to boot in the auto-init mode:
  1. 1/1/11 and 1/1/12 (10GE fiber ports)
  2. 1/1/13 and 1/1/14 (1GE fiber ports)
- The 7210 SAS-Dxp 24p tries ports in the following order to boot in the auto-init mode:
  1. 1/1/17 and 1/1/18 (10GE fiber ports)
  2. 1/1/19 and 1/1/20 (1GE fiber ports)
- The 7210 SAS-K 3SFP+ 8C tries ports in the following order to boot in the auto-init mode:
  1. 1/1/1 and 1/1/2 (10GE fiber ports)
  2. 1/1/10 and 1/1/11 (1GE fiber ports)

4.1.2.5 Secure download of image and configuration files using SFTP

Note:
This feature is only supported on the 7210 SAS-Dxp.

Auto-init is used for retrieving IP configuration information using DHCP, and subsequently the BOF file, image file, and configuration file to allow the node to be provisioned with the minimal configuration and enable subsequent management of the node.

During auto-init, initially the BOF file is downloaded using FTP (when using DHCP Option 43) or using TFTP (when using sname and file field in the DHCP message), followed by parsing the BOF file to obtain the location to download the image file and the configuration file. The files are downloaded using FTP. The existing protocols do not provide secure transmission mechanisms. This feature allows the use of SFTP for secure download of files (in other words, the BOF file, TiMOS image file (named `both.tim`), `support.tim`, and the configuration file) downloaded during auto-init.

SFTP requires mutual authentication of the SFTP client on the 7210 SAS and the SFTP server (in other words, the SFTP server deployed by the operator from where the images and configuration files are downloaded). To enable mutual authentication, the SFTP server presents the host key to the client for proving its' identity so the client can establish connections with only trusted servers. The SFTP client uses PKI mechanisms (using the private-public key pair) to prove that it is a valid user allowed to download the files from the SFTP server.

When SFTP is not used for a secure download, auto-init requires only the boot loader image (`boot.tim`) on the storage media (SD card, and so on) to start the auto-init process and boot the node with correct images and initial configuration file. Introducing SFTP to download the files securely requires the user to provide more information along with the boot loader so that the SFTP client and SFTP server can mutually

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authenticate each other. The following information must be available on the storage media used for auto-init for successful mutual authentication:

- **SFTP server public key**

  The SFTP server public key is used by the client to authenticate the server when the server presents its host key during the session establishment. The client continues to establish the session only if the available server public key can be used to validate the authenticity of the server successfully. It assures the client is talking to the operator's trusted SFTP server.

- **SFTP client user private key and public key pair**

  The SFTP client user public key is used by the server to authenticate the user and allow access to the files stored on the server. It is expected that the client public key is available on the server so that when the client (7210 SAS node) presents it during the authentication phase, the server uses the client's public key to validate the authenticity of the user and provides access to resources (BOF, TiMOS image, and configuration files in this context) on the server on successful authentication.

4.1.2.5.1 Preparing the storage media for secure download during auto-init

About this task

Perform the following steps to use SFTP and PKI for the secure download of files during auto-init for the following scenarios:

- using auto-init for the first-time bootup of a unit shipped from the factory
- using the **admin>reboot>auto-init** command to explicitly trigger auto-init manually (for subsequent use of auto-init if needed)

For first-time bootup before powering on the 7210 SAS, or before initiating auto-init using the **admin>reboot>auto-init** command, the storage media with the required artefacts must be prepared for secure download of the files during auto-init.

If necessary, copy the `boot.tim` from Release 26.9.R1 or later to replace the existing `boot.tim`, if any. Also, if needed, copy the `both.tim` from Release 26.9.R1 or later (and `support.tim`) to replace the existing `both.tim` (and `support.tim`), if any. The storage media is prepared for secure download using a 7210 SAS-Dxp running Release 26.9.R1 or later.

Note:
A storage media shipped with a software license from Release 26.9.R1 or later can be used. It already contains the bootloader (`boot.tim`) and the TiMOS image (`both.tim`), while the remaining files described in this section must be added to it using the following procedure.

To prepare the SD card with the required artefacts for secure download of the auto-init files, perform the following steps using a 7210 SAS-Dxp running Release 26.9.R1 or later.

Procedure

Step 1. Execute the **tools>perform>system>ssh>gen-keypair** command with the following options.

Example

The following command syntax and options are displayed for reference:

```
-------------------------------------------------------------------
 tools perform system ssh gen-keypair
 - gen-keypair <url-string> curve {secp256r1|secp384r1|secp521r1}
   [secure-download-type]
```


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```
- gen-keypair <url-string> ed25519 [secure-download-type]
- gen-keypair <url-string> rsa <key-size> [secure-download-type]

<url-string>           : <local-url> - [99 chars max]
                         local-url      - <cflash-id>/<file-path>
                         cflash-id      - cf1:
<key-size>             : [2048..4096] - Default: 3072
<secure-download-type> : autoinit-secure-download|boot-secure-download
---------------------------------------------------------------------
```

In this example, the **tools perform system ssh gen-keypair cf1:\autoinit\sftp\client_key rsa 2048 autoinit-secure-download** command is executed.

a. Execute the **gen-keypair** command with the **autoinit-secure-download** option as displayed in the preceding example.

The value specified with the *url-string* parameter is the location used to store the generated key files. Users should specify a temporary location to store the key files as these key files are generated on this node but copied over to a new SD card used to boot the 7210 SAS that are deployed in field.

In this example, RSA is the cryptographic algorithm with a *key-size* of 2048.

b. The preceding command prompts for a passphrase. Enter the passphrase of choice.

Note:

- A passphrase is not mandatory. Without a passphrase, the client private key file is not encrypted. It is highly recommended to use a passphrase to securely encrypt the client private key file.
- Any Linux machine can be used to generate the client private-public key when not using a passphrase. In this case, the client private-public key pair can be copied over manually to the SD card in the correct directory (directory and filenames to use must match the ones specified in the next step).

Step 2. After the passphrase is entered, the following files are created.

- `cf1:\autoinit\sftp\client_key`: this file contains the client private key and is encrypted using the passphrase (if provided).
- `cf1:\autoinit\sftp\client_key.pub`: this file contains the client public key; this file is stored in cleartext.
- `cf1:\autoinit\sftp\passphrase.enc`: this file contain the encrypted passphrase used to decrypt the client_key. This file is not created if user enters a blank passphrase.

Step 3. Copy the SFTP server public key into the same folder as above (for example, `cf1:\autoinit\sftp\server_key.pub`).

Note:
If more than one server is used, (for example, a different server for each of the primary, secondary, tertiary BOF image and configuration parameters) the public key for each of the server is copied into the `server_key.pub` file.

Example

The following example of the `server_pub.key` is displayed for reference:

```
================================================================================
```


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```
*A:Router-1# file type cf1:\autoinit\sftp\server_key.pub
File: server_key.pub
------------------------------------------------------------------------------
ssh-rsa AAAAB3NzaC1yc2EAAAABIwAAAQEAv5fUo5YwUFc/ZuZ8sC8v1/O5EhnJufefaqf55sCxetbxTLo
VebUayxPBDuNmFSk3qINzqq/3m4aIoPmSLYzbf21OIjdeZBC+VvnwYXFfI02vgcSXxVLxIFBROonw6LdZYd
QynQ79KWjoIDL5tgBGAm8DLBsqj8hX/C/XhGvbTCRf+lGiA7ZmjQ/xn7kJ4+gDxh+jLP41AG9KOgSDt
NghODsgXMiEdcCJLZduzyPcbvSMiJvOpcWf4gvhKB5DtGj/b9ydjxl7+B5ARmqW/D3peL5UKnu834TmYgh
Kyw5WYjcr8QPNs7NksHc/wM5cV9GNKFmQ41fXdNvIwuonxoyoTw==
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIN3q2e0PIpa9X5V7gWQlDHa6DoZjzx1IdKeg6fKQPQ0+
 user@host1
ecdsa-sha2-nistp521 AAAAE2VjZHNhLXNoYTItbmlzdHA1MjEAAAAIbmlzdHA1MjEAAACFBAC8gfxZ2w9Kk
LrxdQ0Pvirx+iJXBDSIAyFAtxAZXaOz8+2IrwCPOQj2JAjYllfhd6cXZGNwlzJMRWLGdugG3JBxTQGm6M0f
BgTfdEorM4gLmXhwlnZQSK3A9eGbsegxSqllsijicKCJUXL7H6qtUJFT5AqzuWvHuV81HXnpQj1hwTZe9A==
 user@host2

==============================================================================
*A:Router-1#
```

Step 4. Copy all the files from `cf1:\autoinit\sftp\` to the storage media used to boot up the factory-shipped 7210 SAS-Dxp unit using auto-init.

- Files can be first transferred to a server and then used to create copies of storage media (multiple copies) to be used for auto-init.
- Files must be copied under the following directory hierarchy `<booted-drive:>\autoinit\sftp\`.

Note:
During bootup, the 7210 SAS searches for the bootloader (for example, `boot.tim` image file) on all drives available in the system in a predefined order and uses the first instance when it locates a `boot.tim` image. This drive is termed as <booted-drive> and must contain the `\autoinit\sftp\` directory with the corresponding files to use the secure download option with auto-init.

Step 5. Ensure the `boot.tim`, `both.tim`, and `support.tim` files are also copied over, if needed.

Step 6. At the end of the preceding steps, the new storage media to be used for booting a factory-shipped 7210 SAS should have the following content.

Example

```
cf1:\autoinit\sftp\client_key
cf1:\autoinit\sftp\passphrase.enc
cf1:\autoinit\sftp\server_key.pub
cf1:\autoinit\sftp\client_key.pub
cf1:\boot.tim
cf1:\both.tim
cf1:\support.tim
```

Note:

- If the storage shipped with a software license is used, `both.tim` and `support.tim` are shipped from the factory under a root-directory (for example, `cf1:\`) or under `<root-directory>:\TIMOS\both.tim` (for example, `cf1:\TIMOS\both.tim`).
- `support.tim` must be located in the same location as the `both.tim`. `support.tim` is required only on nodes that support Secure Boot.

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Step 7. The storage media is ready for use.

Step 8. Before starting auto-init, copy the contents of the `client_key.pub` file to the server under the correct location as required by the SFTP server configuration. For example, on a standard Linux server, the client public key is copied into the `<user-home-directory-on-server>/.ssh/authorized_keys` file.

4.1.2.5.2 Auto-init with secure download on a factory-shipped 7210 SAS

About this task

After the storage media is ready using the Preparing the storage media for secure download during auto-init procedure, the following steps describe how auto-init with secure download works on a factory-shipped 7210 SAS unit.

Note:
The following steps are also applicable for initiation of auto-init explicitly using the **admin>reboot>auto-init** command, with the exception that the user must ensure the new storage media with the required artefacts are inserted into the unit before issuing the **admin>reboot>auto-init** command.

Procedure

Step 1. Install the factory-shipped 7210 SAS in the network.

Step 2. Use the newly created storage media (for example, an SD card) and insert it into the storage slot (for example, an SD card slot).

Step 3. Power on the 7210 SAS. The 7210 SAS shipped from factory is configured to use auto-init by default.

Step 4. During power on, the bootrom loads up and searches all the available drives in a predefined order for the `boot.tim` file (for example, `cf1:\boot.tim`). If it locates one successfully, it loads `boot.tim`.

Step 5. The `boot.tim` checks for the autoboot flag and initiates auto-init process if the autoboot flag is set (which is set by default on all units shipped from the factory). The autoboot flag is also set when the **admin>reboot>auto-init** command is executed.

4.1.2.5.2.1 Boot.tim running the auto-init process

This section describes the sequence of events when the `boot.tim` is running the auto-init process, with specifics of the secure download of files called out explicitly.

The first step is to download the BOF file. After using the BOF file, the image and configuration file is downloaded. The following list describes how the BOF file is downloaded.

1. The bootloader sends out DHCP packets to retrieve IP information and BOF file location URL (in DHCP Option 43).

   The DHCP server side must be configured to send Option 43. For example, on a Linux machine using the DHCP server, the `/etc/dhcp/dhcpd.conf` file has an entry as follows:

```
option vendor-encapsulated-options "sftp://host-abc@192.168.10.1/home/abc/7210-images/
SASDxp/bof.cfg";
```


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2. The bootloader configures the IP address and static routes using the information provided by the DHCP server.
3. If the BOF file location URL specifies an SFTP URL (with a username and without a password), use SFTP to download the BOF file using the PKI keys stored in `<boot-drive>:\autoinit\sftp\` (for example, `cf1:\autoinit\sftp\`), as described below:
   a. The `cf1:\autoinit\sftp\server_key.pub` file is used to retrieve the server public key and authenticate the SFTP server.
   b. Using the passphrase, the `cf1:\autoinit\sftp\client_key` file is decrypted to retrieve the private key. The client key is used to authenticate the 7210 SAS SFTP client to the SFTP server successfully. Users are not prompted for the passphrase or password.
   c. Alternatively, if the BOF file location URL specifies the SFTP URL (with a username and a password), use SFTP to download the BOF file using the username and password provided.
      i. In this case, only the server public key from the `<booted-drive>:\autoinit\sftp\` file is used to avoid the prompt to know if the server can be trusted or not. No other files are required in this location.
      ii. **Note:**
      - The username and password are cleartext in the SFTP URL and typically not recommended.
      - If an SFTP URL with a username and password configured in BOF is used to download images or configuration files, copy the SFTP server public key into the booted drive in the folder path configured at `/bof sftp-key-directory`. If `/bof sftp-key-directory` is not configured, the SFTP server public key must be copied in `:\autoinit\sftp\server_key.pub`. If a server key is missing, the node goes into a boot loop.

   d. The BOF file is downloaded.

4.1.2.5.2.2 Processing of downloaded BOF file and use of SFTP

The downloaded BOF file contains the location of the primary, secondary, and tertiary image files and the configuration files. The BOF file is parsed by bootloader auto-init process to obtain these image and configuration file locations. SFTP is used to download these files as described in the following sequence of events.

1. If the configuration specifies the SFTP URL (with a username and without a password) for the primary, secondary, and tertiary image files and the configuration files, SFTP is used to download the image and configuration files.
   a. The passphrase is used to decrypt the `cf1:\autoinit\sftp\client_key` file and retrieve the client private key.
   b. The client key is used to authenticate to the SFTP server successfully as described above. The user is not prompted for a passphrase or a password.
2. Alternatively, if the BOF configuration specifies an SFTP URL with a username and password for the primary, secondary, and tertiary image files and the configuration files, SFTP is used to download the image and configuration files. This is similar to step c in Boot.tim running the auto-init process and requires only a server public key.

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After the TiMOS image and configuration files are downloaded, the bootloader loads the TiMOS image (`both.tim`) and the TiMOS image executes the configuration file. After successful boot up of the node the following occurs:

- The node is booted successfully in TiMOS context and CLI access should be available through console (if not blocked), management access is available using OOB management port (if not blocked and if OOB port is configured appropriately using BOF parameters), or management access is available using in-band management port (if in-band management port is configured appropriately using the configuration file).
- The autoboot or auto-init flag is reset so that the node does not attempt auto-init on the next reboot.

Note:
A sample BOF file (downloaded from the server as part of auto-init) is displayed as follows (only relevant parameters appears below):

```
Primary-image  sftp:\\username@<ip-address or servername>\both.tim
Primary-config  sftp:\\ username@<ip-address or servername>\config
```

- The node can be manged locally or remotely (as long as the configuration file provided to the node from the server has the minimal management configuration information required for remote management of the node).

Note:
The software does not restrict the use of client keys under `<booted-drive>:\autoinit\sftp\` for use only with auto-init. It is used if the BOF is absent (not present) or when the BOF file **sftp-key-directory** command is not configured explicitly. In other words, the keys under `<booted-drive>:\autoinit\sftp\` are always used when auto-init is initiated (either through the **admin>reboot>auto-init** command or when the 7210 SAS is powered up from the factory for the first time), because in both these cases the BOF file is absent.

4.1.2.6 Using SFTP and PKI on a subsequent reboot

On a subsequent reboot of the node, the following options are present for a download of the TiMOS image and configuration file. Users must change the BOF configuration after a successful auto-init to use one of the supported options listed below. In all the options below, the BOF file must be present.

Note:
If the BOF file is not present, the 7210 SAS attempts auto-init by default.

- Using local storage media as the primary, secondary, and tertiary image and configuration file location. Files can be copied to the local storage media using FTP, SFTP, or another media (if available).
- Using an FTP URL to specify a remote location for the primary, secondary, and tertiary image and configuration file location.
- Using an SFTP URL (with user/password option) to specify a remote location for the primary, secondary, and tertiary image and configuration file location.
  - The server public key must be known by users beforehand. The server public key is obtained from the BOF **sftp-key-directory** command, if configured. If the **sftp-key-directory** command is not configured, the keys are obtained from the `<booted-drive>:\autoinit\sftp` location, the server public key must be copied to either one of these locations beforehand.

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– **Note:**
With SFTP used in 7210 SAS bootloader context, if the server public key is not available, an error message is displayed and the node attempts auto-init indefinitely until auto-init is stopped by the user or the server public key is made available.

- Using an SFTP URL with the PKI option (without a passphrase prompt) to specify the remote location for the primary, secondary, and tertiary image and configuration file location.
  – Uses SFTP client key files available in the location specified with the BOF **sftp-key-directory** command for authentication. If the **sftp-key-directory** command is not configured, the keys are obtained from the `<booted-drive>:\autoinit\sftp` location.
  – The server public key must be known by users beforehand. The server public key is obtained from the BOF **sftp-key-directory** command, if configured. If the **sftp-key-directory** command is not configured, the keys are obtained from the `<booted-drive>:\autoinit\sftp` location, the SFTP client key files must be copied to either one of these locations beforehand.
  – **Note:**
  With SFTP used in 7210 SAS bootloader context, if the server public key is not available, an error message is displayed and the node attempts auto-init indefinitely until auto-init is stopped by the user or the server public key is made available.

Note:
It is recommended to use an SFTP username and password for normal operations when auto-init is complete or to use SFTP PKI with per node keys as described in BOF parameter for key files during bootup.

4.1.2.7 BOF parameter for key files during bootup

To allow an SFTP client to use a per node private-public key pair with the better protection for passphrase, an option is provided **tools>perform>system>ssh>gen-keypair boot-secure-download** command.

Using the **boot-secure-download** option, users can generate a private-public key pair that is unique for the node and can only be used with the SFTP client on the node. Executing the **tools>perform** command prompts for a passphrase. allowing users to protect the private key file using a passphrase of their choice.

The generated keys and the passphrase files are stored in the directory specified with the **tools** command. This directory must match the BOF **sftp-key-directory** command, or else the software displays an error.

If the user does not specify the directory name while using the **gen-key-pair** command with the **boot-secure-download** option, the software displays an error.

The **sftp-key-directory** command is introduced in the BOF configuration to allow users to specify the directory where the key files are located so that on bootup the bootloader can determine the location for retrieving the key files. This command is also made available in **bof>sftp-key-directory** *directory-name* command.

4.1.2.8 Using SFTP and PKI for the BOF configuration in the TiMOS context

When the BOF parameters such as the primary, secondary, and tertiary image and configuration file location are changed in the TiMOS context (using the commands available under the **bof** context) to

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specify a remote location, TiMOS checks the specified remote location to determine if the file exists and is in the correct format.

If the check succeeds, the configuration is allowed to proceed. If the check fails, TiMOS displays an informational message (“Valid timos image should be present in the mentioned path”) and allows the configuration to proceed. When the SFTP URL is used to specify the remote location, TiMOS uses the SFTP client to make this check and uses the required keys from the following location:

If the **sftp-key-directory** command is configured, the SFTP client uses the keys from the specified location. If not, it uses the `<bootdrive>:\autotinit\sftp` location.

4.1.2.9 Using SFTP and PKI with the admin>save command

When the **admin>save** command is executed in the TiMOS context without the URL argument specified, the command uses the URL specified in the BOF file for **bof>primary-config** command to determine the location where the file needs to be saved. If SFTP is configured as the URL, the following options are available:

- SFTP with a username and password
- SFTP with PKI

For each of the preceding options provided for use with the SFTP client with the **admin>save** command, the behavior is the same as using the SFTP client to download the image or configuration file. In other words, all options provided with those scenarios should work when the SFTP client is used with the **admin>save** command. See Using SFTP and PKI on a subsequent reboot for more information.

4.1.2.10 Configuration guidelines for SFTP with auto-init with the bof>save and admin>save commands

The following configuration guidelines apply for use of SFTP with auto-init with the **bof>save** and **admin>save** commands:

- During auto-init, with SFTP used in 7210 SAS bootloader context to securely download the files, if the server public key is not available, an error message is displayed and the node attempts auto-init indefinitely until auto-init is stopped by the user or the server public key is made available.
- If an SFTP URL using either PKI or username/password authentication credentials configured in BOF is used to download images or configuration files, copy the SFTP server public key into the booted drive in the folder path configured at **/bof sftp-key-directory**. If `/bof sftp-key-directory` is not configured, the SFTP server public key must be copied in `:\autoinit\sftp\server_key.pub`. If a server key is missing, the system reboots and attempts to boot gain. This process continues indefinitely until the server public key required to download the image and configuration files is successfully made available.
- To assure the unattended node is brought up or other operations when using SFTP, ensure that the SSH/SFTP server is configured to not request more information during the SFTP client/user authentication (for example, disable use of the keyboard-interactive method on the SSH/SFTP server side). It is recommend users validate the SFTP client authentication process in their labs with the SSH/SFTP server of their choice, before deployment, to ensure that the SFTP server does not request additional information from SFTP client during the authentication phase. Requests for additional information from the server results in user prompts and waiting for user inputs indefinitely. This breaks the unattended operation, such as auto-init.

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4.1.3 BOF and configuration file encryption

Note:
This feature is supported on all 7210 SAS platforms as described in this document, except the 7210 SAS-D.

In cases where the 7210 SAS platform is not installed in a physically secure location, the user can encrypt the BOF and the configuration file to halt or hinder interpretation of the contents of the file.

By default, the BOF and configuration file are not encrypted. When encryption is enabled for either file and a change is saved (using the **bof save** command), the original file is moved to *filename*.1 and the encrypted file becomes the new *filename*.cfg.

Caution:
When the original file is moved to *filename*.1, this file is unencrypted. To maintain node security, delete the unencrypted *filename*.1 file.

When the BOF is encrypted on the compact flash, the BOF parameters can be modified using the BOF interactive menu during node startup, and fields can be modified using this menu.

See Configuring BOF encryption for information about configuring BOF encryption. See Configuring the BOF interactive menu password for information about configuring the BOF interactive menu password. See Configuring configuration file encryption for information about configuring configuration file encryption.

4.1.4 Bootstrap load process

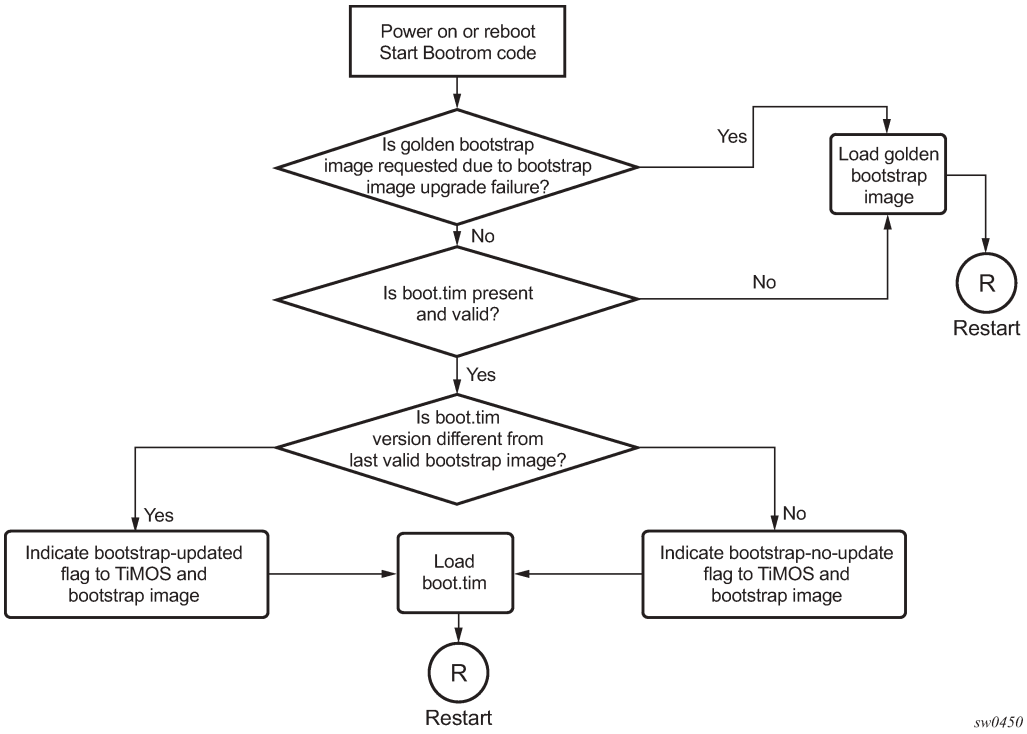
The following figure shows the bootstrap load process.

Note:
The golden bootstrap image shown in Figure 4: System initialization: bootstrap load process is only supported on the 7210 SAS-D.

See Boot options on 7210 SAS platforms for more information about platform-specific supported boot options, and how the specific system processes these options and loads the bootstrap image file (`boot.tim`), the TiMOS image (`both.tim`) and the configuration file to make the system operational and ready for use.

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Figure 4: System initialization: bootstrap load process



Example

The following is a sample of console display when the `boot.tim` file is located on `cf1:/` and the system boots successfully.

```
Nokia 7210 Boot ROM. Copyright 2016 Nokia.
All rights reserved. All use is subject to applicable license agreements.
Running POST tests from ROM
Testing ROM load area...done

Relocating code...Jumping to RAM

Performing second stage RAM test....passed

Board Serial Number is 'SN123456789'
Bootlog started for Version V-0.0.I317
Build V-0.0.I317 bootrom/mpc 7xxx
Built on Tue Jan 6 02:23:14 IST 2016 by panosbld in /panosbld/ws/panos/main

?Attempting to load from file cf1:/boot.tim
Version L-0.0.I312, Fri Jan  2 04:26:32 IST 2016 by panosbld in /panosbld/ws/panos/
main
text:(3002475-->12623392) + data:(550940-->2414128)
Starting at 0xb000000...


Total Memory: 512MB  Chassis Type: sas  Card Type: badami_7210
TiMOS-L-0.0.I312 boot/mpc NOKIA SAS-D 7210 Copyright (c) 2016 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Fri Jan 2 04:26:32 IST 2016 by panosbld in /panosbld/ws/panos/main
```


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```
TiMOS BOOT LOADER

...
```

4.1.5 Boot options on 7210 SAS platforms

The location of the `boot.tim` bootstrap image varies per 7210 SAS platform and depends on the storage locations supported by the platform. The boot option modes to find and load the `boot.tim` bootstrap image file also vary per 7210 SAS platform.

This section provides information about the supported boot option modes and storage locations for 7210 SAS platforms.

4.1.5.1 System boot options on 7210 SAS-D and 7210 SAS-Dxp devices

Thea platforms support the following options to boot the system:

- storage media associated with `cf1:\`
  - internal flash on 7210 SAS-D
  - SD card slot on 7210 SAS-Dxp
- network (with auto-init)
- network (without auto-init)

Note:
The 7210 SAS platforms do not support the use of a `boot.tim` file on a USB storage device for booting up.

During bootup, the bootrom searches `cf1:\` (internal USB on 7210 SAS-D; SD card slot on 7210 SAS-Dxp) for the `boot.tim` in the following locations in the specified order, and uses the image obtained from the first location where `boot.tim` is found to load the bootloader.

If the `boot.tim` bootstrap image is not found in any of these locations, the boot procedure fails. If the `boot.tim` image is found, the system searches for `bof.cfg` (the boot options file) on the same storage device in the root directory. For example, if `boot.tim` is found on `cf2:\`, the system also looks for `bof.cfg` in `cf2:\bof.cfg`.

If `bof.cfg` is found, the system uses the BOF to locate the TiMOS software (`both.tim` file), configuration file, and other boot parameters, and processes them to boot the system. If the BOF is not found, the system attempts to retrieve the BOF from the network using the auto-init mode and create a new BOF as part of the auto-init process.

See the appropriate 7210 SAS chassis installation guide for more information about booting the system using these options.

4.1.5.2 System boot options on 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C devices

These platforms support the following options to boot the system:

- internal flash at the rear of the node (`cf1:\`)

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- external USB flash (`uf1:\`)
- network (with auto-init mode)
- network (without auto-init mode)

Because multiple storage locations are available for the bootstrap image `boot.tim` file on the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, these platforms do not support the golden bootstrap image.

During bootup, the bootrom searches for the `boot.tim` in the following locations in the specified order, and uses the image obtained from the first location where `boot.tim` is found to load the bootloader:

- `cf1:\` (SD card slot or USB slot)
- `uf1:\` (external USB)

Note:
Users must plug in a USB storage device or SD card, with the correct TiMOS images into one of the supported locations before powering on the system.

If the `boot.tim` bootstrap image is not found in any of these locations, the boot procedure fails. If the `boot.tim` image is found, the system searches for `bof.cfg` (the boot options file) on the same storage device in the root directory. For example, if `boot.tim` is found on `cf1:\`, the system also looks for `bof.cfg` in `cf1:\bof.cfg`.

If `bof.cfg` is found, the system uses the BOF to locate the TiMOS software (`both.tim` file), configuration file, and other boot parameters, and processes them to boot the system. If the BOF is not found, the system attempts to retrieve the BOF from the network using the auto-init mode and create a new BOF as part of the auto-init process.

See the appropriate 7210 SAS chassis installation guide for more information about booting the system using these options.

4.1.5.2.1 Storage locations for index files (ndx, sdx) and images for 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

The 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C software sets the default location for accounting records, logs, and other frequently written objects to `cf1:\`.

The following storage locations are supported in the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C:

- The software sets the default location for accounting records and logs to `cf1:\`. The user can change the storage location to `uf1:\`.
- The `boot.tim` and BOF can be on `cf1:\` (recommended) or `uf1:\`.
- TiMOS images (`both.tim`) can be located on either `cf1:\` or `uf1:\` with appropriate configuration of the BOF (that is, primary, secondary, and tertiary locations pointing to the appropriate places).
- The `ndx` file and `sdx` file are generated at the location specified in the BOF parameter for the configuration file. If the user does not specify the location in the BOF, these files are located at the same location as the default configuration file. The default configuration file is created in the same location as the TiMOS image that the system uses to boot up.
- Nokia recommends to use the following guidelines for storing the TiMOS, `boot.tim`, `B0F.cfg`, `ndx`, `sdx`, and `nvsys.info` files:

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- Store the `boot.tim` and `BOF.cfg` on `cf1:\`. Create a backup of the `boot.tim` and `BOF.cfg` on `uf1:\`.
- Store the `both.tim`, configuration file (and as a result, the `ndx`, `sdx`, and `nvsys.info`) on `cf1:\`. Create a backup of these files on `uf1:\`, or create a backup on the SAM/network management station regularly.

4.2 Configuration file and TiMOS image loading

The bootstrap image processes the initialization parameters from the BOF and attempts to locate the configuration file configured in the BOF. Up to three locations can be configured for the system to search for the configuration file. The locations can be local or remote. The first location searched is the primary configuration location. If not found, the secondary configuration location is searched, and lastly, the tertiary configuration location is searched.

If the configuration file is in a remote location, the bootstrap process saves it on the flash as `cf1:/default.cfg`. Users must not delete this file or create a file with this name. The configuration file includes chassis, IOM, MDA, and port configurations, as well as system, routing, and service configurations.

Like the configuration file, three locations can be configured for the system to search for the files that contain the 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.

The following diagrams and paragraphs provide details about how the 7210 SAS platform boots up on power ON, and how it obtains the TiMOS image file, the BOF, the configuration file loads, the image, and the configuration file to bring up the platform.

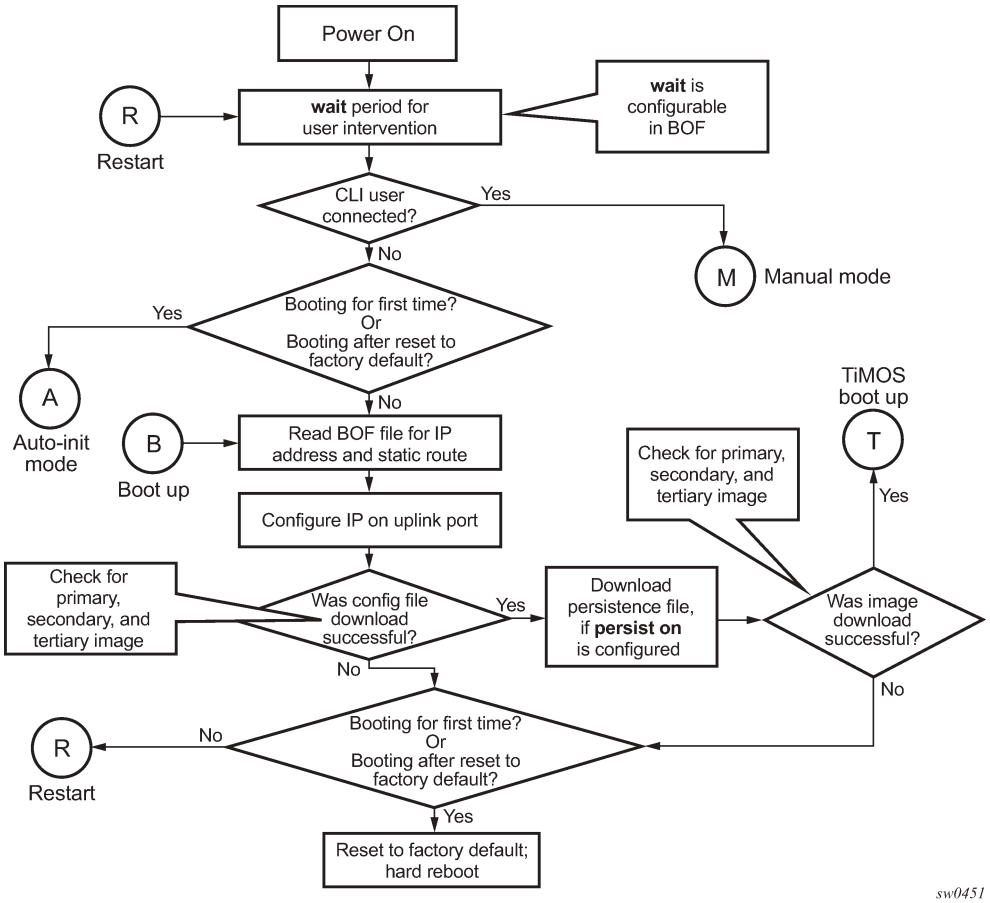
4.2.1 Boot sequence and image loading

This section describes the booting sequence of the 7210 SAS platforms when they are powered on, and how they obtain the TiMOS image file, the BOF, the configuration file loads, the image, and the configuration file to bring up the platform:

- Figure 4: System initialization: bootstrap load process shows the boostrap load process.
- Figure 5: System initialization: bootstrap process overview shows the process for booting up the BOF after it is retrieved using either the manual mode or auto-init mode.
- Figure 6: System initialization: bootstrap process for manual mode shows the process for manual mode to create or edit the BOF.
- Figure 7: System initialization: Bootstrap process for auto-init mode with partial BOF shows the process for configuring partial BOF parameters for auto-init mode.
- Figure 8: System initialization: bootstrap process for auto-init mode shows the process for auto-init mode to retrieve the BOF from the network.
- Figure 9: System initialization: TiMOS boot shows the process for booting up the TiMOS file.

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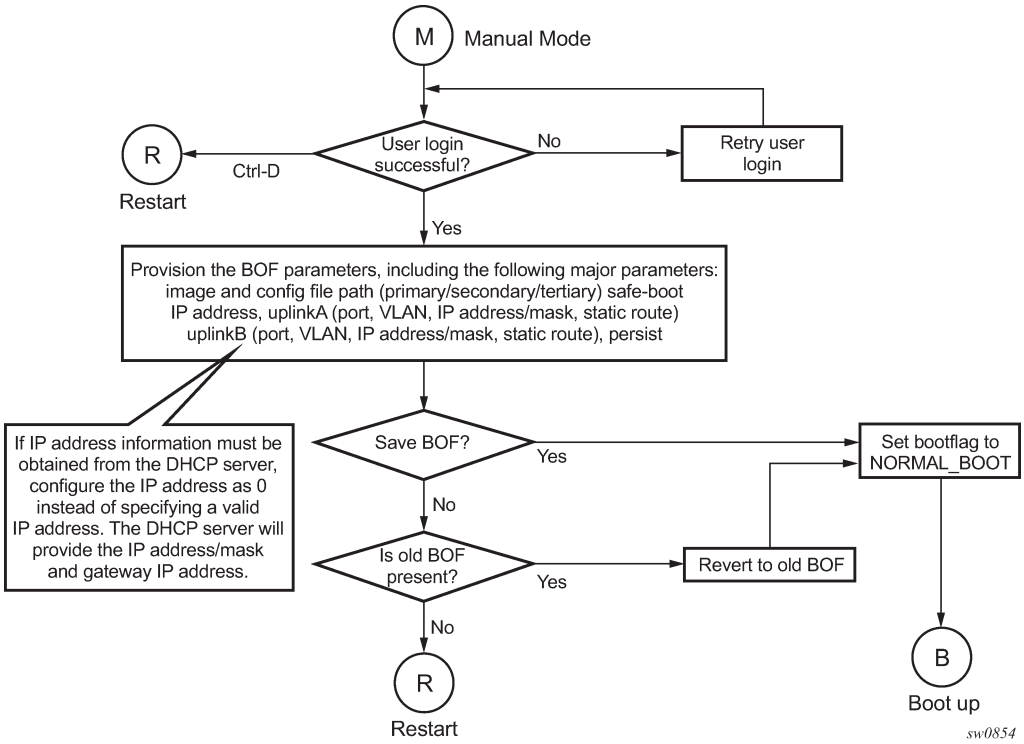
Figure 5: System initialization: bootstrap process overview



See Persistence for more information about persistence of the index files.

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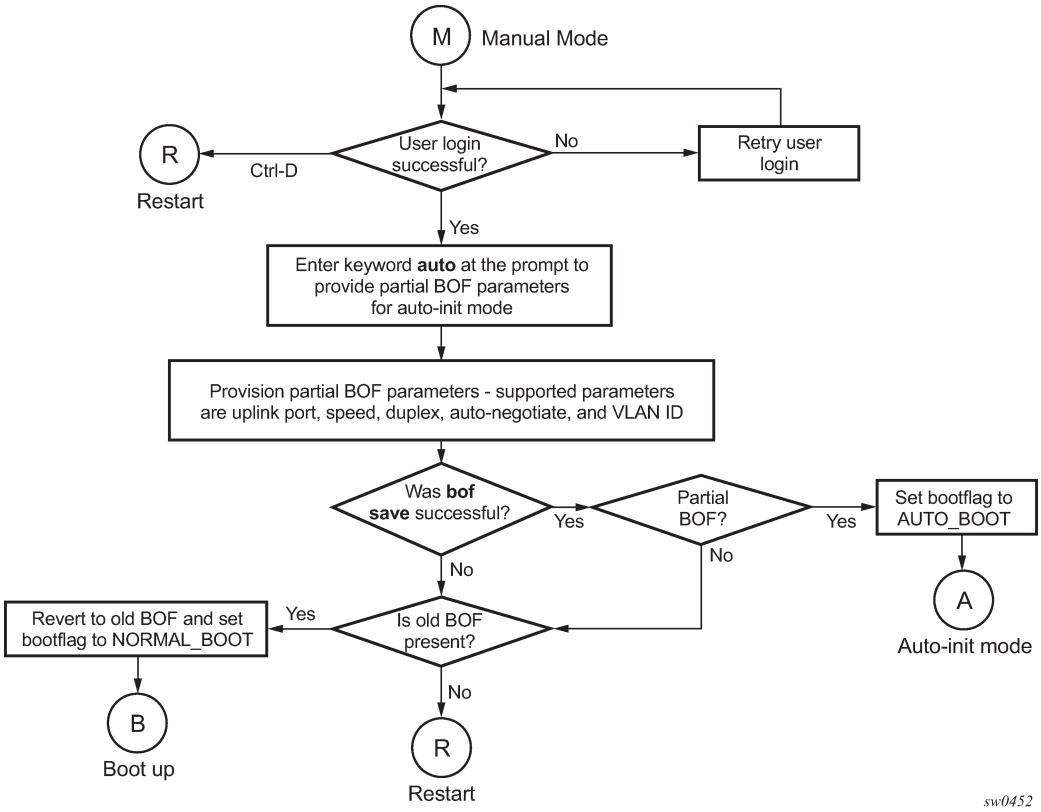
Figure 6: System initialization: bootstrap process for manual mode



See Manual mode for more information about the manual mode process.

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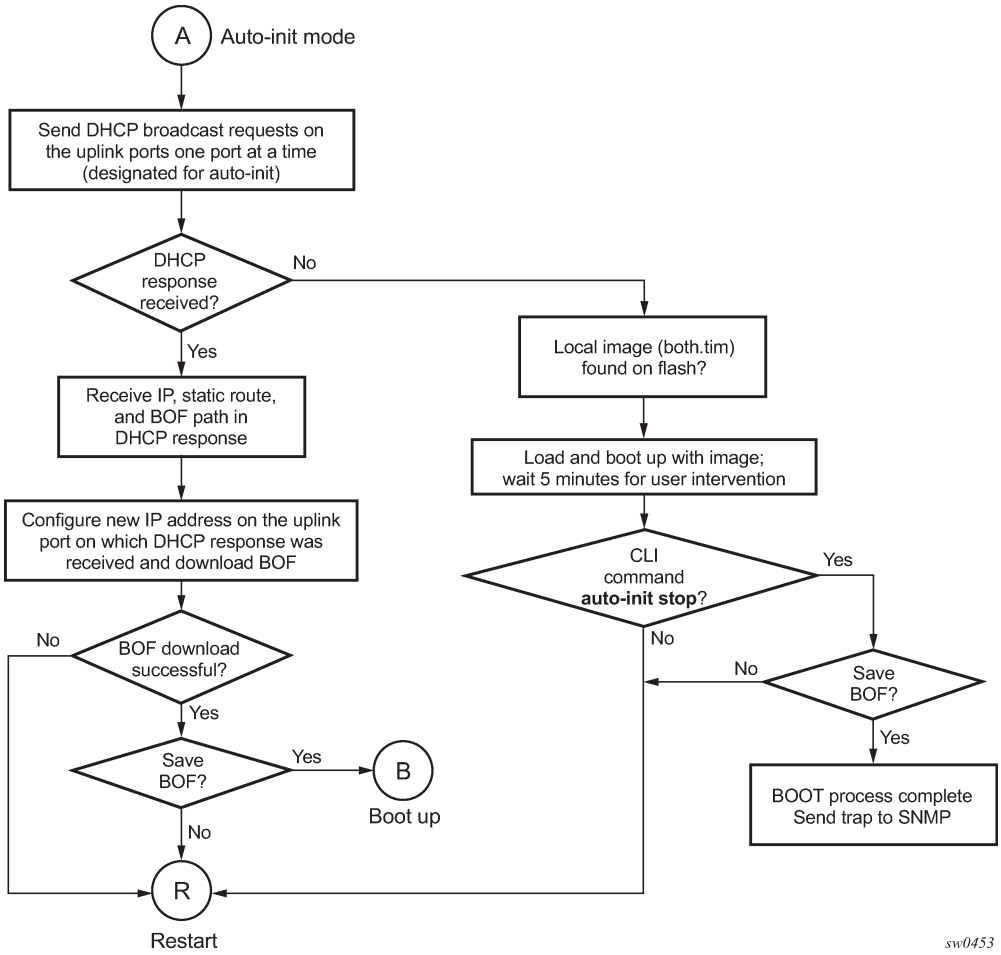
Figure 7: System initialization: Bootstrap process for auto-init mode with partial BOF



See Auto-init mode for more information about operating in the auto-init mode with a partial BOF.

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Figure 8: System initialization: bootstrap process for auto-init mode



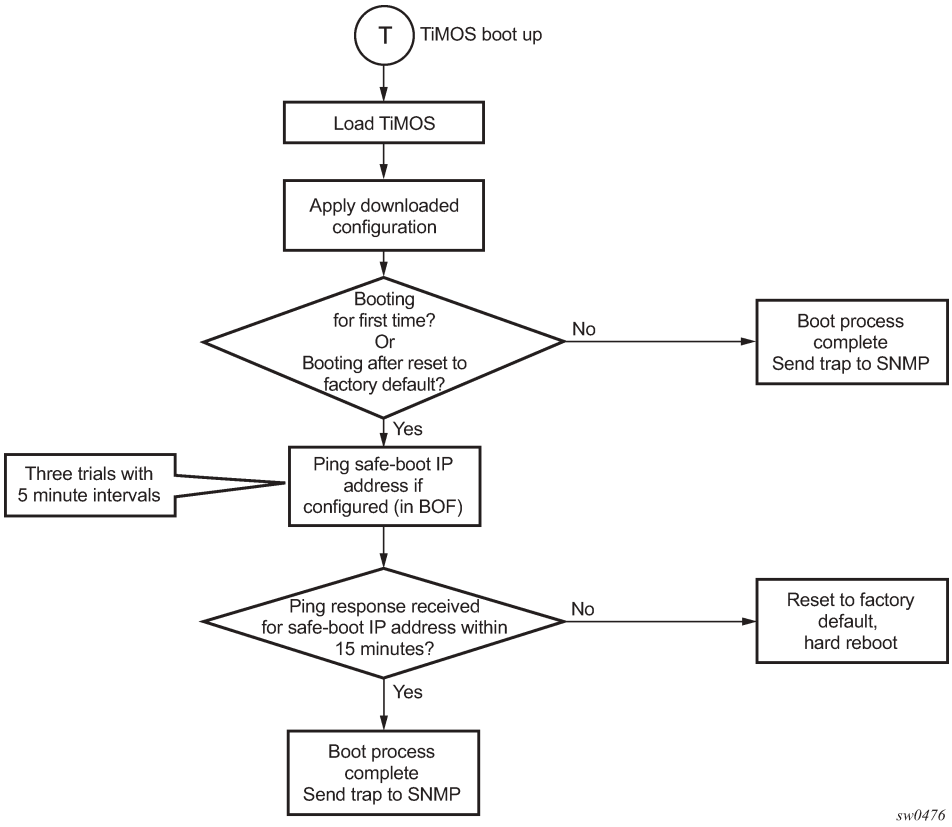
When the `both.tim` image is successfully downloaded, control is passed from the bootstrap image to the TiMOS image. The `both.tim` attempts to load the configurations from the downloaded configuration file. If no configuration file location is present in the BOF, the system is loaded with default configuration.

Note:
During the auto-init procedure, if the configuration file or image file download fails from the network, the system reinitiates the auto-init procedure.

See Auto-init mode for more information about the auto-init mode process.

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Figure 9: System initialization: TiMOS boot



4.3 Persistence

Optionally, the BOF **persist** command can specify whether the system should preserve system indexes when a **save** command is executed. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index. If persistence is not required and the configuration file is successfully processed, the system becomes operational. If persistence is required, a matching `x.ndx` file must be located and successfully processed before the system can become operational. Matching files (configuration and index files) must have the same filename prefix such as `test123.cfg` and `test123.ndx`, and are created at the same time when a **save** command is executed. The persistence option must be enabled to deploy the Network Management System (NMS). The default is off.

Traps, logs, and console messages are generated if problems occur and SNMP shuts down for all SNMP gets and sets; however, traps are issued.

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4.4 Configuration guidelines for use of software images on the 7210 SAS-D with 128MB

7210 SAS-D platforms with a 128MB flash can boot entirely new software releases. Older images cannot be used with these devices. 7210 SAS-D platforms with a 64MB flash can use any image. All 7210 SAS-D devices with a 128MB flash are shipped with the latest boot ROM. The system boot ROM, boot loader, and TiMOS image introduce the following checks to prevent use of older releases with this hardware:

- If a user issues an **admin reboot** upgrade with an older `boot.tim`, the boot ROM detects it and fails to load the boot loader; instead, the boot ROM uses the golden bootstrap image, loads it for booting with the boot ROM, and loads the `both.tim` file.
- If a user issues an **admin reboot** upgrade with an older `boot.tim` and older `both.tim`, the boot ROM detects it and fails to load the boot loader; instead, the boot ROM uses the golden bootstrap image and stops booting when the user specifies an earlier version of the `both.tim`, which the system cannot use. This process results in loss of management connectivity.
- If a user issues an **admin reboot** upgrade with an older `boot.tim`, an older `both.tim` as primary, and a newer `both.tim` as secondary, the boot ROM detects it and fails to load the boot loader; instead, the boot ROM uses the golden bootstrap image. The boot loader checks the primary location for a compatible `both.tim` image, and because the image is an earlier version, the boot fails. The boot loader then checks the secondary location for a compatible `both.tim` image, and because the image is a newer version, the boot loader successfully boots the system.
- The **admin>update-golden-bootstrap** CLI command does not update the golden bootstrap image with the `boot.tim` specified in the parameter value if the `boot.tim` is not a new image.

4.5 BOF password

7210 SAS devices require a BOF password for the user to change the contents of the BOF using the BOF interactive menu. Additionally, the 7210 SAS supports an option to securely store the BOF password using the **bof secure-bof-password** command, as shown in the following sample logs.

Example

```
------------
primary-image ftp://*:*@135.254.173.17//usr/global/images/21.9/B1-8/7xxx/
bcmiproc-both.tim
primary-config ftp://*:*@135.254.173.3/tmp/dxp/dxp2537.cfg
secondary-config ftp://*:*@135.254.173.3/tmp/dxp/dxp2537bkup.cfg
password *
ping-address 1.1.1.1
#uplinkA Port Settings:
uplinkA-port 1/1/1
uplinkA-autoneg
uplinkA-duplex full
uplinkA-speed 1000
uplinkA-address 10.135.25.37/24
uplinkA-vlan null
uplinkA-route 135.0.0.0/8 next-hop 10.135.25.1
#uplinkB Port Settings:
uplinkB-port 1/1/11
no uplinkB-autoneg
uplinkB-duplex full
```


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```
uplinkB-speed 10000
uplinkB-address 0
uplinkB-vlan 0
#System Settings:
wait 3
persist off
console-speed 115200
uplink-mode access-uplink
no console-disabled
secure-bof-password enable
Do you want to overwrite cf1:/bof.cfg with the new settings? (yes/no): y
Successfully saved the new settings in cf1:/bof.cfg
----------------------------
```

4.6 Resetting the node to the factory default setting

The **bof>bof-password** command is available to modify the factory default BOF password **password**.

The user must enter the correct BOF password to edit the BOF parameters. If the incorrect password is entered three times consecutively, the system prompts the user, after the third attempt, to reset the BOF password to the factory default.

If the user chooses not to reset the BOF password, the system prompts the user to enter the password again. If the user chooses to reset the password to factory default, the system also resets the flash to factory defaults (removes all files from the flash drive, except the boot image file (`cf1:\boot.tim`) and TiMOS image file (`cf1:\both.tim`)) as a security measure to prevent malicious access to the configuration file.

After password reset, the node is rebooted with the factory default settings; the BOF parameters are also set to default values. The user must now setup the box using the same steps that were used during first-time boot up of the factory-shipped box. After the system boots up with this setup, use the factory default password **password** to edit the BOF parameters, and use the **bof>bof-password** command to change the password again.

Note:

- The BOF password can be changed from the default value to any other user-defined value only at the TiMOS level.
- Nokia strongly recommends that the user not rename `cf1:\boot.tim` and `cf1:\both.tim` if the system needs to retain them during the password recovery procedure.
- Nokia strongly recommends that the user retain a backup copy of all the image files, configuration files, and other data.

Example

The following sample logs show the system console prompts that are displayed when the user forgets the password and chooses to reset the password to the factory default setting. The BOF contents before and after the reset are also displayed.

Note:
The BOF parameters are set to default values after a password reset.

```
TiMOS BOOT LOADER
Time from clock is SAT JAN 18 01:41:32 2020 UTC
```


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```
Switching serial output to sync mode...   done
Looking for cf1:/bof.cfg ... OK, reading
Contents of Boot Options File on cf1:
    primary-image      ftp://*:*@xxx.xxx.xxx.xxx/xxxx/7xxx/both.tim
    primary-config     cf1:\dxp2537.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    192.0.2.37
    uplinkA-vlan       null
    uplinkA-route      239.0.0.0/8 next-hop 192.0.2.1
#uplinkB Port Settings:
    uplinkB-port       1/1/1
    uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      1000
    uplinkB-address    192.0.2.37
    uplinkB-vlan       null
    uplinkB-route      239.0.0.0/8 next-hop 192.0.2.1
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled

Hit a key within 3 seconds to change boot parameters...

Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Password:
Incorrect password

Password:
Incorrect password

Password:
Incorrect password

 Authentication failed, Do you want to reset password?(yes/no)

********************************************************************
  On reset,this node's flash contents will be set to factory defaults.
  All files on the flash drives(i.e. cf1:) of this
  node will be removed.
  If present, files boot.tim and both.tim are not removed
  from cf1: drive.
  Please ensure that you have a backup of the required
  files before you proceed.
********************************************************************
Type (yes/no) within 10 seconds: yes

*****************************************
*** Chassis must not be powered off nor  ***
*** cards removed while password reset   ***
*** is in progress                       ***
*****************************************
Password reset complete. Restarting...
```


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At this point, the password reset is complete and the node restarts to boot up with factory default settings.

```
Resetting...OK

Nokia SASDxp 7210 Boot ROM. Copyright 2000-2019 Nokia.

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Build: X-xx.x.Rx-xx on Fri Dec 13 16:39:13 IST 2019 by sasb
Version: 0x7
SASDxp-DC Board
Passed!
Copying code from FLASH to RAM....
Done
Board CPLD Version: 0x0e
Reboot Reason: 0x05
Boot rom version is v7
>>> RAM: Testing DDR Passed!
Board Serial Number is 'NS1917T0023'

Tuning values already saved. Skip saving to flash.
Memory Test Passed!
Jumping to vxrom at 0x61400000 now.................



Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Version M-xx.x.Rx, Thu Dec 19 15:32:20 IST 2019 by sasb in /home/xx.x/Rx/main
text:(12965024-->39651248) + data:(4504288-->20038580)
Starting at 0x6f000000...
Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x4e
TiMOS-xx.x.Rx boot/APRC Nokia SAS-Dxp 6T4F2SFP+ 7210 Copyright (c) 2000-2019 Nokia.
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Built on Thu Dec 19 15:32:20 IST 2019 by sasb in /home/xx.0/Rx/main
TiMOS BOOT LOADER
Time from clock is SAT JAN 18 01:43:06 2020 UTC
Switching serial output to sync mode...   done
Looking for cf1:/bof.cfg ... not found
Could not find bof.cfg on drive cf1:

Default Settings
----------------
#uplinkA Port Settings:
    uplinkA-port       1/1/11
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/12
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
   wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled
```


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```
Hit a key within 1 second to change boot parameters...
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt
Password:
```

Note:
At this password prompt, you are required to enter the default password **password**.

4.7 Security for console port and Ethernet management port

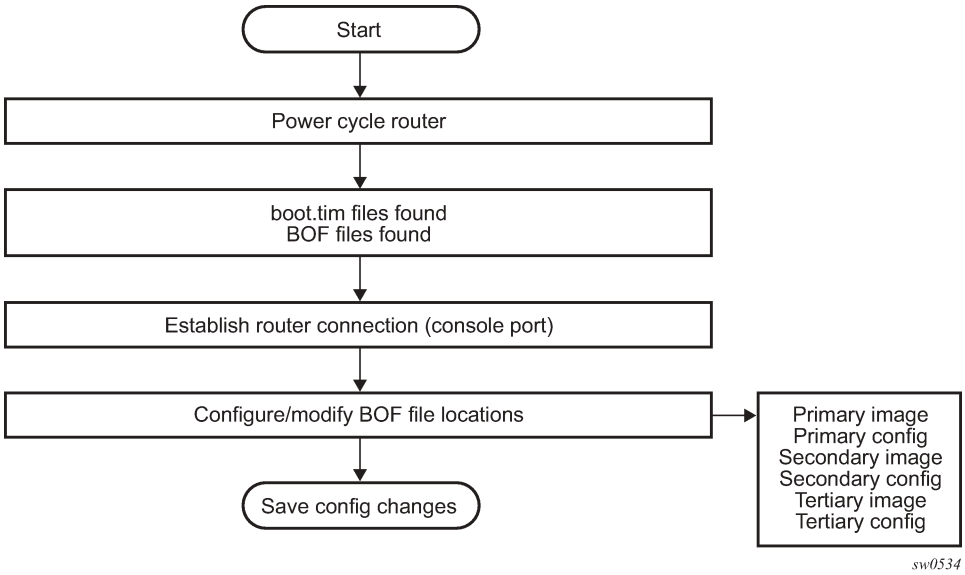
The 7210 SAS supports disabling the console port. In remote deployments, operators can choose to disable user access to the node through the console and through the Ethernet management port to prevent unauthorized and malicious access. Operators can use the **bof>console-disabled** command to disable the console.

Note:
Access to the console is only disabled when the TiMOS image is loaded. Console access remains unchanged during the boot loader stage of the boot-up process. That is, the **bof** command takes effect only when the node is booted with the TiMOS image.

4.8 Initial system startup process flow

The following figure shows the process to start your system. This example assumes that the boot loader and BOF image and configuration files are successfully located.

Figure 10: System startup process flow



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4.9 Configuration notes

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.

4.10 Configuring boot file options with CLI

This section provides information about configuring BOF parameters with CLI.

4.10.1 BOF configuration overview

Nokia routers do not contain a boot EEPROM. The bootstrap image is loaded from the `boot.tim` file. The BOF performs the following tasks:

1. sets up the uplink ports or the Ethernet management port (speed, duplex, auto) (only on platforms that support the Ethernet management port)
2. assigns the IP address (either statically or using DHCP) for the uplink or Ethernet management port
3. assigns the VLAN to the uplink port
4. creates static routes to provide network connectivity
5. sets the console port speed
6. configures the Domain Name System (DNS) name and DNS servers
7. configures the primary, secondary, and tertiary configuration source
8. configures the primary, secondary, and tertiary image source
9. configures operational parameters

4.10.2 Basic BOF configuration

The parameters that specify the location of the image filename that the router will try to boot from and the configuration file are in the BOF.

The most basic BOF configuration should have the following:

- uplink port or Ethernet management port parameters
- primary image location
- primary configuration location

Example: BOF configuration for the 7210 SAS-D and 7210 SAS-Dxp

```
*A:SAS>show# bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xxx.xxx.xxx.xx//home/***/images/SASD-both.tim
    primary-config     cf1:\****.cfg
#uplinkA Port Settings:
```


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```
    uplinkA-port       1/1/10
    uplinkA-address    xx.xxx.xx.xxx/24
uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    0
    uplinkA-vlan       0
uplinkA-route          xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    uplinkA-route      xxx.xxx.x.x/16 next-hop xx.xxx.xx.x
    uplinkA-route      xxx.xx.x.x/16 next-hop xx.xxx.xx.x
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no console-disabled
===============================================================================
*A:SAS>show#
```

Example: BOF configuration for the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, or 7210 SAS-K 3SFP+ 8C

```
A:Dut-A# show bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      ftp://*:*@xxx.xxx.xxx.x/./images/xen-both.tim
    primary-config     ftp://*:*@xxx.xxx.xxx.x/./images/dut-a.cfg
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/5
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    xxx.xxx.xxx.x/24
    uplinkA-vlan       0
    uplinkA-route      xxx.xxx.x.x/16 next-hop xxx.xxx.xxx.x
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
===============================================================================
A:Dut-A#
```

4.10.3 Common configuration tasks

This section describes basic system configuration tasks that must be performed to configure the BOF.

For details about hardware installation and initial router connections, see the specific hardware installation guide.

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4.10.3.1 Searching for the BOF

The BOF should be on the same drive as the bootstrap image file. If the system cannot load or cannot find the BOF, the system checks whether the boot sequence was manually interrupted; otherwise, the system continues with the auto-init mode. The system prompts for a different image and configuration location.

4.10.3.2 Accessing the CLI

About this task

To access the CLI to configure the software for the first time, perform the following steps.

Procedure

Step 1. Turn on the power to the chassis.

The 7210 SAS software automatically begins the boot sequence.

Step 2. When the boot loader, BOF image, and configuration files are successfully located, establish a router connection (console session).

See the respective 7210 SAS chassis and installation guide for more information about establishing a console connection.

4.10.3.3 Configuring BOF encryption

The BOF contents can be encrypted using AES256 and integrity information maintained using SHA256.

Use the following CLI syntax to configure BOF encryption.

```
bof
        encrypt {on | off}
```

4.10.3.4 Configuring the BOF interactive menu password

The 7210 SAS supports the capability to configure a BOF password to provide specific users with access to the BOF interactive menu. Additionally, the 7210 SAS supports an option to securely store the BOF password using the **bof secure-bof-password** command.

Use the following CLI syntax to configure a password for the menu.

```
bof
        bof-password password
        no bof-password
        secure-bof-password {enable | disable}
```

The password must be a plaintext string, between 8 and 32 characters. The plaintext string cannot contain embedded nulls.

Caution:
When entering the password in plaintext, ensure that the password is not visible to bystanders.

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4.10.3.5 Configuring configuration file encryption

The configuration file contents can be encrypted using AES256 and integrity information maintained using SHA256.

Use the following CLI syntax to configure a configuration file encryption key.

```
bof
        encryption-key key
        no encryption-key
```

The configured encryption key must be a plaintext string, between 8 to 32 characters. The plaintext string cannot contain embedded nulls.

Caution:
When entering the encryption key in plaintext, ensure that the key is not visible to bystanders.

4.11 Service management tasks

This section describes the service management tasks and system administration commands.

4.11.1 System administration commands

Use the following administrative commands to perform management tasks.

```
A:ALA-1# admin
        auto-init stop
        check-golden-bootstrap
        debug-save [<file-url>]
        disconnect [address <ip-address> | username <user-name> |
        {console|telnet|ftp|ssh}]
        display-config
        [no]enable-tech
        reboot [auto-init][now]
        save [file-url] [detail] [index]
        set-time <date> <time>
        tech-support <file-url>
        update-golden-bootstrap [file-url]
```

4.11.1.1 Viewing the current configuration

Use one of the following CLI commands to display the current configuration. The **detail** option displays all default values. The **index** option displays only the persistent indices. The **info** command displays context-level information.

```
admin# display-config [detail|index]
    info detail
```


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Example: Configuration file

```
*A:sim169# admin display-config
# TiMOS-B-0.0.I218 both/i386 NOKIA SAS-D 7210 Copyright (c) 2016 Nokia.
# All rights reserved. All use subject to applicable license agreements.
# Built on Fri Sep 26 20:46:58 IST 2016 by panosbld in /panosbld/ws/panos/main

# Generated THU JUN 23 19:19:22 2016 UTC

exit all
configure
#--------------------------------------------------
echo "System Configuration"
#--------------------------------------------------
    system
        name "7210-3"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
        ccm 1
        exit
        snmp
        exit
        login-control
            idle-timeout 1440
            motd text "7210-3"
        exit
        time
            sntp
                shutdown
            exit
            zone UTC
        exit
        thresholds
            rmon
            exit
        exit
    exit...
...
#--------------------------------------------------

# Finished FRI Nov 21 15:06:16 2016 UTC
A:*A:sim169##
```

4.11.1.2 Modifying and saving a configuration

If you modify a configuration file, the changes remain in effect only during the current power cycle unless a **save** command is executed. Changes are lost if the system is powered down or the router is rebooted without saving:

- Specify the file URL location to save the running configuration. If a destination is not specified, the files are saved to the location where the files were found for that boot sequence. The same configuration can be saved with different filenames to the same location or to different locations.
- The **detail** option adds the default parameters to the saved configuration.
- The **index** option forces a save of the index file.
- Changing the active and standby addresses without reboot standby CPM may cause a boot-env sync to fail.

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Use the following command sytax to save a configuration.

```
bof# save [cflash-id]
```

Example

```
A:ALA-1# bof
    A:ALA-1>bof# save cf1:
    A:ALA-1>bof#
```

Use the following command syntax to save the system configuration.

```
admin# save[file-url][detail][index]
```

Example

```
A:ALA-1# admin save cf1:\test123.cfg
    Saving config.# Saved to cf1:\test123.cfg
    ... complete
    A:ALA-1#
```

Note:
If the **persist** option is enabled and the **admin save** *file-url* command is executed with an FTP path used as the *file-url* parameter, two FTP sessions simultaneously open to the FTP server. The FTP server must be configured to allow multiple sessions from the same login; otherwise, the configuration and index files are not saved correctly.

4.11.1.3 Deleting BOF parameters

You can delete specific BOF parameters. The **no** form of these commands removes the parameter from configuration. The changes remain in effect only during the current power cycle unless a **save** command is executed. Changes are lost if the system is powered down or the router is rebooted without saving.

Deleting the BOF file and rebooting causes the system to enter auto mode.

Use the following CLI syntax to save and remove BOF configuration parameters.

```
bof# save [cflash-id]
```

Example

```
A:ALA-1# bof
    A:ALA-1>bof# save cf1:
    A:ALA-1>bof#
```

Example: CLI syntax for the 7210 SAS-D

```
*A:7210>bof#
    no console-speed
    no dns-domain
    persist
    no ping-address
    no primary-config
    no primary-dns
    no primary-image
```


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```
    save
    no secondary-config
    no secondary-dns
    no secondary-image
    no tertiary-config
    no tertiary-dns
    no tertiary-image
    no uplinkA-address
     no uplinkA-autoneg
    no uplinkA-duplex
    no uplinkA-speed
    no uplinkA-port
   no uplinkA-route
    no uplinkA-vlan
    no uplinkB-address
     no uplinkB-autoneg
    no uplinkB-duplex
    no uplinkB-speed
    no uplinkB-port
    no uplinkB-route
    no uplinkB-vlan
    wait
```

4.11.1.4 Saving a configuration to a different filename

Save the current configuration with a unique filename to have additional backup copies and to edit parameters with a text editor. You can save your current configuration to an ASCII file.

Use either of the following CLI syntax to save a configuration to a different location.

```
bof# save [cflash-id]
```

Example

```
A:ALA-1# bof
    A:ALA-1>bof# save cf1:
    A:ALA-1>bof#
```

or

```
admin# save [file-url][detail][index]
```

Example

```
A:ALA-1>admin# save cf1:\testABC.cfg
    Saving config.# Saved to cf1:\testABC.cfg
    ... complete
    A:ALA-1#
```

4.11.1.5 Rebooting

When an **admin>reboot** command is issued, the system reboots. Changes are lost unless the configuration is saved. Use the **admin>save** *file-url* command to save the current configuration. The user is prompted to confirm the reboot operation. If the **now** option is not specified, the user is prompted to confirm the reboot operation.

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Use the following CLI syntax to reboot.

```
admin# reboot [auto-init][now]
```

Example

```
A:ALA-1>admin# reboot
    A:DutA>admin# reboot

    Are you sure you want to reboot (y/n)? y
```

Example

```
Resetting...OK

Nokia 7210 Boot ROM. Copyright 2016 Nokia.
All rights reserved. All use is subject to applicable license agreements.
Running POST tests from ROM
Testing ROM load area...done

Relocating code...Jumping to RAM
...
```

When an **admin reboot auto-init** command is issued, the system resets the existing BOF file and reboots. The system startup process after the **admin reboot auto-init** command is executed is the same as the first-time system boot as described in System initialization.

Note:
After the BOF is reset, the system may not boot up with the last saved system configuration unless the new BOF file also uses the same configuration file. If booting the system with the last saved system configuration is required, it is recommended to run the **admin>save** *file-url* command to save the current system configuration and modify the BOF to use this configuration file.

Use the following syntax to reset the BOF and reboot.

```
admin# reboot auto-init [now]
```

Example

```
Example: *A:ALA-1# admin reboot auto-init
WARNING: Configuration and/or Boot options may have changed since the last save.
Are you sure you want to reset the bof and reboot (y/n)? Y
Resetting...OK

Nokia 7210 Boot ROM. Copyright 2016 Nokia.
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```


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4.12 BOF command reference

4.12.1 Command hierarchies

4.12.1.1 Configuration commands

Note:
Not all the commands are supported on all the 7210 SAS platforms.

```
bof
    - bof-password password
    - no bof-password
    - [no] console-disabled
    - console-speed baud-rate
    - no console-speed
    - dns-domain dns-name
    - no dns-domain
    - encrypt {on | off}
    - encryption-key key
    - no encryption-key
    - persist {on | off}
    - ping-address ip-address
    - no ping-address
    - primary-config file-url
    - no primary-config
    - primary-dns ip-address
    - no primary-dns [ip-address]
    - primary-image file-url
    - no primary-image
    - save [cflash-id ]
    - secondary-config file-url
    - no secondary-config
    - secondary-dns ip-address
    - no secondary-dns [ip-address]
    - secondary-image file-url
    - no secondary-image
    - secure-bof-password {enable | disable}
    - sftp-key-directory file-url
    - no sftp-key-directory
    - tertiary-config file-url
    - no tertiary-config
    - tertiary-dns ip-address
    - no tertiary-dns [ip-address]
    - tertiary-image file-url
    - no tertiary-image
    - wait seconds
    - uplinkA-address ip-address/mask
    - no uplinkA-address
    - uplinkA-autoneg
    - no uplinkA-autoneg
    - uplinkA-duplex {full | half}
    - uplinkA-port port-id
    - no uplinkA-port
    - [no] uplinkA-route ip-address/mask next-hop ip-address
    - uplinkA-speed speed
    - uplinkA-vlan 0..4094
```


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```
    - no uplinkA-vlan
    - uplinkB-address ip-address/mask
    - no uplinkB-address
    - uplinkB-autoneg
    - no uplinkB-autoneg
    - uplinkB-duplex {full | half}
    - uplinkB-port port-id
    - no uplinkB-port
    - [no] uplinkB-route ip-address/mask next-hop ip-address
    - uplinkB-speed speed
    - uplinkB-vlan 0..4094
    - no uplinkB-vlan
    - wait seconds
```

4.12.1.2 Show commands

```
show
    - bof [cflash-id | booted]
    - boot-messages
```

4.12.2 Command descriptions

- Configuration commands
- Show commands

4.12.2.1 Configuration commands

- File management commands
- BOF processing control commands
- Console port configuration commands
- Image and configuration management commands
- DNS configuration commands

4.12.2.1.1 File management commands

bof

Syntax

bof

Context

<ROOT>

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command creates or edits the boot option file (BOF) for the specified local storage device.

A BOF specifies where the system searches for runtime images, configuration files, and other operational parameters during system initialization.

BOF parameters can be modified, and changes can be saved to a specified compact flash. The BOF must be located in the root directory of either an internal or external compact flash local to the system and have the mandatory filename `bof.cfg`.

When modifications are made to in-memory parameters that are currently in use or operating, the changes are effective immediately. For example, if the console speed is changed, the change takes place immediately.

Only one entry of the BOF configuration command statement can be saved after the statement has been found to be syntactically correct.

No default boot option file exists.

encrypt

Syntax

encrypt {**on** | **off**}

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, except the 7210 SAS-D

Description

This command enables and disables encryption of the BOF using AES256 and SHA256.

When the BOF is encrypted on the compact flash, it is still reachable using the BOF interactive menu during node startup, and fields can be modified using this menu.

Default

encrypt off

Parameters

on

Keyword to enable BOF encryption.

off

Keyword to disable BOF encryption.

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encryption-key

Syntax

encryption-key *key*

no encryption-key

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, except the 7210 SAS-D

Description

This command creates a key used by AES256 and SHA256 algorithms for configuration file encryption and hashing. This key is used for all configuration files (primary, secondary, and tertiary).

After creating or deleting a key, use the **admin save** command to save the configuration file with the current encryption key state.

The **no** form of this command deletes the encryption key.

Default

no encryption-key

Parameters

key

Specifies the encryption key in plaintext format between 8 and 32 characters.

save

Syntax

save [*cflash-id*]

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command uses the boot option parameters currently in memory and writes them from the BOF to the compact flash.

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The BOF is located in the root directory of the internal compact flash drive local to the system and has the mandatory filename `bof.cfg`. Saves must be explicitly executed. BOF is saved at the same location as the location of the `boot.tim` file, which is used for booting the system.

Command usage:

- **bof save**

  This configuration saves the BOF to the flash drive.

- **bof save cf1:**

  This configuration saves the BOF to cf1:.

Parameters

cflash-id

Specifies the compact flash ID where the `bof.cfg` is to be saved.

cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1: | uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C)

secure-bof-password

Syntax

secure-bof-password {**enable** | **disable**}

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document, except the 7210 SAS-D

Description

This command securely stores BOF passwords in the `bof.cfg` file in an encrypted format.

Note:
When this command is enabled or disabled, the system resets the BOF password to the default password. Nokia recommends that after enabling or disabling this command, the user should change the password using the **bof>bof-password** command.

Parameters

enable

Keyword to enable securing the BOF password.

disable

Keyword to disable securing the BOF password.

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sftp-key-directory

Syntax

sftp-key-directory *file-url*

no sftp-key-directory

Context

bof

Platforms

7210 SAS-Dxp

Description

This command configures the location where the SFTP PKI files are available.

The **no** form of this command clears the SFTP key directory location and disables the use of SFTP client key files available in this location.

Default

no sftp-key-directory

Parameters

file-url

Specifies the primary configuration file location, expressed as a file URL.

Values url-string: <local-url> [up to 180 characters]

local-url: <cflash-id>/<file-path>

cflash-id: cf1:

usb-flash-id: uf1:

Note:
The *usb-flash-id* parameter is applicable only to platforms that support USB port and USB storage devices.

4.12.2.1.2 BOF processing control commands

wait

Syntax

wait *seconds*

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Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures a pause, in seconds, at the start of the boot process, which allows system initialization to be interrupted at the console.

When system initialization is interrupted, the operator is allowed to manually override the parameters defined in the BOF.

Only one **wait** command can be defined in the BOF.

Default

3

Parameters

seconds

Specifies the length of the pause at the start of the boot process, in seconds.

Values 1 to 10

4.12.2.1.3 Console port configuration commands

bof-password

Syntax

bof-password *password*

no bof-password

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures a BOF password. The user must provide the password to edit the BOF parameters in the boot loader.

This command also implements a mechanism for password recovery. If the user forgets the password, it can be reset to factory default. When a password is reset, a security measure to prevent a malicious access to the configuration files, the system also resets the flash to factory defaults (that is, it removes

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all files from the flash, except the boot image file (`cf1:\boot.tim`) and TiMOS image file (`cf1:\both.tim`)), and reboots the node with the factory default settings. After boot up, the user must set up the box using the same steps used to boot the box the first time after it was received from the factory. During bootup after a reboot, the user can use the factory default **password** to edit the BOF parameters. After using the factory default password, Nokia recommends that the user change the password.

Note:

- Nokia strongly recommends that you not rename `cf1:\boot.tim` and `cf1:\both.tim` files, if the system needs to retain them during the password recovery procedure. Nokia also recommends making a backup of all the image files, configuration files, and other data.
- Enabling or disabling the **secure-bof-password** command resets the BOF password to the default password. See secure-bof-password for more information.

The **no** form of this command deletes the configured password and resets to the default password. The **no** form is supported only when **secure-bof-password enable** is configured.

Default

bof-password password

Parameters

password

Specifies the BOF password, in plaintext string format, between 8 and 32 characters.

console-disabled

Syntax

[**no**] **console-disabled**

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command enables or disables the serial port console for use.

In remote deployments this command provides an additional security mechanism for the user. The console can be disabled to prevent unauthorized access to the system.

Note:
The console is always available for use when the device is booting up. This command is applicable only after the TiMOS image (`both.tim`) is running successfully. If the user executes this command in the BOF CLI context, the command takes effect only during the next boot. A BOF **save** operation must be performed after executing the **console-disabled** command.

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

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Default

no console-disabled

console-speed

Syntax

console-speed *baud-rate*

no console-speed

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the console port baud rate.

When this command is issued to edit the BOF used for the most recent boot, the BOF and the active configuration are changed immediately.

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

Default

115200 bps

Parameters

baud-rate

Specifies the console port baud rate, expressed as a decimal integer.

Values 9600, 19200, 38400, 57600, 115200

4.12.2.1.4 Image and configuration management commands

persist

Syntax

persist {**on** | **off**}

Context

bof

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies whether the system preserves system indexes when a **save** command is executed. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index, and so on. This reduces resynchronizations of the Network Management System (NMS) with the affected network element.

If **persist** is enabled 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** *file-url* command is executed with an FTP path used as the *file-url* parameter value, 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 are not saved correctly.

Note:

- Persistency files (`.ndx`) are saved on the same disk as the configuration files and the image files.
- When a user sets the location for the persistency file, the system checks to ensure that the disk has enough free space. If this there is not enough free space, the persistency does not become active and a trap is generated. Then, it is up to the operator to free adequate disk space. In the meantime, the system performs a space availability check every 30 seconds. As soon as the space is available, the persistency becomes active on the next (30 second) check.

Default

off

Parameters

on

Keyword to preserve the system index when saving the configuration.

off

Keyword to disable the system index saves between reboots.

primary-config

Syntax

primary-config *file-url*

no primary-config

Context

bof

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies the name and location of the primary configuration file.

The system attempts to use the configuration specified in **primary-config**. If the specified file cannot be located, the system automatically attempts to obtain the configuration from the location specified in **secondary-config** and then the **tertiary-config**.

Note:
If an error in the configuration file is encountered, the boot process aborts.

The **no** form of this command removes the **primary-config** configuration.

Parameters

file-url

Specifies the primary configuration file location, expressed as a file URL.

Values

file-url	[local-url | remote-url] (up to 180 characters)
local-url	[<cflash-id/> | <usb-flash-id>][file-path]
remote-url	[{ftp://|tftp://} *login:pswd@remote-locn/*] [*file-path*]
cflash-id	cf1:
usb-flash-id	uf1:

primary-image

Syntax

primary-image *file-url*

no primary image

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies the primary directory location for runtime image file loading.

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The system attempts to load all runtime image files configured in the **primary-image** first. If this fails, the system attempts to load the runtime images from the location configured in the **secondary-image**. If the secondary image load fails, the tertiary image specified in **tertiary-image** is used.

The **no** form of this command removes the **primary-image** configuration.

Parameters

file-url

Specifies the *location-url* can be either local (this flash) or a remote FTP server.

Values

file-url	[local-url | remote-url] (up to 180 characters)
local-url	[<cflash-id/> | <usb-flash-id>][file-path]
remote-url	[{ftp://|tftp://} *login:pswd@remote-locn*/] [*file-path*]
cflash-id	cf1:
usb-flash-id	uf1:

secondary-config

Syntax

secondary-config *file-url*

no secondary-config

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

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**.

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.

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Values

file-url	[local-url | remote-url] (up to 180 characters)
local-url	[<cflash-id/> | <usb-flash-id>][file-path]
remote-url	[{ftp://|tftp://} *login:pswd@remote-locn/*][*file-path*]
cflash-id	cf1:
usb-flash-id	uf1:

secondary-image

Syntax

secondary-image *file-url*

no secondary-image

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

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.

The **no** form of this command removes the **secondary-image** configuration.

Parameters

file-url

Specifies that the *file-url* can be either local (this local flash) or a remote FTP server.

Values

file-url	[local-url | remote-url] (up to 180 characters)
local-url	[<cflash-id/> | <usb-flash-id>][file-path]
remote-url	[{ftp://|tftp://} *login:pswd@remote-locn/*] [*file-path*]
cflash-id	cf1:
usb-flash-id	uf1:

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tertiary-config

Syntax

tertiary-config *file-url*

no tertiary-config

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

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.

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		
	local-url	[<cflash-id/> | <usb-flash-id>][file-path]
	cflash-id	cf1:
	usb-flash-id	uf1:
	remote-url	[{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*]local-url

tertiary-image

Syntax

tertiary-image *file-url*

no tertiary-image

Context

bof

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies the tertiary directory location for runtime image file loading.

The system attempts to load all runtime image files configured in the **primary-image** first. If this fails, the system attempts to load the runtime images from the location configured in the **secondary-image**. If the secondary image load fails, the tertiary image specified in **tertiary-image** is used.

The **no** form of this command removes the **tertiary-image** configuration.

Parameters

file-url

Specifies that the *location-url* can be either local (this flash) or a remote FTP server.

Values

file-url	[local-url | remote-url] (up to 180 characters)
local-url	[<cflash-id/> | <usb-flash-id>][file-path]
remote-url	[{ftp://|tftp://} *login:pswd@remote-locn/*][*file-path*]
cflash-id	cf1:
usb-flash-id	uf1:

ping-address

Syntax

ping-address *ip-address*

no ping-address

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies the IP address used for a ping-test after the system boots.

The **no** form of this command removes the ping-address configuration. Setting a value of 0 also removes the ping-address configuration.

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Parameters

ip-address

Specifies an IPv4 address in the form a.b.c.d; for example, 10.1.2.10.

uplinkA-address

Syntax

uplinkA-address *ip-address/mask*

no uplinkA-address

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the uplink-A IP address.

The **no** form of this command sets the uplinkA to use DHCP to get the IPv4 address and the **show bof** value reflects 0 for this parameter.

Note:
When using IPv6, the uplinkA interface does not support DHCPv6. Therefore, the address must be set explicitly by the user.

Parameters

ip-address

Specifies the IP address. This address must be unique within the subnet and specified in dotted-decimal notation.

Values

ipv4-address - a.b.c.d

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

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

x - [0 to FFFF]H

d - [0 to 255]D

mask

Specifies the subnet mask length when the IP prefix is specified in CIDR notation. When the IP prefix is specified in CIDR notation, a forward slash (/) separates the *ip-address* from the *mask* parameter. The *mask* parameter indicates the number of bits used for the network portion of the IP address; the remainder of the IP address is used to determine the host portion of the IP address.

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Values 1 to 30

uplinkB-address

Syntax

uplinkB-address *ip-address/mask*

no uplinkB-address

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the uplink-B IP address.

The **no** form of this command sets the uplinkB to use DHCP to get the IPv4 address, and the **show bof** value reflects 0 for this parameter.

Note:
When using IPv6, the uplinkB interface does not support DHCPv6. Therefore, the address must be set explicitly by the user.

Parameters

ip-address

Specifies the IP address of the BOF. This address must be unique within the subnet and specified in dotted-decimal notation.

Values

ipv4-address - a.b.c.d

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

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

x - [0 to FFFF]H

d - [0 to 255]D

mask

Specifies the subnet mask length when the IP prefix is specified in CIDR notation. When the IP prefix is specified in CIDR notation, a forward slash (/) separates the *ip-address* from the *mask* parameter. The *mask* parameter indicates the number of bits used for the network portion of the IP address; the remainder of the IP address is used to determine the host portion of the IP address.

Values 1 to 30

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uplinkA-autoneg

Syntax

[**no**] **uplinkA-autoneg**

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command enables speed and duplex auto-negotiation on the uplinkA port in the running configuration and the BOF.

The **no** form of this command disables **auto-negotiate** on this port.

Note:
The **uplinkA-autoneg** command is not valid for 10GE ports. Therefore, whenever the user selects 10GE ports as uplinkA-port, the **uplinkA-autoneg** command is defaulted to **no uplinkA-autoneg**, speed as **uplinkA-speed 10000**, and duplex as **uplinkA-duplex full**, as shown in the following output example.

Example

```
#uplinkA Port Settings:
    uplinkA-port       1/1/26
    no uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
```

Default

uplinkA-autoneg

uplinkB-autoneg

Syntax

[**no**] **uplinkB-autoneg**

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command enables speed and duplex Auto-negotiation on the uplinkB port in the running configuration and the BOF.

The **no** form of this command disables **auto-negotiate** on this port.

Note:
The **uplinkB-autoneg** command is not valid for 10GE ports. Therefore, whenever the user selects 10GE ports as uplinkB-port, the **uplinkB-autoneg** command is defaulted to **no uplinkB-autoneg**, speed as **uplinkB-speed 10000**, and duplex as **uplinkB-duplex full**, as shown in the following output example.

Example

```
#uplinkB Port Settings:
    uplinkB-port       1/1/26
    no uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
```

Default

uplinkB-autoneg

uplinkA-duplex

Syntax

uplinkA-duplex {**full** | **half**}

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the duplex mode of the uplinkA port when auto-negotiation is disabled in the running configuration and the BOF.

This command also enables the context to configure the duplex mode of the Ethernet port. If the port is configured to auto-negotiate, this parameter will be ignored.

Note:
The **uplinkA-autoneg** command is not valid for 10GE ports. Therefore, whenever the user selects 10GE ports as uplinkA-port, the **uplinkA-autoneg** command is defaulted to **no uplinkA-autoneg**, speed as **uplinkA-speed 10000**, and duplex as **uplinkA-duplex full**, as shown in the following output example.

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Example

```
#uplinkA Port Settings:
    uplinkA-port       1/1/26
    no uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
```

Default

uplinkA-duplex full

Parameters

full

Keyword to set the link to full duplex mode.

half

Keyword to sets the link to half duplex mode.

uplinkB-duplex

Syntax

uplinkB-duplex {**full** | **half**}

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the duplex mode of the uplinkB port when auto-negotiation is disabled in the running configuration and the BOF.

This configuration command allows for the configuration of the duplex mode of the Ethernet port. If the port is configured to auto-negotiate, this parameter is ignored.

Note:
The **uplinkB-autoneg** command is not valid for 10GE ports. Therefore, whenever the user selects 10GE ports as uplinkB-port, the **uplinkB-autoneg** command defaults to **no uplinkB-autoneg**, speed as **uplinkB-speed 10000**, duplex as **uplinkB-duplex full**, as shown in the following output example.

Example

```
#uplinkB Port Settings:
    uplinkB-port       1/1/26
    no uplinkB-autoneg
```


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```
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
```

Default

uplinkB-duplex full

Parameters

full

Keyword to set the link to full duplex mode.

half

Keyword to set the link to half duplex mode.

uplinkA-port

Syntax

uplinkA-port *port-id*

no uplinkA-port

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the primary port to be used for boot up.

The **no** form of this command removes all uplinkA parameters from the BOF.

Parameters

port-id

Specifies the primary port to be used for boot up in the slot/mda/port format.

uplinkB-port

Syntax

uplinkB-port *port-id*

no uplinkB-port

Context

bof

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the secondary port to be used for bootup.

The **no** form of this command removes all uplinkB parameters from the BOF.

Parameters

port-id

Specifies the secondary port to be used for boot up in the slot/mda/port format.

uplinkA-route

Syntax

[**no**] **uplinkA-route** *ip-address/mask* **next-hop** *ip-address*

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures an uplinkA static route.

Parameters

ip-address

Specifies the IP destination address. This address must be unique within the subnet and specified in dotted-decimal notation.

Values

ipv4-address - a.b.c.d

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

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

x - [0 to FFFF]H

d - [0 to 255]D

mask

Specifies the subnet mask length when the IP prefix is specified in CIDR notation. When the IP prefix is specified in CIDR notation, a forward slash (/) separates the *ip-address* from the *mask* parameter. The *mask* parameter indicates the number of bits used for the

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network portion of the IP address; the remainder of the IP address is used to determine the host portion of the IP address.

Values 0 to 32

next-hop *ip-address*

Specifies the next-hop IP address used to reach the destination.

uplinkB-route

Syntax

[**no**] **uplinkB-route** *ip-address/mask* **next-hop** *ip-address*

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures an uplinkB static route.

Parameters

ip-address

Specifies the IP destination address. This address must be unique within the subnet and specified in dotted-decimal notation.

Values

ipv4-address - a.b.c.d

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

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

x - [0 to FFFF]H

d - [0 to 255]D

mask

Specifies the subnet mask length when the IP prefix is specified in CIDR notation. When the IP prefix is specified in CIDR notation, a forward slash (/) separates the **ip-address** from the *mask* parameter. The *mask* parameter indicates the number of bits used for the network portion of the IP address; the remainder of the IP address is used to determine the host portion of the IP address.

Values 0 to 32

next-hop *ip-address*

Specifies the next-hop IP address used to reach the destination.

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uplinkA-speed

Syntax

uplinkA-speed *speed*

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the speed for the uplinkA when auto-negotiation is disabled in the running configuration and the BOF.

If the port is configured to auto-negotiate, this parameter is ignored.

Note:
The **uplinkA-autoneg** command is not valid for 10GE ports. Therefore, whenever the user selects 10GE ports as uplinkA-port, the **uplinkA-autoneg** command defaults to **no uplinkA-autoneg**, speed as **uplinkA-speed 10000**, and duplex as **uplinkA-duplex full**, as shown in the following output example.

Example

```
#uplinkA Port Settings:
    uplinkA-port       1/1/26
    no uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
```

Default

uplinkA-speed 1000 m/bps

Parameters

10

Keyword to set the link to 10 M/bps speed.

100

Keyword to set the link to 100 M/bps speed.

1000

Keyword to set the link to 1000 M/bps speed.

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uplinkB-speed

Syntax

uplinkB-speed *speed*

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the speed for the uplinkB when auto-negotiation is disabled in the running configuration and the BOF.

If the port is configured to auto-negotiate, this parameter is ignored.

Note:
The **uplinkB-autoneg** command is not valid for 10GE ports. Therefore, whenever the user selects 10GE ports as uplinkB port, the **uplinkB-autoneg** command is defaulted to **no uplinkB-autoneg**, speed as **uplinkB-speed 10000**, and duplex as **uplinkB-duplex full**, as shown in the following output example.

Example

```
#uplinkB Port Settings:
    uplinkB-port       1/1/26
    no uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
```

Default

uplinkB-speed 1000

Parameters

10

Keyword to set the link to 10 M/bps speed.

100

Keyword to set the link to 100 M/bps speed.

1000

Keyword to set the link to 1000 M/bps speed.

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uplinkA-vlan

Syntax

uplinkA-vlan *0..4094*

no uplinkA-vlan

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies a VLAN ID to be used on uplinkA.

The **no** form of this command is used to send untagged packets on uplinkA.

Parameters

0...4094

Specifies the VLAN ID.

Values 0 to 4094

uplinkB-vlan

Syntax

uplinkB-vlan *0..4094*

no uplinkB-vlan

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies a VLAN ID to be used on uplinkB.

The **no** form of this command is used to send untagged packets on uplinkB.

Parameters

0..4094

Specifies the VLAN ID.

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Values 0 to 4094

4.12.2.1.5 DNS configuration commands

dns-domain

Syntax

dns-domain *dns-name*

no dns-domain

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the domain name used when performing DNS address resolution. This is a required parameter if DNS address resolution is required. Only a single domain name can be configured. If multiple domain statements are configured, the last one encountered is used.

The **no** form of this command removes the domain name from the configuration.

Default

no dns-domain

Parameters

dns-name

Specifies the DNS domain name, up to 32 characters.

primary-dns

Syntax

primary-dns *ip-address*

no primary-dns [*ip-address*]

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command configures the primary DNS server used for DNS name resolution. DNS name resolution can be used when executing ping, traceroute, and service-ping, and 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 address of the primary DNS server.

Values

ipv4-address - a.b.c.d

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

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

x - [0 to FFFF]H

d - [0 to 255]D

secondary-dns

Syntax

secondary-dns *ip-address*

no secondary-dns [*ip-address*]

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

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.

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Default

no secondary-dns

Parameters

ip-address

Specifies the IP address of the secondary DNS server.

Values

ipv4-address - a.b.c.d

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

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

x - [0 to FFFF]H

d - [0 to 255]D

tertiary-dns

Syntax

tertiary-dns *ip-address*

no tertiary-dns [*ip-address*]

Context

bof

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the tertiary DNS server for DNS name resolution. The tertiary DNS server is used only if the primary DNS server and the secondary DNS server do not respond.

DNS name resolution can be used when executing ping, traceroute, and service-ping, and also when defining file URLs. DNS name resolution is not supported when DNS names are embedded in configuration files.

The **no** form of this command removes the tertiary DNS server from the configuration.

Default

no tertiary-dns

Parameters

ip-address

Specifies the IP address of the tertiary DNS server.

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Values

ipv4-address - a.b.c.d

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

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

x - [0 to FFFF]H

d - [0 to 255]D

4.12.2.2 Show commands

bof

Syntax

bof [*cflash-id* | **booted**]

Context

show

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays the BOF executed on last system boot or on the specified device.

If no device is specified, the BOF used in the last system boot displays. If the BOF has been modified since the system boot, a message displays.

Parameters

cflash-id

Specifies the cflash directory name.

cf1: (7210 SAS-D, 7210 SAS-Dxp)

cf1: | uf1: (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C)

booted

Keyword to display the boot option file used to boot the system.

Output

The following output is an example of BOF information, and Table 20: Output fields: BOF describes the output fields.

Sample output

```
*A:ALA# show bof cf1:
```


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```
===============================================================================
BOF on cf1:
===============================================================================
    primary-image      ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/bothx.tim
    secondary-image    ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/bothx.tim
    tertiary-image     ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/both.tim
    primary-dns        xxx.xxx.xxx.xxx
    dns-domain         in.example.com
    ping 10.135.16.90
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-address    xxx.xxx.x.xx/24
uplinkA-autoneg
uplinkA-duplexfull
uplinkA-speed1000
    uplinkA-vlan       0
    uplinkA-route      xx.xxx.x.x/16 next-hop xxx.xxx.x.x
#uplinkB Port Settings:
    uplinkB-port       1/1/2
    uplinkB-address    0
uplinkB-autoneg
uplinkB-duplexfull
uplinkB-speed1000
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            on
    console-speed      115200
    no console-disabled
===============================================================================
*A:ALA#
*A:ALA# show bof booted
===============================================================================
System booted with BOF
===============================================================================
    primary-image      ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/bothx.tim
    secondary-image    ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/bothx.tim
    tertiary-image     ftp://*:*@xx.xxx.xx.xx/./images/auto-boot/solution/both.tim
    primary-dns        xxx.xxx.xxx.xxx
    dns-domain         in.example.com
    ping-address   xx.xxx.xx.xx
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-address    xxx.xxx.x.xx/24
uplinkA-autoneg
uplinkA-duplexfull
uplinkA-speed1000
    uplinkA-vlan       0
    uplinkA-route      xx.xxx.x.x/16 next-hop xxx.xxx.x.x
#uplinkB Port Settings:
    uplinkB-port       1/1/2
    uplinkB-address    0
uplinkA-autoneg
uplinkA-duplexfull
uplinkA-speed1000
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            on
    console-speed      115200
    no console-disabled
===============================================================================
```


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```
*A:ALA#
```

```
A:Router-1# show bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image      sftp://*@xxx.xxx.xx.a/./images/bcmiproc-both.tim
    secondary-image    sftp://*@xxx.xxx.xx.b:10001/./images/bcmiproc-both.tim
    primary-config     sftp://*@xxx.xxx.xx.c:10002/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    secondary-config   sftp://*@xx.xxx.xxx.a/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    tertiary-config    sftp://*@xxx.xxx.xx.b:10001/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    xxx.xxx.xx.yyy/24
    uplinkA-vlan       null
    uplinkA-route      xxx.xx.x.x/16 next-hop xxx.xxx.xx.x
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled
    sftp-key-directory cf1:/bootSecure
===============================================================================
A:Router-1# show bof cf1:
===============================================================================
BOF on cf1:
===============================================================================
    primary-image      sftp://*@xxx.xxx.xx.a/./images/bcmiproc-both.tim
    secondary-image    sftp://*@xxx.xxx.xx.b:10001/./images/bcmiproc-both.tim
    primary-config     sftp://*@xxx.xxx.xx.c:10002/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    secondary-config   sftp://*@xx.xxx.xxx.a/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    tertiary-config    sftp://*@xxx.xxx.xx.b:10001/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    xxx.xxx.xx.yyy/24
    uplinkA-vlan       null
    uplinkA-route      xxx.xx.x.x/16 next-hop xxx.xxx.xx.x
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled
    sftp-key-directory cf1:/bootSecure
===============================================================================
A:Router-1# show bof booted
===============================================================================
System booted with BOF
===============================================================================
    primary-image      sftp://*@xxx.xxx.xx.a/./images/bcmiproc-both.tim
    secondary-image    sftp://*@xxx.xxx.xx.b:10001/./images/bcmiproc-both.tim
    primary-config     sftp://*@xxx.xxx.xx.c:10002/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    secondary-config   sftp://*@xx.xxx.xxx.a/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
    tertiary-config    sftp://*@xxx.xxx.xx.b:10001/./secAutoInitFiles/node-a-1-1-11-10g-cfg.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/1
```


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```
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    xxx.xxx.xx.yyy/24
    uplinkA-vlan       null
    uplinkA-route      xxx.xx.x.x/16 next-hop xxx.xxx.xx.x
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled
    sftp-key-directory cf1:/bootSecure
===============================================================================
A:Dut-C#
```

Table 20: Output fields: BOF

Label	Description
primary-image	The primary location of the directory that contains the runtime images of both CPM and IOM
primary-config	The primary location of the file that contains the configuration
primary-dns	The primary DNS server for resolution of hostnames to IP addresses
secondary-image	The secondary location of the directory that contains the runtime images of both CPM and IOM
secondary-config	The secondary location of the file that contains the configuration
secondary-dns	The secondary DNS server for resolution of hostnames to IP addresses
tertiary-image	The tertiary location of the directory that contains the runtime images of both CPM and IOM
tertiary-config	The tertiary location of the file that contains the configuration
tertiary-dns	The tertiary DNS server for resolution of hostnames to IP addresses
persist	on — Persistent indexes between system reboots is enabled off — Persistent indexes between system reboots is disabled
wait	The time configured for the boot to pause while waiting for console input
autonegotiate	No autonegotiate — Autonegotiate not enabled autonegotiate — Autonegotiate is enabled
console speed	The console port baud rate.

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Label	Description
ping-address	The IPv4 IP address to be used for ping-test after auto-init
dns domain	The domain name used when performing DNS address resolution
uplinkA-address	Displays the Uplink-A IP address.
uplinkA-autoneg	Displays the Auto-negotiation of the management Ethernet port
uplinkA-duplex	Displays Full duplex operation
uplinkA-speed	Displays the 1000 M/bps operation
uplinkA-port	Displays the primary port to be used for auto-boot.
uplinkA-route	Displays the static route associated with uplinkA.
uplinkA-vlan	Displays the VLAN ID to be used on uplinkA.
uplinkB-address	Displays the uplinkB IP address
uplinkB-autoneg	Displays the auto-negotiation of the management Ethernet port
uplinkB-duplex	Displays the full duplex operation
uplinkB-speed	Displays the 1000 M/bps operation
uplinkB-port	Displays the secondary port to be used for auto-init
uplinkB-route	Displays the static route associated with uplinkB
uplinkB-vlan	Displays the VLAN ID to be used on uplinkB
console-disabled	Displays the status of serial port console
sftp-key-directory	Displays the location of the directory containing the PKI files used by SFTP client during bootup (including auto-init)

boot-messages

Syntax

boot-messages

Context

show

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command displays boot messages generated during the last system boot.

Output

The following output is an example of boot messages.

Sample output

```
===============================================================================
cf1:/bootlog.txt
===============================================================================
Bootlog started for Version V-0.0.I317
Build V-0.0.I317 bootrom/mpc 7xxx
Built on Tue Jan 6 02:23:14 IST 2016 by panosbld in /panosbld/ws/panos/main

?Attempting to load from file cf1:/boot.tim
Version L-0.0.I312, Fri Jan  2 04:26:32 IST 2016 by panosbld in /panosbld/ws/panos/
main
text:(3002475-->12623392) + data:(550940-->2414128)
Starting at 0xb000000...

Total Memory: 512MB  Chassis Type: sas  Card Type: badami_7210
TiMOS-L-0.0.I312 boot/mpc NOKIA SAS-D 7210 Copyright (c) 2016 Nokia.
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Built on Fri Jan 2 04:26:32 IST 2016 by panosbld in /panosbld/ws/panos/main

TiMOS BOOT LOADER
Extended checks enabled with overhead of 36B
Time from clock is THU JAN 08 16:04:05 2016 UTC
Switching serial output to sync mode...   done

Looking for cf1:/bof.cfg ... OK, reading

Contents of Boot Options File on cf1:
    primary-image      ftp://*:*@xxx.xxx.xxx.xx/import/panos_nightly_builds/1.0/B1-
12/STU-sultan/both.tim
    primary-config     cf1:\config.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/13
uplinkA-autoneg
uplinkA-duplexfull
uplinkA-speed1000
    uplinkA-address    xx.xxx.xx.xxx/24
    uplinkA-vlan       null
    uplinkA-route      xx.xxx.x.x/16 next-hop xx.xxx.xx.x
    uplinkA-route      xxx.xxx.x.x/16 next-hop xx.xxx.xx.x
#uplinkB Port Settings:
    uplinkB-port       1/1/2
    uplinkB-address    0
uplinkB-autoneg
uplinkB-duplexfull
uplinkB-speed1000
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200

Hit a key within 1 second to change boot parms...
Configuring Network with uplinkA Port Setting.....
Primary config file present at: cf1:\config.cfg
```


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```
Primary image location: ftp://*:*@xxx.xxx.xxx.xx/import/panos_nightly_builds/1.0/B1-
12/STU-sultan/both.tim
Initializing uplinkA port using IP addr xx.xxx.xx.xxx.
Loading image ftp://*:*@xxx.xxx.xxx.xx/import/panos_nightly_builds/1.0/B1-12/STU-
sultan/both.tim
Version B-1.0.B1-12, Wed Jan  7 00:58:35 IST 2016 by builder in /builder/ws/panos/
main
text:(27022791-->84574868) + data:(1921023-->10720420)
Executing TiMOS image at 0x100000

Total Memory: 512MB  Chassis Type: sas  Card Type: badami_7210
TiMOS-B-1.0.B1-12 both/mpc NOKIA 7210 Copyright (c) 2016 Nokia.
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Built on Wed Jan 7 00:58:35 IST 2016 by builder in /builder/ws/panos/main


   ___                  ___          ___          ___
  /\  \                /\__\        /\  \        /\  \
  \:\  \        ___    /::|  |      /::\  \      /::\  \
   \:\  \      /\__\  /:|:|  |     /:/\:\  \    /:/\ \  \
   /::\  \    _\/__/  /:/|:|__|__  /:/  \:\  \   _\:\~\ \  \
  /:/\:\__\  /\__\   /:/ |:::::\__\/:/__/ \:\__\ /\ \:\ \ \__\
 /:/  \/__/ /:/  /   \/__/~~/:/  / \:\  \  \/:/  / \:\ \:\ \/__/
/:/  /     /:/  /          /:/  /   \:\  /:/  /   \:\ \:\__\
\/__/      \/__/          /:/  /     \:\/:/  /     \:\/:/  /
                         /:/  /       \::/  /       \::/  /
                         \/__/         \/__/         \/__/

Time from clock is THU JAN 08 16:05:20 2016 UTC

Attempting to exec primary configuration file:
   'cf1:\config.cfg' ...
System Configuration
System Security Configuration
Log Configuration
System Security Cpm Hw Filters Configuration
QoS Slope and Queue Policies Configuration
Port Scheduler Policies Configuration
Card Configuration
Port Configuration
Management Router Configuration
Router (Network Side) Configuration
Static Route Configuration
Service Configuration
Router (Service Side) Configuration
Executed 234 lines in 0.1 seconds from file cf1:\config.cfg

INFO: CLI #1008 The SNMP daemon is disabled.  To enable SNMP, execute the command 'c
onfig>system>snmp no shutdown'.
TiMOS-B-1.0.B1-12 both/mpc NOKIA SAS-D 7210 Copyright (c) 2016 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Jan 7 00:58:35 IST 2016 by builder in /builder/ws/panos/main

Login:
```


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5 Secure Boot

Note: The Secure Boot feature is only supported on the 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T.

The 7210 SAS SR OS Secure Boot ensures that the software executed by the system is trusted and originated from Nokia IP Networks.

At every boot of the control card, each step in the boot process verifies the digital signature of the next software element to ensure its integrity and authenticity, up to and including the 7210 SAS SR OS images. This boot sequence forms the chain of trust for Secure Boot.

Software image signatures use RSA-4096 keys and SHA-384 hashes.

The Secure Boot chain is rooted in the platform CPM firmware, based on UEFI specifications. As such, the Nokia Platform Key, Key Exchange Key, and allowed and disallowed databases are provisioned when Secure Boot is activated to perform the required signature verification.

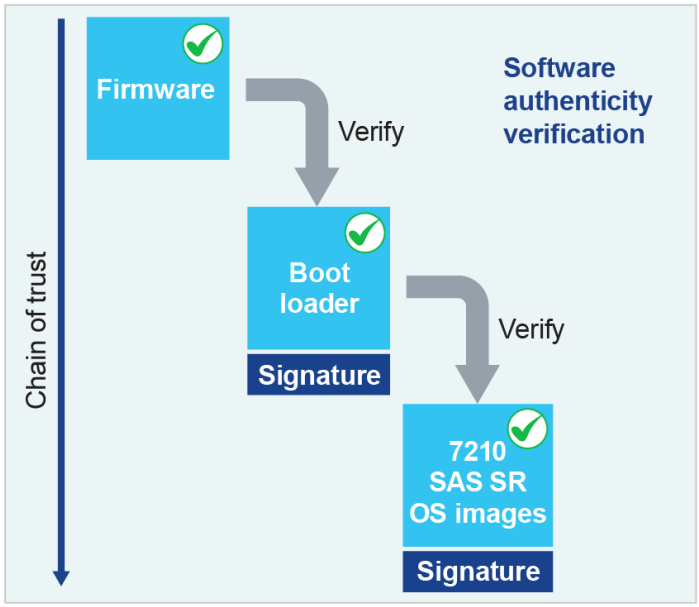
Firmware updates are also digitally signed and verified using the same principle. The signature verification of a firmware update is performed at boot time by the existing firmware before the firmware update can proceed.

5.1 Secure Boot chain

The following figure shows the Secure Boot chain of trust for 7210 SAS SR OS platforms.

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Figure 11: Secure boot chain of trust



sw4500

The software images part of the Secure Boot chain varies among SR OS platforms. This list of software images per platform is described in System initialization, and includes the Boot Loader, `boot.tim`, and the 7210 SAS SR OS `*.tim` software images.

5.2 Activate Secure Boot

Secure Boot is enabled, per node, by providing the card slot, card serial number, and confirmation code command options.

Use the following command to activate Secure Boot.

```
admin system security secure-boot activate card "A" serial-number NS123456789 confirmation-code
 secure-boot-permanent
```

The following example shows the warning messages and a prompt for proceeding with Secure Boot activation.

Example

```
This operation will permanently activate secure boot on card A and cannot be reversed.
After activation, the system will only accept digitally signed software and will not boot
 using un-signed software.
This operation will immediately reset card A.
Are you sure you want to continue (y/n)?
```

The card serial number and Secure Boot confirmation code are required to avoid accidental activation of Secure Boot in the network. The confirmation code is *secure-boot-permanent*.

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The Secure Boot **activate** command verifies that the BOF primary image uses the same software release as the currently running software, and automatically reboots the node if the software release matches. Otherwise, an error is generated in the CLI.

Note:

- The system also verifies the boot.tim version against the running software version on applicable platforms. These verifications ensure that the entire boot chain up to the primary image supports Secure Boot, before activating Secure Boot and rebooting the node.
- The node must use the latest bootrom that is recommended for use with Secure Boot before activating Secure Boot. Check the 7210 SAS 25.9.R1 release notes to view the bootrom version that support Secure Boot.

WARNING: After Secure Boot is activated on a node, the capability is permanently enabled and cannot be disabled. The node permanently refuses to execute unsigned software for security reasons. As a result, it is not possible to downgrade to a software release published before the release that introduced Secure Boot for a specific platform. For example, 7210 SAS-K 2F1C2T Secure Boot support is introduced in software Release 25.9.R1. After activating Secure Boot on this platform the system cannot be downgraded to software releases before 25.9.R1.

5.3 Operational commands and logs

This section describes the following:

- Secure Boot state
- Software update
- Update Secure Boot variables

5.3.1 Secure Boot state

Secure Boot and UEFI variables Secure Boot keys status is available for each node.

Use the following command to display Secure Boot state information.

```
show card A detail
```

Output example

```
Hardware Data
    Secure boot status            : enabled
    UEFI variables status         : ok
```

where

- Secure Boot status — indicates if Secure Boot is enabled or disabled
- UEFI variables status — indicates if Secure Boot variables need updating

At every boot in the security log, the system records if Secure Boot is enabled or disabled for each node. The following is an example of such a log message.

```
24 2023/05/17 06:09:03.140 EDT MAJOR: SECURITY #2241 Base Card A
```


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```
"CPM A has booted with a secure-boot status of enabled"
```

Secure Boot UEFI variables can be obtained for each node using the following command.

```
tools dump system security secure-boot uefi-var card
```

The command displays the following x509 certificates and SHA-256 hash UEFI variables:

- Platform Key (PK)
- Key Exchange Key (KEK)
- Allowed Database (DB)
- Disallowed Database (DBx)

5.3.2 Software update

After Secure Boot is enabled on the system, and before upgrading to a new software release, the user must validate that the new software image is properly signed. This additional verification is required because the system only boots Nokia-signed software images; unsigned or improperly signed images are not booted.

Use the following command to validate the signature of the TiMOS *.tim images contained in the **software-image** *url* location referenced in the command. This verification includes `boot.tim`, `support.tim`, and `both.tim` if the files are present in the cf1 or uf1 directory.

```
admin system security secure-boot validate software-image url
```

5.3.3 Update Secure Boot variables

The system supports Secure Boot UEFI key updates and revocation using the following commands.

```
admin system security secure-boot update-key
admin system security secure-boot revoke-key
```

5.4 Secure Boot command reference

5.4.1 Command hierarchies

- Secure Boot administration commands
- Secure Boot tools commands

5.4.1.1 Secure Boot administration commands

```
root
    - admin
        - system
```


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```
            - security
                - secure-boot
                    - activate card cpm-slot serial-number cpm-serial-number confirmation-
code code
                    - revoke-key card cpm-slot serial-number cpm-serial-number confirmation-
code code
                    - update-key card cpm-slot serial-number cpm-serial-number confirmation-
code code software-image file-url
                    - validate software-image url [override-default-boot-image]
```

5.4.1.2 Secure Boot tools commands

```
tools
    - dump
        - system
            - security
                - secure-boot
                    - uefi-vars card cpm-slot
```

5.4.2 Command descriptions

- Secure Boot administration commands
- Secure Boot tools commands

5.4.2.1 Secure Boot administration commands

secure-boot

Syntax

secure-boot

Context

admin>system>security

Platforms

7210 SAS-Dxp, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T

Description

Commands in this context administratively provision Secure Boot.

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activate

Syntax

activate card *cpm-slot* **serial-number** *cpm-serial-number* **confirmation-code** *code*

Context

admin>system>security>secure-boot

Platforms

7210 SAS-Dxp, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T

Description

This command activates Secure Boot to enforce digital signature verification of the software on every boot.

When Secure Boot is activated on a node, the capability is permanently enabled and cannot be disabled.

Parameters

cpm-slot

Specifies the logical CPM slot.

Values A

cpm-serial-number

Specifies the node serial number, up to 256 characters.

code

Specifies the Secure Boot confirmation code, up to 32 characters.

revoke-key

Syntax

revoke-key card *cpm-slot* **serial-number** *cpm-serial-number* **confirmation-code** *code*

Context

admin>system>security>secure-boot

Platforms

7210 SAS-Dxp, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T

Description

This command revokes Secure Boot keys.

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Parameters

cpm-slot

Specifies the logical CPM slot.

Values A

cpm-serial-number

Specifies the node serial number, up to 256 characters.

code

Specifies the Secure Boot confirmation code, up to 32 characters.

update-key

Syntax

update-key card *cpm-slot* **serial-number** *cpm-serial-number* **confirmation-code** *code* **software-image** *file-url*

Context

admin>system>security>secure-boot

Platforms

7210 SAS-Dxp, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T

Description

This command updates Secure Boot keys.

Parameters

cpm-slot

Specifies the logical CPM slot.

Values A

cpm-serial-number

Specifies the node serial number, up to 256 characters.

code

Specifies the Secure Boot confirmation code, up to 32 characters.

file-url

Specifies the URL for the software image.

Values [*local-url* | *remote-url*] (up to 180 characters)

where:

- *local-url* — [*cflash-id/*] [*file-path*]
  180 characters maximum, including *cflash-id*
  directory length 99 characters maximum each

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- *remote-url* — [{ftp://| tftp://} *login*:*pswd@remote-locn*/][*file-path*]
  180 characters maximum
  directory length 99 characters maximum each
  where: *remote-locn* — [*hostname* | *ipv4-address* | *ipv6-address*]
- *cflash-id* — cf1: | uf1:

validate

Syntax

validate software-image *url* [**override-default-boot-image**]

Context

admin>system>security>secure-boot

Platforms

7210 SAS-Dxp, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T

Description

This command validates the specified software image.

Parameters

file-url

Specifies the URL for the file.

Values [*local-url* | *remote-url*] (up to 180 characters)
where:

- *local-url* — [*cflash-id*/] [*file-path*]
  180 characters maximum, including *cflash-id*
  directory length 99 characters maximum each
- *remote-url* — [{ftp://| tftp://} *login*:*pswd@remote-locn*/][*file-path*]
  180 characters maximum
  directory length 99 characters maximum each
  where: *remote-locn* — [*hostname* | *ipv4-address* | *ipv6-address*]
- *cflash-id* — cf1: | uf1:

override-default-boot-image

Keyword to override the default boot image.

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5.4.2.2 Secure Boot tools commands

secure-boot

Syntax

secure-boot

Context

tools>dump>system>security

Platforms

7210 SAS-Dxp, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T

Description

This command displays Secure Boot settings.

uefi-vars

Syntax

uefi-vars card *cpm-slot*

Context

tools>dump>system>security>secure-boot

Platforms

7210 SAS-Dxp, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T

Description

This command displays the Secure Boot Unified Extensible Firmware Interface (UEFI) variables.

Parameters

cpm-slot

Specifies the logical CPM slot.

Values A

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6 System management

This chapter provides information about configuring basic system management parameters.

6.1 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.

6.1.1 System information

This section describes the system information components.

6.1.1.1 System name

The system name is the MIB II (RFC 1907, *Management Information Base for Version 2 of the Simple Network Management Protocol (SNMPv2)*) sysName object. By convention, this text string is the fully-qualified domain name of the node. The system name can be any ASCII printable text string up to 32 characters.

6.1.1.2 System contact

The system contact is the MIB II sysContact object. By convention, this text string is a textual identification of the contact person for this managed node, together with information about how to contact this person. The system contact can be any ASCII printable text string up to 80 characters.

6.1.1.3 System location

The system location is the MIB II sysLocation object, which is a text string conventionally used to describe the physical location of the node; for example, Bldg MV-11, 1st Floor, Room 101. The system location can be any ASCII printable text string up to 80 characters.

6.1.1.4 System coordinates

The Nokia Chassis MIB tmnxChassisCoordinates object defines the system coordinates. This text string indicates the Global Positioning System (GPS) coordinates of the location of the chassis.

Two-dimensional GPS positioning offers latitude and longitude information as a four dimensional vector:

direction, hours, minutes, seconds

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where:

direction is one of the four basic values: N, S, W, E

hours ranges from 0 to 180 (for latitude) and 0 to 90 for longitude

minutes and *seconds* range from 0 to 60.

<W, 122, 56, 89> is an example of longitude and <N, 85, 66, 43> is an example of latitude.

System coordinates can be expressed in different notations; for example:

- N 45 58 23, W 34 56 12
- N37 37' 00 latitude, W122 22' 00 longitude
- N36*39.246' W121*40.121

The system coordinates can be any ASCII printable text string up to 80 characters.

6.1.1.5 Naming objects

It is discouraged to configure named objects with a name that starts with "_tmnx_" and with the "_" symbol.

6.1.1.6 CLLI

A CLLI code string for the device is an 11-character standardized geographic identifier that uniquely identifies the geographic location of places and specific 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.

6.1.2 System time

The 7210 SAS routers are equipped with a real-time system clock for time-keeping purposes. When set, the system clock always operates on Coordinated Universal Time (UTC), but the software has options for local time translation and system clock synchronization. System time parameters include Time zones, Network Time Protocol (NTP), SNTP time synchronization, and CRON.

6.1.2.1 Time zones

Setting a time zone allows for times to be displayed in the local time instead of in UTC. The 7210 SAS supports both user-defined and system-defined time zones.

A user-defined time zone has a user-assigned name of up to four printable ASCII characters that is different from the system-defined time zones. For user-defined time zones, the offset from UTC is configured, as well as any summer time adjustment for the time zone.

The following table describes the system-defined time zones, including time zones with and without summer time correction.

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Table 21: System-defined time zones

Acronym	Time zone name	UTC offset
Europe		
GMT	Greenwich Mean Time	UTC
BST	British Summer Time	UTC +1
IST	Irish Summer Time	UTC +1*
WET	Western Europe Time	UTC
WEST	Western Europe Summer Time	UTC +1
CET	Central Europe Time	UTC +1
CEST	Central Europe Summer Time	UTC +2
EET	Eastern Europe Time	UTC +2
EEST	Eastern Europe Summer Time	UTC +3
MSK	Moscow Time	UTC +3
MSD	Moscow Summer Time	UTC +4
US and Canada		
AST	Atlantic Standard Time	UTC -4
ADT	Atlantic Daylight Time	UTC -3
EST	Eastern Standard Time	UTC -5
EDT	Eastern Daylight Saving Time	UTC -4
ET	Eastern Time	Either as EST or EDT, depending on place and time of year
CST	Central Standard Time	UTC -6
CDT	Central Daylight Saving Time	UTC -5
CT	Central Time	Either as CST or CDT, depending on place and time of year
MST	Mountain Standard Time	UTC -7
MDT	Mountain Daylight Saving Time	UTC -6

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Acronym	Time zone name	UTC offset
MT	Mountain Time	Either as MST or MDT, depending on place and time of year
PST	Pacific Standard Time	UTC -8
PDT	Pacific Daylight Saving Time	UTC -7
PT	Pacific Time	Either as PST or PDT, depending on place and time of year
HST	Hawaiian Standard Time	UTC -10
AKST	Alaska Standard Time	UTC -9
AKDT	Alaska Standard Daylight Saving Time	UTC -8
Australia		
AWST	Western Standard Time (for example, Perth)	UTC +8
ACST	Central Standard Time (for example, Darwin)	UTC +9.5
AEST	Eastern Standard/Summer Time (for example, Canberra)	UTC +10

6.1.2.2 Network Time Protocol (NTP)

The Network Time Protocol (NTP) is defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis*. It allows participating network nodes to keep time more accurately and maintain time in a more synchronized manner between the participating network nodes.

NTP uses stratum levels to define the number of hops from a reference clock. The reference clock is treated as a stratum-0 device that is assumed to be accurate with little or no delay. Stratum-0 servers cannot be used in a network. However, they can be directly connected to devices that operate as stratum-1 servers. A stratum-1 server is an NTP server with a directly-connected device that provides Coordinated Universal Time (UTC), such as a GPS or atomic clock.

The 7210 SAS devices cannot act as stratum-1 servers but can act as stratum-2 devices because a network connection to an NTP server is required.

The higher stratum levels are separated from the stratum-1 server over a network path, therefore a stratum-2 server receives its time over a network link from a stratum-1 server. A stratum-3 server receives its time over a network link from a stratum-2 server.

If the internal PTP process is used as a time source for System Time and OAM, it must be specified as a server for NTP. If PTP is specified, the **prefer** parameter must also be specified. After PTP has established a UTC traceable time from an external grandmaster source, that clock is always the time source into NTP, even if PTP goes into time holdover.

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Note:
Use of the internal PTP time source for NTP promotes the internal NTP server to stratum-1 level. This may impact the NTP network topology.

The following NTP elements are supported:

- **server mode**

  In this mode, the node advertises the ability to act as a clock source for other network elements. By default, the node, by default, transmits NTP packets in NTP version 4 mode.

- **authentication keys**

  These keys implement increased security support in carrier and other networks. Both DES and MD5 authentication are supported, as well as multiple keys.

- **symmetric active mode**

  In this mode, the NTP is synchronized with a specific node that is considered more trustworthy or accurate than other nodes carrying NTP in the system. This mode requires that a specific peer is set.

- **broadcast**

  In this mode, the node receives or sends using a broadcast address.

- **alert when NTP server is not available**

  When none of the configured servers are reachable on the node, the system reverts to manual timekeeping and issues a critical alarm. When a server becomes available, a trap is issued indicating that standard operation has resumed.

- **NTP and SNTP**

  If both NTP and SNTP are enabled on the node, SNTP transitions to an operationally down state. If NTP is removed from the configuration or shut down, SNTP resumes an operationally up state.

- **gradual clock adjustment**

  Because several applications (such as Service Assurance Agent (SAA)) can use the clock, if a major adjustment (128 ms or more) is needed, it is performed by programmatically stepping the clock. If a minor (less than 128 ms) adjustment is needed, it is performed by either speeding up or slowing down the clock.

- **rate limit events and traps**

  To avoid the generation of excessive events and traps the NTP module rate limits the generation of events and traps to three per second. At that point, a single trap is generated to indicate that event and trap squashing is taking place.

- **server and peer addressing using IPv6**
  Both external servers and external peers may be defined using IPv6 or IPv4 addresses. Other features (such as broadcast) use IPv4 addressing only.

6.1.2.3 SNTP time synchronization

To synchronize the system clock with outside time sources, the 7210 SAS devices include a Simple Network Time Protocol (SNTP) client. As defined in RFC 2030, SNTP Version 4 is an adaptation of NTP. SNTP typically provides time accuracy within 100 ms of the time source. SNTP can only receive the time 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.

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In the 7210 SAS software, the SNTP client can be configured in both unicast client modes (point-to-point) and broadcast client modes (point-to-multipoint). SNTP should be used only at the extremities of the synchronization subnet. SNTP clients should operate only at the highest stratum (leaves) of the subnet and in configurations where no NTP or SNTP client is dependent on another SNTP client for synchronization. SNTP time servers should operate only at the root (stratum 1) of the subnet and then only in configurations where no other source of synchronization other than a reliable radio clock is available.

6.1.2.4 CRON

The CRON feature supports the SAA functions and time-based policy scheduling to meet time of day requirements. CRON functionality includes the ability to specify the commands to be run, their scheduling, including one-time only functionality (oneshot), interval and calendar functions, and the storage location for the script output. CRON can also specify the relationship between input, output, and schedule. Scheduled reboots, peer turn ups, service assurance agent tests, and OAM events, such as connectivity checks or troubleshooting runs, can also be scheduled.

CRON features are saved to the configuration file.

CRON features run serially with at least 255 separate schedules and scripts. Each instance can support a schedule where the event is repeatedly executed.

The following CRON elements are supported:

- **action**

  This configures parameters for a script including the maximum amount of time to keep the results from a script run, the maximum amount of time a script may run, the maximum number of script runs to store and the location to store the results.

- **schedule**

  The **schedule** function configures the type of schedule to run, including one-time only (oneshot), periodic, or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds).

- **script**

  The **script** command opens a new nodal context that contains information about a script.

- **time range**

  ACLs and QoS policy configurations may be enhanced to support time-based matching. CRON configuration includes time-matching with the **schedule** sub-command. Schedules are based on events; **time-range** defines an end-time used as a match criteria.

- **time of day**

  Time of Day (TOD) suites are useful when configuring many types of time-based policies or when a large number of SAPs require the same type of TOD changes. The TOD suite may be configured while using specific ingress or egress ACLs or QoS policies, and is an enhancement of the ingress and egress CLI trees.

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6.2 High availability

This section describes the high availability (HA) routing options and features that service providers can use to reduce vulnerability at the network or service provider edge and alleviate the effect of a lengthy outage on IP networks.

HA is an important feature in service provider routing systems. The unprecedented growth of IP services and applications in service provider networks is driven by the demand from the enterprise and residential communities. Downtime can be very costly, and, in addition to lost revenue, customer information and business-critical communications can be lost. HA is the combination of continuous uptime over long periods (Mean Time Between Failures (MTBF)) and the speed at which failover or recovery occurs (Mean Time To Repair (MTTR)).

The advantage of HA routing is evident at the network or service provider edge, where thousands of connections are hosted. Rerouting options around a failed piece of equipment are often limited, or, a single access link exists to a customer because of the additional cost of redundant links. As service providers converge business-critical services, such as real-time voice (VoIP), video, and VPN applications over their IP networks, the requirements for HA become more stringent compared to the requirements for best-effort data.

Network and service availability become critical aspects in advanced IP service offerings, which dictate that the IP routers used to build the foundations of these networks must be resilient to component and software outages.

6.2.1 HA features

This section describes high availability features for devices.

6.2.1.1 Redundancy

Redundancy features enable duplication of data elements to maintain service continuation in case of outages or component failure.

6.2.1.1.1 Component redundancy

7210 SAS component redundancy is critical to reducing MTTR for the routing system.

The following component redundancy features are supported on the 7210 SAS-D and 7210 SAS-Dxp:

- **AC or DC power supply**

  The 7210 SAS-D and 7210 SAS-Dxp each have an integrated AC or DC power supply. A redundant external backup power supply is available only on the 7210 SAS-D ETR variant, 7210 SAS-Dxp 12p ETR variant, 7210 SAS-Dxp 16p, and 7210 SAS-Dxp 24p. Use of redundant external backup power is optional. The external backup power supply cannot be used with the 7210 SAS-D standard variant and 7210 SAS-Dxp 12p standard variant.

  The 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p provide two power input pins to connect external power supplies for power redundancy. The external power supply can be equipped with various power supply units to meet specific PoE requirements. See the *7210 SAS-Dxp 16p/24p Chassis Installation*

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Guide and 7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Interface Configuration Guide for more information.

- **chassis cooling**

  7210 SAS-D 128 MB devices support passive cooling. The device also has a fan to allow air circulation (and not cooling). By default, the fan mode is set to auto mode. In auto mode, by default, the software determines when to turn the fan on and when to switch it off. This can be changed by the operator using the CLI command **config>system>fan**. Operators have an option to switch off the fan permanently or turn it on permanently.

  7210 SAS-Dxp supports passive cooling; it does not have any fans.

- **hot swap**

  The power supply is integrated into the chassis. Hot swapping is not supported. The external power supply backup connection can be added or removed at any time on the 7210 SAS-D ETR variant and 7210 SAS-Dxp 12p ETR variant.

  The external power supply can be added or removed at any time on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p.

- **replaceable storage media**

  The 7210 SAS-D internal flash device (cf1:\) cannot be replaced.

  The 7210 SAS-Dxp (all variants) supports a single, field-replaceable, SD card-based storage medium.

The following component redundancy features are supported on the 7210 SAS-K 2F1C2T:

- The 7210 SAS-K 2F1C2T non-ETR (standard) unit supports a single external AC power supply.
- The 7210 SAS-K 2F1C2T ETR unit supports power redundancy and provides two power input pins on the rear of the unit. The user has the option to use AC, -48V DC, or +24V DC power.
- There are no fans in either of the 7210 SAS-K 2F1C2T non-ETR or ETR variants; these units are passively cooled.
- The 7210 SAS-K 2F1C2T (all variants) supports a single, field-replaceable, SD card-based storage medium.

The following component redundancy features are supported on the 7210 SAS-K 2F6C4T:

- The 7210 SAS-K 2F6C4T non-ETR (standard) unit supports a single external AC power supply.
- The 7210 SAS-K 2F6C4T ETR unit supports power redundancy and provides two power input connectors on the front panel of the unit. The unit currently only supports an external AC power supply.
- There are no fans in either of the 7210 SAS-K 2F6C4T non-ETR or ETR variants; these units are passively cooled.
- The 7210 SAS-K 2F6C4T (all variants) supports a single, field-replaceable, SD card-based storage medium.

The following component redundancy features are supported on the 7210 SAS-K 3SFP+ 8C:

- The 7210 SAS-K 3SFP+ 8C AC and DC variants support power redundancy and provide two power input connectors on the front panel of the unit. The AC variant has two integrated AC power supplies. The DC variant has one integrated DC power supply.
- There are no fans in the 7210 SAS-K 3SFP+ 8C; the unit is passively cooled.
- The 7210 SAS-K 3SFP+ 8C (all variants) supports a single, field-replaceable, SD card-based storage medium.

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6.3 Temperature threshold alarm and fan speed

The following table describes the over-temperature thresholds for 7210 SAS devices:

Table 22: Over-temperature threshold for 7210 SAS devices

Device variants	Minimum temperature (in degree centigrade)	Maximum temperature (in degree centigrade)
7210 SAS-D	0	45
7210 SAS-D ETR	-40	60
7210 SAS-Dxp 12p	0	45
7210 SAS-Dxp 12p ETR	-40	60
7210 SAS-Dxp 16p	-40	95
7210 SAS-Dxp 24p	-40	95
7210 SAS-K 2F1C2T	0	65
7210 SAS-K 2F1C2T ETR	-25	85
7210 SAS-K 2F6C4T	0	76
7210 SAS-K 2F6C4T ETR	-25	85
7210 SAS-K 3SFP+ 8C	-25	90

The 7210 SAS system software controls the fans by monitoring the internal temperature of the chassis. The software manages the fan speed to maintain the internal temperature within the operational limits.

The 7210 SAS-D and 7210 SAS-D ETR platforms support fanless operation. The platforms have a fan for air circulation only, and not for cooling. The fan operates in automatic mode by default, and can be disabled by the operator.

The 7210 SAS-Dxp platforms are passively cooled and do not have fans.

6.4 Network synchronization

This section describes the network synchronization capabilities available on 7210 SAS platforms. These capabilities involve multiple approaches to network timing, including synchronous Ethernet, PTP/1588v2, adaptive timing, and others. These features address barriers to entry as follows:

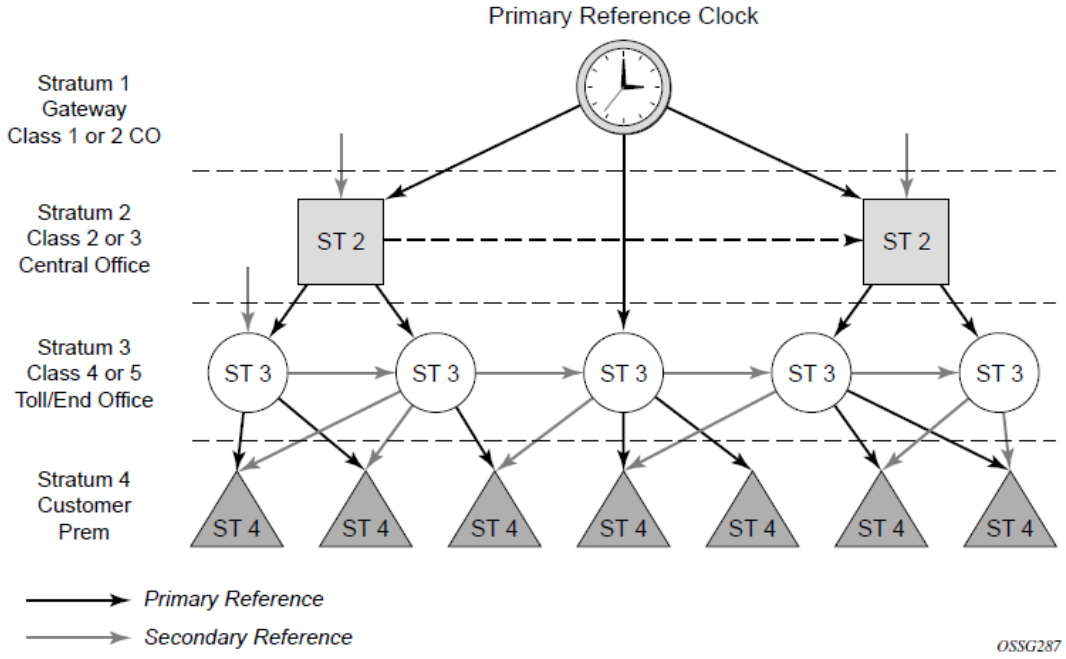
- provide synchronization quality required by mobile networks, such as radio operations and circuit emulation services (CES) transport
- augment and potentially replace the existing (SONET/SDH) timing infrastructure and deliver high quality network timing for time-sensitive wireline applications

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Note:
Network synchronization is only supported on the 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C.

The following figure shows how network synchronization is commonly distributed in a hierarchical PTP topology at the physical layer.

Figure 12: Conventional network timing architecture (North American nomenclature)



The architecture shown in the preceding figure provides the following benefits:

- It limits the need for high quality clocks at each network element and only requires that they reliably replicate input to remain traceable to its reference.
- It uses reliable physical media to provide transport of the timing signal. It does not consume any bandwidth and requires limited additional processing.

The synchronization network is designed so a clock always receives timing from a clock of equal or higher stratum or quality level. This ensures that if an upstream clock has a fault condition (for example, loses its reference and enters a holdover or free-run state) and begins to drift in frequency, the downstream clock will be able to follow it. For greater reliability and robustness, most offices and nodes have at least two synchronization references that can be selected in priority order (such as primary and secondary).

Further levels of resiliency can be provided by designing a capability in the node clock that will operate within prescribed network performance specifications without any reference for a specified timeframe. A clock operating in this mode is said to hold the last known state over (or holdover) until the reference lock is once again achieved. Each level in the timing hierarchy is associated with minimum levels of network performance.

Each synchronization-capable port can be independently configured to transmit data using the node reference timing. In addition, some TDM channels can use adaptive timing or loop timing.

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Transmission of a reference clock through a chain of Ethernet equipment requires that all equipment supports Synchronous Ethernet. A single piece of equipment that is not capable of performing Synchronous Ethernet breaks the chain. Ethernet frames will still get through but downstream devices should not use the recovered line timing because it will not be traceable to an acceptable stratum source.

6.4.1 Central synchronization subsystem

The timing subsystem has a central clock located on the CPM. The timing subsystem performs several functions of the network element clock as defined by Telcordia (GR-1244-CORE) and ITU-T G.781 standards.

The central clock uses the available timing inputs to train its local oscillator. The number of timing inputs available to train the local oscillator varies per platform. The priority order of these references must be specified. This is an ordered list of inputs: (ref1, ref2). The CPM clock output can drive the clocking for all line cards in the system. The routers support selection of the node reference using Quality Level (QL) indications. The recovered clock will be able to derive its timing from one of the references available on that platform.

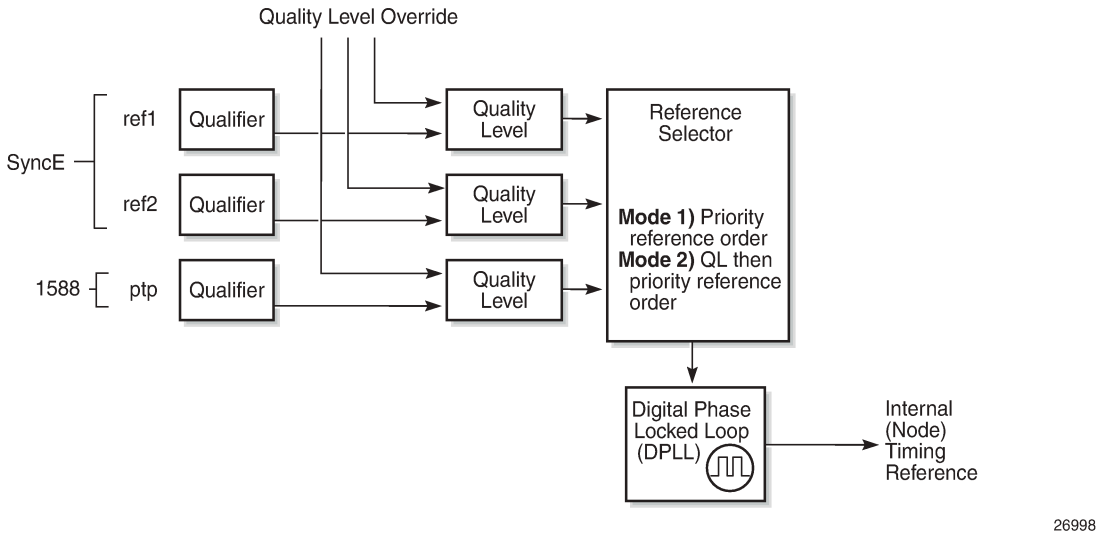
Figure 13: A logical model of the synchronization reference selection on 7210 SAS platforms shows how on 7210 SAS devices, the recovered clock is able to derive the timing from any of the following references:

- synchronous Ethernet ports
- 1588v2/PTP timeReceiver port

See Synchronization options available on 7210 SAS platforms for information about the synchronization options supported by each 7210 SAS platform.

The following figure shows the synchronization reference selection available for the 7210 SAS platforms.

Figure 13: A logical model of the synchronization reference selection on 7210 SAS platforms



When Quality Level (QL) selection mode is disabled, the reversion setting controls when the central clock can reselect a previously failed reference.

The following table describes the selection followed for two references in both revertive and non-revertive modes.

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Table 23: Revertive, non-revertive timing reference switching operation

Status of reference A	Status of reference B	Active reference non-revertive case	Active reference revertive case
OK	OK	A	A
Failed	OK	B	B
OK	OK	B	A
OK	Failed	A	A
OK	OK	A	A
Failed	Failed	Holdover	Holdover
OK	Failed	A	A
Failed	Failed	Holdover	Holdover
Failed	OK	B	B
Failed	Failed	Holdover	Holdover
OK	OK	A or B	A

6.4.2 Synchronization options available on 7210 SAS platforms

The following table lists the synchronization options supported on 7210 SAS platforms.

Note:
The 7210 SAS supports the ordinary clock in timeReceiver mode and the boundary clock. The boundary clock and ordinary clock timeReceiver can be used for both frequency and time distribution and recovery. The 7210 SAS does not support ordinary clock in timeTransmitter mode or peer-to-peer transparent clock.

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Table 24: Synchronization options on 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Synchronization options	7210 SAS platforms						
	7210 SAS-D ETR	7210 SAS-Dxp 12p ETR	7210 SAS-Dxp 16p	7210 SAS-Dxp 24p	7210 SAS-K 2F1C2T	7210 SAS-K 2F6C4T	7210 SAS-K 3SFP+ 8C
SyncE with SSM (SFP, SFP+, and 10G/XFP ports)	✓	✓	✓	✓	✓[15]	✓[15]	✓
SyncE with fixed copper ports[16]	✓[17]	✓	✓	✓	✓[15]	✓[15]	✓
1588v2/PTP with port-based timestamps (both for frequency and time, also known as PTP pure mode)	—[18]				✓[19]	✓[19]	✓[20]
1588v2/PTP with port-based timestamps (time only with SyncE used for frequency recovery, also known as PTP hybrid mode)	✓	✓			✓	✓	✓
PTP end-to-end (E2E) transparent clock[21]							
PTP power profile (IEC/IEEE 61850-9-3 and C37.238-2017)			✓	✓			

6.4.3 Synchronization status messages (SSM)

Note:
Synchronous status messages are supported on devices that support Synchronous Ethernet.

SSM allows the synchronization distribution network to determine the quality level of the clock sourcing a specific synchronization trail and also allows a network element to select the best of multiple input synchronization trails. SSMs are defined for various transport protocols (including SONET/SDH, T1/E1,

15 Supported on non-ETR and ETR variants

16 Fixed copper ports using synchronous Ethernet can be used as a candidate reference or for distribution of recovered reference when the port is operating at a speed of 1000 Mb/s.

17 Only supported on fixed copper ports

18 Not recommended for use

19 Ordinary clock (timeReceiver) and boundary clock are supported on all variants (non-ETR and ETR)

20 Ordinary clock (timeReceiver) and boundary clock are supported

21 PTP E2E transparent clock is not supported on the 7210 SAS-D, 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C.

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and Synchronous Ethernet), for interaction with office clocks (such as BITS or SSUs) and embedded network element clocks.

SSM allows equipment to autonomously provision and reconfigure (by reference switching) their synchronization references, while helping to avoid the creation of timing loops. These messages are particularly useful for synchronization re-configurations when timing is distributed in both directions around a ring.

6.4.4 Synchronous Ethernet

Traditionally, Ethernet-based networks employ a physical layer transmitter clock derived from an inexpensive +/-100ppm crystal oscillator and the receiver locks onto it. Because data is packetized and can be buffered, there is no need for long-term frequency stability or for consistency between frequencies of different links.

Synchronous Ethernet is a variant of the line timing that derives the physical layer transmitter clock from a high-quality frequency reference, replacing the crystal oscillator with a frequency source traceable to a primary reference clock. This change is transparent to the other Ethernet layers and does not affect their operation. The receiver at the far end of the link is locked to the physical layer clock of the received signal, and ensures access to a highly accurate and stable frequency reference. In a manner analogous to conventional hierarchical network synchronization, this receiver can lock the transmission clock of other ports to this frequency reference, and establish a fully time-synchronous network.

Unlike methods that rely on sending timing information in packets over an unclocked physical layer, Synchronous Ethernet is not affected by impairments introduced by higher levels of networking technology (packet loss, packet delay variation). The frequency accuracy and stability in Synchronous Ethernet typically exceeds networks with unsynchronized physical layers.

Synchronous Ethernet allows operators to gracefully integrate existing systems and future deployments into a conventional industry-standard synchronization hierarchy. The concept is analogous to SONET/SDH system timing capabilities. The operator can select any (optical) Ethernet port as a candidate timing reference. The recovered timing from this port is used to time the system (for example, the CPM locks to this provisioned reference selection). The operator then can ensure that all system output is locked to a stable traceable frequency source.

Note:

- The SFP, XFP or SFP+ transceivers used with the SFP, XFP, and SFP+ ports must support Synchronous Ethernet.
- See Synchronization options available on 7210 SAS platforms for information about Synchronous Ethernet support for each 7210 SAS platform.

Fixed copper ports using Synchronous Ethernet can be used as a candidate reference or for distribution of recovered reference. 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 (see ITU-T G.8262). The 802.3 standard link timing states must align with the needed 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, 802.3 link autonegotiation is triggered to ensure that the link timing aligns correctly.

The SSM of synchronous Ethernet uses an Ethernet OAM PDU that uses the slow protocol subtype. For a complete description of the format and processing, see ITU-T G.8264.

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6.4.4.1 Clock source quality level definitions

This section describes the clock source quality levels identified for tracking network timing flow in accordance with the network deployment options defined in Recommendation G.803 and G.781. The Option I network is developed on the original European SDH model; Option II network is a network developed on the North American SONET model.

In addition to the QL values received over SSM of an interface, the standards define the following additional codes for internal use:

- QL INVx is generated internally by the system if and when an unallocated SSM value is received, where x represents the binary value of this SSM. Within the SR OS, these independent values are assigned as the single value QL-INVALID.
- QL FAILED is generated internally by the system if and when the terminated network synchronization distribution trail is in the signal fail state.

The internal quality level of QL-UNKNOWN is used to differentiate from a received QL-STU code, but is equivalent for the purposes of QL selection.

The following tables list the synchronization message coding and source priorities for SSM values received and transmitted on the port.

Table 25: Synchronization message coding and source priorities – SSM received

SSM value received on port				Internal relative quality level
SDH interface **SyncE interface in SDH mode**	**SONET interface** **SyncE interface in SONET mode**	**E1 interface**	**T1 interface (ESF)**	
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

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SSM value received on port				Internal relative quality level
SDH interface SyncE interface in SDH mode	SONET interface SyncE interface in SONET mode	E1 interface	T1 interface (ESF)	
	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 26: Synchronization message coding and source priorities – SSM transmitted

Internal relative quality level	SSM values to be transmitted by interface of type			
	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)

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Internal relative quality level	SSM values to be transmitted by interface of type			
	SDH interface SyncE interface in SDH mode	SONET interface SyncE interface in SONET mode	E1 interface	T1 interface (ESF)
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)

6.4.5 IEEE 1588v2 PTP

Note:

- Precision Time Protocol (PTP) is only supported on the 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C.
- References to G.8275.1 and Ethernet encapsulation apply only to the 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C.

PTP is a timing-over-packet protocol defined in the IEEE 1588v2 standard 1588 PTP 2008.

PTP may be deployed as an alternative timing-over-packet option to ACR. PTP provides the capability to synchronize network elements to a Stratum-1 clock or primary reference clock (PRC) traceable source over a network that may or may not be PTP-aware. PTP has several advantages over ACR. It is a standards-based protocol, has lower bandwidth requirements, can transport both frequency and time, and can potentially provide better performance.

The following is a list of the four basic types of PTP devices:

- ordinary clock

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- boundary clock
- end-to-end transparent clock
- peer-to-peer transparent clock

See Synchronization options available on 7210 SAS platforms for more information about supported PTP device types on 7210 SAS platforms.

Figure 14: Peer clocks shows how the 7210 SAS communicates with peer 1588v2 clocks. These peers can be ordinary clock timeReceivers or boundary clocks. The communication can be based on either unicast IPv4 sessions transported through IP interfaces or Ethernet multicast PTP packets transported through an Ethernet port.

The following table describes IP/UDP unicast and multicast support for 7210 SAS platforms.

Table 27: IP/UDP unicast and Ethernet multicast support

Protocol	IP/UDP unicast	Ethernet multicast
7210 SAS-D	Yes[22]	No
7210 SAS-Dxp 12p	Yes[22]	Yes[22]
7210 SAS-Dxp 16p	Yes	Yes
7210 SAS-Dxp 24p	Yes	Yes
7210 SAS-K 2F1C2T	Yes	No
7210 SAS-K 2F6C4T	Yes	Yes
7210 SAS-K 3SFP+ 8C	Yes	Yes

Unicast IP sessions support two types of peers: configured and discovered. The 7210 SAS operating as an ordinary clock timeReceiver or as a boundary clock must have configured peers for each PTP neighbor clock from which it may accept synchronization information. The 7210 SAS initiates unicast sessions with all configured peers. A 7210 SAS operating as a boundary clock accepts unicast session requests from external peers. If the peer is not configured, it is considered a discovered peer. The 7210 SAS can deliver synchronization information toward discovered peers (that is, timeReceivers).

For Ethernet multicast operation, the node listens for and transmits PTP messages using the configured multicast MAC address. Neighbor clocks are discovered via messages received through an enabled Ethernet port. Figure 15: Ethernet multicast ports shows how the 7210 SAS supports only one neighbor PTP clock connecting into a single port.

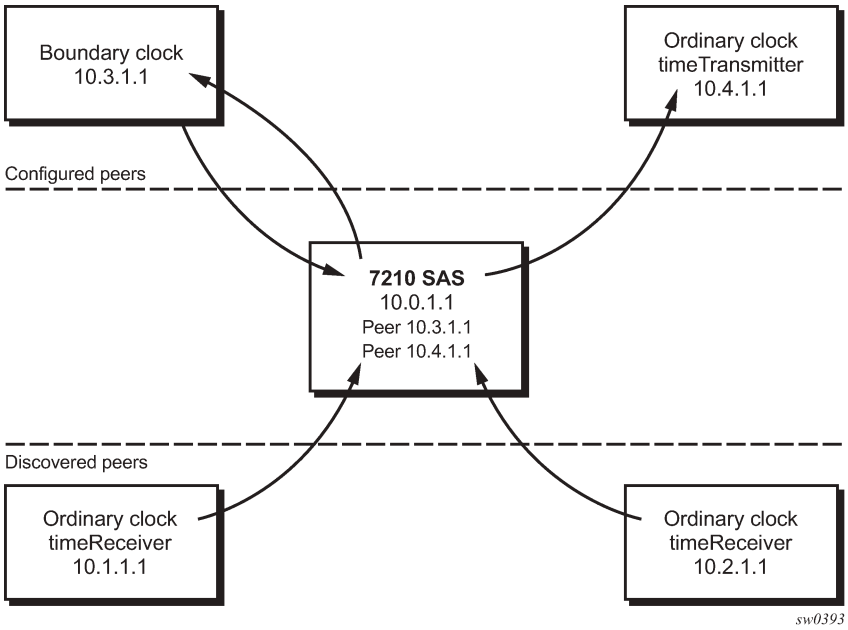
The 7210 SAS does not allow for simultaneous PTP operations using both unicast IPv4 and Ethernet multicast. A change of profile to G.8275.1 or from G.8275.1 to another profile requires a reboot of the node.

The following figure shows the relationship of various neighbor clocks using unicast IP sessions to communicate with a 7210 SAS configured as a boundary clock with two configured peers.

[22] Only supported on the ETR variant.

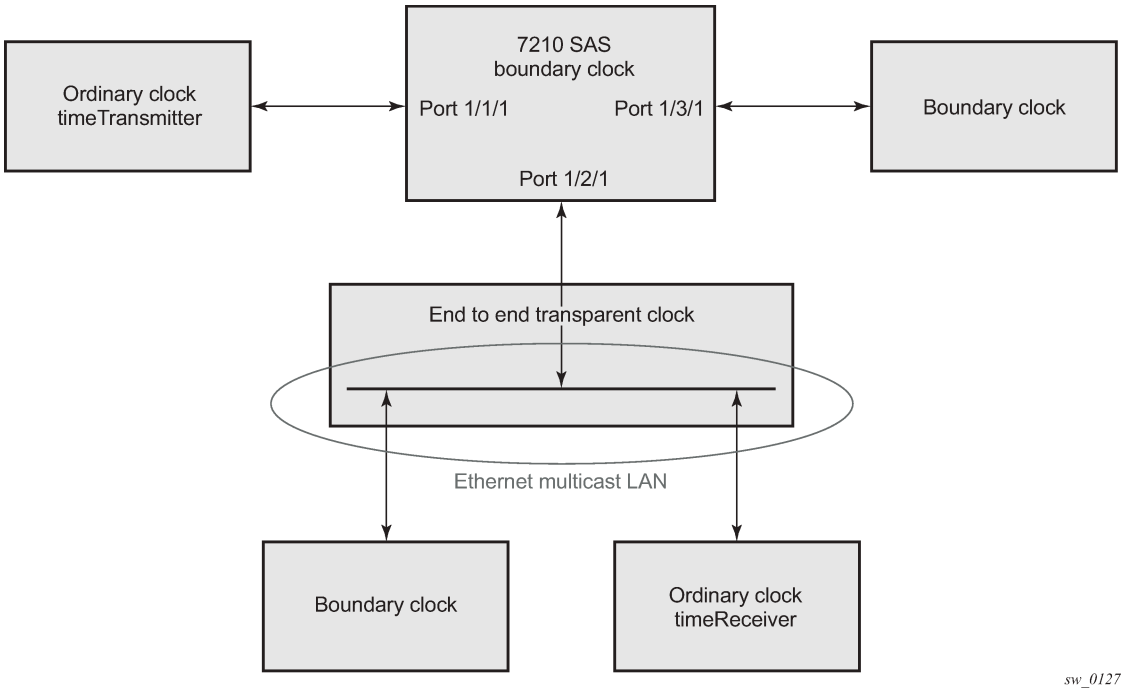
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Figure 14: Peer clocks



The following figure shows the relationship of various neighbor clocks using multicast Ethernet sessions to a 7210 SAS configured as a boundary clock.

Figure 15: Ethernet multicast ports



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Note:
7210 SAS platforms do not support the ordinary clock timeTransmitter configuration.

The IEEE 1588v2 standard includes the concept of PTP profiles. These profiles are defined by industry groups or standards bodies that define the use of IEEE 1588v2 for specific applications.

The following table lists PTP profile support for 7210 SAS platforms.

Table 28: PTP profile support on 7210 SAS platforms

PTP profiles	7210 SAS platforms						
	7210 SAS-D ETR	7210 SAS-Dxp 12p ETR	7210 SAS-Dxp 16p	7210 SAS-Dxp 24p	7210 SAS-K 2F1C2T	7210 SAS-K 2F6C4T	7210 SAS-K 3SFP+ 8C
IEEE 1588v2 (default profile)	✓	✓	✓	✓	✓	✓	✓
ITU-T Telecom profile (G.82651)	✓				✓	✓	✓
ITU-T Telecom profile for time with full timing support (G.8275.1)		✓	✓	✓		✓	✓
IEC/IEEE 61850-9-3 and C37.238-2017 profiles			✓	✓			

When a 7210 SAS receives Announce messages from one or more configured peers or multicast neighbors, it executes a Best timeTransmitter Clock Algorithm (BTCA) to determine the state of communication between itself and the peers. The system uses the BTCA to create a hierarchical topology, allowing the flow of synchronization information from the best source (the grandmaster clock) out through the network to all boundary and timeReceiver clocks. Each profile has a dedicated BTCA.

If the profile setting for the clock is **ieee1588-2008**, the precedence order for the BTCA is as follows:

- priority1
- clock class
- clock accuracy
- PTP variance (offsetScaledLogVariance)
- priority2
- clock identity
- steps removed from the grandmaster

The following table describes how the 7210 SAS sets its local parameters.

Table 29: Local clock parameters when profile is set to ieee1588-2008

Parameter	Value
clockClass	248 - the 7210 SAS is configured as a boundary clock

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Parameter	Value
	255 - the 7210 SAS is configured as an ordinary clock time Receiver
clockAccuracy	FE - unknown
offsetScaledLogVariance	FFFF - not computed
clockIdentity	Chassis MAC address following the guidelines of section 7.5.2.2.2 of IEEE 1588-2008

If the profile setting for the clock is **itu-telecom-freq** (ITU G.8265.1 profile), the precedence order for the best timeTransmitter selection algorithm is the following:

- clock class
- PTSF (Packet Timing Signal Fail) - Announce Loss (miss 3 Announce messages or do not get an Announce message for 6 seconds)
- priority

The following table describes how the 7210 SAS sets its local parameters.

Table 30: Local clock parameters when profile is set to itu-telecom-freq

Parameter	Value
clockClass	80-110 - value corresponding to the QL out of the central clock of the 7210 SAS as per Table 1/G.8265.1 255 - the 7210 SAS is configured as an ordinary clock time Receiver

The ITU-T profile is for use in environments with only ordinary clock timeTransmitters and timeReceivers for frequency distribution.

If the profile setting for the clock is **g8275dot1-2014**, the precedence order for the best timeTransmitter selection algorithm is very similar to that used for the default profile. It ignores the **priority1** parameter, includes a **localPriority** parameter, and includes the ability to force a port to never enter the timeReceiver state (**master-only**). The precedence is as follows:

- clock class
- clock accuracy
- PTP variance (offsetScaledLogVariance)
- priority2
- localPriority
- clock identity
- steps removed from the grandmaster

The following table describes how the 7210 SAS sets its local parameters.

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Table 31: Local clock parameters when profile is set to g8275dot1-2014

Parameter	Value
clockClass	165 - the 7210 SAS is configured as a boundary clock and the boundary clock was previously locked to a grandmaster with a clock class of 6 248 - the 7210 SAS is configured as a boundary clock 255 - the 7210 SAS is configured as an ordinary clock time Receiver
clockAccuracy	FE - unknown
offsetScaledLogVariance	FFFF - not computed
clockIdentity	Chassis MAC address following the guidelines of section 7.5.2.2.2 of IEEE 1588-2008

The 7210 SAS can support a limited number of configured peers (possible timeTransmitter or neighbor boundary clocks) and a limited number of discovered peers (timeReceivers).These peers use the unicast negotiation procedures to request service from the 7210 SAS clock. A neighbor boundary clock counts for two peers (both a configured and a discovered peer) toward the maximum limit.

On the 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, there are limits on the number of timeReceivers enforced in the implementation for unicast and multicast PTP timeReceivers. Contact your Nokia technical support representative for information about the specific unicast message limits related to PTP.

When PTP is configured, the PTP load must be monitored to ensure that the load does not exceed the capabilities (configured values) to ensure that sufficient CPU processing cycles are available for PTP. There are several commands that can be used for this monitoring, including **show system cpu**, which identifies the load of the PTP software process. If the "capacity usage" reaches 100%, the PTP software process on the 7210 SAS is at its limit of transmitting or receiving PTP packets.

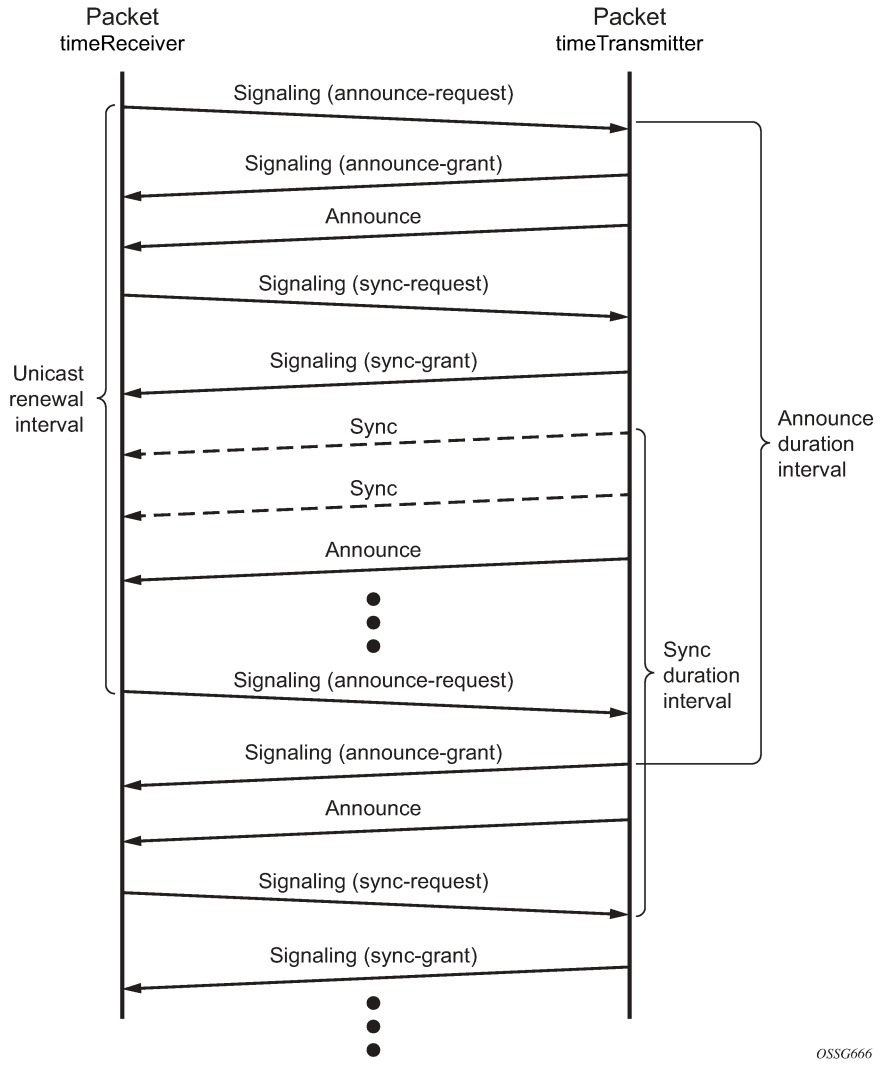
Because the user cannot control the number of PTP messages received by the 7210 SAS over its Ethernet ports, the following statistics commands can be used to identify the source of the message load:

- **show system ptp statistics** displays aggregate packet rates
- **show system ptp port** and **show system ptp port** *port-id* [**detail**] display received packet rates

The following figure shows the unicast negotiation procedure performed between a timeReceiver and a peer clock that is selected to be the timeTransmitter clock. The timeReceiver clock will request Announce messages from all peer clocks but only request Sync and Delay_Resp messages from the clock selected to be the timeTransmitter clock.

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Figure 16: Messaging sequence between the PTP timeReceiver clock and PTP timeTransmitter clocks



6.4.5.1 PTP clock synchronization

The IEEE 1588v2 standard synchronizes the frequency and time from a timeTransmitter clock to one or more timeReceiver clocks over a packet stream. This packet-based synchronization can be over IP/UDP unicast or Ethernet multicast.

As part of the basic synchronization timing computation, event messages are defined for synchronization messaging between the PTP timeReceiver clock and PTP timeTransmitter clock. A one-step or two-step synchronization operation can be used; the two-step operation requires a follow-up message after each synchronization message.

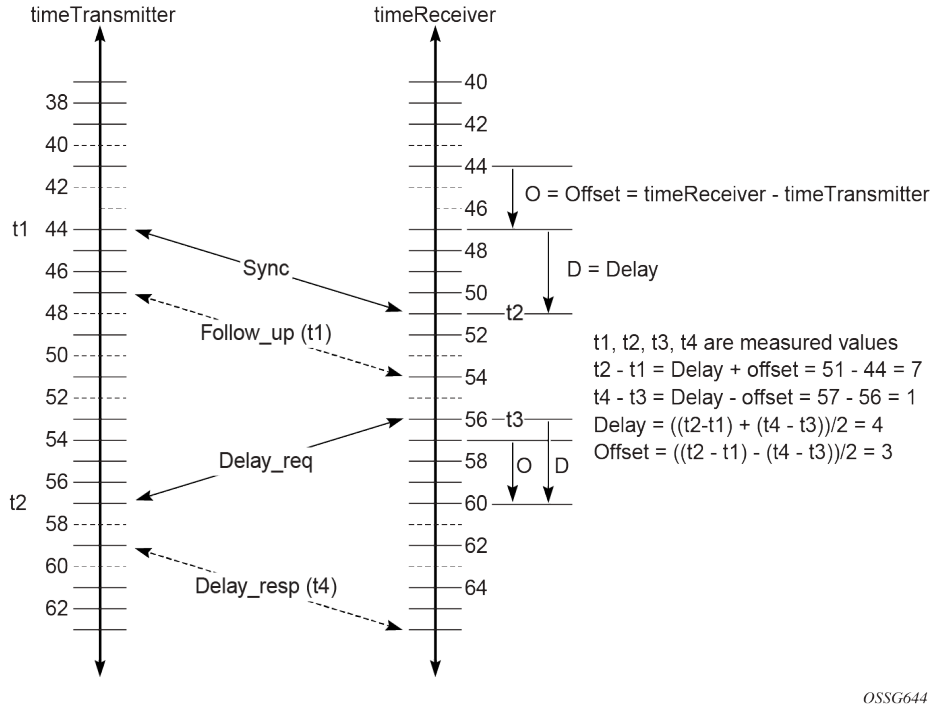
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Note:
The 7210 SAS-D ETR supports only two-step timeTransmitter port operation. All platforms can operate timeReceiver ports that receive from a one-step or two-step timeTransmitter port.

During startup, the PTP timeReceiver clock receives synchronization messages from the PTP timeTransmitter clock before a network delay calculation is made. Before any delay calculation, the delay is assumed to be zero. A drift compensation is activated after a number of synchronization message intervals occur. The expected interval between the reception of synchronization messages is user-configurable.

The following figure shows the basic synchronization timing computation between the PTP timeReceiver clock and PTP best timeTransmitter, as well as the offset of the timeReceiver clock referenced to the best timeTransmitter signal during startup.

Figure 17: PTP timeReceiver clock and timeTransmitter clock synchronization timing computation



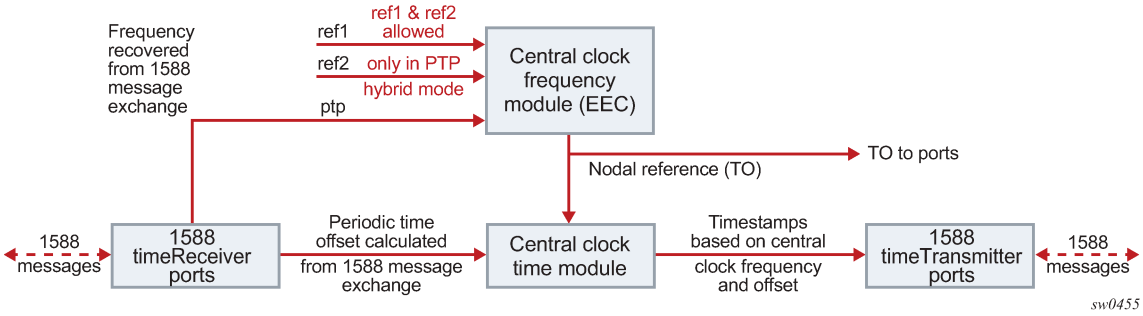
When the IEEE 1588v2 standard is used for distribution of a frequency reference, the timeReceiver calculates a message delay from the timeTransmitter to the timeReceiver based on the timestamps exchanged. A sequence of these calculated delays contains information about the relative frequencies of the timeTransmitter clock and timeReceiver clock, but also includes a noise component related to the PDV experienced across the network. The timeReceiver must filter the PDV effects to extract the relative frequency data and then adjust the timeReceiver frequency to align with the timeTransmitter frequency.

When the IEEE 1588v2 standard is used for distribution of time, the 7210 SAS calculates the offset between the 7210 SAS time base and the external timeTransmitter clock time base based on the four timestamps exchanged. The 7210 SAS determines the offset adjustment, and between these adjustments, it maintains the progression of time using the frequency from the central clock of the node. This allows time to be maintained using a Synchronous Ethernet input source even if the IEEE 1588v2 communications fail. When using IEEE 1588v2 for time distribution, the central clock should, at a minimum, have the PTP input reference enabled.

The following figure shows the logical model for using PTP/1588 for network synchronization.

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Figure 18: Logical model for using PTP/1588 for network synchronization on 7210 SAS platforms



6.4.5.2 Performance considerations

Although IEEE 1588v2 can be used on a network that is not PTP-aware, the use of PTP-aware network elements (boundary clocks) within the packet-switched network improves synchronization performance by reducing the impact of PDV between the grandmaster clock and the timeReceiver clock. In particular, when IEEE 1588v2 is used to distribute high-accuracy time, such as for mobile base station phase requirements, the network architecture requires the deployment of PTP awareness in every device between the grandmaster and the mobile base station timeReceiver.

In addition, performance is also improved by the removal of any PDV caused by internal queuing within the boundary clock or timeReceiver clock. This is accomplished with hardware that is capable of port-based timestamping, which detects and timestamps the IEEE 1588v2 packets at the Ethernet interface.

6.4.5.2.1 PTP message transparent forwarding

Note:
The **ptp-hw-timestamp** command is supported only on the 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C. On bootup, port-based hardware timestamping is enabled by default on all ports on the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C. It is disabled by default on the 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, and 7210 SAS-Dxp 24p.
The correction field in the PTP IP/UDP messages and PTP Ethernet messages that are not addressed to the node are updated for the residence time of the packet in the node.

The **ptp-hw-timestamp** command must be enabled for the node to process locally-destined PTP packets.

Use the **ptp-hw-timestamp** command to disable port-based hardware timestamping on ports that transparently forward received PTP packets. See the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Interface Configuration Guide* for more information about the **ptp-hw-timestamp** command.

When PTP port-based hardware timestamping is disabled, the node does not update the correction field in PTP messages.

For example, to transparently forward PTP packets over MPLS tunnels that use access ports with SAPs to connect the PTP timeTransmitters or timeReceivers, you can use the **ptp-hw-timestamp** command to disable PTP port-based hardware timestamping on the access ports.

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Note:
The configuration of port-based hardware timestamping on selective ports of the 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C platforms can be used for transparent PTP packet forwarding if PTP is enabled and used to time the node (that is, PTP messages are originated and terminated by the node acting as a PTP OC-timeReceiver or BC).

The following guidelines must be considered for transparent PTP packet forwarding:

- To enable transparent PTP packet forwarding, use the **configure>port>no ptp-hw-timestamp** command to disable the feature on all ports that receive and forward IP-UDP and Ethernet PTP messages.
- To enable transparent forwarding of PTP packets over MPLS tunnels on the 7210 SAS-K 2F6C4T and 7210 SAS-K 3SFP+ 8C, PTP hardware port-based timestamping must be disabled on the access ports where SAPs are configured. These access ports connect to either PTP timeTransmitter or PTP timeReceivers that need to establish PTP sessions and exchange PTP messages transparently. Disabling PTP hardware port-based timestamping is not required on network ports where the MPLS tunnels originate and terminate. As a result, these network ports can be used for PTP packet exchange when the node is a PTP boundary clock or an ordinary clock timeReceiver. If the requirement is to forward PTP packets transparently when MPLS uplinks are not used or when a hybrid port with a SAP is used, PTP hardware port-based timestamping must be disabled on the access port and hybrid port.

6.4.5.3 PTP capabilities

PTP messages are supported through IPv4 unicast with a fixed IP header size. The following table describes the supported message rates for timeReceiver and timeTransmitter states. The ordinary clock can only be used in the timeReceiver state. The boundary clock can be in both of these states.

Table 32: Support message rates for timeReceiver and timeTransmitter clock states

Support message	timeReceiver clock	timeTransmitter clock	
	Request rate	Grant rate	
		Min	Max
Announce	1 packet every 2 seconds	1 packet every 2 seconds[23]	1 packet every 2 seconds[23]
Sync	User-configurable with an option to configure 8/16 packets per second	8 packets/second[23]	16 or 64 packets/second[23]
Delay_Resp	User-configurable with an option to configure 8/16 packets per second	8 packets/second[23]	16 or 64 packets/second[23]

[23] Maximum PPS depends on the profile in use

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Support message	timeReceiver clock	timeTransmitter clock	
	Request rate	Grant rate	
		Min	Max
Duration	300 seconds	1 second	1000 seconds

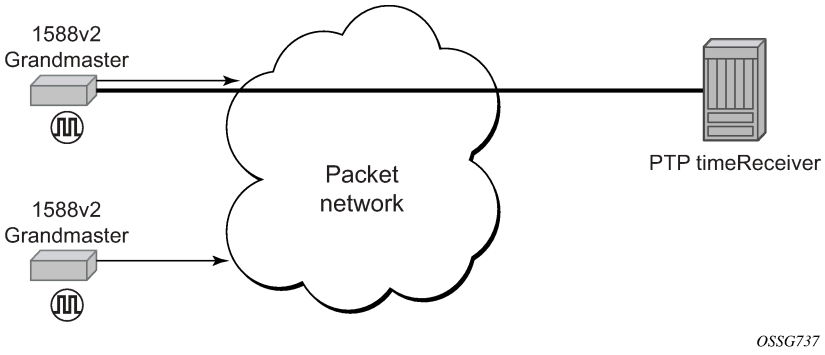
State and statistics data for each timeTransmitter clock are available to assist in the detection of failures or unusual situations.

6.4.5.4 PTP ordinary timeReceiver clock for frequency

Traditionally, only clock frequency is required to ensure smooth transmission in a synchronous network. The PTP ordinary clock with timeReceiver capability on the 7210 SAS provides another option to reference a Stratum-1 traceable clock across a packet switched network. The recovered clock can be referenced by the internal SSU and distributed to all slots and ports.

The following figure shows a PTP ordinary timeReceiver clock network configuration.

Figure 19: timeReceiver clock



6.4.6 PTP boundary clock for frequency and time

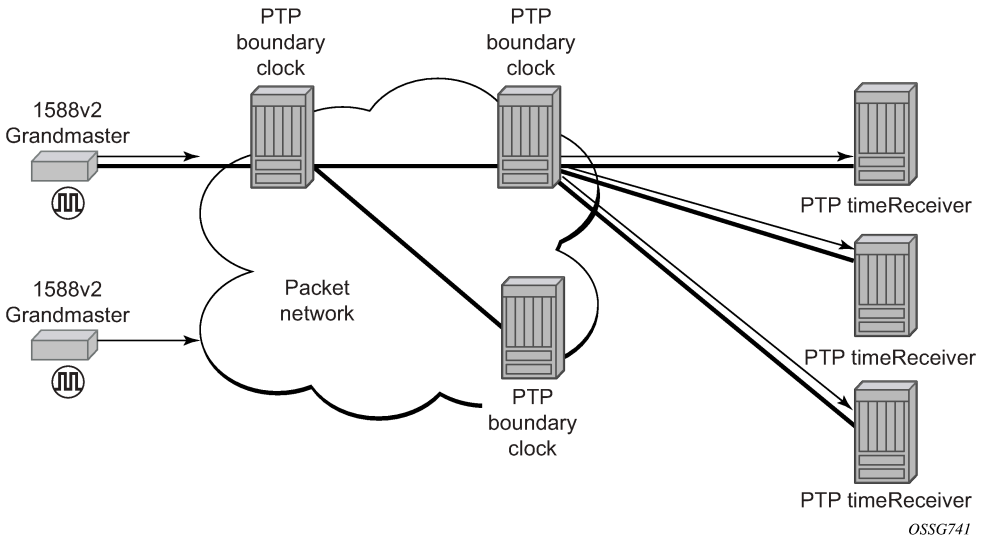
Although IEEE 1588v2 can function across a packet network that is not PTP-aware, performance may be unsatisfactory and unpredictable. PDV across the packet network varies with the number of hops, link speeds, utilization rates, and the inherent behavior of routers. By using routers with boundary clock functionality in the path between the grandmaster clock and the timeReceiver clock, one long path over many hops is split into multiple shorter segments, allowing better PDV control and improved timeReceiver performance. This allows PTP to function as a valid timing option in more network deployments and allows for better scalability and increased robustness in certain topologies, such as rings.

Boundary clocks can simultaneously function as a PTP timeReceiver of an upstream grandmaster (ordinary clock) or boundary clock, and as a PTP timeTransmitter of downstream timeReceivers (ordinary clock) or boundary clocks. The time scale recovered in the timeReceiver side of the boundary clock is used by the timeTransmitter side of the boundary clock. This allows time across the boundary clock.

The following figure shows routers with boundary clock functionality in the path between grandmaster and the timeReceiver clock.

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Figure 20: Boundary clock



6.4.7 IEC/IEEE 61850-9-3 and C37.238-2017

Note: PTP power profile (that is, IEC/IEEE 61850-9-3 and C37.238-2017) is supported only on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p.

The 7210 SAS supports IEC/IEEE 61850-9-3 and the C37.238-2017 extension, which are profiles that allow PTP to act as a timing source in power utility networks.

The IEC/IEEE 61850-9-3 and C37.238-2017 profiles support only Ethernet encapsulation with multicast addressing. Both profiles use the peer delay mechanism instead of the delay-request and response mechanism.

When configured for IEC/IEEE 61850-9-3 or C37.238-2017, the 7210 SAS can operate as a boundary clock and supports recovery of frequency as well as time of day or phase.

Synchronous Ethernet is recommeded to be used for frequency recovery when using PTP power profile for accurate phase and time recovery.

The IEC/IEEE 61850-9-3 and C37.238-2017 profiles have the following characteristics:

- The default domain setting is 0 for IEC/IEEE 61850-9-3 and 254 for C37.238-2017; the allowed range is 0 to 255.
- One-step clock operation is supported on the 7210 SAS without the need for follow-up messages.
- Can operate timeReceiver ports that receive from a one-step or two-step timeTransmitter port.
- Only Ethernet encapsulation with multicast frames is supported with this profile.
- When Ethernet encapsulation is used, virtual local area network (VLAN) tags within Ethernet frames carrying PTP messages are not supported. When a PTP clock receives a PTP message within a frame containing a VLAN tag, it discards this frame.
- Synchronization messages, Announce messages, and peer delay messages are sent, by default, at the rate of 1 packet/s.

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- By default, the priority1 and priority2 values are set to 128 when the **clock-type** is **boundary**. The priority values can be configured to be between 0 and 255.

The C37.238-2017 profile uses the IEEE_C37_238 TLV in Announce messages between the parent and slave clocks. This TLV includes the grand master clock ID and the total time inaccuracy. Each clock in the chain adds its own inaccuracy to the total time inaccuracy, which gives the ultimate slave clock an estimate of the inaccuracy over the entire path.

When acting as a boundary clock, the system receives the total time inaccuracy from the parent clock and adds its own time inaccuracy, then sends out a TLV with the updated total time inaccuracy. The user can change the default value for a boundary clock with the **time-inaccuracy-override** command.

See the IEC/IEEE 61850-9-3 standard and the C37.238-2017 extension for more information.

6.4.8 Configuration guidelines and restrictions for PTP

The following configuration guidelines and restrictions apply for PTP:

- The PTP timeReceiver capability is available on all the ports on the 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C.
- The 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C use CPU processing cycles for frequency and time recovery.
- On the 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, and 7210 SAS-Dxp 24p, Nokia highly recommends that PTP be used only in hybrid mode. Hybrid mode allows users to use reduced PTP packet rates and to scale better while using syncE for frequency reference.
- On the 7210 SAS-D ETR, use of both PTP and SyncE as a reference simultaneously is not allowed. Either PTP or SyncE can be configured as a reference but not both at the same time.
- On 7210 SAS devices, only a single profile (IEEE 1588v2, G.8265.1, or G.8275.1), IEC/IEEE 61850-9-3-2016, or C37.238-2017 can be enabled for all PTP communications (both toward its timeTransmitter and timeReceivers connected to it) at a time.
- The PTP G.8275.1 profile is only supported on the 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C. The following restrictions apply to the use of the G.8275.1 PTP profile:
  - The delay and sync requests are set to 16 pps by default and are not configurable.
  - The announce rate is set to 8 pps by default and is not configurable.
  - A change of profile to G.8275.1 or from G.8275.1 to another profile requires a reboot of the node.
  - Only a single multicast timeReceiver is supported per port.
- PTP with Ethernet encapsulation is only supported with the G.8275.1 profile, IEC/IEEE 61850-9-3, and C37.238-2017 profiles.
- PTP over IP encapsulation is not supported with the G.8275.1, IEC/IEEE 61850-9-3, and C37.238-2017 profiles. It is only supported with the IEEE 1588v2 and G.8265.1 profiles.
- When changing the **clock-type** to or from a boundary clock on the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, the node must be rebooted for the change to take effect. Ensure that measures are taken to minimize service disruption during the reboot process.

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- On the 7210 SAS-K 2F6C4T and 7210 SAS-K 3SFP+ 8C, to enable PTP hybrid mode when using the IEEE profile, the user must execute the command **config>system>ptp>clock>freq-source ssu**. To enable pure PTP mode, the user must execute the command **config>system>ptp>clock>freq-source ptp**. A change of value from **ssu** to **ptp**, or the other way around, requires a reboot of the node after the configuration changes are saved for the change to take effect.
- On the 7210 SAS-Dxp 12p ETR, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, when the profile is set to G8275.1, the software automatically sets the **freq-source** to **ssu**. The user is not required to explicitly configure this setting.
- On the 7210 SAS-D ETR, port-based timestamping is enabled for all PTP packets by default when PTP is enabled.

  When PTP is enabled, PTP packets are not forwarded transparently through the node, regardless of the service used and whether PTP is configured as a system clock reference. If PTP is enabled, to enable transparent PTP forwarding again, disable PTP, save the configuration, and reboot the node.
- On the 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, and 7210 SAS-Dxp 24p, port-based timestamping is disabled for all PTP packets by default. To enable PTP port-based timestamps, the user must explicitly enable PTP timestamping on the required ports.

  When PTP is enabled, PTP packets are not forwarded transparently through the node, regardless of the service used and whether PTP is configured as a system clock reference. If PTP is enabled, to enable transparent PTP forwarding again, disable PTP port-based timestamping for the applicable ports.
- On the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, port-based timestamping is enabled for all PTP packets by default:
  - When port-based timestamping is enabled on all ports, PTP packets are not forwarded transparently through the node, regardless of the service used and whether PTP is configured as a system clock reference. To enable transparent PTP forwarding, disable port-based timestamping on the port.
  - Regardless of whether PTP is enabled (**configure>sync-if-timing>ptp>no shutdown**) or disabled (**configure>sync-if-timing>ptp>shutdown**), the timestamp value stored in the correction field (CF) is updated for all PTP packets that are in transit through the node. This affects all PTP packets that are not originated or terminated on the node.

    See PTP message transparent forwarding for more information about enabling transparent forwarding.
- PTP cannot be enabled on a port if MACsec is enabled on the port.

6.4.9 Configuration to change reference from SyncE to PTP on 7210 SAS-D ETR

About this task

The following are the configuration steps to change reference from SyncE to PTP. This procedure is required only on 7210 SAS-D ETR nodes.

Procedure

Step 1. Run the following commands to configure standalone PTP as a reference.

```
configure >system >ptp >no shutdown

config> system> sync-if-timing> begin
ptp
no shutdown
exit
```


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```
ref-order ptp [Must be configured]

config> system> sync-if-timing> commit
```

After the preceding commands are run, the frequency and time are provided by PTP only.

Step 2. Run the following commands to change the reference to syncE.

```
config> system> sync-if-timing> begin
ptp
shutdown
exit

config> system> sync-if-timing> commit

config> system> sync-if-timing> begin
ref1
source-port 1/1/10
no shutdown
exit

ref2
source-port 1/1/11
no shutdown
exit

ref-order ref1 ref2   --------> Or, the ref-order you want [But Must be configured]

    revert    ---------------------> If you want ref-order you have setup to take
effect

ql-selection -------------------> Optional, if we need Quality to be considered.

config> system> sync-if-timing> commit
```

After the preceding commands are run, the frequency is provided by SyncE and TOD is provided by PTP [**configure>system>ptp>no shutdown**]. This is called PTP Hybrid mode.

Step 3. Run the following commands to revert to standalone PTP from SyncE.

```
config> system> sync-if-timing> begin
ref1
source-port 1/1/10   --------------------> Not Required if port is already
                                           configured, but in admin down state
shutdown
exit

ref2
source-port 1/1/11   --------------------> Not Required if port is already
                                           configured, but in admin down state
shutdown
exit

config> system> sync-if-timing> commit

config> system> sync-if-timing> begin
ptp
no shutdown
exit

ref-order ptp [Must be configured]
```


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```
config> system> sync-if-timing> commit
```

Now the frequency and time are provide by PTP (**config>system>ptp>no shutdown**) only. This is standalone PTP mode.

6.5 Link Layer Discovery Protocol (LLDP)

The IEEE 802.1ab Link Layer Discovery Protocol (LLDP) is a unidirectional protocol that uses the MAC layer to transmit specific information about the capabilities and status of the local device. The LLDP can send as well as receive information from a remote device stored in the related MIB (or MIBs).

The LLDP does not contain a mechanism to solicit information received from other LLDP agents or to confirm the receipt of information. However, LLDP provides the flexibility to enable a transmitter and receiver separately, and the following LLDP agent configurations are allowed:

- only transmit information
- only receive information
- transmit and receive information

The information fields in each LLDP frame are contained in an LLDP Data Unit (LLDPDU) as a sequence of variable length information elements. Each information element includes Type, Length, and Value fields (TLVs):

- Type indicates the nature of information being transmitted.
- Length indicates the length of the information string in octets.
- Value is the actual information that is transmitted. (For example, a binary bit map or an alphanumeric string that can contain one or more fields).

Each LLDPDU contains four mandatory TLVs and optional TLVs selected by the Network Management. The following is the format of an LLDPDU:

- Chassis ID TLV
- Port ID TLV
- Time To Live (TTL) TLV
- zero or more optional TLVs, depending on the maximum size of the LLDPDU allowed
- End of LLDPDU TLV

A concatenated string formed by the Chassis ID TLV and the Port ID TLV is used by a recipient to identify an LLDP port or agent. The combination of the Port ID and Chassis ID TLVs remains unchanged until the port or agent is operational.

The TTL field of a Time-To-Live TLV can be a zero or non-zero value. A zero TTL field value notifies the receiving LLDP agent to immediately discard all information related to sending LLDP agent. A non-zero TTL field value indicates the time duration for which the receiving LLDP agent should retain the information of the sending LLDP agent. The receiving LLDP agent discards all information related to the sending LLDP agent after the time interval indicated in the TTL field is complete.

Note:
A TTL zero value is used to signal that the sending LLDP port has initiated a port shutdown procedure.

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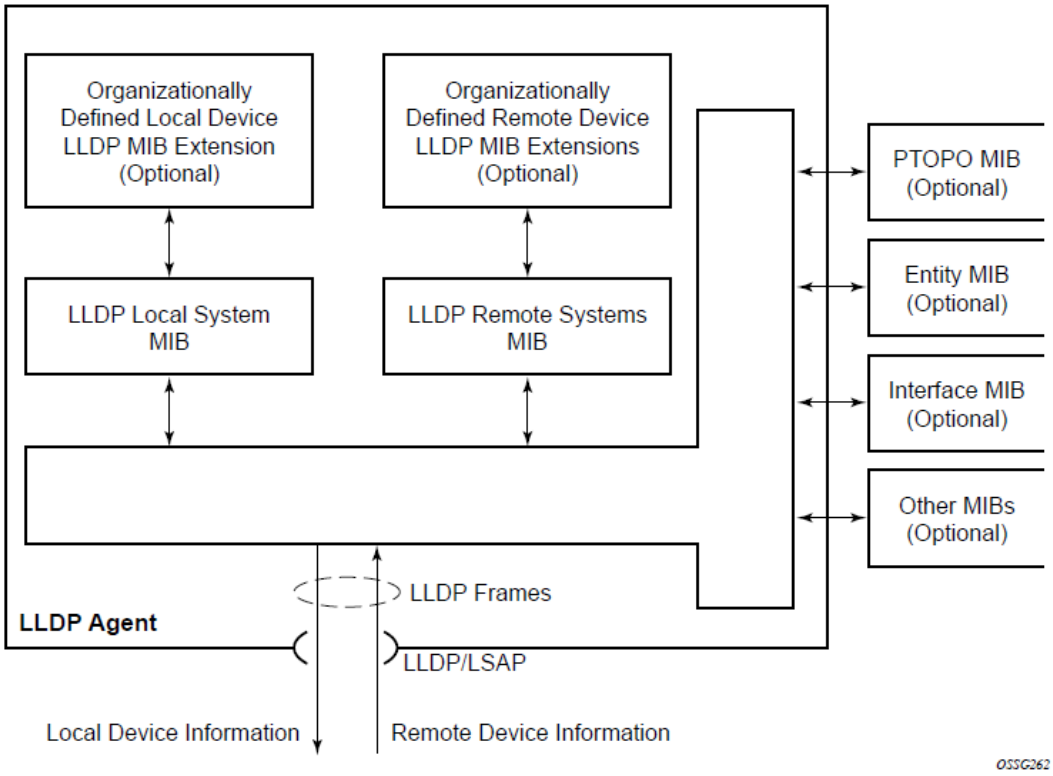
The End Of LLDPDU TLV indicates the end of the LLDPDU.

The following information is included in the protocol as defined by the IEEE 802.1ab standard:

- Connectivity and management information about the local station to adjacent stations on the same IEEE 802 LAN is advertised.
- Network management information from adjacent stations on the same IEEE 802 LAN is received.
- It operates with all IEEE 802 access protocols and network media.
- Network management information schema and object definitions suitable for storing connection information about adjacent stations is established.
- It supports compatibility with a number of MIBs.

The following figure shows the LLDP internal architecture for a network node.

Figure 21: LLDP internal architecture for a network node



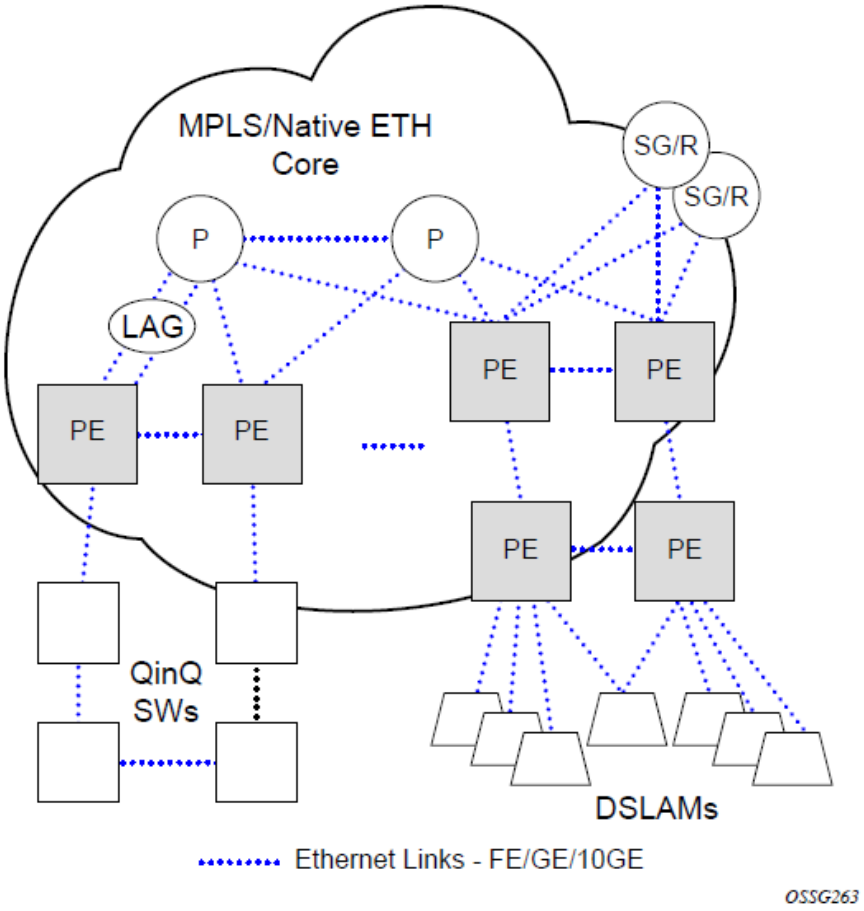
To detect and address network problems and inconsistencies in the configuration, the network operators can discover the topology information using LLDP. The standard-based tools address the complex network scenarios where multiple devices from different vendors are interconnected using Ethernet interfaces.

The following figure shows an MPLS network that uses Ethernet interfaces in the core, or as an access or handoff interface to connect to different kinds of Ethernet-enabled devices such as service gateway and routers, QinQ switches, DSLAMs, or customer equipment.

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The topology information of the network in the following figure can be discovered if IEEE 802.1ab LLDP is running on each of the Ethernet interfaces in the network.

Figure 22: Customer use example for LLDP



6.6 System resource allocation

This section describes system resource allocation.

6.6.1 Allocation of ingress internal TCAM resources

The system statically allocates ingress TCAM resources for use by SAP ingress QoS classification, SAP ingress access control lists (ACLs), identifying and sending CFM OAM packets to CPU for local processing, and so on. The resource allocation is not user-configurable. With the introduction of new capabilities such as IPv6 classification, UP MEP support, and G8032-fast-flood, the static allocation of resources by software does not meet requirements of customer who need to use different features.

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The user can allocate a fixed amount of resources per system for QoS, ACLs, CFM/Y.1731 MEPs, and other features. Of these, some parameters are boot-time and others are run-time. A change in the current value of the parameter that is designated boot-time needs a reboot of the node before the new value takes effect. Change in the current value of the parameter that is designated run-time takes effect immediately if the software determines resources are available for use to accommodate the change.

During bootup, the system reads the resource profile parameters and allocates resources to features in the order they appear in the configuration file.

Because resources are shared, the user must ensure that the sum total of such resources does not exceed the limit supported by the IMM or node. If the system determines that it cannot allocate the requested resources, the feature is disabled. For example, if the system determines that it cannot allocate resources for g8032-fast-flood, it disables the feature from use and G8032 eth-rings will not be able to use fast-flood mechanisms). Another example is the case where the system determines that it cannot allocate resources for IPv4-based SAP Ingress ACL classification, the system will not allow users to use IPv4-based SAP ingress ACL classification feature and fails the configuration when it comes upon the first SAP in the configuration file that uses an IPv4-based SAP ingress ACL policy.

For boot-time parameters, such as g8032-fast-flood-enable, the user must ensure that the configured services match the resources allocated. If the system determines that it cannot allocate resources to services, it fails the configuration file at the first instance where it encounters a command to which resources cannot be allocated. The available resources can be allocated to different features.

For ACL and QoS resources, the user has the option to allocate resources to limit usage per feature, regardless of the match criteria used. The sum of all resources used for different SAP ingress classification match-criteria is limited by the amount of resources allocated for SAP ingress classification. The user can also allocate resources by specific match criteria. The user can enable any supported match criteria and associate a fixed amount of resources with each match criteria in fixed sizes; the chunk size is dependent on the platform.

The system allocates resources based on the order of appearance in the configuration file, and fails any match criteria if the system does not have any more resources to allocate. In addition, the **max** keyword can be used to indicate that the system needs to allocate resources when they are first required, as long as the maximum amount of resources allocated for that feature is not exceeded or the maximum amount of resources available in the system is not exceeded. The 7210 SAS platforms allocate resources to each feature and match-criteria in fixed-size chunks.

The **no** form of the command disables the use of corresponding match criteria. During runtime, the command succeeds, if no SAPs are currently using the criteria. Similarly, reduction of resources from the current value to a lower value succeeds, if no SAPs are currently using the criteria.

If the system successfully runs the **no** command, it frees up resources used by the chunk or slice and make the resources, or the entire chunk/slice, available for use by other features. Before deallocating resources, the software checks if a service object is using the resource and fails the command if the object is in use. If resources are in use, they can be freed up by deleting a SAP, removing a policy association with a SAP, deleting a MEP, and so on. Some commands under the **system resource-profile** context do not take effect immediately and require a system reboot before the change occurs and resources are freed. The following is the handling of freed resources:

- If some entries in a slice are freed, they are made available for use by other SAPs using the same feature to which the chunk is allocated.
- If an entire chunk is freed, it is returned to the system free pool for possible use by other features.

The **no** form of the commands that are designated as boot-time does not take effect immediately. It takes effect after the reboot. Before reboot, it is the user’s responsibility to free up resources required for use by

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the feature that has been enabled to take effect after the reboot. Not doing so results in failure when the configuration file is executed on boot up.

See the CLI and feature description chapters in the appropriate 7210 SAS platform user guide for more information about CLI commands and features that use system resource allocation.

6.6.2 Allocation of egress internal TCAM resources

Before the introduction of new capabilities, such as IPv6 match criteria, the system allocated egress TCAM resources on bootup for use by different criteria in SAP egress access control lists (ACLs) and other purposes; the resource allocation was not user configurable. With the introduction of new capabilities, such as IPv6 match criteria in egress, the static allocation of resources by software may not meet customer requirements if they want to use different features. Therefore, to facilitate user configuration and resource allocation in accordance with user needs, the ingress internal TCAM resource allocation capabilities have been extended to include the egress internal TCAM resources.

For information about specific CLI commands and features that use system resource allocation, see the CLI command and feature descriptions in the appropriate 7210 SAS software user manuals.

Note:
The commands in the **config>system>resource-profile** context, which require a reboot to take effect, are read and implemented by the system only during bootup. These commands do not take effect if the **exec** command is used to run the configuration file.

6.6.2.1 System resource allocation examples

Note:

- On the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, resources must be allocated among SAP ingress QoS and ingress ACLs. Users do not need to further allocate resources individually for MAC and IPv4 or IPv6 criteria.
- The **qos-sap-ingress-resource** and **acl-sap ingress** commands under the **system>resource-profile>ingress-internal-tcam** context allocate resources to ingress QoS and ingress ACLs:
  - On the 7210 SAS-D and 7210 SAS-Dxp, resources are allocated in slices with 256 entries per slice.
  - On the 7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T, resources are allocated with 510 entries per slice.
  - On the 7210 SAS-K 3SFP+ 8C, resources are allocated with 192 entries per slice.
- The **acl-sap egress** command in the **system>resource-profile>egress-internal-tcam** context allocates resources to egress ACLs:
  - On the 7210 SAS-D and 7210 SAS-Dxp, resources are allocated in slices with 128 entries per slice.
  - On the 7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T, resources are allocated with 510 entries per slice.
  - On the 7210 SAS-K 3SFP+ 8C, resources are allocated with 180 entries per slice.

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Example: 1

```
config> system> resource-profile...
...
   acl-sap-ingress 3
      mac-match-enable max
      ipv4-match-enable 1
      no ipv6_128-ipv4-match-enable
      no ipv6_64-only-match-enable
   exit
...
```

In the preceding CLI example, the system performs the following actions:

- 3 chunks are allocated for use by the SAP ingress ACL entries.
- 1 chunk is allocated for use by SAP ingress ACL entries that use ipv4-criteria. The system fails the configuration when the number of ACL entries using ipv4-criteria exceeds the configured limit (that is, the system does not allocate in excess of the configured limit of 1 chunk).
- A chunk is allocated for use by SAP ingress ACL entries that use mac-criteria. After the **max** keyword is specified, the system allocates 1 chunk for use when an ingress ACL policy (with mac-criteria entries defined) is associated with a SAP. The system can allocate up to 2 chunks because the **max** keyword is used. More chunks are allocated when the user configures a SAP that uses mac-criteria and all entries in the allocated chunks are used up. The system fails the configuration if the number of ACL entries with mac-criteria exceeds the limit of 2 chunks allocated to SAP ingress ACL match (that is, the system does not allocate in excess of the configured limit of 3; up to 2 chunks of the configured 3 chunk limit are allocated to mac-criteria and 1 chunk is allocated to ipv4-criteria).
- The system fails a user attempt to use SAP ingress ACLs with IPv6 match criteria (and other combinations listed in the preceding list items), because the user has disabled these criteria.

Example: 2

```
config> system> resource-profile>ingress-internal-tcam>
...
acl-sap-ingress  3
mac-match-enable max
ipv4-match-enable 1
no ipv6_128-ipv4-match-enable
ipv6_64-only-match-enable max
exit
...
```

In the preceding CLI example, the system performs the following actions:

- 3 chunks are allocated for use by the SAP ingress ACL entries. These resources are available for use with mac-criteria, ipv4-criteria and ipv6-64-bit match criteria.
- 1 chunk is allocated for use by SAP ingress ACL entries that use ipv4-criteria. The system fails the configuration if the number of ACL entries using ipv4-criteria exceeds the configured limit (that is, the system does not allocate more than the configured limit of 1 chunk).
- 1 chunk is allocated for use by SAP ingress ACL entries that use mac-criteria when the user associates an ingress ACL policy (with mac-criteria entries defined) with a SAP. Because the **max** keyword is used, the system can allocate more chunks, if a chunk is available for use.

  In this example, (assuming a SAP with an ingress ACL policy that uses ipv6-64-bit criteria is configured), as no additional chunks are available, mac-criteria cannot allocate more than 1 chunk (even if the **max** keyword is specified). The system fails the configuration if the number of ACL entries

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with mac-criteria exceeds the limit of 1 chunk allocated to SAP ingress ACL mac-criteria (that is, the system does not allocate more than the configured limit of 3 chunks = 1 for mac-criteria + for ipv4-criteria + 1 for ipv6-criteria).

- A chunk is allocated for use by SAP ingress ACL entries that use ipv6-64-bit criteria when the user associates an ingress ACL policy (with ipv6-64-bit-criteria entries defined) with a SAP. Because the **max** keyword is specified, the system can allocate more chunks, if a chunk is available for use.

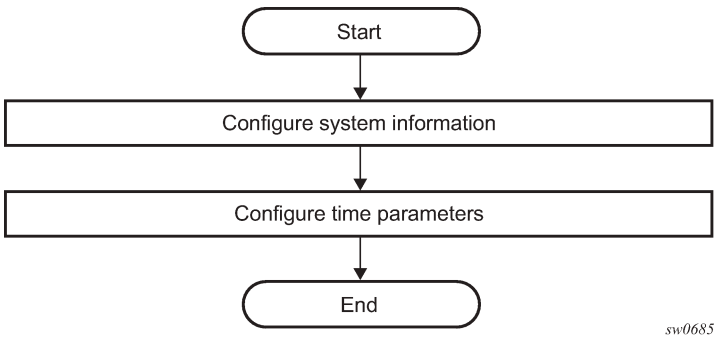
  In this example, as there are no more chunks available, ipv6-64-bit criteria cannot allocate more than 1 chunk (even if the **max** keyword is specified). The system fails the configuration when the number of ACL entries with ipv6-64-bit criteria exceeds the limit of one chunk allocated to SAP ingress ACL match (that is, the system does not allocate more than the configured limit of 3 chunks = 1 for mac-criteria + 1 for ipv4-criteria + 1 for ipv6-64-bit criteria).
- The system fails any attempt to use SAP ingress ACLs with ipv6-128 bit match criteria (and the other combinations listed above), because the user has disabled these criteria.

In Example 2, the user can run **no ipv4-match-enable** command to disable the use of ipv4-criteria. The system checks for SAPs that use ipv4-criteria and if found, fails the command; otherwise, the chunk freed for use with either mac-criteria or ipv6-64-bit criteria. The entire chunk is allocated to mac-criteria if the first SAP that needs resources requests for mac-criteria and no entries in the chunk are already allocated to mac-criteria, which leaves no resources for use by ipv6-64-bit criteria. In the same way, the entire chunk is allocated to ipv6-64-bit criteria, if the first SAP that needs resources requests for ipv6-64-bit criteria and no entries in the chunk are already allocated to ipv6-64-bit criteria, which leaves no resources for use by mac-criteria.

6.7 System configuration process overview

The following figure shows the process to provision basic system parameters.

Figure 23: System configuration and implementation flow



6.8 Configuration notes

This section describes system configuration restrictions.

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6.8.1 General

To access the CLI, ensure that the 7210 SAS device is correctly initialized and the boot loader and BOFs have successfully executed.

6.9 Configuring system management with CLI

This section provides information about configuring system management features with the CLI.

6.10 Saving configurations

When configuration changes are made, the modified configuration must be saved so the changes are not lost when the system is rebooted. The system uses the configuration and image files, as well as other operational parameters necessary for system initialization, according to the locations specified in the BOF parameters. See Boot options for more information about boot option files.

Configuration files are saved by executing implicit or explicit command syntax:

- An explicit save writes the configuration to the location specified in the **save** command syntax using the *file-url* option.
- An implicit save writes the configuration to the file specified in the primary configuration location.

  If the *file-url* option is not specified in the **save** command syntax, the system attempts to save the current configuration to the current BOF primary configuration source. If the primary configuration source (path and/or filename) has changed since the last boot, the new configuration source is used.

Use the **detail** option of the **save** command to save both default and non-default configuration parameters.

The **index** option ensures that the system preserves system indexes when a **save** command is executed, regardless of the persistent status in the BOF. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index, LSP IDs, and path IDs. This reduces resynchronizations of the network management system (NMS) with the affected network element.

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.

6.11 Basic system configuration

This section provides information about configuring system parameters and provides configuration examples of common configuration tasks. The minimal system parameters that should be configured are System information parameters and System time elements.

Example: Basic system configuration

```
A:ALA-12>config>system# info
#------------------------------------------
echo "System Configuration "
```


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```
#------------------------------------------
        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#
```

6.12 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.

6.12.1 System information

This section covers the basic system information parameters to configure the physical location of the router, contact information, location information for the router (for example, an address, floor or room number), global positioning system (GPS) coordinates, and system name.

Use the CLI syntax displayed in this section to configure the system information parameters.

6.12.1.1 System information parameters

This section describes the system information parameters.

6.12.1.1.1 Name

Use the **name** command to configure a name for the device. The name is used in the prompt string. Only one system name can be configured. If multiple system names are configured, the last one encountered overwrites the previous entry.

Use the following CLI syntax to configure the system name.

```
config>system
        name system-name
```


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Example: Command usage to configure the system name

```
config>system# name ALA-12
```

Example: Configuration output for the system name

```
sysName@domain>config>system# info
#------------------------------------------
echo "System Configuration "
#------------------------------------------
        name "ALA-12"
. . .
        exit
----------------------------------------------
sysName@domain>config>system#
```

6.12.1.1.2 Contact

Use the **contact** command to specify the name of a system administrator, IT staff member, or other administrative entity.

Use the following syntax to specify the contact name.

```
config>system
        contact contact-name
```

The following example shows the .

Example: Command usage to specify the contact name

```
config>system# contact “Fred Information Technology”
```

6.12.1.1.3 Location

Use the **location** command to specify the system location of the device. For example, enter the city, building address, floor, or room number where the router is located.

Use the following CLI syntax to configure the location.

```
config>system
        location location
```

Example: Command usage to configure the location

```
config>system# location “Bldg.1-floor 2-Room 201”
```

6.12.1.1.4 CLLI code

The Common Language Location code (CLLI code) is an 11-character standardized geographic identifier that is used to uniquely identify the geographic location of a router.

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Use the following CLI command syntax to define the CLLI code.

```
config>system
        clli-code clli-code
```

Example: Command usage to define the CLLI code

```
config>system# clli-code abcdefg1234
```

6.12.1.1.5 Coordinates

Use the optional **coordinates** command to specify the GPS location of the device. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

Use the following CLI syntax to configure the location.

```
config>system
        coordinates coordinates
```

Example: Command usage to configure the location

```
config>system# coordinates "N 45 58 23, W 34 56 12"
```

Example: Configuration output of 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"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"

. . .
        exit
----------------------------------------------
A:ALA-12>config>system#
```

6.12.1.2 System time elements

This section describes system time elements.

The system clock maintains time according to Coordinated Universal Time (UTC). Configure information time zone and summer time (daylight savings time) parameters to correctly display time according to the local time zone.

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6.12.1.2.1 Zone

The **zone** command sets the time zone or time zone offset for the device. The 7210 SAS supports system-defined and user-defined time zones. Table 33: System-defined time zones describes system-defined time zones.

Use the following CLI syntax to configure the time zone.

```
config>system>time
        zone std-zone-name|non-std-zone-name [hh [:mm]]
```

Example: Command usage to configure the time zone

```
config>system>time#
    config>system>time# zone GMT
```

Example: Zone output

```
A:ALA-12>config>system>time# info
----------------------------------------------
ntp
                server 192.168.15.221
                no shutdown
exit
sntp
                shutdown
exit
zone UTC
----------------------------------------------
A:ALA-12>config>system>time#
```

Table 33: 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

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Acronym	Time zone name	UTC offset
US and Canada:		
AST	Atlantic Standard Time	UTC -4 hours
ADT	Atlantic Daylight Time	UTC -3 hours
EST	Eastern Standard Time	UTC -5 hours
EDT	Eastern Daylight Saving Time	UTC -4 hours
CST	Central Standard Time	UTC -6 hours
CDT	Central Daylight Saving Time	UTC -5 hours
MST	Mountain Standard Time	UTC -7 hours
MDT	Mountain Daylight Saving Time	UTC -6 hours
PST	Pacific Standard Time	UTC -8 hours
PDT	Pacific Daylight Saving Time	UTC -7 hours
HST	Hawaiian Standard Time	UTC -10 hours
AKST	Alaska Standard Time	UTC -9 hours
AKDT	Alaska Standard Daylight Saving Time	UTC -8 hours
Australia and New Zealand:		
AWST	Western Standard Time (for example, Perth)	UTC +8 hours
ACST	Central Standard Time (for example, Darwin)	UTC +9.5 hours
AEST	Eastern Standard/Summer Time (for example, Canberra)	UTC +10 hours
NZT	New Zealand Standard Time	UTC +12 hours
NZDT	New Zealand Daylight Saving Time	UTC +13 hours

6.12.1.2.2 Summer time conditions

The **config>system>time>dst-zone** context configures the start and end dates and offset for summer time or daylight savings time to override system defaults or for user-defined time zones.

When configured, the time is adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

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Use the following CLI syntax to configure summer time conditions.

```
config>system>time
        dst-zone zone-name
        end {end-week} {end-day} {end-month} [hours-minutes]
            offset offset
            start {start-week} {start-day} {start-month} [hours-minutes]
```

Example: Command usage to configure summer time conditions

```
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 33: System-defined time zones , the starting and ending parameters and offset do not need to be configured with this command unless there is a need to override the system defaults. The command returns an error if the start and ending dates and times are not available either in Table 33: System-defined time zones or entered as optional parameters in this command.

Example: Output for the configured parameters

```
A:ALA-48>config>system>time>dst-zone# info
----------------------------------------------
                start second sunday april 02:00
                end first sunday october 02:00
                offset 0
----------------------------------------------
A:ALA-48>config>system>time>dst-zone# offset 0
```

6.12.1.2.3 NTP

Network Time Protocol (NTP) is defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis*. It enables participating network nodes to keep time more accurately and maintain time in a synchronized manner between all participating network nodes.

6.12.1.2.3.1 Authentication-check

The **authentication-check** command provides the option to skip the rejection of NTP PDUs that do not match the authentication key or authentication type requirements. The default behavior when authentication is configured is to reject all NTP PDUs that have a mismatch in either the authentication key ID, type, or key.

When **authentication-check** is configured, NTP PDUs are authenticated on receipt. However, mismatches cause a counter to be incremented, one counter for the key ID, one for the type, and one for key value mismatches.

Use the following CLI syntax to authenticate NTP PDUs on receipt.

```
config>system>time>ntp
        authentication-check
```


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Example: Command usage to authenticate NTP PDUs on receipt

```
config>system>time>ntp#
    config>system>time>ntp# authentication-check
    config>system>time>ntp# no shutdown
```

6.12.1.2.3.2 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 values must match.

Use the following CLI syntax to configure an authentication key ID, key type, and key.

```
config>system>time>ntp
        authentication-key key-id {key key} [hash | hash2] type {des|message-digest}
```

Example: Command usage to configure an authentication key ID, key type, and key

```
config>system>time>ntp#
    config>system>time>ntp# authentication-key 1 key A type des
    config>system>time>ntp# no shutdown
```

Example

The following sample configuration shows NTP disabled with the **authentication-key** parameter enabled.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
                shutdown
                authentication-key 1 key "OAwgNUlbzgI" hash2 type des
----------------------------------------------
A:sim1>config>system>time>ntp#
```

6.12.1.2.3.3 Broadcast

The **broadcast** command is used to transmit broadcast packets on a specific subnet.

Use the following CLI syntax to transmit broadcast packets.

```
config>system>time>ntp
        broadcast [router router-name] {interface
            ip-int-name> [key-id key-id] [version version]
            [ttl ttl]
```

Example: Command usage to transmit broadcast packets

```
config>system>time>ntp#
    config>system>time>ntp# broadcast interface int11 version 4
        ttl 127
    config>system>time>ntp# no shutdown
```


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Example

The following sample configuration of the **system>time** context shows NTP enabled with the **broadcast** command configured.

```
A:sim1>config>system>time# info detail
----------------------------------------------
            ntp
                no shutdown
                authentication-check
                ntp-server
                broadcast interface int11 version 4 ttl 127
            exit
A:sim1>config>system>time#
```

Example

The following sample configuration shows NTP enabled in the **config** context with the **broadcast** command configured. At this level, the NTP broadcast commands are displayed at the end of the output after the router interfaces are shown.

```
A:sim1>config info

    ....

#--------------------------------------------------
echo "System Time NTP Configuration"
#--------------------------------------------------
    system
        time
            ntp
                broadcast interface toboth
            exit
        exit
    exit
A:sim1>config
```

6.12.1.2.3.4 Broadcastclient

The **broadcastclient** command enables listening to NTP broadcast messages on the specified interface.

Use the following CLI syntax to enable listening to NTP broadcast messages.

```
config>system>time>ntp
        broadcastclient [router router-name] {interface ip-int-name} [authenticate]
```

Example: Command usage to enable listening to NTP broadcast messages

```
config>system>time>ntp#
    config>system>time>ntp# broadcastclient interface int11
    config>system>time>ntp# no shutdown
```

Example

The following is a sample configuration of NTP enabled with the **broadcastclient** parameter enabled.

```
A:ALA-12>config>system>time# info
----------------------------------------------
```


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```
            ntp
                broadcastclient interface int11
                no shutdown
            exit
            dst-zone PT
                start second sunday april 02:00
                end first sunday october 02:00
                offset 0
            exit
            zone UTC
-----------------------------------------------
A:ALA-12>config>system>time#
```

6.12.1.2.3.5 NTP-server

This command configures the node to assume the role of an NTP server. Unless the **server** command is used, this node functions as an NTP client only and does not distribute the time to downstream network elements. If an authentication key ID is specified in this command, the NTP server requires client packets to be authenticated.

Use the following CLI syntax to configure the node to function as an NTP client.

```
config>system>time>ntp
       ntp-server [transmit key-id]
```

Example: Command usage to configure the node to function as an NTP client

```
config>system>time>ntp#
    config>system>time>ntp# ntp-server transmit 1
    config>system>time>ntp# no shutdown
```

Example

The following is a sample configuration output of NTP enabled with the **ntp-server** command configured.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
        no shutdown
        ntp-server
----------------------------------------------
A:sim1>config>system>time>ntp#
```

6.12.1.2.3.6 Peer

Configuration of an NTP peer configures symmetric active mode for the configured peer. Although any system can be configured to peer with any other NTP node, Nokia recommends to configure authentication and to configure known time servers as their peers. Use the **no** form of the command to remove the configured peer.

Use the following CLI syntax to configure symmetric active mode.

```
config>system>time>ntp
       peer ip-address[version version][key-id key-id]
```


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```
        [prefer]
```

Example: Command usage to configure symmetric active mode

```
config>system>time>ntp#
    config>system>time>ntp# peer 192.168.1.1 key-id 1
    config>system>time>ntp# no shutdown
```

Example

The following is a sample configuration output of NTP enabled with the **peer** command configured.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
            no shutdown
            peer 192.168.1.1 key-id 1
----------------------------------------------
A:sim1>config>system>time>ntp#
```

6.12.1.2.3.7 Server

The **server** command is used when the node operates in client mode with the NTP server specified in the address field. Use the **no** form of this command to remove the server with the specified address from the configuration. Up to five NTP servers can be configured.

Use the following CLI syntax to configure the node to operate in client mode.

```
config>system>time>ntp
        server {ip-address |ptp} [key-id key-id] [version version] [prefer]
```

Example: Command usage to configure the node to operate in client mode

```
config>system>time>ntp#
    config>system>time>ntp# server 192.168.1.1 key-id 1
    config>system>time>ntp# no shutdown
```

Example

The following is a sample configuration output of NTP enabled with the **server** command configured.

```
A:7210SAS>config>system>time>ntp# info
----------------------------------------------
                ntp-server
                server ptp prefer
                broadcast interface "a1"
                no shutdown
----------------------------------------------
A:7210SAS>config>system>time>ntp#
```

6.12.1.2.4 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.

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SNTP time elements include Broadcast-client and Server-address.

Use the following CLI syntax to configure the SNTP.

```
config>system
        time
            sntp
                broadcast-client
                server-address ip-address [version version-number] [normal|preferred]
 [interval seconds]
            no shutdown
```

6.12.1.2.4.1 Broadcast-client

The **broadcast-client** command enables listening at the global device level to SNTP broadcast messages on interfaces with broadcast client enabled.

Use the following CLI syntax to enable listening to SNTP broadcast messages.

```
config>system>time>sntp
        broadcast-client
```

Example: Command usage to enable listening to SNTP broadcast messages

```
config>system>time>sntp#
    config>system>time>sntp# broadcast-client
    config>system>time>sntp# no shutdown
```

Example

The following is a sample configuration output of SNTP enabled with the **broadcast-client** command enabled.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            sntp
                broadcast-client
                no shutdown
            exit
            dst-zone PT
                start second sunday april 02:00
                end first sunday october 02:00
                offset 0
            exit
            zone GMT
----------------------------------------------
A:ALA-12>config>system>time#
```

6.12.1.2.4.2 Server-address

The **server-address** command configures an SNTP server for SNTP unicast client mode.

Use the following CLI syntax to configure an SNTP server for unicast client mode.

```
config>system>time>sntp#
```


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```
        server-address ip-address version version-number] [normal|preferred] [interval seconds]
```

Example: Command usage to configure an SNTP server for unicast client mode

```
config>system>time>sntp#
    config>system>time# server-address 10.10.0.94 version
        1 preferred interval 100
```

Example

The following is a sample configuration output of SNTP enabled with the **server-address** command configured.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            sntp
                server-address 10.10.0.94 version 1 preferred interval 100
                no shutdown
            exit
            dst-zone PT start-date 2006/04/04 12:00 end-date 2006/10/25 12:00
            zone GMT
----------------------------------------------
A:ALA-12>config>system>time#
```

6.12.1.2.5 CRON

The **cron** command supports the Service Assurance Agent (SAA) functions and the ability to schedule turning on and off policies to meet "Time of Day" requirements. CRON functionality includes the ability to specify the commands that need to be run, when they will be scheduled, including one-time only functionality (oneshot), interval and calendar functions, as well as where to store the output of the results. In addition, CRON can specify the relationship between input, output, and schedule. Scheduled reboots, peer turn ups, service assurance agent tests and more can all be scheduled with CRON, as well as OAM events, such as connectivity checks, or troubleshooting runs.

CRON elements include Schedule, Script , Time range, and Time of Day.

6.12.1.2.5.1 Schedule

The **schedule** 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). If end-time and interval are both configured, whichever condition is reached first is applied.

Use the following CLI syntax to configure the type of schedule to run.

```
config>system>cron
        schedule schedule-name[owner schedule-owner]
            count number
            day-of-month {day-number [..day-number]|all}
            description description-string
            end-time [date|day-name] time
            hour {hour-number [..hour-number] | all}
            interval seconds
            minute {minute-number [..minute-number]|all}
            month {month-number [..month-number]|month-name [..month-name]|all}
```


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```
            no shutdown
            type {periodic|calendar|oneshot}
            weekday {weekday-number [..weekday-number]|day-name [..day-name]|all}
            shutdown
```

The following example shows the .

Example: Command usage to configure the type of schedule to run

```
config>system>cron# schedule test2
    config>system>cron>sched# day-of-month 17
    config>system>cron>sched# end-time 2007/07/17 12:00
    config>system>cron>sched# minute 0 15 30 45
    config>system>cron>sched# weekday friday
    config>system>cron>sched# shut
```

Example

The following is a sample configuration output that schedules a script named "test2" to run every 15 minutes on the 17th of each month and every Friday until noon on July 17, 2007.

```
*A:SR-3>config>system>cron# info
----------------------------------------------
        schedule "test2"
            shutdown
            day-of-month 17
            minute 0 15 30 45
            weekday friday
            end-time 2007/07/17 12:00
        exit
----------------------------------------------
*A:SR-3>config>system>cron#
```

6.12.1.2.5.2 Script

The **script** command opens a new nodal context, which contains information about a script.

Use the following CLI syntax to create a nodal context.

```
config>system>cron
        script script-name[owner script-owner]
        description description-string
        location file-url
        shutdown
```

Example: Command usage to create a nodal context called "test"

```
config>system>cron# script test
    config>system>cron>script#
```

Example

The following is a sample configuration output that names a script "test".

```
A:sim1>config>system>cron# info
----------------------------------------------
        script "test"
            location "ftp://172.16.0.0/./sim1/test.cfg"
```


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```
            no shutdown
        exit
-----------------------------------------
A:sim1>config>system>cron#
```

6.12.1.2.6 Time range

ACLs and QoS policy configurations may be enhanced to support time-based matching. CRON configuration includes time matching with the 'schedule' subcommand. Schedules are based on events; **time-range** defines an end-time that is used as a match criteria.

Time range elements include Create, Absolute, Daily, Weekdays, Weekend, and Weekly.

6.12.1.2.6.1 Create

Use this command to enable the **time-range** context.

Use the following syntax to create a time range.

```
config>system>cron
        time-range name create
```

Example: Command usage to create a time-range called "test1"

```
config>system>cron# time-range test1 create
    config>system>cron>time-range$
```

6.12.1.2.6.2 Absolute

The **absolute** command configures a start and end time that does not repeat.

Use the following syntax to configure a time range that does not repeat.

```
config>system>cron>time-range$
        absoluteabsolute-time end absolute-time
```

Example: Command usage to configure a non-repetitive time range

```
config>system>cron>time-range$ absolute start 2006/05/05,11:00 end
    2006/05/06,11:01
    config>system>cron>time-range$
```

Example

The following is a sample configuration output of an absolute time range beginning on May 5, 2006 at 11:00 and ending May 6, 2006 at 11:01.

```
A:sim1>config>system>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : test1
Triggers    : 0
```


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```
Status      : Inactive
Absolute    : start 2006/05/05,11:00 end 2006/05/06,11:01
===============================================================================
A:sim1>config>system>cron>time-range#
```

6.12.1.2.6.3 Daily

The **daily** command configures the start and end of a periodic schedule for every day of the week (Sunday through Saturday).

Use the following syntax to configure a time range that is repeated daily.

```
config>system>cron>time-range$
        daily start time-of-day end time-of-day
```

Example: Command usage to create a time range that is repeated daily

```
config>system>cron>time-range$ daily start 11:00 end 12:00
    config>system>cron>time-range$
```

Example

The following is a sample configuration output of a daily time range beginning at 11:00 and ending at 12:00.

```
A:sim1>config>system>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : 1
Triggers    : 0
Status      : Inactive
Periodic    : daily   Start 11:00 End 12:00
===============================================================================
A:sim1>config>system>cron>time-range#
```

6.12.1.2.6.4 Weekdays

The **weekdays** command configures the start and end of a periodic schedule for weekdays (Monday through Friday).

Use the following syntax to configure a time range that is repeated on weekdays.

```
config>system>cron>time-range$
        weekdays start time-of-day end time-of-day
```

Example: Command usage to create a time range that is repeated on weekdays

```
config>system>cron>time-range$ weekdays start 11:00 end 12:00
    config>system>cron>time-range$
```


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Example

The following is a sample configuration output of a time range beginning at 11:00 and ending at 12:00. This schedule runs all weekdays during this time period.

```
A:sim1>config>system>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : 1
Triggers    : 0
Status      : Inactive
Periodic    : weekdays Start 11:00 End 12:00
===============================================================================
A:sim1>config>system>cron>time-range#
```

6.12.1.2.6.5 Weekend

The **weekend** command configures the start and end of a periodic schedule for weekends (Saturday and Sunday). The resolution must be at least one minute apart, for example, start at 11:00 and end at 11:01. A start time and end time of 11:00 is invalid.

Use the following syntax to configure a time range that is repeated on weekends.

```
config>system>cron>time-range$
        weekend start time-of-day end time-of-day
```

Example: Command usage to create a time range that is repeated on weekends

```
config>system>cron>time-range$ weekend start 11:00 end 12:00
    config>system>cron>time-range$
```

Example

The following is a sample configuration output of a weekend time range beginning at 11:00am and ending at 12:00pm, both Saturday and Sunday.

To specify 11:00am to 12:00pm on Saturday or Sunday only, use the **absolute** parameter for one day, or the **weekly** parameter for every Saturday or Sunday accordingly. In addition, see the **schedule** parameter to schedule one-shot or periodic events in the **config>system>cron** context.

```
A:sim1>config>system>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : 1
Triggers    : 0
Status      : Inactive
Periodic    : weekend Start 11:00 End 12:00
```

6.12.1.2.6.6 Weekly

The **weekly** command configures the start and end of a periodic schedule for the same day every week, for example, every Friday. The start and end dates must be the same. The resolution must be at least one minute apart, for example, start at 11:00 and end at 11:01. A start time and end time of 11:00 is invalid.

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Use the following syntax to create a time range that is repeated weekly.

```
config>system>cron>time-range$
        weekly start time-in-week end time-in-week
```

The following example shows the .

Example: Command usage to create a time range that is repeated weekly

```
config>system>cron>time-range$ start fri,01:01 end fri,01:02
    config>system>cron>time-range$
```

Example

The following is a sample configuration output of a weekly time range beginning on Friday at 1:01am ending Friday at 1:02am.

```
A:sim1>config>system>cron>time-range$ info
----------------------------------------------
        weekly start fri,01:01 end fri,01:02
----------------------------------------------
A:sim1>config>system>cron>time-range$
```

6.12.1.2.7 Time of Day

Time of Day (TOD) suites are useful when configuring many types of time-based policies or when a large number of subscribers or SAPs require the same type of TOD changes. The TOD suite may be configured while using specific ingress or egress ACLs or QoS policies, and is an enhancement of the ingress and egress CLI trees.

6.12.1.2.7.1 SAPs

- If a TOD suite is assigned to a SAP; statistics collection are not collected for that SAP.
- When an item is configured both on the SAP level and in the TOD suite assigned to the SAP, the TOD suite defined value takes precedence.
- A policy or filter assignment configured directly on a SAP has a lower priority than any assignment in a TOD suite. Therefore, it is possible that a new direct configuration has no immediate effect. If the configuration is made by CLI, a warning is given.

6.12.1.2.7.2 Egress

This command is an enhancement for specific egress policies. Use this command to create time range based associations of previously created filter lists, QoS, and scheduler policies. Multiple policies may be included and each must be assigned a different priority; in case time ranges overlap, the priority is used to determine the prevailing policy. Only a single reference to a policy may be included without a time range.

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6.12.1.2.7.3 Filters

In a TOD suite, filters that have entries with time ranges may not be selected. Similarly, filter entries with a time range may not be created while a TOD suite refers to that filter. QoS policies and filters referred to by a TOD suite must have the scope "template" (default).

Use the following syntax to configure TOD-suite egress parameters.

```
config>system>cron
        tod-suite tod-suite-name create
            egress
                filter ip ip-filter-id [time-range time-range-name]
                [priority priority]
                filter ipv6 ipv6-filter-id [time-range time-range-name]
                [priority priority]
                filter mac mac-filter-id [time-range time-range-name] [priority priority]
```

Example: Command usage to configure TOD-suite egress parameters

```
config>system>cron>tod-suite$ egress filter ip 100
    config>system>cron>tod-suite$
```

Example

The following is a sample configuration output of an egress IP filter association with filter ID 100.

```
sim1>config>filter# ip-filter 100 create
A:sim1>config>filter>ip-filter$ entry 10 create
A:sim1>config>filter>ip-filter>entry$
A:sim1>config>system>cron>tod-suite# egress filter ip 100
A:sim1>config>system>cron>tod-suite# info detail
----------------------------------------------
            no description
            egress
                filter ip 100
            exit
----------------------------------------------
A:sim1>config>system>cron>tod-suite#
```

6.12.1.2.7.4 Ingress

This command is an enhancement for specific ingress policies including filter lists and QoS policies. Use this command to create time range based associations of previously created filter lists and QoS policies. Multiple policies may be included and each must be assigned a different priority; in case time ranges overlap, the priority is used to determine the prevailing policy. Only a single reference to a policy may be included without a time range. To configure a daily time range across midnight, use a combination of two entries. An entry that starts at hour zero takes over from an entry that ends at hour 24.

Use the following syntax to configure time range based associations.

```
config>system>cron
        tod-suite tod-suite-name create
            ingress
                filter ip ip-filter-id [time-range time-range-name]
                [priority priority]
                filter ipv6 ipv6-filter-id [time-range time-range-name]
```


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```
            filter mac mac-filter-id [time-range time-range-name] [priority priority]
            qos policy-id [time-range time-range-name] [priority priority]
```

Example: Command usage to configure an IP filter association

```
config>system>cron>tod-suite$ ingress filter ip 100
    config>system>cron>tod-suite$
```

Example: Ingress IP filter association with filter ID 100

```
sim1>config>filter# ip-filter 100 create
A:sim1>config>filter>ip-filter$ entry 10 create
A:sim1>config>filter>ip-filter>entry$
...
A:sim1>config>system>cron>tod-suite# ingress filter ip 100
A:sim1>config>system>cron>tod-suite# info detail
----------------------------------------------
            no description
            ingress
                filter ip 100
            exit
----------------------------------------------
A:sim1>config>system>cron>tod-suite#
```

Example: Command usage to configure an association with a SAP ingress QoS policy

```
config>system>cron>tod-suite$ ingress qos 101
    config>system>cron>tod-suite$
```

Example

The following is a sample configuration output of an association with a SAP ingress QoS policy.

```
A:sim1>config>qos# sap-egress 101 create
...
A:sim1>config>system>cron>tod-suite# ingress qos 101
A:sim1>config>system>cron>tod-suite# info detail
----------------------------------------------
            no description
            ingress
                qos 101
            exit
----------------------------------------------
A:sim1>config>system>cron>tod-suite#
```

6.12.2 Configuring backup copies

The **config-backup** command allows you to specify the maximum number of backup versions of the configuration and index files kept in the primary location.

For example, assume the **config-backup** *count* is set to **5** and the configuration file is named `xyz.cfg`. When a **save** command is issued, the `xyz.cfg` file is saved with a .1 extension. Each subsequent **config-backup** command increments the numeric extension until the maximum count is reached. The oldest file (**5**) is deleted as more recent files are saved.

`xyz.cfg`

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xyz.cfg.1

xyz.cfg.2

xyz.cfg.3

xyz.cfg.4

xyz.cfg.**5**

xyz.ndx

Each persistent index file is updated at the same time as the associated configuration file. When the index file is updated, the save is performed to xyz .cfg and the index file is created as xyz.ndx. Synchronization between the active and standby is performed for all configurations and their associated persistent index files.

Use the following CLI syntax to specify the maximum number of backup versions of the configuration and index files kept in the primary location.

```
config>system
        config-backup <count>
```

Example

The following example shows the command usage to set the maximum number of backup versions of the configuration and index files kept in the primary location to 7.

```
config>system#
    config>system# config-backup 7
```

Example: Output for the config-backup command

```
A:ALA-12>config>system>time# info
#------------------------------------------
echo "System Configuration"
#------------------------------------------
        name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
        config-backup 7
...
------------------------------------------------
A:ALA-12>config>system>time#
```

6.13 System administration parameters

This section describes the system administration parameters and the CLI syntax to configure the parameters.

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6.13.1 Validating the golden bootstrap image

The **admin>check-golden-bootstrap** command validates the current golden bootstrap image and displays its version.

Use the following syntax to validate the current golden boot strap image.

```
admin
        check-golden-bootstrap
```

Example: Command usage to validate the current bootstrap image

```
admin# check-golden-bootstrap
```

Example

```
version TiMOS-L-0.0.I312
Golden Bootstrap Image validation successful
```

6.13.2 Updating the golden bootstrap image

The **admin>update-golden-bootstrap** command validates the input file and updates the golden bootstrap image with the contents of this file.

Use the following syntax to update the golden boot strap image.

```
admin
        update-golden-bootstrap [file-url]
```

Example: Command usage to update the bootstrap image

```
admin# update-golden-bootstrap boot.tim
```

Example

```
Updating Golden Bootstrap Image from "boot.tim"
This operation must not be interrupted
Updating Golden Bootstrap image .... Completed.
```

6.13.3 Disconnect

The **disconnect** command immediately disconnects a user from a console, Telnet, FTP, or SSH session.

Note:
Configuration modifications are saved to the primary image file.

Use the following syntax to disconnect a user from a session.

```
admin
        disconnect [address ip-address |username user-name | {console|telnet|ftp|ssh}]
```


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Example: Command usage to disconnect a user from a session

```
– admin# disconnect
```

Example: Output of the disconnect command

```
ALA-1>admin# disconnect
ALA-1>admin# Logged out by the administrator
Connection to host lost.

C:\>
```

6.13.4 Set-time

Use the **set-time** command to set the system date and time. The time entered should be accurate for the time zone configured for the system. The system will convert the local time to UTC before saving to the system clock, which is always set to UTC. If SNTP or NTP is enabled (**no shutdown**), this command cannot be used. The **set-time** command does not take into account any daylight saving offset, if defined.

Use the following syntax to set the system date and time.

```
admin
        set-time date time
```

The following example shows the .

Example: Command usage to set the system date and time

```
admin# set-time 2007/02/06 04:10:00
```

Example: Output of the set-time command

```
ALA-2# admin set-time 2007/02/06 04:10:00
ALA-2# show time
Thu Feb 2 04:10:04 GMT 2007
ALA-2#
```

6.13.5 Display-config

The **display-config** command displays the running configuration of the system.

Use the following syntax to display the running configuration of the system.

```
admin
        display-config [detail] [index]
```

Example: Command usage to display the detailed running configuration of the system

```
admin# display-config detail
```


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Example: Output of the display-config detail command

```
A:ALA-12>admin# display-config detail
#------------------------------------------
echo "System Configuration"
#------------------------------------------
    system
        name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
        config-backup 7
        boot-good-exec "ftp://test:test@192.168.xx.xxx/./1xx.cfg.A"
        boot-bad-exec "ftp://test:test@192.168.xx.xxx/./1xx.cfg.1"
        lacp-system-priority 1
        no synchronize
        snmp
            shutdown
            engineID "0000197f000000000467ff00"
            packet-size 1500
            general-port 161
        exit
        login-control
            ftp
                inbound-max-sessions 3
            exit
            telnet
                inbound-max-sessions 5
                outbound-max-sessions 2
            exit
            idle-timeout 1440
            pre-login-message "Property of Service Routing Inc.Unauthorized
access prohibited."
            motd text "Notice to all users: Software upgrade scheduled 3/2 1:00 AM"
        exit
        security
            management-access-filter
                default-action permit
                entry 1
                    no description
...
```

6.13.6 Tech-support

Note:
This command should only be used with explicit authorization and direction from the Nokia Technical Assistance Center (TAC).

6.13.7 Save

The **save** command saves the running configuration to a configuration file. If the **debug-save** parameter is specified, debug configurations are saved in the configuration file; otherwise, the debug configurations are not saved between reboots.

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Use the following syntax to save the running configuration and debug configurations to a configuration file.

```
admin
        save [file-url] [detail] [index]
        debug-save [file-url]
```

Example

The following example shows the command usage to save the running configuration and the debug configurations to a configuration file.

```
admin# save ftp://test:test@192.168.x.xx/./1.cfg
    admin# debug-save debugsave.txt
```

Example: save command output

```
A:ALA-1>admin# save ftp://test:test@192.168.x.xx/./1x.cfg
Writing file to ftp://test:test@192.168.x.xx/./1x.cfg
Saving configuration ...Completed.
ALA-1>admin# debug-save ftp://test:test@192.168.x.xx/./debugsave.txt
Writing file to ftp://julie:julie@192.168.x.xx/./debugsave.txt
Saving debug configuration .....Completed.
A:ALA-1>admin#
```

See Using SFTP and PKI with the admin>save command for more information about when the SFTP client is used with the **admin>save** command.

6.13.8 Reboot

The **reboot** command reboots the router, including redundant cards in redundant systems. If the **now** option is not specified, you are prompted to confirm the reboot operation.

Use the following syntax to reboot the router.

```
admin
        reboot [auto-init][now]
```

Example: Command usage to reboot the router

```
admin# reboot now
```

Example: reboot command output

```
A:ALA-1>admin# reboot now
Are you sure you want to reboot (y/n)? y
Rebooting...
Using preloaded VxWorks boot loader.
...
```

When an **admin reboot auto-init** command is issued, the system resets the existing BOF and reboots. The system startup process after the **admin reboot auto-init** command is executed is the same as the first-time system boot described in System initialization.

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Note:
After the BOF is reset, the system may not boot up with the last saved system configuration unless the new BOF also uses the same configuration file. If you require the system to boot up with the last saved system configuration, Nokia recommends that you should run the **admin>save** *file-url* command to save the current system configuration and modify the BOF to use this configuration.

Use the following CLI to reset the BOF and reboot.

```
admin# reboot auto-init [now]
```

Example: admin reboot auto-init command output

```
Example: *A:ALA-1# admin reboot auto-init
WARNING: Configuration and/or Boot options may have changed since the last save.
Are you sure you want to reset the bof and reboot (y/n)? Y
Resetting...OK

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```

6.13.9 Post-boot configuration extension files

Two post-boot configuration extension files are supported and are triggered when either a successful or failed boot configuration file is processed. The commands specify URLs for the CLI scripts that are run following the completion of the boot-up configuration. A URL must be specified or no action is taken. The commands are persistent between router reboots and are included in the configuration saves (**admin save**).

Use the following syntax to specify the CLI scripts that are tun following the completion of the boot-up configuration.

```
config>system
        boot-bad-exec file-url
        boot-good-exec file-url
```

Example

The following example shows the command usage to specify the CLI scripts that are run following the completion of the boot-up configuration.

```
config>system# boot-bad-exec ftp://test:test@192.168.xx.xxx/./
    fail.cfg
    config>system# boot-good-exec ftp://test:test@192.168.xx.xxx/./
    ok.cfg
```

Example: Command output

```
*A:ALA# configure system
*A:ALA>config>system# info
----------------------------------------------
#----------------------------------------------
echo "System Configuration"
#----------------------------------------------
        name "ALA"
```


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```
        boot-good-exec "cf1:\good.cfg"
        boot-bad-exec "cf1:\bad.cfg"
        snmp
            shutdown
        exit
        login-control
            idle-timeout disable
            pre-login-message "ala-1" name
        exit
        time
            ntp
                authentication-key 1 key "SV3BxZCsIvI" hash type message-digest
                server 10.135.16.130
                peer 10.0.0.1 key-id 1
                no shutdown
            exit
            sntp
                server-address 10.135.16.90 preferred
                no shutdown
            exit
            zone UTC
        exit
        thresholds
            rmon
            exit
        exit
#--------------------------------------------------
echo "System Security Configuration"
#--------------------------------------------------
        security
            hash-control read-version all write-version 1
            telnet-server
            ftp-server
            snmp
                community "private" rwa version both
                community "public" r version both
            exit
            source-address
                application ftp 10.135.16.97
                application snmptrap 10.135.16.97
                application ping 10.135.16.97
                application dns 10.135.16.97
            exit
        exit
-------------------------------------------
*A:ALA>config>system#
```

6.13.9.1 Show command output and console messages

The **show system information** command displays the current value of the bad and good **exec** URLs and indicates whether a post-boot configuration extension file was executed when the system was booted. If an extension file was executed, the **show system information** command also indicates if it completed successfully.

When executing a post-boot configuration extension file, status messages are output to the console screen before the “Login” prompt.

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Example

The following is sample output of a failed boot-up configuration that caused a boot-bad-exec file containing another error to be executed.

```
Attempting to exec configuration file:
'ftp://test:test@192.168.xx.xxx/./12.cfg' ...
System Configuration
Log Configuration
MAJOR: CLI #1009 An error occurred while processing a CLI command -
File ftp://test:test@192.168.xx.xxx/./12.cfg, Line 195: Command "log" failed.
CRITICAL: CLI #1002 An error occurred while processing the configuration file.
The system configuration is missing or incomplete.
MAJOR: CLI #1008 The SNMP daemon is disabled.
If desired, enable SNMP with the 'config>system>snmp no shutdown' command.
Attempting to exec configuration failure extension file:
'ftp://test:test@192.168.xx.xxx/./fail.cfg' ...
Config fail extension
Enabling SNMP daemon
MAJOR: CLI #1009 An error occurred while processing a CLI command -
File ftp://test:test@192.168.xx.xxx/./fail.cfg, Line 5: Command "abc log" failed.
TiMOS-B-x.0.Rx both/hops NOKIA Copyright (c) 2016 Nokia.
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Built on Thu Nov 20 19:19:11 PST 2016 by builder in /rel5x.0/b1/Rx/panos/main


Login:
```

6.14 System timing

When synchronous Ethernet is enabled, the operator can select an Ethernet port as a candidate for timing reference. The timing information recovered from this port is used to time the system.

6.14.1 CLI command syntax for 7210 SAS platforms

This section describes the CLI command syntax to enable synchronous Ethernet on specific 7210 SAS platforms.

6.14.1.1 CLI syntax for 7210 SAS-D

Example: CLI configuration for the 7210 SAS-D

```
*A:sas-d>config>system>sync-if-timing# info detail
----------------------------------------------
            no ql-selection
            ref-order ref1 ref2
            ref1
                shutdown
                no source-port
                no ql-override
            exit
            ref2
                shutdown
                no source-port
```


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```
                no ql-override
            exit
            ptp
                shutdown
                no ql-override
            exit
            no revert
-----------------------------------------------
*A:sas-d>config>system>sync-if-timing#
```

6.14.1.2 CLI syntax for 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Example

The following is a sample CLI configuration for the 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C, and 7210 SAS-K 2F1C2T.

```
A:Dut-A>config>system>sync-if-timing# info detail
-----------------------------------------------
            no ql-selection
            ref-order ref1 ref2 ptp
            ref1
                shutdown
                no source-port
                no ql-override
            exit
            ref2
                shutdown
                no source-port
                no ql-override
            exit
            ptp
                shutdown
                no ql-override
            exit
            no revert
-----------------------------------------------
A:Dut-A>config>system>sync-if-timing#
```

6.14.2 Entering edit mode

To enter edit mode and edit timing references, enter the **begin** keyword at the **config>system>sync-if-timing#** prompt.

Use the following CLI syntax to enter edit mode.

```
config>system>sync-if-timing
        begin
```

Example

The following is a sample error message that is displayed if you try to modify **sync-if-timing** parameters without entering the **begin** keyword.

```
ort 2/1/1
```


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```
MINOR: CLI The sync-if-timing must be in edit mode by calling begin before any
changes can be made.
MINOR: CLI Unable to set source port for ref1 to 2/1/1.
A:ALA-12>config>system>sync-if-timing>ref1#
```

Note:
Use **commit** to save or **abort** to discard the changes made in a session.

6.14.3 Configuring timing references

On the 7210 SAS-D, ref1 must be configured to use one of ports 1/1/1 to 1/1/4 and ref2 must be configured to use either port 1/1/5 or 1/1/6. The software enforces this check. Ports 1/1/7 to 1/1/10 can be configured as either ref1 or ref2.

There is no port restriction on the 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, or 7210 SAS-K 3SFP+ 8C; any port can be configured for ref1 or ref2.

Example: Configuration of timing reference parameters

```
config>system# sync-if-timing
config>system>sync-if-timing# begin
config>system>sync-if-timing# ref1
config>system>sync-if-timing>ref1# source-port 1/1/1
config>system>sync-if-timing>ref1# no shutdown
config>system>sync-if-timing>ref1# exit
config>system>sync-if-timing# ref2
config>system>sync-if-timing>ref2# source-port 1/1/2
config>system>sync-if-timing>ref2# no shutdown
config>system>sync-if-timing>ref2# exit
config>system>sync-if-timing>commit
```

Example: Timing reference parameters

```
*7210-SAS>config>system>sync-if-timing#info detail

----------------------------------------------
ref-order ref1 ref2
ref1
source-port 1/1/1
no shutdown
exit
ref2
source-port 1/1/2
no shutdown
exit
no revert
----------------------------------------------
```

6.14.4 Using the revert command

The **revert** command allows the clock to revert to a higher-priority reference if the current reference goes offline or becomes unstable.

If revertive switching is enabled, the highest-priority valid timing reference is used. If a reference with a higher priority becomes valid, a switchover to that reference is initiated. If a failure on the current reference occurs, the next highest reference takes over.

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If non-revertive switching is enabled, the active reference always remains selected while its valid, even if a higher priority reference becomes available. If the active reference becomes invalid, a reference switchover to a valid reference with the highest priority is initiated. The failed reference is eligible for selection when it becomes operational.

```
config>system>sync-if-timing
        revert
```

6.14.5 Other editing commands

Other editing commands are:

- **commit**

  Saves changes made to the timing references during a session. Modifications are not persistent across system boots unless this command is entered.

- **abort**

  Discards changes that have been made to the timing references during a session.

Use the following syntax to abort or commit changes made to a timing reference.

```
config>system>sync-if-timing
        abort
        commit
```

6.14.6 Forcing a specific reference

You can force the system synchronous timing output to use a specific reference.

Note:
The **debug sync-if-timing force-reference** command should only be used to test and debug problems. After the system timing reference input has been forced, it does not revert to another reference unless explicitly reconfigured, if the forced reference fails, or if the received QL code is QL-DNU/DUS and QL selection is enabled.

When the **debug sync-if-timing force-reference** command is run, the current system synchronous timing output is immediately referenced from the specified reference input. The reference must be qualified.

Debug configurations are not saved between reboots.

Use the following syntax to reference the current system synchronous timing output from the specifies reference input.

```
debug>sync-if-timing
        force-reference {ref1 | ref2}
```

Example

The following example shows the command usage to reference the current system synchronous timing output from the specifies reference input.

```
debug>sync-if-timing# force-reference
```


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6.15 Configuring system monitoring thresholds

This section describes how to configure system monitoring thresholds.

6.15.1 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 is created to record the occurrence of the event. It can also specify whether an SNMP notification (trap) is generated for the event. There are two notifications for threshold crossing events: a rising alarm and a falling alarm.ping-address.

Creating an event entry in the RMON-MIB log table does not create a corresponding entry in the 7210 SAS event logs. However, when the event is set to trap, the generation of a rising alarm or falling alarm, a notification creates an entry in the event logs and is distributed to the configured log destinations, including: console, session, memory, file, syslog, or SNMP trap destination. The logger message includes a rising or falling threshold crossing event indicator, the sample type (absolute or delta), the sampled value, the threshold value, the *rmon-alarm-id*, the associated *rmon-event-id*, and the sampled SNMP object identifier.

The **alarm** command configures an entry in the RMON-MIB alarm table. The **alarm** command controls the monitoring and triggering of threshold crossing events. To trigger the notification or logging of a threshold crossing event, at least one associated **rmon event** must be configured.

The agent periodically takes statistical sample values from the MIB variable specified for monitoring and compares them to thresholds that have been configured with the **alarm** command. The **alarm** command configures the MIB variable to be monitored, the polling period (interval), sampling type (absolute or delta value), and rising and falling threshold parameters. If a sample has crossed a threshold value, the associated event is generated.

Preconfigured CLI threshold commands are available. Preconfigured commands hide some of the complexities of configuring RMON alarm and event commands and perform the same function. In particular, the preconfigured commands do not require the user to know the SNMP object identifier to be sampled. The preconfigured threshold configurations include memory warnings, alarms, and compact flash usage warnings and alarms.

To create events, use the following sample CLI configuration.

Example

```
config>system>thresholds# cflash-cap-warn cf1-B: rising-threshold 2000000 falling-
threshold 1999900 interval 240 trap startup-alarm either
```

Example

```
config>system>thresholds# memory-use-alarm rising-threshold 50000000 falling-threshold
 45999999 interval 500 both startup-alarm either
```

Example

```
config>system>thresh# rmon
```


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Example

```
config>system>thresh>rmon# event 5 both description "alarm testing" owner "Timos CLI"
```

Example: Command output

```
A:ALA-49>config>system>thresholds# info
----------------------------------------------
            rmon
                event 5 description "alarm testing" owner "Timos CLI"
            exit
            cflash-cap-warn cf1-B: rising-threshold 2000000 falling-threshold
1999900 interval 240 trap
            memory-use-alarm rising-threshold 50000000 falling-threshold
45999999 interval 500
----------------------------------------------
A:ALA-49>config>system>thresholds#
```

6.15.2 Configuring an alarm input

The 7210 SAS-D, 7210 SAS-Dxp 12p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C do not support alarm contact inputs; instead, they provide an option to configure the console port as an alarm input pin. A single alarm input pin can be enabled for use with the console port, allowing operators to monitor external events and alert the operator.

The 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p support the alarm contact input interface. They do not support the console port interface.

You can configure generation of events when alarm input pins transition between the open and close states. For each generated event, you can specify the following:

- action associated with each state transition
- severity associated with each state transition
- log message associated with each state transition

The RXD and TXD pins of the console input is used to provide a single alarm input pin functionality. The RXD and TXD pins of the console port is used by software to detect external events. The operating system detects an open or closed circuit, triggers an alarm, and logs it when an event is detected.

By default, the console port does not provide alarm input pin functionality. The CLI command **configure>system>console>use-console-alarm-input** is used to enable the use of console port as an alarm input pin. After this command is executed, the console port can no longer be used as a console port, and the system generates a log message to convey this restriction. Additionally, the user must configure the **alarm-contact-input** parameters for the console by using the CLI command **config> system>alarm-contact-input console-1**.

Note:
The user must enable a Telnet session with the node before enabling the console as an alarm input. After the alarm input functionality is enabled, the user can configure the **alarm-contact-input no shutdown** using the Telnet session.

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6.16 Configuring system resource profile

Example: System resource profile defaults

```
*A:Dut-A>config>system>res-prof# info detail
----------------------------------------------
            ingress-internal-tcam
                no qos-sap-ingress-resource
                acl-sap-ingress 1
                    no mac-ipv4-ipv6-128-match-enable
                exit
            exit
            egress-internal-tcam
                acl-sap-egress 2
                    no mac-ipv4-ipv6-128-match-enable
                exit
                no eth-cfm-primary-vlan-enable
            exit
----------------------------------------------
*A:Dut-A>config>system>res-prof#
```

6.17 Configuring LLDP

Use the following syntax to configure LLDP.

```
config>system>lldp
        tx-interval <interval>
        tx-hold-multiplier <multiplier>
        reinit-delay <time>
        notification-interval <time>
        tx-credit-max <count>
        message-fast-tx <time>
        message-fast-init <count>
        shutdown
```

The following is a sample .

Example: LLDP port configuration

```
*A:7210-SAS>config>port>ethernet>lldp# info
----------------------------------------------
       dest-mac nearest-bridge
              admin-status tx-rx
              tx-tlvs port-desc sys-cap
              tx-mgmt-address system
       exit
----------------------------------------------
*A:7210-SAS>config>port>ethernet>lldp#
```

Example: Global system LLDP configuration

```
A:7210-SAS>config>system>lldp# info
----------------------------------------------
```


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```
        tx-interval 10
        tx-hold-multiplier 2
        reinit-delay 5
        notification-interval 10
-----------------------------------------------
A:7210-SAS>config>system>lldp#
```

6.18 System command reference

Note:
Some commands are available only on specific platforms. Support for a command on a specific platform is stated explicitly in the CLI command description.

6.18.1 Command hierarchies

- Configuration commands
  - System information commands
  - System alarm commands
  - PTP commands for 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C
  - PTP commands for 7210 SAS-K 2F1C2T
  - System time commands
  - CRON commands
  - Script control commands
  - System port LAG MAC assignment commands for 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C
  - System administration commands
  - System alarm contact commands
  - System console commands
  - System synchronization commands
  - LLDP system commands
  - System resource-profile commands for 7210 SAS-D and 7210 SAS-Dxp
  - System resource-profile commands for 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C
  - Fan controller commands for 7210 SAS-D and 7210 SAS-D ETR variant with 128MB flash
- Show commands
- Clear commands
- Debug commands
- Tools commands

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6.18.1.1 Configuration commands

6.18.1.1.1 System information commands

```
config
    - system
        - boot-bad-exec file-url
        - no boot-bad-exec
        - boot-good-exec
        - boot-good-exec
        - clli-code clli-code
        - no clli-code
        - config-backup  count
        - no config-backup
        - contact contact-name
        - no contact
        - coordinates coordinates
        - no coordinates
        - lacp-system-priority lacp-system-priority
        - no lacp-system-priority
        - lldp
        - location location
        - no location
        - login-control
        - name system-name
        - no name
        - poe
            - max-poe-power-budget value
            - no max-poe-power-budget
        - power-supply [power-supply-id] type power-module-type module-type
        - power-supply [power-supply-id] type
        - [no] oper-group name [create]
            - hold-time
                - [no] group-down time in seconds
                - [no] group-up time in seconds
```

6.18.1.1.2 System alarm commands

```
config
    - system
        - thresholds
            - kb-memory-use-alarm cflash-id rising-threshold threshold [falling-
threshold threshold] interval seconds [rmon-event-type] [startup-alarm alarm-type]
            - no kb-memory-use-alarm cflash-id
            - cflash-cap-warn cflash-id rising-threshold threshold [falling-
threshold threshold] interval seconds [rmon-event-type] [startup-alarm alarm-type]
            - no cflash-cap-warn cflash-id
            - kb-memory-use-alarm rising-threshold threshold [falling-threshold threshold]
 interval seconds [rmon-event-type] [startup-alarm alarm-type]
            - no kb-memory-use-alarm
            - kb-memory-use-warn rising-threshold threshold [falling-threshold threshold]
 interval seconds [rmon-event-type] [startup-alarm alarm-type]
            - no kb-memory-use-warn
            - memory-use-alarm rising-threshold threshold [falling-threshold threshold]
 interval seconds [rmon-event-type] [startup-alarm alarm-type]
            - no memory-use-alarm
```


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```
            - 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
```

6.18.1.1.3 PTP commands for 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

```
config
    - system
        - ptp
            - anno-rx-timeout  count
            - no anno-rx-timeout
            - clock
                - freq-source  freq-source
                - no freq-source
            - clock-type boundary
            - clock-type ordinary {slave}
            - domain domain-value
            - no domain
            - local-priority  priority
            - log-anno-interval  log-interval
            - no log-anno-interval
            - log-sync-interval  value
            - no log-sync-interval
            - network-type  {sdh | sonet}
            - peer  ip-address [create]
            - no peer  ip-address
                - local-priority  priority
                - [no] shutdown
            - port  port-id [create]
            - no port  port-id
                - address  {01:1b:19:00:00:00 | 01:80:c2:00:00:0e}
                - local-priority  priority
                - master-only  {true | false}
                - [no] shutdown
            - priority1 priority-value
            - no priority1
            - priority2 priority-value
            - no priority2
            - profile {g8265dot1-2010 | ieee1588-2008 | g8275dot1-2014 | iec-61850-9-3-2016 |
 c37dot238-2017}
            - [no] shutdown
            - [no] transit-ptp-pkts
```

6.18.1.1.4 PTP commands for 7210 SAS-K 2F1C2T

```
config
    - system
        - ptp
```


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```
            - clock
                - freq-source  freq-source
                - no freq-source
            - clock-type boundary
            - clock-type ordinary {slave}
            - domain domain-value
            - no domain
            - log-sync-interval  value
            - no log-sync-interval
            - network-type  {sdh | sonet}
            - peer  ip-address [create]
            - no peer  ip-address
                - local-priority  priority
                - [no] shutdown
            - priority1 priority-value
            - no priority1
            - priority2 priority-value
            - no priority2
            - profile {g8265dot1-2010 | ieee1588-2008 | g8275dot1-2014}
            - [no] shutdown
```

6.18.1.1.5 System time commands

```
root
    - admin
        - set-time [date][time]
config
    - system
        - time
            - [no] ntp
                - [no] authentication-check
                - authentication-key key-id key key [hash | hash2] type {des | message-digest}
                - no authentication-key key-id
                - [no] authentication-keychain name
                - [no] broadcast [router router-name] {interface ip-int-name} [key-id key-id
 | authentication-keychain name]  [version version] [ttl ttl]
                - [no] broadcast [router router-name] {interface ip-int-name}
                - broadcastclient [router router-name] {interface ip-int-name} [authenticate]
                - [no] broadcastclient [router router-name] {interface ip-int-name}
                - [no] ntp-server [authenticate]
                - [no] peer ip-address [version version] [key-id key-id] [prefer]
 [authentication-keychain name]
                - [no] server {ip-address| ptp} [version version] [key-id key-id] [prefer]
 [authentication-keychain name]
                - [no] shutdown
            - [no] sntp
                - [no] broadcast-client
                - server-address ip-address [version version-number] [normal | preferred]
 [interval seconds]
                - no server-address ip-address
                - [no] shutdown
            - [no] dst-zone [std-zone-name | non-std-zone-name]
                - end {end-week} {end-day} {end-month} [hours-minutes]
                - offset offset
                - start {start-week} {start-day} {start-month} [hours-minutes]
            - zone std-zone-name | non-std-zone-name [hh [:mm]]
            - no zone
```


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6.18.1.1.6 CRON commands

```
config>system
    - [no] cron
        - [no] schedule schedule-name [owner schedule-owner]
            - count number
            - [no] day-of-month {day-number [..day-number] all}
            - [no] description description-string
            - [no] end-time [date | day-name] time
            - [no] hour {..hour-number [..hour-number]|all}
            - [no] interval seconds
            - [no] minute {minute-number [..minute-number]|all}
            - [no] month {month-number [..month-number]|month-name [..month-name]|all}
            - [no] script-policy policy-name [owner policy-owner]
            - [no] shutdown
            - type {schedule-type}
            - [no] weekday {weekday-number [..weekday-number]|day-name [..day-name]|all}
        - [no] time-range name [create]
            - absolute start start-absolute-time end end-absolute-time
            - no absolute start start-absolute-time
            - daily start start-time-of-day end end-time-of-day
            -  no daily start start-time-of-day
            - [no] description description-string
            - weekdays start start-time-of-day end end-time-of-day
            - no weekdays start start-time-of-day
            - weekend start start-time-of-day end end-time-of-day
            - no weekend start start-time-of-day
            - weekly start start-time-in-week end end-time-in-week
            - no weekly start start-time-in-week
        - [no] tod-suite tod-suite-name [create]
            - [no] description description-string
            - egress
                - filter ip ip-filter-id [time-range time-range-name] [priority priority]
                - filter mac mac-filter-id [time-range time-range-name] [priority priority]
                - filter ipv6 ipv6-filter-id [time-range time-range-name] [priority priority]
                - no filter ip ip-filter-id [time-range time-range-name]
                - no filter mac mac-filter-id [time-range time-range-name
                - no filter ipv6 ipv6-filter-id [time-range time-range-name]
            - ingress
                - filter ip ip-filter-id [time-range time-range-name] [priority priority]
                - filter mac mac-filter-id [time-range time-range-name] [priority priority]
                - filter ipv6 ipv6-filter-id [time-range time-range-name] [priority priority]
                - no filter ip ip-filter-id [time-range time-range-name]
                - no filter mac mac-filter-id [time-range time-range-name
                - no filter ipv6 ipv6-filter-id [time-range time-range-name]
                - qos policy-id [time-range time-range-name] [priority priority]
                - no qos policy-id [time-range time-range-name]
```

6.18.1.1.7 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
```


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```
            - [no] script-policy policy-name [owner policy-owner]
                - expire-time {seconds | forever}
                - lifetime {seconds | forever}
                - max-completed unsigned
                - results file-url
                - no results
                - script script-name [owner script-owner]
                - no script
                - [no] shutdown
```

6.18.1.1.8 System port LAG MAC assignment commands for 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

```
config
    - system
        - port-lag-mac-assignment [v1-enable]
        - no port-lag-mac-assignment
```

6.18.1.1.9 System administration commands

```
root
    - admin
        - auto-init stop
        - check-golden-bootstrap
        - debug-save file-url
        - disconnect {address ip-address | username user-name | console | telnet | ftp | ssh |
 netconf}
        - display-config [detail | index]
        - [no] enable-tech
        - radius-discovery
        - reboot [upgrade][auto-init] [now]
        - save [file-url] [detail] [index]
        - set-time date / time
        - system
            - security
                - system-password admin-password
        - tech-support [file-url]
        - update-golden-bootstrap [file-url]
```

6.18.1.1.10 System alarm contact commands

```
config
    - system
        - alarm-contact-input alarm-contact-input-id
            - [no] alarm-output-severity [critical | major | minor | none]
            - [no] clear-alarm-msg {alarm-msg-txt}
            - description description-string
            - normal-state [open | closed]
            - [no] shutdown
            - [no] trigger-alarm-msg {alarm-msg-txt}
```


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6.18.1.1.11 System console commands

```
config
    - system
        - console
            - [no] use-console-alarm-input
```

6.18.1.1.12 System synchronization commands

```
config
    - system
        - sync-if-timing
            - abort
            - begin
            - commit
            - ptp
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec}
                - no ql-override
                - [no] shutdown
            - [no] ql-selection
            - ref-order first second third
            - no ref-order
            - ref1
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec |
 eec1 | eec2}
                - no ql-override
                - [no] shutdown
                - source-port port-id
                - no source-port
            - ref2
                - ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec |
 eec1 | eec2}
                - no ql-override
                - [no] shutdown
                - source-port port-id
                - no source-port
            - [no] revert
```

6.18.1.1.13 LLDP system commands

```
config>system
        - lldp
            - lldp-med
                - network-policy network-policy-id [create]
                - no network-policy network-policy-id
                - application-type {voice | voice-signaling | guest-voice | guest-voice-
signaling | soft-phone-voice | video-conferencing | streaming-video | video-signaling}
                - no application-type
                - dot1p dot1p-value
                - no dot1p
                - ip-dscp ip-dscp
                - no ip-dscp
                - vlan-id vlan-id
                - no vlan-id
                - [no] vlan-tag-present
            - message-fast-tx time
```


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```
            - 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
```

6.18.1.1.14 System resource-profile commands for 7210 SAS-D and 7210 SAS-Dxp

```
config
    - system
        - resource-profile
            - decommission
                - entry entry-id port port-range to port-range
                - no entry entry-id
            - egress-internal-tcam
                - acl-sap-egress [num-resources]
                - no acl-sap-egress
                    - ipv6-128bit-match-enable num-resources
                    - no ipv6-128bit-match-enable
                    - mac-ipv4-match-enable num-resources
                    - no mac-ipv4-match-enable
                    - mac-ipv6-64bit-match-enable num-resources
                    - no mac-ipv6-64bit-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - egress-sap-aggregate-meter num-resources
                - no egress-sap-aggregate-meter num-resources
                - mac-auth-res num-resources
                - no mac-auth-res
            - ingress-internal-tcam
                - acl-sap-ingress [num-resources]
                - no acl-sap-ingress
                    - ipv4-ipv6-128-match-enable num-resources
                    - no ipv4-ipv6-128-match-enable
                    - ipv4-match-enable num-resources
                    - no ipv4-match-enable
                    - ipv6-64-only-match-enable num-resources
                    - no ipv6-64-only-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - eth-cfm [num-resources]
                - no eth-cfm
                    - up-mep num-resources
                    - no up-mep
                - mac-auth-res num-resources
                - no mac-auth-res
                - qos-sap-ingress-resource num-resources
                - no qos-sap-ingress-resource
                    - ipv4-mac-match-enable num-resources
                    - no ipv4-mac-match-enable
                    - ipv4-match-enable num-resources
                    - no ipv4-match-enable
```


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```
                    - ipv6-ipv4-match-enable num-resources
                    - no ipv6-ipv4-match-enable
                    - mac-match-enable num-resources
                    - no mac-match-enable
                - sap-aggregate-meter  num-resources
                - no sap-aggregate-meter
```

6.18.1.1.15 System resource-profile commands for 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

```
config
    - system
        - resource-profile
            - egress-internal-tcam
                - acl-sap-egress [num-resources]
                - no acl-sap-egress
                    - mac-ipv4-ipv6-128-match-enable num-resources
                    - no mac-ipv4-ipv6-128-match-enable
                - eth-cfm-primary-vlan-enable
                - no eth-cfm-primary-vlan-enable
            - ingress-internal-tcam
                - acl-sap-ingress [num-resources]
                - no acl-sap-ingress
                    - mac-ipv4-ipv6-128-match-enable num-resources
                    - no mac-ipv4-ipv6-128-match-enable
                - no qos-sap-ingress-resource
                - qos-sap-ingress-resource num-resources
                    - mac-ipv4-ipv6-128-match-enable num-resources
                    - no mac-ipv4-ipv6-128-match-enable
```

6.18.1.1.16 Fan controller commands for 7210 SAS-D and 7210 SAS-D ETR variant with 128MB flash

```
config
    - system
        - fan {on | off | auto}
```

6.18.1.2 Show commands

```
show
    - alarm-contact-input alarm-contact-input-id [detail]
    - alarm-contact-input all
    - chassis [environment] [power-supply]
    - chassis
    - system
        - cron
            - schedule action-name [owner owner-name]
            - tod-suite tod-suite-name [detail] associations failed-associations
            - time-range name associations [detail]
        - connections [address ip-address [port port-number] [detail]
        - cpu [sample-period seconds]
        - information
        - lldp
        - lldp
```


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```
        - memory-pools
        - ntp [{peers | peer peer-address} | {servers | server server-address} | [all] [detail]
        - resource-profile [active | configured]
        - ptp
            - peer ip-address [router router-instance | service-name service-name] [detail]
            - peers [router router-instance | service-name service-name] [detail]
            - port port-id [detail]
            - statistics
            - unicast [router router-instance | service-name service-name]
        - sntp
        - sync-if-timing
        - script-control
            - script [script-name] [owner script-owner]
            - script-policy script-policy-name [owner owner-name]
            - script-policy run-history [run-state]
        - thresholds
        - time
        - time
    - oper-group [group-name]
    - oper-group group-name [detail]
    - oper-group group-name [monitoring]
    - uptime
```

6.18.1.3 Clear commands

```
clear
    - cron
    - screen
    - system
        - ptp inactive-peers
        - ptp peer ip-address statistics
        - ptp statistics
        - script-control
            - script-policy
                - completed [script-policy-name] [owner owner-name]
        - sync-if-timing {ref1 | ref2}
```

6.18.1.4 Debug commands

```
debug
    - sync-if-timing
        - force-reference {ref1 | ref2 | ptp}
        - no force-reference
    - [no] system
        - ntp [router router-name] [interface ip-int-name]
```

6.18.1.4.1 Fan controller debug command (applicable only to 7210 SAS-D and 7210 SAS-D ETR variant with 128MB flash)

```
tools
    - dump
        - fan-stats
```


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6.18.1.5 Tools commands

```
tools
    - perform
        - system
            - ssh
                - gen-keypair url-string curve {secp256r1 | secp384r1 | secp521r1} [secure-
download-type]
                - gen-keypair url-string ed25519 [secure-download-type]
                - gen-keypair url-string rsa key-size [secure-download-type]
```

6.18.2 Command descriptions

- Configuration commands
- Show commands
- Clear commands
- Debug commands
- Tools commands

6.18.2.1 Configuration commands

- Generic commands
- System information commands
- System alarm commands
- PTP commands
- Date and time commands
- System synchronization commands
- System administration commands
- System alarm contact commands
- LLDP system commands
- LLDP Ethernet port commands
- System resource-profile commands
- Fan controller commands

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6.18.2.1.1 Generic commands

shutdown

Syntax

[**no**] **shutdown**

Context

config>system>ptp

config>system>ptp>peer

config>system>ptp>port

config>system>time>ntp

config>system>time>sntp

config>system>cron>sched

config>system>script-control>script-policy

config>system>script-control>script

config>system>alarms

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command administratively disables the entity. When disabled, an entity does not change, reset, or remove any configuration settings or statistics.

The operational state of the entity is disabled as well as the operational state of any entities contained within. Many objects must be shut down before they may be deleted.

The **no** form of this command places the entity into an administratively enabled state.

Default

no shutdown

description

Syntax

description *description-string*

no description

Context

config>system>cron>sched

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config>system>cron>tod-suite

config>system>script-control>script

Platforms

Supported on all 7210 SAS platforms as described in this document

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.

Parameters

string

Specifies the description character string. Allowed values are any string up to 80 characters composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

6.18.2.1.2 System information commands

boot-bad-exec

Syntax

boot-bad-exec *file-url*

no boot-bad-exec

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures a URL for a CLI script to exec following a failure of a boot-up configuration. The command specifies a URL for the CLI scripts to be run following the completion of the boot-up configuration. A URL must be specified or no action is taken.

The commands are persistent between router reboots and are included in the configuration saves (**admin save**).

See the exec command for related commands. This command executes the contents of a text file as if they were commands entered at the console.

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Default

no boot-bad-exec

Parameters

file-url

Specifies the location and name of the CLI script file executed following failure of the boot-up configuration file execution. When this parameter is not specified, no CLI script file is executed.

Values *file url* — *local-url* | *remote-url*: 255 chars max

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

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

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

ipv4-address — a.b.c.d

cflash-id — cf1:

usb-flash-id — uf1:

boot-good-exec

Syntax

boot-good-exec *file-url*

no boot-good-exec

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures a URL for a CLI script to exec following the success of a boot-up configuration.

The **exec** 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 boot-up configuration file execution. When this parameter is not specified, no CLI script file is executed.

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Values *file url* — *local-url* | *remote-url*: 255 chars max
local-url — [*cflash-id*/ | *usb-flash-id*][file-path]
remote-url — [{ftp://} login:pswd@remote-locn/][file-path]
remote-locn — [*hostname* | *ipv4-address*]
ipv4-address — a.b.c.d
cflash-id — cf1:
usb-flash-id — uf1:

clli-code

Syntax

clli-code *clli-code*

no clli-code

Context

config>system

Platforms

Supported on all 7210 SASplatforms as described in this document

Description

This command creates a Common Language Location Identifier (CLLI) code string for the router. A CLLI code is an 11-character standardized geographic identifier that uniquely identifies geographic locations and specific functional categories of equipment unique to the telecommunications industry.

No CLLI validity checks other than truncating or padding the string to eleven characters are performed.

Only one CLLI code can be configured, if multiple CLLI codes are configured the last one entered overwrites the previous entry.

The **no** form of this command removes the CLLI code.

Parameters

clli-code

Specifies the 11 character string CLLI code. Any printable, seven bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes. If more than 11 characters are entered, the string is truncated. If less than 11 characters are entered the string is padded with spaces.

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config-backup

Syntax

config-backup *count*

no config-backup

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the maximum number of backup versions maintained for configuration files and BOF.

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.

`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 is performed for all configurations and their associated persistent index files.

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

Default

5

Parameters

count

Specifies the maximum number of backup revisions.

Values 1 to 9

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console

Syntax

console

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure console as an alarm-input-pin.

use-console-alarm-input

Syntax

[**no**] **use-console-alarm-input**

Context

config>system>console

Platforms

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

Description

This command provides an option to the user to use the console port on the 7210 SAS-D, 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, or 7210 SAS-K 3SFP+ 8C as an alarm-input pin. When this command is executed, the console port can be used as an alarm input pin. A single alarm-input pin can be enabled for use with the console port, allowing operators to monitor external events and alert the operator. For this command to take effect, the console must be enabled in the BOF.

The RXD and TXD pins of the console input is used to provide a single alarm input pin functionality and is used by the software to detect external events. The operating system detects an open or a close circuit which triggers an alarm and logs it when an event is detected.

After this command is executed, the console port can no longer be used as a console port, and the system generates a log message to convey this restriction. Additionally, the user needs to configure the **alarm-contact-input** parameter for console by using the **config system alarm-contact-input console-1** command (the console alarm-contact-input is identified with the ID = console-1).

The **no** form of this command disables use of console port as alarm-input interface.

Default

no use-console-alarm-input

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contact

Syntax

contact *contact-name*

no contact

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command creates a text string that identifies the contact name for the device.

Only one contact can be configured. If multiple contacts are configured, the last one entered overwrites the previous entry.

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

Parameters

contact-name

Specifies the contact name character string. The string can 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.

coordinates

Syntax

coordinates *coordinates*

no coordinates

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command creates a text string that identifies the system coordinates for the device location. The **coordinates** "37.390 -122.0550" command is read as latitude 37.390 north and longitude 122.0550 west.

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Only one set of coordinates can be configured. If multiple coordinates are configured, the last one entered overwrites the previous entry.

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

Parameters

coordinates

Specifies the coordinates describing the device location character string. The string may be up to 80 characters. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes. If the coordinates are subsequently used by an algorithm that locates the exact position of this node then the string must match the requirements of the algorithm.

lacp-system-priority

Syntax

lacp-system-priority *lacp-system-priority*

no lacp-system-priority

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the Link Aggregation Control Protocol (LACP) system priority on aggregated Ethernet interfaces. LACP allows the operator to aggregate multiple physical interfaces to form one logical interface.

Default

32768

Parameters

lacp-system-priority

Specifies the LACP system priority

Values 1 to 65535

location

Syntax

location *location*

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no location

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command creates a text string that identifies the system location for the device.

Only one location can be configured. If multiple locations are configured, the last one entered overwrites the previous entry.

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

Parameters

location

Specifies the location as a character string. The string may be up to 80 characters. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

login-control

Syntax

login-control

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure login control.

name

Syntax

name *system-name*

no name

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Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command creates a system name string for the device.

For example, system-name parameter ALA-1 for the **name** command configures the device name as ALA-1.

Only one system name can be configured. If multiple system names are configured, the last one encountered overwrites the previous entry.

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

Default

The default system name is set to the chassis serial number which is read from the backplane EEPROM.

Parameters

system-name

Specifies the system name as a character string. The string may be up to 32 characters. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

oper-group

Syntax

oper-group *name* [**create**]

no oper-group

Context

config>system

Platforms

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

Description

This command creates a system-wide group name which can be used to associate a number of service objects; for example, ports. The status of the group is derived from the status of its members. The status of the group can then be used to influence the status of non-member objects. For example, when a group status is marked as down, the objects that monitor the group change their status accordingly.

The **no** form of this command removes the group. All the object associations need to be removed before the no command can be executed.

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Default

no oper-group

Parameters

name

Specifies the operational group identifier, up to 32 characters.

create

Keyword to create the configuration context. After the context is created, it is possible to navigate into the context without the **create** keyword.

hold-time

Syntax

hold-time

Context

config>system>oper-group

Platforms

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

Description

Commands in this context configure hold time information.

group-down

Syntax

[**no**] **group-down** *time in seconds*

Context

config>system>oper-group>hold-time

Platforms

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

Description

This command configures the number of seconds to wait before notifying clients monitoring this group when its operational status transitions from down to up. A value of zero indicates that transitions are reported immediately to monitoring clients.

The **no** form reverts the value to the default.

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Default

0

Parameters

time in seconds

Specifies the wait time, in seconds.

Values 0 to 3600

group-up

Syntax

[**no**] **group-up** *time in seconds*

Context

config>system>oper-group>hold-time

Platforms

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

Description

This command configures the number of seconds to wait before notifying clients monitoring this group when its operational status transitions from up to down.

The **no** form reverts the value to the default.

Default

4

Parameters

time in seconds

Specifies the wait time, in seconds.

Values 0 to 3600

poe

Syntax

poe

Context

config>system

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Platforms

7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p

Description

Commands in this context configure power over Ethernet (PoE) power budget information.

max-poe-power-budget

Syntax

max-poe-power-budget *value*

no max-poe-power-budget

Context

config>system>poe

Platforms

7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p

Description

This command configures the maximum PoE budget that the software uses to allocate PoE power to connected PoE devices (PDs).

When configuring the *value* parameter, the user must consider the PD power requirements at a site and the available power based on the power supply, operating temperature, and operating altitude. See the *7210 SAS-Dxp 16p/24p Chassis Installation Guide* for more information about the formula to calculate the maximum PoE budget based on the operating altitude and temperature range for specific PoE power modules.

The software accounts for power requirements based on the PD type and does not consider the PoE class within a type. The following table lists the power requirements per PD type.

Table 34: PD power requirements

PD	Power requirement
PoE	15 W
PoE+	30 W
PoE++	60 W
HPoE	90 W

For example, if the user configures one PoE port, the software deducts 15 W from the configured **max-poe-power-budget**. If the user configures two PoE ports and two PoE + ports, the software deducts 90 W from the configured **max-poe-power-budget** (assuming the configured *value* is greater than or equal to 90 W). If the user configures a *value* of 100 W and attempts to configure four PoE+ ports, the software deducts 30 W from the configured **max-poe-power-budget** for the first three configured PoE+ ports using

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a total of 90 W (10 W are remaining). When the user configures the fourth port, the configuration fails because only 10 W are available, which does not meet the power requirement for the fourth PoE+ port.

Note:
The following configuration guidelines apply for this command.

- If power module redundancy is configured, use the lowest common denominator PoE power budget of the two available power modules to determine the available PoE power.
- If **no max-poe-power-budget** is configured, no PoE devices can be connected to the node.
- To modify the *module-type*, configure **no max-poe-power-budget**, change the *module-type*, and configure the correct **max-poe-power-budget** for the new *module-type*.
- The user cannot execute the **no max-poe-power-budget** command when PoE ports are enabled. Before configuring **no max-poe-power-budget**, the user must either shut down all PoE ports or remove the PoE configuration on all ports.

The **no** form of this command allocates 0 W for the PoE power budget.

Default

no max-poe-power-budget

Parameters

value

Specifies the maximum PoE power budget.

Note:
The MIB uses a common maximum value of 720 W for the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p, but the system displays an error message for the 7210 SAS-Dxp 16p when the value exceeds 540 W.

Values 15 W to 540 W, in multiples of 15 W(7210 SAS-Dxp 16p)
15 W to 720 W, in multiples of 15 W (7210 SAS-Dxp 24p)

power-supply

Syntax

power-supply [*power-supply-id*] *type* **power-module-type** *module-type*

Context

config>system

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, and 7210 SAS-Dxp 24p

Description

This command configures a power supply.

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By default, the software does not generate any traps or alarms for PS1 or PS2 when external power supply failure is detected. The user is provided with an option to configure the external backup power supply type on the 7210 SAS-Dxp 12p ETR and external power supply type on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p. The system generates an alarm or trap on a power supply failure only when the user configures the power supply *type* as **ac** or **dc**. The user can disable alarms or traps by setting the *type* value to **none**.

On the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p, the **power-module-type** parameter identifies the specific power supply module in use among the various modules supported on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p.

Note:

- If the value is **none**, the software does not send a trap to the management station to clear any pending alarms. Traps are only cleared locally and the LED color is reset if no major or critical alarms are pending. The management station is expected to take appropriate action upon receiving the configuration change event or trap.
- On the 7210 SAS-Dxp 12p ETR, this command does not affect any traps or alarms generated for the integrated power supply, which continue to be generated on detection of integrated power supply failure when an external power supply is in use.
- The 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, and 7210 SAS-Dxp 24p do not have the capability to detect whether the external power supply type is an AC or DC version. Consequently, the user-configured value is not validated by the software. The user is responsible for ensuring that the value is correct and it corresponds to the type of power supply (AC or DC) in use. If an incorrect value is configured, the software continues to display the configured value and generate traps or alarms.
- This command is only supported on the 7210 SAS-D ETR and 7210 SAS-Dxp 12p ETR. attempts to configure this command on the standard 7210 SAS-D and 7210 SAS-Dxp 12p causes the software to return an error message.
- On the standard 7210 SAS-Dxp 12p and 7210 SAS-Dxp 12p ETR variant, when a single power supply is used, failure of that power supply brings the node down. On loss of power, the user can configure EFM OAM dying gasp or SNMP IP-based dying gasp to send a power loss notification.

Parameters

power-supply-id

Specifies the power supply ID for which the type is to be applied.

Values 1, 2 (7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p)
2 (7210 SAS-D ETR and 7210 SAS-Dxp 12p ETR)

type

Specifies the type of power supply.

Values dc, ac, none

module-type

Specifies the power module type. This parameter is supported only on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p.

Values none, ac-100w, ac-480w, ac-960w, dc-290w

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power-supply

Syntax

power-supply [*power-supply-id*] *type*

Context

config>system

Platforms

7210 SAS-K 2F1C2T ETR

Description

This command configures the external power-supply type and also provides an option to the user to enable or disable notifications related to power supply. This command is recommended to be used when redundant power supplies are used with the 7210 SAS-K 2F1C2T ETR.

Note:
When a single power supply is used, failure of that power supply brings the node down and user has an option to use EFM OAM dying gasp or SNMP IP based dying gasp for sending out power loss notification.

On the 7210 SAS-K 2F1C2T ETR, by default, the software does not generate any traps or alarms when the external power-supply failure has been detected. The user is provided with an option to configure the external power-supply and its type. Only if the user configures the power-supply type as 'ac' or 'dc' the system generates alarm or trap on a power-supply failure. The user can disable generation of alarms or traps by setting the value to **none**.

Note:

- By setting the value to **none**, the software does not send out a trap to the management station to clear the alarm, if there was one pending. The **none** value only clears the trap locally and resets the LED color, if there are no other major or critical alarms pending. It is expected that the management station takes appropriate action on receiving the configuration change event or trap.
- The 7210 SAS-K 2F1C2T ETR does not have the capability to detect whether the external power-supply type is an AC or DC version. Therefore, the user-configured value is not validated by the software. The user is responsible for ensuring whether the value is correct and corresponds to what they are using. If users provide an incorrect value, the software continues to display the configured value and generate traps or alarms on detection of the power supply failure.
- The **power-supply** command is only supported on the 7210 SAS-K 2F1C2T ETR. If the **power-supply** command is used on the 7210 SAS-K 2F1C2T, the software returns an error message.

Parameters

power-supply-id

Specifies the power-supply for which the type is to be applied.

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Values 1, 2. Identifies the optional external backup power supply on the 7210 SAS-K 2F1C2T ETR

type

Specifies the type of power-supply.

Values ac, dc, none

6.18.2.1.3 System alarm commands

alarm

Syntax

alarm *rmon-alarm-id* **variable-oid** *oid-string* **interval** *seconds* [*sample-type*] [**startup-alarm** *alarm-type*] [**rising-event** *rmon-event-id* **rising-threshold** *threshold*] [**falling-event** *rmon-event-id* **falling threshold** *threshold*] [**owner** *owner-string*]

no alarm *rmon-alarm-id*

Context

config>system>thresholds>rmon

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This 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. This 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.

The **no** form of this command removes an *rmon-alarm-id* from the configuration.

Parameters

rmon-alarm-id

Specifies the *rmon-alarm-id* as a numerical identifier for the alarm being configured. The number of alarms that can be created is limited to 1200.

Values 1 to 65535

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variable-oid *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 may be expressed using either the dotted string notation or as object name plus dotted instance identifier. For example, "1.3.6.1.2.1.2.2.1.10.184582144" or "ifInOctets.184582144".

The *oid-string* has a maximum length of 255 characters

interval *seconds*

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds. In the case of **delta** type sampling, the interval should be set short enough that the sampled variable is very unlikely to increase or decrease by more than 2147483647 - 1 during a single sampling interval. To avoid creating unnecessary processing overhead, the interval value should not be set too low.

Values 1 to 2147483647

sample-type

Specifies the method of sampling the selected variable and calculating the value to be compared against the thresholds.

Values **absolute** — Specifies that the value of the selected variable is 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 is subtracted from the current value, and the difference compared with the thresholds.

Default absolute

startup-alarm *alarm-type*

Specifies the alarm that may be sent when this alarm is first created.

If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to **rising** or **either**, a single rising threshold crossing event is generated.

If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values rising, falling, either

Default either

rising-event *rmon-event-id*

Specifies the action to be taken when a rising threshold crossing event occurs.

If there is no corresponding event configured for the specified *rmon-event-id*, 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 is configured, the CLI requires a **rising-threshold** to also be configured.

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Values 0 to 65535

Default 0

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event is also 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 is not generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

Values -2147483648 to 2147483647

Default 0

falling-event *rmon-event-id*

Specifies the action to be taken when a falling threshold crossing event occurs. If there is no corresponding event configured for the specified *rmon-event-id*, no association exists and no action is taken. If the falling-event has a value of zero (0), no associated event exists.

If a falling event is configured, the CLI requires a falling-threshold to also be configured.

Values -2147483648 to 2147483647

Default 0

falling-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event is also generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to **falling** or **either**.

After a rising threshold crossing event is generated, another such event is not generated until the sampled value rises above this threshold and reaches greater than or equal the **rising-threshold** *threshold* value.

Values -2147483648 to 2147483647

Default 0

owner *owner*

Specifies 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 is not typically configured by CLI users and can be a maximum of 80 characters.

Default TiMOS CLI

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kb-memory-use-alarm

Syntax

kb-memory-use-alarm rising-threshold *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]

no kb-memory-use-warn

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures memory use, in kilobytes, alarm thresholds.

The **no** form of this command removes the parameters from the configuration.

Parameters

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event is also 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 is not generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

Values -2147483648 to 2147483647

Default 0

falling-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event is also 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 is not generated until the sampled value rises above this threshold and reaches greater than or equal the **rising-threshold** value.

Values -2147483648 to 2147483647

Default 0

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interval ***seconds***

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs

Values **log** — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, Telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm ***alarm-type***

Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value, and the 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

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command configures memory usage, in kilobytes, for warning thresholds

Parameters

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event is also 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 is not generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

Values -2147483648 to 2147483647

Default 0

falling-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event is also 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 is not generated until the sampled value rises above this threshold and reaches greater than or equal the **rising-threshold** value.

Values -2147483648 to 2147483647

Default 0

interval *seconds*

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs

Values **log** — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, Telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

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both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm *alarm-type*

Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to **rising** or **either**, a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values rising, falling, either

Default either

cflash-cap-alarm

Syntax

cflash-cap-alarm *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*][**startup-alarm** *alarm-type*]

no cflash-cap-alarm *cflash-id*

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document

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:, cf2:, uf1:, cf1-A:

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold

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crossing event is also 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 is not generated until the sampled value falls below this threshold and reaches less than or equal to the **falling-threshold** value.

Values -2147483648 to 2147483647

Default 0

falling-threshold ***threshold***

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event is also 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 is not generated until the sampled value raises above this threshold and reaches greater than or equal the rising-threshold value.

Values -2147483648 to 2147483647

Default 0

interval ***seconds***

Specifies the polling period, in seconds, over which the data is sampled and compared with the rising and falling thresholds.

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs.

Values **log** — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, Telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm ***alarm-type***

Specifies the alarm that may be sent when this alarm is first created.

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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

cflash-cap-warn

Syntax

cflash-cap-warn *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]

no cflash-cap-warn *cflash-id*

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command enables capacity monitoring of the compact flash specified in this command. The severity level is warning. Both a rising and falling threshold can be specified. The no form of this command removes the configured compact flash threshold warning.

Parameters

cflash-id

Specifies the name of the cflash device to be monitored.

Values cf1:, cf2:, uf1:, cf1-A:

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event is also 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 is not 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

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falling-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event is also 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 is not generated until the sampled value raises above this threshold and reaches greater than or equal the **rising-threshold** value.

Values -2147483648 to 2147483647

Default 0

interval *seconds*

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs.

Values **log** — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, Telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm *alarm-type*

Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to **rising** or **either**, 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

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event

Syntax

event *rmon-event-id* [*event-type*] [**description** *description-string*] [**owner** *owner-string*]

no event *rmon-event-id*

Context

config>system>thresholds>rmon

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures an entry in the RMON-MIB event table. The **event** command controls the generation and notification of threshold crossing events configured with the alarm command. When a threshold crossing event is triggered, the **rmon>event** configuration optionally specifies if an entry in the RMON-MIB log table should be created to record the occurrence of the event. It may also specify that an SNMP notification (trap) should be generated for the event. The RMON-MIB defines two notifications for threshold crossing events: Rising Alarm and Falling Alarm.

Creating an event entry in the RMON-MIB log table does not create a corresponding entry in the TiMOS event logs. However, when the event type is set to **trap**, the generation of a Rising Alarm or Falling Alarm notification creates an entry in the TiMOS event logs and that is distributed to whatever TiMOS log destinations are configured: CONSOLE, session, memory, file, syslog, or SNMP trap destination.

The TiMOS logger message includes a rising or falling threshold crossing event indicator, the sample type (absolute or delta), the sampled value, the threshold value, the RMON-alarm-id, the associated RMON-event-id and the sampled SNMP object identifier.

The **no** form of this command removes an *rmon-event-id* from the configuration.

Parameters

rmon-event-type

Specifies the type of notification action to be taken when this event occurs.

Values **log** — An entry is made in the RMON-MIB log table for each event occurrence.

This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, Telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

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Default both

description description-string

Specifies a user configurable string that can be used to identify the purpose of this event. This is an optional parameter and can be up to 80 characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

owner *owner*

Specifies the creator of this alarm. 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 is not typically configured by CLI users and can be a maximum of 80 characters.

Default TiMOS CLI

memory-use-alarm

Syntax

memory-use-alarm rising-threshold *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]

no memory-use-alarm

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document

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 **no** form of this command removes the configured memory threshold warning.

Parameters

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event is also 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 is not generated until the sampled value falls below this threshold and reaches less than or equal the **falling-threshold** value.

Values -2147483648 to 2147483647

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Default 0

falling-threshold ***threshold***

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event is also 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 is not generated until the sampled value raises above this threshold and reaches greater than or equal the **rising-threshold** *threshold* value.

Values -2147483648 to 2147483647

Default 0

interval ***seconds***

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs

Values **log** — An entry is made in the RMON-MIB log table for each event occurrence. This does not create an OS logger entry. The RMON-MIB log table entries can be viewed using the CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, Telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm ***alarm-type***

Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to **rising** or **either**, 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

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memory-use-warn

Syntax

memory-use-warn rising-threshold *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]

no memory-use-warn

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

The memory thresholds are based on monitoring MemoryUsed object. This object contains the amount of memory currently used by the system. The severity level is Alarm.

The absolute sample type method is used.

The **no** form of this command removes the configured compact flash threshold warning.

Parameters

rising-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold. A single threshold crossing event is also 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 is not generated until the sampled value falls below this threshold and reaches less than or equal the **falling-threshold** value.

Values -2147483648 to 2147483647

Default 0

falling-threshold *threshold*

Specifies a threshold for the sampled statistic. A single threshold crossing event is generated when the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold. A single threshold crossing event is also 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 is not generated until the sampled value raises above this threshold and reaches greater than or equal the **rising-threshold** *threshold* value.

Values -2147483648 to 2147483647

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Default 0

interval *seconds*

Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 to 2147483647

rmon-event-type

Specifies the type of notification action to be taken when this event occurs.

Values **log** — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, Telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default both

startup-alarm *alarm-type*

Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to **rising** or **either**, 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

rmon

Syntax

rmon

Context

config>system>thresholds

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

Commands in this context configure generic RMON alarms and events.

Generic RMON alarms can be created on any SNMP object-ID that is valid for RMON monitoring (for example, an integer-based datatype).

The configuration of an event controls the generation and notification of threshold crossing events configured with the **alarm** command.

thresholds

Syntax

thresholds

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure monitoring thresholds.

6.18.2.1.4 PTP commands

ptp

Syntax

ptp

Context

config>system

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

Commands in this context configure parameters for IEEE 1588-2008, Precision Time Protocol (PTP).

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anno-rx-timeout

Syntax

anno-rx-timeout *count*

no anno-rx-timeout

Context

config>system>ptp

Platforms

7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the PTP announce receipt timeout count in the Announce message.

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

Default

anno-rx-timeout 3

Parameters

count

Specifies the PTP announce receipt timeout count.

Values 2 to 10

clock

Syntax

clock

Context

config>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

Commands in this context configure the source of frequency reference for PTP.

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freq-source

Syntax

freq-source *freq-source*

no freq-source

Context

config>system>ptp>clock

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command provides a stable frequency reference obtained through one of the line references (SyncE) for the PTP clock. This is achieved by specifying **ssu** as the frequency source for PTP. This mode of operation where PTP is used only for time recovery and SyncE is used for frequency recovery is known as PTP hybrid mode.

If set to **ssu**, PTP runs in hybrid mode (if PTP is also in a **no shutdown** state), using the recovered frequency provided by the central clock through the configured reference (SyncE). When this parameter is set to **ssu**, PTP cannot be configured as a reference in the **ref-order**. The CLI blocks this configuration. The reverse is also true; that is, if PTP is configured under **ref-order**, this parameter cannot be set to **ssu**.

If set to **ptp**, PTP runs in pure mode, potentially being configured as a frequency reference in **ref-order**.

Note:
If the *freq-source* value is changed, the system must be rebooted after the configuration changes are saved in order for the new value to take effect.

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

Default

freq-source ptp

Parameters

freq-source

Specifies if PTP is used for frequency and time recovery or only for time recovery. If **ptp** is specified, PTP is used for both frequency and time recovery. If **ssu** is specified, PTP is used only for time recovery.

The **ptp** option is not supported on the 7210 SAS-Dxp 12p ETR.

Values ptp, ssu

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clock-type

Syntax

clock-type boundary

clock-type ordinary slave

Context

config>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the type of clock. The **clock-type** can only be changed when PTP is shut down.

Default

clock-type ordinary slave

Parameters

boundary

Keyword to configure the clock as a boundary clock capable of functioning as both a timeTransmitter and timeReceiver concurrently.

ordinary slave

Keyword to configure the clock as an ordinary PTP timeReceiver. This keyword is not supported on the 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, and 7210 SAS-Dxp 24p.

domain

Syntax

domain *domain-value*

no domain

Context

config>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

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Description

This command configures the PTP domain.

Note:

- Some profiles may require a domain number in a restricted range. It is up to the operator to ensure that the value aligns with what is expected within the profile.
- Available domain numbers are restricted by the profile that is supported on the specific 7210 SAS platform.
- The 7210 SAS-Dxp 12p ETR supports only the IEEE 1558-2008 profile, G.8275.1 profile, and the corresponding domain numbers.
- The 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p also support the IEEE 1558-2008 and G.8275.1 profiles.
- The IEC/IEEE 61850-9-3 and C37.238-2017 profiles and corresponding domain numbers are supported only on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p.

The domain can be changed only if PTP is shut down.

If the PTP profile is changed, the domain is changed to the default domain for the new PTP profile.

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

Default

domain 0 (**ieee1588-2008** or **iec-61850-9-3-2016**)

domain 4 (**g8265dot1-2010**)

domain 24 (**g8275dot1-2014**)

domain 254 (**c37dot238-2017**)

Parameters

domain-value

Specifies the PTP domain.

Values 0 to 255 (**ieee1588-2008**, **g8265dot1-2010**, **iec-61850-9-3-2016**, or **c37dot238-2017**)

24 to 43 (**g8275dot1-2014**)

local-priority

Syntax

local-priority *priority*

local-priority *local-priority* (under the **peer** context)

Context

config>system>ptp

config>system>ptp>peer (supported only on 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C)

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config>system>ptp>port (supported only on 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C)

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the local priority used to choose between PTP timeTransmitters in the best timeTransmitter clock algorithm (BTCA). This setting is relevant when the profile is set to **g8265dot1-2010** or **g8275dot1-2014**. The parameter is ignored when the profile is set to **ieee1588-2008**.

The value 1 is the highest priority and 255 is the lowest priority.

For **g8265dot1-2010**, this command sets the priority to select between timeTransmitter clocks with the same quality.

For **g8275dot1-2014**, this command sets the value of the local priority associated with the Announce messages received from the external clocks (**ptp>peer** or **ptp>port**), or the local clock (PTP).

Note:
The 7210 SAS-Dxp 12p ETR supports only the G8275.1 profile.

Default

local-priority 128

Parameters

priority

Specifies the value of the local priority.

Values 1 to 255

log-anno-interval

Syntax

log-anno-interval *log-interval*

no log-anno-interval

Context

config>system>ptp

Platforms

7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the PTP Announce interval.

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This command applies only when the profile is set to **g8275dot1-2014**, **iec-61850-9-3-2016**, or **c37dot238-2017**.

Note: The IEC/IEEE 61850-9-3 and C37.238-2017 profiles are supported only on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p

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

Default

log-anno-interval -3 (**g8275dot1-2014**)

log-anno-interval 0 (**iec-61850-9-3-2016** or **c37dot238-2017**)

Parameters

log-interval

Specifies the PTP Announce interval, in seconds, as the logarithm to the base 2.

Values –3, where –3 = 0.125 s (**g8275dot1-2014**)

–3 to 4, where –3 = 0.125 s, –2 = 0.25 s, –1 = 1 s, 1 = 2 s, 2 = 4 s, 3 = 8 s, 4 = 16 s (**iec-61850-9-3-2016** or **c37dot238-2017**)

log-sync-interval

Syntax

log-sync-interval *value*

no log-sync-interval

Context

config>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the PTP Sync and PTP Delay-Req message rate that a PTP timeReceiver requests of a PTP timeTransmitter. The value specified is used as the rate for both PTP Sync and Delay-Req messages. The user can set a lower packet rate, typically when using SyncE for frequency and PTP, for time only.

This command applies only if the profile is set to **ieee1588-2008** or **g8265dot1-2010**. It does not apply when **g8275dot1-2014** is configured. When the profile is set to **g8275dot1-2014**, the value is set to –4 (16 packets/s) and cannot be changed.

Note:

- The 7210 SAS-Dxp 12p ETR supports both the IEEE 1588-2008 and G8275.1 profiles.

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- The IEC/IEEE 61850-9-3 and C37.238-2017 profiles are supported only on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p.
- For the 7210 SAS-D ETR, it is recommended that the packet rate be set to either –4 or –3.

For multicast messages used on PTP Ethernet ports, this command configures the message interval used for synchronization messages transmitted by the local node when the port is in the timeTransmitter state.

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

Default

log-sync-interval –6 (64 pps) for **ieee1588-2008** or **g8265dot1-2010**

log-sync-interval –4 (16 pps) for **g8275dot1-2014**

log-sync-interval 0 (1 pps) for **iec-61850-9-3-2016** or **c37dot238-2017**

Parameters

value

Specifies the rate for both PTP Sync and Delay-Req messages.

Values –6 to –3, where –6 = 64 packets/s, –5 = 32 packets/s, –4 = 16 packets/s, –3 = 8 packets/s (for the **ieee1588-2008** or **g8265dot1-2010** profiles)

–4, where –4 = 16 packets/s (for the **g8275dot1-2014** profile)

–6 to 0, where –6 = 64 packets/s, –5 = 32 packets/s, –4 = 16 packets/s, –3 = 8 packets/s, –2 = 4 packets/s, –1 = 2 packets/s, 0 = 1 packet/s (for the **iec-61850-9-3-2016** or **c37dot238-2017** profiles)

network-type

Syntax

network-type {**sdh** | **sonet**}

Context

config>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the codeset used to encode the QL values into PTP clockClass values when the profile is configured for G.8265.1. The codeset is defined in G.8265.1, Table 1.

This setting only applies to the range of values observed in the clockClass values transmitted out of the node in Announce messages. The 7210 SAS supports the reception of any valid value in G.8265.1, Table 1.

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Default

nework-type sdh

Parameters

sdh

Specifies the values used on a G.781 Option 1 compliant network.

sonet

Specifies the values used on a G.781 Option 2 compliant network.

peer

Syntax

peer *ip-address* [**create**]

no peer *ip-address*

Context

config>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

Commands in this context configure parameters associated with remote PTP peers.

Note:
The maximum supported number of PTP peers depends on the supported PTP PPS rate on 7210 SAS platforms. Contact a Nokia representative for more information.

If the **clock-type** is **ordinary slave** or **boundary**, and PTP is not shut down, the last peer cannot be deleted. This prevents the user from having PTP enabled without any peer configured and enabled.

The **no** form of this command deletes the specified peer.

Parameters

ip-address

Specifies the IPv4 address of the remote peer.

Values a.b.c.d

create

Keyword to create the peer.

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shutdown

Syntax

[**no**] **shutdown**

Context

configure>system>ptp>peer

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command disables a specific PTP peer. Shutting down a peer sends cancel unicast negotiation messages on any established unicast sessions. When the peer is shut down, all received packets from the peer are ignored.

If the **clock-type** is **ordinary slave** or **boundary**, and PTP is not shut down, the last enabled peer cannot be shut down. This prevents the user from having PTP enabled without any peer configured and enabled.

The **no** form of this command enables a specific PTP peer.

Default

no shutdown

port

Syntax

port *port-id* [**create**]

no port *port-id*

Context

config>system>ptp

Platforms

7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

Commands in this context configure PTP over Ethernet on the physical port. The PTP process transmits and receives PTP messages through the port using Ethernet encapsulation (as opposed to UDP/IPv4 encapsulation).

The frames are transmitted with no VLAN tags even if the port is configured for dot1q or QinQ modes for **encap-type**. In addition, the received frames from the external PTP clock must also be untagged.

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There are two reserved multicast addresses allocated for PTP messages. See IEEE 1588-2008 Annex F and the address command for more information. Either address can be configured for the PTP messages sent through this port.

This command applies only if the PTP profile is set to g8275dot1-2014, iec-61850-9-3-2016 or c37dot238-2017.

Changing the encapsulation or the port type of the Ethernet port is not permitted when PTP Ethernet multicast operation is configured on the port. To change the encapsulation or port type, the physical port must be shut down.

The **no** form of this command deletes the specified port.

Parameters

port-id

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

create

Keyword to create a port.

address

Syntax

address {**01:1b:19:00:00:00** | **01:80:c2:00:00:0e**}

Context

config>system>ptp>port

Platforms

7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the MAC address to be used as the multicast destination address for transmitted PTP messages.

This command applies only if **profile** is set to g8275dot1-2014, iec-61850-9-3-2016 or c37dot238-2017.

The IEEE 1588-2008 Annex F defines two reserved addresses for PTP messages, as follows:

- 01-1B-19-00-00-00 — for all messages except peer delay mechanism messages
- 01-80-C2-00-00-0E — for peer delay mechanism messages

The system accepts PTP messages received using either destination MAC address, regardless of the address configured by this command.

Default

address 01:1b:19:00:00:00

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master-only

Syntax

master-only {**true** | **false**}

Context

config>system>ptp>port

Platforms

7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command prevents the local port from ever entering the timeReceiver state. This can be used to ensure that the 7210 SAS never draws synchronization from the attached external device.

This command applies only if **profile** is set to **g8275dot1-2014**.

Parameters

true

Keyword to prevent the local port from entering the timeReceiver state.

false

Keyword to allow the local port to enter the timeReceiver state or timeTransmitter state.

shutdown

Syntax

[**no**] **shutdown**

Context

configure>system>ptp>port

Platforms

7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command disables a specific PTP port. When the PTPT port is shut down, all PTP Ethernet messages are dropped on the IOM. They are not counted in the PTP message statistics. No PTP packets are transmitted by the node toward this port.

If the clock-type is **ordinary slave** or **boundary**, and PTP is not shut down, the last enabled port cannot be shut down. This prevents the user from having PTP enabled without any means to synchronize the local clock to a parent clock.

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This command applies only if **profile** is set to **g8275dot1-2014**, **iec-61850-9-3-2016**, or **c37dot238-2017**.

The **no** form of this command enables a specific PTP port.

Default

no shutdown

priority1

Syntax

priority1 *priority*

no priority1

Context

config>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the priority1 value of the local clock. This command applies only if the profile is set to ieee-1588-2008, iec-61850-9-3-2016, or c37dot238-2017. This value is used by the BTCA to determine which clock should provide timing for the network. It is also used as the advertised value in Announce messages and as the local clock value in data set comparisons.

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

Default

priority1 128

Parameters

priority

Specifies the value of the priority1 field.

Values 0 to 255

priority2

Syntax

priority2 *priority*

no priority2

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Context

config>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the priority2 value of the local clock. This parameter is only used when the profile is set to **ieee1588-2008**, **g8275dot1-2014**, **iec-61850-9-3-2016**, or **c37dot238-2017**.

This value is used by the BTCA to determine which clock should provide timing for the network. It is also used as the advertised value in Announce messages and as the local clock value in data set comparisons.

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

Default

priority2 128

Parameters

priority

Specifies the value of the priority2 field.

Values 0 to 255

profile

Syntax

profile {**g8265dot1-2010** | **ieee1588-2008** | **g8275dot1-2014** | **iec-61850-9-3-2016** | **c37dot238-2017**}

Context

config>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the profile for the internal PTP clock. This profile defines the BTCA behavior.

The profile cannot be changed unless PTP is shut down.

When the profile is changed, the domain is changed to the default value for the new profile. On the 7210 SAS platforms, a profile change requires a node reboot. See Configuration guidelines and restrictions for PTP for more information.

Descriptions for commands in the **config>system>ptp** context indicate whether the command is applicable based on the configured profile.

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Default

profile g8265dot1-2010

Parameters

g8265dot1-2010

Keyword to conform to the ITU-T G.8265.1 specification.

ieee1588-2008

Keyword to conform to the 2008 version of the IEEE 1588 standard.

g8275dot1-2014

Keyword to conform to the ITU-T G.8275.1 specification. This profile is supported only on the 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C.

iec-61850-9-3-2016

Keyword to conform to the IEC/IEEE 61850-9-3 specification. This profile is supported only on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p.

c37dot238-2017

Keyword to conform to the C37.238-2017 specification. This profile is supported only on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p.

transit-ptp-pkts

Syntax

[**no**] **transit-ptp-pkts**

Context

config>system>ptp

Platforms

7210 SAS-Dxp 24p

Description

This command configures the processing behavior for transit PTP packets. When this command is enabled, PTP packets that are received on ports 1/1/17 to 1/1/20 and forwarded by the node, the correction field in the PTP header is updated correctly to only account for the data plane processing delay incurred by the packet. Additionally, PTP messages used for clock recovery by the node are not fully compensated for the delay incurred when received and sent on ports 1/1/17 to 1/1/20.

The **no** form of this command disables transit PTP packets. When disabled, the node provides improved delay compensation for PTP messages received on ports 1/1/17 to 1/1/20 and used for clock recovery, improving the accuracy of the recovered clock. The correction field in PTP transit packets may also be updated incorrectly. Therefore, users must ensure that no PTP packets transit the node through ports 1/1/17 to 1/1/20 using the appropriate network design. PTP packets are allowed to transit the node if the packets do not enter the node through ports 1/1/17 to 1/1/20.

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Note:
The **transit-ptp-pkts** command does not have any affect unless **ptp-hw-timestamp** is enabled.

Default

transit-ptp-pkts

6.18.2.1.5 Date and time commands

set-time

Syntax

set-time [*date*] [*time*]

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the local system time.

The time entered should be accurate for the time zone configured for the system. The system converts the local time to UTC before saving to the system clock which is always set to UTC. This command does not take into account any daylight saving offset if defined.

Parameters

date

Specifies the local date and time accurate to the minute in the *YYYY/MM/DD* format.

Values *YYYY* is the four-digit year
MM is the two-digit month
DD is the two-digit date

time

Specifies the time (accurate to the second) in the *hh:mm[:ss]* format. If no seconds value is entered, the seconds are 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

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time

Syntax

time

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure the system time zone and time synchronization parameters.

6.18.2.1.6 Network Time Protocol Commands

ntp

Syntax

[**no**] **ntp**

Context

config>system>time

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure Network Time Protocol (NTP) and its operation. This protocol defines a method to accurately distribute and maintain time for network elements. Furthermore this capability allows for the synchronization of clocks between the various network elements.

The **no** form of this command stops the execution of NTP and remove its configuration.

authentication-check

Syntax

[**no**] **authentication-check**

Context

config>system>time>ntp

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command skips 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-checks

authentication-key

Syntax

authentication-key *key-id* {**key** *key*} [**hash** | **hash2**] **type** {**des** | **message-digest**}

no authentication-key *key-id*

Context

config>system>time>ntp

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command sets the authentication key ID, type and key used to authenticate NTP PDUs sent to or received by other network elements participating in the NTP protocol. For authentication to work, the authentication key ID, type and key value must match.

The **no** form of this command removes the authentication key.

Parameters

key-id

Specifies the authentication key ID that is 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 results in overriding the existing entry.

Recipients of the NTP packets must have the same authentication key ID, type, and key value to use the data transmitted by this node.

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Values 1 to 255

key key

Specifies the authentication key associated with the configured key ID, the value configured in this parameter is the actual value used by other network elements to authenticate the NTP packet.

The key can be any combination of ASCII characters up to maximum 32 characters for message-digest (MD5) or maximum 8 characters for des (length limits are not encrypted). If spaces are used in the string, enclose the entire string in quotation marks (".").

hash

Specifies that the key is entered in an encrypted form. If the **hash** or **hash2** parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security, all keys are stored in an encrypted form in the configuration file with the **hash** or **hash2** parameter specified.

hash2

Specifies that the key is entered in a more complex encrypted form that involves more variables than the key value alone; that is, 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 a non-encrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the **hash** or **hash2** parameter specified.

type

Specifies if DES or message-digest authentication is used.

Values **des** — Specifies that DES authentication is used for this key

message-digest — Specifies that MD5 authentication in accordance with RFC 2104 is used for this key

authentication-keychain

Syntax

authentication-keychain *name*

no authentication-keychain

Context

config>system>time>ntp

Platforms

7210 SAS-Dxp, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the authentication keychain used to handle unsolicited NTP requests.

If the system receives a request with a key ID that matches both the configured key and the keychain, the system checks the MAC ID using the key information first. If the key authentication fails, the system then checks the MAC ID using the information from the keychain.

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The **no** form of this command removes the authentication keychain.

Default

no authentication-keychain

Parameters

name

Specifies the keychain name, up to 32 characters.

broadcast

Syntax

broadcast [**router** *router-name*] {**interface** *ip-int-name*} [**key-id** *key-id* | **authentication-keychain** *name*] [**version** *version*] [**ttl** *ttl*]

no broadcast [**router** *router-name*] {**interface** *ip-int-name*}

Context

config>system>time>ntp

Platforms

7210 SAS-D, 7210 SAS-Dxp

Description

This command configures the node to transmit NTP packets on a specific interface. Broadcast messages can easily be spoofed, therefore, 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 and the only router name supported currently.

Values Base

Default Base

ip-int-name

Specifies the local interface on which to transmit NTP broadcast packets, up to 32 characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

key-id *key-id*

Specifies the 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

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is received by this node both authentication key and authentication type must be valid otherwise the packet is rejected and an event/trap generated.

Values 1 to 255

authentication-keychain *name*

Specifies the keychain name, up to 32 characters.

version *version*

Specifies the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode in which case all versions are accepted.

Values 2 to 4

Default 4

ttl *ttl*

Specifies the IP Time To Live (TTL) value.

Values 1 to 255

broadcastclient

Syntax

broadcastclient [**router** *router-name*] {**interface** *ip-int-name*} [**authenticate**]

no broadcastclient [**router** *router-name*] {**interface** *ip-int-name*}

Context

config>system>time>ntp

Platforms

7210 SAS-D, 7210 SAS-Dxp

Description

When configuring NTP, the node can be configured to receive broadcast packets on a specific subnet. Broadcast messages can easily be spoofed, therefore, authentication is strongly recommended. If broadcast is not configured then received NTP broadcast traffic is ignored. Use the show command to view the state of the configuration.

The **no** form of this command removes the address from the configuration.

Parameters

router-name

Specifies the router name used to receive NTP packets.

Values Base

Default Base

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ip-int-name

Specifies the local interface on which to receive NTP broadcast packets, up to 32 characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

authenticate

Specifies whether to require authentication of NTP PDUs. When enabled, NTP PDUs are authenticated upon receipt.

ntp-server

Syntax

ntp-server [**authenticate**]

no ntp-server

Context

config>system>time>ntp

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the node to assume the role of an NTP server. Unless the server command is used, this node functions as an NTP client only and does not distribute the time to downstream network elements.

Default

no ntp-server

Parameters

authenticate

Specifies authentication as a requirement. If authentication is required, the authentication key ID received in a message must have been configured in the **authentication-key** command, and the key ID type and value must also match.

peer

Syntax

peer *ip-address* [**key-id** *key-id*] [**version** *version*] [**prefer**] [**authentication-keychain** *name*]

no peer *ip-address*

Context

config>system>time>ntp

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command 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.

The **no** form of this command removes the configured peer.

Parameters

ip-address

Specifies the IP address of the peer that requires a peering relationship to be set up. This is a required parameter.

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

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

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

x - [0 to FFFF]H

d - [0 to 255]D

key-id *key-id*

Specifies 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 this node, the authentication key ID, type, and key value must be valid, otherwise the packet is rejected and an event/trap generated. Successful authentication requires that both peers must have configured the same authentication key ID, type, and key value.

Values 1 to 255

version *version*

Specifies the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode in which case all three nodes are accepted.

Values 2 to 4

Default 4

prefer

Specifies the preferred 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.

authentication-keychain *name*

Specifies the keychain name, up to 32 characters.

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server

Syntax

server {*ip address* | **ptp**} [**key-id** *key-id*] [**version** *version*] [**prefer**] [**authentication-keychain** *name*]

no server *ip address*

Context

config>system>time>ntp

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command is used when the node operates in client mode with the ntp server specified in the address field of this command.

Up to five NTP servers can be configured.

If the internal PTP process is to be used as a source of time for System Time and OAM time, it must be specified as a server for NTP. If PTP is specified, the prefer parameter must also be specified. After PTP has established a UTC traceable time from an external grandmaster, it is always the source for time into NTP, even if PTP goes into time holdover.

Note:
Use of the internal PTP time source for NTP promotes the internal NTP server to stratum 1 level. This may impact the NTP network topology.

The **no** form of this command removes the server with the specified address from the configuration.

Parameters

ip-address

Specifies the IP address of a node that acts as an NTP server to this network element. This is a required parameter.

Values

ipv4-address - a.b.c.d

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

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

x - [0 to FFFF]H

d - [0 to 255]D

ptp

Keyword to configure the internal PTP process as a time server into the NTP process. The **prefer** keyword is mandatory with this server option. The **ptp** keyword is supported only

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on the 7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C.

key-id *key-id*

Specifies the configured authentication key and authentication type used by this node to transmit NTP packets to an NTP server. If an NTP packet is received by this node, the authentication key ID, type, and key value must be valid, otherwise the packet is rejected and an event/trap generated. This is an optional parameter.

Values 1 to 255

version *version*

Specifies the NTP version number that is expected by this node..

Values 2 to 4

Default 4

prefer

Specifies the preferred peer. When configuring more than one peer, one remote system can be configured as the preferred peer. When a second peer is configured as preferred, then the new entry overrides the old entry.

authentication-keychain *name*

Specifies the keychain name, up to 32 characters.

6.18.2.1.7 SNTP Commands

sntp

Syntax

[**no**] **sntp**

Context

config>system>time

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context edit the Simple Network Time Protocol (SNTP).

SNTP can be configured in either broadcast or unicast client mode. SNTP is a compact, client-only version of the NTP. SNTP can only receive the time from SNTP/NTP servers. It cannot be used to provide time services to other systems.

The system clock is adjusted automatically during system initialization and periodically to ensure that the local time is close to server's time. However, if the time difference between the SNTP/NTP server and the

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system clock is more than 2.5 seconds, the software corrects the system time gradually adjusted over an interval.

SNTP is created in an administratively enabled state (**no shutdown**).

The **no** form of this command removes the SNTP instance and configuration. SNTP does not need to be administratively disabled when removing the SNTP instance and configuration.

Default

no sntp

broadcast-client

Syntax

[**no**] **broadcast-client**

Context

config>system>time>sntp

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command enables listening to SNTP/NTP broadcast messages on interfaces with broadcast client enabled at global device level.

SNTP must be shut down before changing either to or from broadcast mode.

The **no** form of this command disables broadcast client mode.

Default

no broadcast-client

server-address

Syntax

server-address *ip-address* [**version** *version-number*] [**normal** | **preferred**]

[**interval** *seconds*]

no server-address

Context

config>system>time>sntp

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command creates an SNTP server for unicast client mode.

Parameters

ip-address

Specifies the IP address of the SNTP server.

version *version-number*

Specifies the SNTP version supported by this server.

Values 1 to 3

Default 3

normal | preferred

Specifies the preference value for this SNTP server. When more than one time-server is configured, one server can have preference over others. The value for that server should be set to **preferred**. Only one server in the table can be a preferred server.

Default normal

interval *seconds*

Specifies the frequency at which this server is queried.

Values 64 to 1024

Default 64

6.18.2.1.8 CRON Commands

cron

Syntax

cron

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context create scripts, script parameters and schedules which support the Service Assurance Agent (SAA) functions.

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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 is determined by the contents of the script.

schedule

Syntax

[**no**] **schedule** *schedule-name* [**owner** *schedule-owner*]

Context

config>system>cron

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the type of schedule to run, including one-time only (oneshot), periodic or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds).

The **no** form of this command removes the context from the configuration.

Parameters

schedule-name

Specifies the name of the schedule.

owner *schedule-owner*

Specifies the owner name of the schedule.

count

Syntax

count *number*

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document

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.

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Parameters

number

Specifies the number of times the schedule is run.

Values 1 to 65535

Default 65535

day-of-month

Syntax

[**no**] **day-of-month** {*day-number* [**..***day-number*] **all**}

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures which days of the month that the schedule occurs. Multiple days of the month can be specified. When multiple days are configured, each of them causes the schedule to trigger. If a day-of-month is configured without configuring the **month**, **weekday**, **hour** and **minute** commands, the event does not execute.

Using the **weekday** command as well as the **day-of-month** command causes the script to run twice. For example, consider that "today" is Monday January 1. If "Tuesday January 5" is configured, the script runs on Tuesday (tomorrow) as well as January 5 (Friday).

See the month, weekday, hour, and minute commands for more information.

The **no** form of this command removes the specified day-of-month from the list.

Parameters

day-number

Specifies the day of the month counting from the first of the month. The negative integers specify the day of the month counting from the last day of the month. For example, configuring **day-of-month -5, 5** in a month that has 31 days configures the schedule to occur on the 27th and 5th of that month.

Integer values must map to a valid day for the month in question. For example, February 30 is not a valid date.

Values 1 to 31, -31 to -1 (maximum 62 day-numbers)

all

Specifies all days of the month.

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end-time

Syntax

[**no**] **end-time** [*date* | *day-name*] *time*

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command is used concurrently with type **periodic** or **calendar**. Using the type of **periodic**, end-time determines at which interval the schedule ends. Using the type of **calendar**, end-time determines on which date the schedule ends.

When **no end-time** is specified, the schedule runs forever.

Parameters

date

Specifies the date to schedule a command

Values YYYY:MM:DD in year:month:day number format.

day-name

Specifies the day of the week to schedule a command.

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday

time

Specifies the time of day to schedule a command.

Values hh:mm in hour:minute format

hour

Syntax

[**no**] **hour** {**..***hour-number* [**..***hour-number*]| **all**}

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command configures which hour to schedule a command. Multiple hours of the day can be specified. When multiple hours are configured, each of them causes 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 the **month**, **weekday**, **day-of-month**, and **minute** commands, the event does not execute.

See the month, weekday, day-of-month, and minute commands for more information.

The **no** form of this command removes the specified hour from the configuration.

Parameters

hour-number

Specifies the hour to schedule a command.

Values 0 to 23 (maximum 24 hour-numbers)

all

Specifies all hours.

interval

Syntax

[**no**] **interval** *seconds*

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the interval between runs of an event.

Parameters

seconds

Specifies the interval, in seconds, between runs of an event.

Values 30 to 4,294,967,295

minute

Syntax

[**no**] **minute** {*minute-number* [**..***minute-number*]| **all**}

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Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the minute to schedule a command. Multiple minutes of the hour can be specified. When multiple minutes are configured, each of them causes the schedule to occur. If a minute is configured, but no hour or day is configured, the event does not execute. If a minute is configured without configuring the **month**, **weekday**, **day-of-month,** and **hour** commands, the event does not execute. See the month, weekday, day-of-month, and hour commands for more information.

The **no** form of this command removes the specified minute from the configuration.

Parameters

minute-number

Specifies the minute to schedule a command.

Values 0 to 59 (maximum 60 minute-numbers)

all

Specifies all minutes.

month

Syntax

[**no**] **month** {*month-number* [**..***month-number*]|*month-name* [**..***month-name*]| **all**}

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the month when the event should be executed. Multiple months can be specified. When multiple months are configured, each of them causes the schedule to trigger. If a month is configured

If a minute is configured without configuring the **weekday**, **day-of-month**, **hour**, and **minute** commands, the event does not execute.

See the weekday, day-of-month, hour, and minute commands for more information.

The **no** form of this command removes the specified month from the configuration.

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Parameters

month-number

Specifies a month number.

Values 1 to 12 (maximum 12 month-numbers)

all

Specifies all months.

month-name

Specifies a month by name.

Values january, february, march, april, may, june, july, august, september, october, november, december (maximum 12 month names)

type

Syntax

type {*schedule-type*}

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies how the system should interpret the commands contained within the schedule node.

Parameters

schedule-type

Specifies the type of schedule for the system to interpret the commands contained within the schedule node.

Values **periodic** — Specifies a schedule that runs at a specified interval. The **interval** command must be specified for this feature to run successfully.

calendar — Specifies a schedule that runs based on a calendar. The **month**, **weekday**, **day-of-month**, **hour**, and **minute** commands must be specified for this feature to run successfully.

oneshot — Specifies a schedule that 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**, **hour**, and **minute** must be specified for this feature to run successfully.

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See interval, month, weekday, day-of-month, hour and minute for more information.

Default periodic

weekday

Syntax

[**no**] **weekday** {*weekday-number* [**..***weekday-number*]|*day-name* [**..***day-name*]| **all**}

Context

config>system>cron>sched

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the days of the week on which the schedule runs. Multiple days of the week can be specified. When multiple days are configured, each of them causes the schedule to occur. If a weekday is configured without configuring the **month**, **day-of-month**, **hour**, and **minute**, the event does not run.

Using the **weekday** command as well as the **day-of-month** command causes the script to run twice. For example, consider that "today" is Monday January 1. If "Tuesday January 5" is configured, the script runs on Tuesday (tomorrow) as well as January 5 (Friday).

See the month, day-of-month, hour, and minute commands for more information.

The **no** form of this command removes the specified weekday from the configuration.

Parameters

day-number

Specifies a weekday number.

Values 1 to 7 (maximum 7 week-day-numbers)

day-name

Specifies a day by name.

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday (maximum 7 weekday names)

all

Specifies all days of the week.

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6.18.2.1.9 Time Range Commands

time-range

Syntax

[**no**] **time-range** *name* [**create**]

Context

config>system>cron

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures a time range.

The **no** form of this command removes the *name* from the configuration.

Parameters

name

Specifies a name for the time range, up to 32 characters.

absolute

Syntax

absolute start *start-absolute-time* **end** *end-absolute-time*

no absolute start *absolute-time*

Context

config>system>cron>time-range

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures an absolute time interval that does not repeat.

The **no** form of this command removes the absolute time range from the configuration.

Parameters

start *absolute-time*

Specifies starting parameters for the absolute time-range.

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Values *absolute-time* — *year*/*month*/*day*,*hh*:*mm*

year — 2005 to 2099

month — 1 to 12

day — 1 to 31

hh — 0 to 23

mm — 0 to 59

end *absolute-time*

Specifies end parameters for the absolute time-range.

Values *absolute-time* — *year*/*month*/*day*,*hh*:*mm*

year — 2005 to 2099

month — 1 to 12

day — 1 to 31

hh — 0 to 23

mm — 0 to 59

daily

Syntax

daily start *start-time-of-day* **end** *end-time-of-day*

no daily start *start-time-of-day*

Context

config>system>cron>time-range

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the start and end of a schedule for every day of the week. To configure a daily time-range across midnight, use a combination of two entries. An entry that starts at hour zero takes over from an entry that ends at hour 24.

The **no** form of this command removes the daily time parameters from the configuration.

Parameters

start-time-of-day

Specifies the starting time for the time range.

Values *start-time-of-day* — *hh*:*mm*

hh — 0 to 23

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mm — 0 to 59

end-time-of-day

Specifies the ending time for the time range.

Values *end-time-of-day* — *hh*:*mm*

hh — 0 to 23

mm — 0 to 59

weekdays

Syntax

weekdays start *start-time-of-day* **end** *end-time-of-day*

no weekdays start *start-time-of-day*

Context

config>system>cron>time-range

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the start and end of a weekday schedule.

The **no** form of this command removes the weekday parameters from the configuration.

Parameters

start-time-of-day

Specifies the starting time for the time range.

Values *start-time-of-day* — *hh*:*mm*

hh — 0 to 23

mm — 0 to 59

end-time-of-day

Specifies the ending time for the time range.

Values *end-time-of-day* — *hh*:*mm*

hh — 0 to 23

mm — 0 to 59

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weekend

Syntax

weekend start *start-time-of-day* **end** *end-time-of-day*

no weekend start *start-time-of-day*

Context

config>system>cron>time-range

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures a time interval for every weekend day in the time range.

The resolution must be at least one minute apart, for example, start at 11:00 and end at 11:01. An 11:00 start and end time is invalid. This example configures a start at 11:00 and an end at 11:01 on both Saturday and Sunday.

The **no** form of this command removes the weekend parameters from the configuration.

Parameters

start-time-of-day

Specifies the starting time for the time range.

Values *start-time-of-day* — *hh*:*mm*

hh — 0 to 23

mm — 0 to 59

end-time-of-day

Specifies the ending time for the time range.

Values *end-time-of-day* — *hh*:*mm*

hh — 0 to 23

mm — 0 to 59

weekly

Syntax

weekly start *start-time-in-week* **end** *end-time-in-week*

no weekly start *start-time-in-week*

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Context

config>system>cron>time-range

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures a weekly periodic interval in the time range.

The command configures the start and end of a schedule for the same day every week, for example, every Friday. The start and end dates must be the same. The resolution must be at least one minute apart, for example, start at 11:00 and end at 11:01. A start time and end time of 11:00 is invalid.

The **no** form of this command removes the weekly parameters from the configuration.

Default

no time-range

Parameters

start-time-in-week

Specifies the start day and time of the week.

Values *start-time-in-week* — *day*,*hh*:*mm*

day — sun, mon, tue, wed, thu, fri, sat

sunday, monday, tuesday, wednesday, thursday, friday, saturday

hh — 0 to 23

mm — 0 to 59

end-time-in-week

Specifies the end day and time of the week.

Values *end-time-in-week* — *day*,*hh*:*mm*

day — sun, mon, tue, wed, thu, fri, sat

sunday, monday, tuesday, wednesday, thursday, friday, saturday

hh — 0 to 23

mm — 0 to 59

6.18.2.1.10 Time of Day Commands

tod-suite

Syntax

[**no**] **tod-suite** *tod-suite name* **create**

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Context
config>system>cron

Platforms
Supported on all 7210 SAS platforms as described in this document

Description
Commands in this context modify time of day (TOD) parameters.

Default
no tod-suite

egress

Syntax
egress

Context
config>system>cron>tod-suite

Platforms
Supported on all 7210 SAS platforms as described in this document

Description
This command enables the TOD suite egress parameters.

ingress

Syntax
ingress

Context
config>system>cron>tod-suite

Platforms
Supported on all 7210 SAS platforms as described in this document

Description
This command enables the TOD suite ingress parameters.

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filter

Syntax

filter ip *ip-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]

filter mac *mac-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]

filter ipv6 *ipv6-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]

no ip *ip-filter-id* [**time-range** *time-range-name*]

no ipv6 *ipv6-filter-id* [**time-range** *time-range-name*]

no filter mac *mac-filter-id* [**time-range** *time-range-name*]

Context

config>system>cron>tod-suite>egress

config>system>cron>tod-suite>ingress

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command creates time-range based associations of previously created filter policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority is used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

Parameters

ip-filter *ip-filter-id*

Specifies an IP filter for this tod-suite.

Values 1 to 65535

ipv6-filter *ip-filter-id*

Specifies an IPv6 filter for this tod-suite.

Values 1 to 65535

time-range *time-range-name*

Specifies a name for the time-range, up to 32 characters. If the time-range is not populated, the system assumes the assignment to mean “all times”. Only one entry without a time-range is allowed for every type of policy. The system does not allow the user to specify more than one policy with the same time-range and priority.

priority *priority*

Specifies the priority of the time-range. Only one time-range assignment of the same type and priority is allowed.

Values 1 to 10

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mac *mac-filter-id*

Specifies a MAC filter for this tod-suite.

Values 1 to 65535

qos

Syntax

qos *policy-id* [**time-range** *time-range-name*] [**priority** *priority*]

no qos *policy-id* [**time-range** *time-range-name*] [

Context

config>system>cron>tod-suite>ingress

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command creates time-range based associations of previously created QoS policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority is used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

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

Parameters

policy-id

Specifies an egress QoS policy for this tod-suite.

Values 1 to 65535

time-range *time-range-name*

Specifies a name for the time-range, up to 32 characters. If the time-range is not populated, the system assumes the assignment to mean "all times". Only one entry without a time-range is allowed for every type of policy. The system does not allow the user to specify more than one policy with the same time-range and priority.

Default "NO-TIME-RANGE" policy

priority *priority*

Specifies the priority of the time-range. Only one time-range assignment of the same type and priority is allowed.

Values 1 to 10

Default 5

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6.18.2.1.11 Script Control Commands

script-control

Syntax

script-control

Context

config>system

Platforms

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

Description

Commands in this context configure command script parameters.

script-policy

Syntax

[**no**] **script-policy** *policy-name* [**owner** *policy-owner*]

Context

config>system>script-control

config>system>cron>schedule

Platforms

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

Description

This command is used to configure the CLI script policy.

Parameters

policy-name

Specifies the name of the policy. Can be up to 32 characters.

owner *policy-owner*

Specifies the name of the policy owner, up to 32 characters. The owner is an arbitrary name and not necessarily a username. 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.

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Default "TiMOS CLI"

expire-time

Syntax

expire-time {*seconds* | **forever**}

Context

config>system>script-control>script-policy

Platforms

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

Description

This command configures the maximum amount of time to keep the run history status entry from a script run.

Default

expire-time 3600

Parameters

seconds

Specifies the time to keep the run history status entry, in seconds.

Values 0 to 21474836

forever

Specifies to keep the run history status entry indefinitely.

lifetime

Syntax

lifetime {*seconds* | **forever**}

Context

config>system>script-control>script-policy

Platforms

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

Description

This command configures the maximum amount of time that a script may run.

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Default

lifetime 3600

Parameters

seconds

Specifies the maximum amount of time that a script may run, in seconds.

Values 0 to 21474836

forever

Specifies to allow a script to run indefinitely.

max-completed

Syntax

max-completed *unsigned*

Context

config>system>script-control>script-policy

Platforms

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

Description

This command configures 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

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Context

config>system>script-control>script-policy

Platforms

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

Description

This command configures the location where the system writes the output of an event script's execution.

The **no** form of this command removes the file location from the configuration. Scripts do not execute if there is no result location defined.

Default

no results

Parameters

file-url

Specifies the location to send CLI output from script runs. The *file-url* is a location, directory, and filename prefix to which a data and timestamp suffix is added when the results files are created during a script run, as follows: *file-url*_YYYYMMDD-hhmmss.uuuuuu.out where:

YYYYMMDD — date hhmmss — hours, minutes, and seconds uuuuuu — microseconds (padded to 6 characters with leading zeros)

Values *file-url — local-url* | *remote-url*

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

200 chars maximum, including *cflash-id*

directory length 99 characters maximum each

remote url — [{ftp:// | tftp://}*login*:*password@remote-location/*][*file-path*] 255 characters maximum directory length 99 characters maximum each

remote-location — [*hostname* | *ipv4-address* | *ipv6-address*]

ipv4-address — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — 32 characters maximum, for link local addresses

cflash-id — cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

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script

Syntax

script *script-name* [**owner** *script-owner*]

no script

Context

config>system>script-control>script-policy

config>system>script-control

Platforms

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

Description

This command configures a script to be run.

The **no** form of this command removes the script.

Default

no script

Parameters

script-name

Specifies the name of the script, up to 32 characters.

script-owner

Specifies the name of the script owner, up to 32 characters.

The owner is an arbitrary name and not necessarily a username. 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

Syntax

location *file-url*

no location

Context

config>system>script-control>script

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Platforms

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

Description

This command identifies the location of a script to be scheduled.

The **no** form of this command removes the location.

Default

no location

Parameters

file-url

Specifies the location to search for scripts.

Values *file-url* — *local-url* | *remote-url*

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

200 chars maximum, including *cflash-id*

directory length 99 characters maximum each

remote url — [{ftp:// | tftp://}*login*:*password@remote-location*/][*file-path*]
255 characters maximum directory length 99 characters maximum each

remote-location — [*hostname* | *ipv4-address* | *ipv6-address*]

ipv4-address — *a.b.c.d*

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

interface — 32 characters maximum, for link local addresses

cflash-id — cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

6.18.2.1.12 System Time Commands

dst-zone

Syntax

[**no**] **dst-zone** [*std-zone-name* | *non-std-zone-name*]

Context

config>system>time

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the start and end dates and offset for summer time or daylight savings time to override system defaults or for user defined time zones.

When configured, the time is adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

If the time zone configured is listed in Table 21: System-defined time zones , 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 in Table 21: System-defined time zones on or entered as optional parameters in this command.

Up to five summer time zones may be configured, for example, for five successive years or for five different time zones. Configuring a sixth entry returns an error message. If no summer (daylight savings) time is supplied, it is assumed no summer time adjustment is required.

The **no** form of this command removes a configured summer (daylight savings) time entry.

Parameters

std-zone-name

Specifies the standard time zone name. The standard name must be a system-defined zone in Table 21: System-defined time zones . For zone names in the table that have an implicit summer time setting, for example MDT for Mountain Daylight Saving Time, the remaining **start-date**, **end-date** and **offset** parameters need to be provided unless it is necessary to override the system defaults for the time zone.

Values std-zone-name ADT, AKDT, CDT, CEST, EDT, EEST, MDT, PDT, WEST, NDT, NZDT

non-std-zone-name

Specifies the non-standard time zone name, up to 5 characters. See the zone command for more information about creating a user-defined name.

end

Syntax

end {*end-week*} {*end-day*} {*end-month*} [*hours-minutes*]

Context

config>system>time>dst-zone

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command configures start of summer time settings.

Parameters

end-week

Specifies the starting week of the month when the summer time ends.

Values first, second, third, fourth, last

Default first

end-day

Specifies the starting day of the week when the summer time ends.

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday

Default sunday

end-month

Specifies the starting month of the year when the summer time takes effect.

Values january, february, march, april, may, june, july, august, september, october, november, december

Default january

hours

Specifies the hour at which the summer time ends.

Values 0 to 24

Default 0

minutes

Specifies the number of minutes, after the hours defined by the *hours* parameter, when the summer time ends.

Values 0 to 59

Default 0

offset

Syntax

offset *offset*

Context

config>system>time>dst-zone

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies the number of minutes that are added to the time when summer time takes effect. The same number of minutes are subtracted from the time when the summer time ends.

Parameters

offset

Specifies the number of minutes added to the time at the beginning of summer time and subtracted at the end of summer time, expressed as an integer.

Values 0 to 60

Default 60

start

Syntax

start {*start-week*} {*start-day*} {*start-month*} [*hours-minutes*]

Context

config>system>time>dst-zone

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures start of summer time settings.

Parameters

start-week

Specifies the starting week of the month when the summer time takes effect.

Values first, second, third, fourth, last

Default first

start-day

Specifies the starting day of the week when the summer time takes effect.

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday

Default sunday

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start-month

Specifies the starting month of the year when the summer time takes effect.

Values january, february, march, april, may, june, july, august, september, october, november, december

Default january

hours

Specifies the hour at which the summer time takes effect.

Values 0 to 23

Default 0

minutes

Specifies the number of minutes, after the hours defined by the *hours* parameter, when the summer time takes effect.

Values 0 to 59

Default 0

zone

Syntax

zone [*std-zone-name* | *non-std-zone-name*] [*hh* [*:mm*]]

no zone

Context

config>system>time

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command sets the time zone and time zone offset for the device.

The 7210 SAS supports system-defined and user-defined time zones. The system-defined time zones are listed in Table 21: System-defined time zones .

For user-defined time zones, the zone and the UTC offset must be specified.

The **no** form of this command reverts to the default of Coordinated Universal Time (UTC). If the time zone in use was a user-defined time zone, the time zone is 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.

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Default

zone utc

Parameters

std-zone-name

Specifies the standard time zone name. The standard name must be a system-defined zone in Table 21: System-defined time zones . For zone names in the table that have an implicit summer time setting, for example MDT for Mountain Daylight Saving Time, the remaining **start-date**, **end-date** and **offset** parameters need to be provided unless it is necessary to override the system defaults for the time zone.

For system-defined time zones, a different offset cannot be specified. If a new time zone is needed with a different offset, the user must create a new time zone. Note that some system-defined time zones have implicit summer time settings which causes the switchover to summer time to occur automatically; configuring the dst-zone parameter is not required.

Values GMT, BST, IST, WET, WEST, CET, CEST, EET, EEST, MSK, MSD, AST, ADT, EST, EDT, ET, CST, CDT, CT, MST, MDT, MT, PST, PDT, PT, HST, AKST, AKDT, WAST, CAST, EAST

non-std-zone-name

Specifies the non-standard time zone name, 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 is UTC + 9.5 hours.

Values *hh* — –11 to 12

mm — 0 to 59

Default hh — 0

mm — 0

6.18.2.1.13 System synchronization commands

sync-if-timing

Syntax

sync-if-timing

Context

config>system

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Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

Commands in this context create or modify timing reference parameters. The ref-order must be specified in order for this command to be enabled.

Default

disabled

abort

Syntax

abort

Context

config>system>sync-if-timing

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command discards changes that have been made to the synchronous interface timing configuration during a session.

begin

Syntax

begin

Context

config>system>sync-if-timing

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command creates or edits the system synchronous interface timing configuration.

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commit

Syntax

commit

Context

config>system>sync-if-timing

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command saves changes made to the system synchronous interface timing configuration.

ptp

Syntax

[**no**] **ptp**

Context

config>system>sync-if-timing

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

Commands in this context configure parameters for system timing via IEEE 1588-2008, Precision Time Protocol (PTP). PTP is not supported on 7210 SAS-Dxp.

ql-override

Syntax

ql-override {**prs** | **stu** | **st2** | **tnc** | **st3e** | **st3** | **sec** | **prc** | **ssu-a** | **ssu-b**}

no ql-override

Context

config>system>sync-if-timing>ptp

config>system>sync-if-timing>ref1

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config>system>sync-if-timing>ref2

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command configures the reference selection based on the quality level (QL) value. This value overrides any value received by that reference's SSM process.

Default

no ql-override

Parameters

prs

Specifies SONET Primary Reference Source Traceable.

stu

Specifies SONET Synchronous Traceability Unknown.

st2

Specifies SONET Stratum 2 Traceable.

tnc

Specifies SONET Transit Node Clock Traceable.

st3e

Specifies SONET Stratum 3E Traceable.

st3

Specifies SONET Stratum 3 Traceable.

prc

Specifies SDH Primary Reference Clock Traceable.

ssu-a

Specifies SDH Primary Level Synchronization Supply Unit Traceable.

ssu-b

Specifies SDH Second Level Synchronization Supply Unit Traceable.

sec

Specifies SDH Synchronous Equipment Clock Traceable.

ql-selection

Syntax

[**no**] **ql-selection**

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Context

config>system>sync-if-timing

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command enables the selection of the system timing reference to take into account the quality level. This command turns SSM encoding on or off as a means of timing reference selection.

Default

no ql-selection

ref-order

Syntax

ref-order *first second third*

ref-order ptp

no ref-order

Context

config>system>sync-if-timing

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

The synchronous equipment timing subsystem can lock to different timing reference inputs, those specified in the **ref1**, **ref2**, 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. Depending on the platform used, either SFP or Fixed copper ports can be used as a reference.

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

Note:
On the 7210 SAS-D ETR, ref1 must be configured to use one of ports 1/1/1 to 1/1/4 and ref2 must be configured to use either port 1/1/5 or 1/1/6. The software enforces this check. Ports 1/1/7 to 1/1/10 can be configured as either ref1 or ref2.

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Default

ref1 ref2 ptp

Parameters

first

Specifies the first timing reference to use in the reference order sequence.

second

Specifies the second timing reference to use in the reference order sequence.

third

Specifies the third timing reference to use in the reference order sequence. This parameter is only supported on 7210 SAS-K devices.

ptp

Specifies that PTP must be used as a timing reference. PTP is not supported on 7210 SAS-Dxp.

ref1

Syntax

ref1

Context

config>system>sync-if-timing

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

Commands in this context configure parameters for the first timing reference.

ref2

Syntax

ref2

Context

config>system>sync-if-timing

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

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Description

Commands in this context configure parameters for the second timing reference.

revert

Syntax

[**no**] **revert**

Context

config>system>sync-if-timing

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command enables the clock to revert to a higher priority reference if the current reference goes offline or becomes unstable.

If revertive switching is enabled, the highest-priority valid timing reference is used. If a reference with a higher priority becomes valid, a 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 this reference becomes invalid, a reference switch over to a valid reference with the highest priority is initiated. When the failed reference becomes operational, it is eligible for selection.

Default

no revert

source-port

Syntax

source-port *port-id*

no source-port

Context

config>system>sync-if-timing>ref1

config>system>sync-if-timing>ref2

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

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Description

This command configures the source port for timing reference **ref1** or **ref2**. 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 ref-order command.

The **no** form of this command deletes the source port from the reference.

Parameters

port-id

Specifies the physical port.

Values *slot/mda/port*

6.18.2.1.14 System port LAG MAC assignment commands for 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

port-lag-mac-assignment

Syntax

port-lag-mac-assignment [**v1-enable**]

no port-lag-mac-assignment

Context

config>system

Platforms

7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command enables new MAC address assignments to avoid an overlap between port MAC addresses and LAG MAC addresses.

In the current default assignments of MAC addresses to ports and LAGs, the MAC addresses that are allocated to the LAGs overlap with the MAC addresses of the physical ports; for example, the MAC address assigned by the system to LAG 1 is the same as the MAC address of port 27.

Use this command to change the MAC address assignment scheme to ensure that the LAG MAC addresses are not the same as the MAC addresses of the physical ports. The new scheme is referred to in the system as "v1."

A reboot is required for this command to take effect.

WARNING:
The MAC address for some ports will change after this command is run. Ensure required changes are made to other service objects (for example, CFM up MEPs, and so on) that reference local

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MAC addresses, and to MAC addresses that reference remote peer devices, if required. Failure to make such changes could result in unpredictable behavior.

The **no** form of this command reverts to the default MAC address assignment scheme for ports and LAGs. The use of the default configuration is not recommended; it is available only to maintain the current mode of operation, if absolutely necessary.

Parameters

v1-enable

Mandatory keyword that forces the system to use the new scheme of MAC address assignment.

6.18.2.1.15 System administration commands

admin

Syntax

admin

Context

<root>

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure administrative system parameters. Only authorized users can execute the commands in the **admin** context.

check-golden-bootstrap

Syntax

check-golden-bootstrap

Context

admin

Platforms

7210 SAS-D

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Description

This command validates the current golden bootstrap image, and displays its version, if found to be valid. If the golden bootstrap image is not found to be a valid, an error message is displayed to that effect.

auto-init

Syntax

auto-init stop

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command can potentially use the TiMOS images available on the local flash to boot up and provide a user login prompt when the system boots up for the first-time. With this command, the user is provided with an option to stop the auto-init process and complete successful boot. After executing this command, the system saves the BOF with the BOF parameter primary-image pointing to the `both.tim` on the local flash.

If the user does not use this command to stop the auto-init process, the system reboots and attempts to find the BOF again using DHCP.

debug-save

Syntax

debug-save *file-url*

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command saves existing debug configuration. Debug configurations are not preserved in configuration saves.

Parameters

file-url

Specifies the file URL location to save the debug configuration.

Values *file-url — local-url* | *remote-url*

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

200 chars maximum, including the *cflash-id* directory length, 99 chars maximum each

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

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

ipv4-address — *a.b.c.d*

cflash-id — cf1:

usb-flash-id — uf1:

disconnect

Syntax

disconnect {**address** *ip-address* | **username** *user-name* | **console** | **telnet** | **ftp** | **ssh** | **netconf**}

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command disconnects a user from a console, Telnet, FTP, SSH, or NETCONF session.

If any of the console, Telnet, FTP, SSH, or NETCONF options are specified, only the respective console, Telnet, FTP, SSH, or NETCONF sessions are affected.

If no console, Telnet, FTP, SSH, or NETCONF options are specified, all sessions from the IP address or from the specified user are disconnected.

Any task that the user is executing is terminated. FTP files accessed by the user are not removed.

A major severity security log event is created specifying what was terminated and by whom.

Parameters

address *ip-address*

Specifies the IP address to disconnect.

Values *ipv4-address* — a.b.c.d

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

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

x — 0 to FFFF (hexadecimal)

d — 0 to 255 (decimal)

username *user-name*

Specifies the name of the user.

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console

Keyword to disconnect the console session.

telnet

Keyword to disconnect the Telnet session.

ftp

Keyword to disconnect the FTP session.

ssh

Keyword to disconnect the SSH session.

netconf

Keyword to disconnect the NETCONF session. This keyword is supported only on the 7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T.

display-config

Syntax

display-config [**detail** | **index**]

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays the system's running configuration.

By default, only non-default settings are displayed.

Parameters

detail

Displays default and non-default configuration parameters.

index

Displays only persistent-indices.

reboot

Syntax

reboot [**upgrade**] [**auto-init**] [**now**]

Context

admin

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command reboots the system or initiates an upgrade of the firmware along with a reboot of the node or initiate an auto-init boot procedure along with a reboot of the node.

If no options are specified, the user is prompted to confirm the reboot operation.

If the **now** option is specified, boot confirmation messages appear.

Parameters

upgrade

Keyword to enable node/card firmware (CPLD and ROM) to be upgraded during node/chassis reboot. The 7210 SAS OS support functionality to perform automatic firmware upgrades. The automatic upgrade must be enabled in the 7210 SAS OS Command Line Interface (CLI) when rebooting the system.

When the **upgrade** keyword is specified, a chassis flag is set and on the subsequent boot of the 7210 SAS OS on the chassis, any firmware images requiring to be upgraded, is upgraded automatically.

If an 7210 SAS is rebooted with the **admin reboot** command (without the **upgrade** keyword), the firmware images are left intact

During any firmware upgrade, automatic or manual, it is imperative that during the upgrade procedure:

- Power must NOT be switched off or interrupted.
- The system must NOT be reset.
- No cards are inserted or removed.

Any of the above conditions may render node/cards inoperable requiring a return of the node/card for resolution.

now

Keyword to forces a reboot of the router immediately without an interactive confirmation.

auto-init

Keyword to reset the BOF and initiate a reboot.

save

Syntax

save [*file-url*] [**detail**] [**index**]

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command saves the running configuration to a configuration file.

By default, the running configuration is saved to the primary configuration file.

Parameters

file-url

Specifies the file URL location to save the configuration file.

Values *file-url* — *local-url* | *remote-url* (255 characters max)
local-url — [*cflash-id*/ | *usb-flash-id*][file-path],
200 chars maximum, including the *cflash-id* directory
length, 99 chars maximum each
remote-url — [{ftp://|tftp://}*login:pswd@ remote-locn*] [*file-path*]
remote-locn — [*hostname* | *ipv4-address*]
ipv4-address — *a.b.c.d*
ipv6-address — x:x:x:x:x:x:x:x [-interface]
x:x:x:x:x:x:d.d.d.d [-interface]
x — 0 to FFFF (hexadecimal)
d — 0 to 255 (decimal)
interface — a string up to 32 characters, for link local addresses
cflash-id — cf1:
usb-flash-id — uf1:

Default the primary configuration file location

detail

Keyword to save both default and non-default configuration parameters.

index

Keyword to 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.

system-password

Syntax

system-password admin-password

Context

admin>system>security

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This operational command changes a local system password.

Parameters

admin-password

Keyword to change the administrative password.

enable-tech

Syntax

[**no**] **enable-tech**

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command enables the shell and kernel commands.

Note:
This command should only be used with authorized direction from the Nokia Technical Assistance Center (TAC).

tech-support

Syntax

tech-support *file-url*

Context

admin

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command creates a system core dump.

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Note:
This command should only be used with authorized direction from the Nokia Technical Assistance Center (TAC).

Parameters

file-url

Specifies the file URL location to save the binary file.

Values *file-url* — *local-url* | *remote-url*

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

200 chars maximum, including the *cflash-id* directory

length, 99 chars maximum each

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

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

ipv4-address — *a.b.c.d*

cflash-id — cf1:

usb-flash-id — uf1:

update-golden-bootstrap

Syntax

update-golden-bootstrap [*file-url*]

Context

admin

Platforms

7210 SAS-D

Description

This command updates the golden bootstrap image with the file-url, after validating it as a bootstrap image for the 7210 SAS platforms. Only on newer 7210 SAS-D platforms, the **admin>update-golden-bootstrap** CLI command does not update the golden-bootstrap image with the `boot.tim` specified in the parameter value, if the `boot.tim` is not a newer image.

Default

cf1:/boot.tim

Parameters

file-url

Specifies the file URL.

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6.18.2.1.16 System alarm contact commands

alarm-contact-input

Syntax

alarm-contact-input *alarm-contact-input-id*

Context

config>system>alarm-contact-input

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure one of four available alarm contact input pins.

Parameters

alarm-contact-input-id

Specifies the alarm contact input pin.

Values console-1 (when using console as alarm input pin) (7210 SAS-D, 7210 SAS-Dxp 12p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C)

1 to 3 (7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p)

alarm-output-severity

Syntax

[**no**] **alarm-output-severity** {**critical** | **major** | **minor** | **none**}

Context

config>system>alarm-contact-input

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command relays alarms from the alarm-contact input to the alarm-contact output by associating an appropriate alarm-contact output with the alarm-contact input. The system generates or clears the alarm-contact output when it triggers or clears the alarm for the associated alarm-contact input.

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If multiple alarm-contact input pins share an alarm-contact output, the system generates the alarm-contact output even if any one of the alarm-contact input pins is triggered, and the system clears alarm-contact output only when all the alarm-contact input pins are cleared.

Note:
The system relays the alarm-contact input to the appropriate alarm-contact output only if the alarm-contact output is available on the platform.

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

Default

alarm-output-severity major

Parameters

critical

Specifies that a critical alarm output is generated or cleared.

major

Specifies that a major alarm output is generated or cleared.

minor

Specifies that a minor alarm output is generated or cleared.

none

Specifies that no alarm output is generated or cleared.

clear-alarm-msg

Syntax

[**no**] **clear-alarm-msg** {*alarm-msg-text*}

Context

config>system>alarm-contact-input

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures a text message for use along with SNMP trap and Log message that are sent when the system clears an alarm. The system generates a default message if the message is not configured.

The **no** form of this command causes the system to not generate a trap or log.

Parameters

alarm-msg-text

Specifies a printable character string, up to 80 characters.

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description

Syntax

description *description-string*

no description

Context

config>system>alarm-contact-input

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command describes an alarm contact input pin. The description provides an indication of the usage or attribute of the pin. It is stored in the CLI configuration file and helps the user identify the purpose of the pin.

The **no** form of this command removes the description string.

Parameters

description-string

Specifies the description character string, up to 80 characters.

normal-state

Syntax

normal-state [**open** | **closed**]

Context

config>system>alarm-contact-input

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the normal state to be associated with the alarm-contact input. When the system detects a transition from the normal state, an alarm is generated. The alarm is cleared when the system detects a transition is back to the normal state.

Default

normal-state open

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Parameters

open

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.

closed

Specifies that the normal state is identified as "closed". When the system detects a transition to the "open" state, and alarm is generated. The alarm is cleared when the system detects a transition back to the "closed" state.

shutdown

Syntax

[**no**] **shutdown**

Context

config>system>alarm-contact-input

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command stops tracking the state changes associated with the alarm contact input. The system does not generate or clear the alarms for the alarm-contact input, but if an alarm is generated for the alarm-contact input, the system clears the alarm when the **shutdown** command is executed.

The **no** form of this command starts tracking the state changes associated with the alarm-contact input.

Default

shutdown

trigger-alarm-msg

Syntax

[**no**] **trigger-alarm-msg** {*alarm-msg-text*}

Context

config>system>alarm-contact-input

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command configures a text message for use with an SNMP trap and log message that are sent when the system generates an alarm. The system generates a default message if the message is not configured.

The **no** form of this command causes the system to not generate a trap or log.

Parameters

alarm-msg-text

Specifies a printable character string, up to 80 characters.

6.18.2.1.17 LLDP system commands

lldp

Syntax

lldp

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure system-wide Link Layer Discovery Protocol parameters.

lldp-med

Syntax

lldp-med

Context

config>system>lldp

Platforms

7210 SAS-Dxp

Description

This command creates the context to configure system-wide LLDP Media Endpoint Discovery (LLDP-MED) information.

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network-policy

Syntax

network-policy *network-policy-id* [**create**]

no network-policy *network-policy-id*

Context

config>system>lldp>lldp-med

Platforms

7210 SAS-Dxp

Description

This command configures network policies, which send configuration information using LLDP-MED TLVs. The configured policy specifies the network policy configuration that must be provided to the LLDP-MED endpoint device. Multiple policies can be configured with different application types.

By default, the system creates network policy 1, which is not associated with a port. The user must explicitly configure a policy for use with a port, or use the default network policy 1, and enable transmission and reception of LLDP-MED TLVs on the port.

The **no** form of the command removes the configured network policy ID.

Parameters

network-policy-id

Specifies the network policy ID.

Values 1 to 65535

create

Keyword to create a network policy.

application-type

Syntax

application-type {**voice** | **voice-signaling** | **guest-voice** | **guest-voice-signaling** | **soft-phone-voice** | **video-conferencing** | **streaming-video** | **video-signaling**}

no application-type

Context

config>system>lldp>lldp-med>network-policy

Platforms

7210 SAS-Dxp

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Description

This command configures the application type for the specified network policy.

The configured **application-type** is used to match with the application type received from an LLDP-MED endpoint device and provides the endpoint device with the network policy configured for the requested application type.

The **no** form of this command configures the Network Policy TLV to send the application type value "not_specified" to the LLDP-MED endpoint device.

Default

no application-type

Parameters

voice

Keyword to configure the voice application type for the network policy.

voice-signaling

Keyword to configure the voice signaling application type for the network policy.

guest-voice

Keyword to configure the guest voice application type for the network policy.

guest-voice-signaling

Keyword to configure the guest voice signaling application type for the network policy.

soft-phone-voice

Keyword to configure the soft phone voice application type for the network policy.

video-conferencing

Keyword to configure the video conferencing application type for the network policy.

streaming-video

Keyword to configure the video streaming application type for the network policy.

video-signaling

Keyword to configure the video signaling application type for the network policy.

dot1p

Syntax

dot1p *dot1p-value*

no dot1p

Context

config>system>lldp>lldp-med>network-policy

Platforms

7210 SAS-Dxp

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Description

This command configures the dot1p value for the network policy.

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

Default

dot1p 0

Parameters

dot1p-value

Specifies the dot1p value.

Values 0 to 7

ip-dscp

Syntax

ip-dscp *ip-dscp*

no ip-dscp

Context

config>system>lldp>lldp-med>network-policy

Platforms

7210 SAS-Dxp

Description

This command configures the IP DSCP value for the network policy.

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

Default

ip-dscp 0

Parameters

ip-dscp

Specifies the IP DSCP value.

Values 0 to 63

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vlan-id

Syntax

vlan-id *vlan-id*

no vlan-id

Context

config>system>lldp>lldp-med>network-policy

Platforms

7210 SAS-Dxp

Description

This command configures the VLAN ID for the network policy.

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

Default

vlan-id 0

Parameters

vlan-id

Specifies the VLAN ID.

Values 0 to 4094

vlan-tag-present

Syntax

[**no**] **vlan-tag-present**

Context

config>system>lldp>lldp-med>network-policy

Platforms

7210 SAS-Dxp

Description

This command configures the application specified by the **application-type** to use a VLAN tagged packet, using the configured VLAN ID in the VLAN tag.

The **no** form of this command disables the use of a VLAN tag.

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Default

no vlan-tag-present

message-fast-tx

Syntax

message-fast-tx *time*

no message-fast-tx

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the duration of the fast transmission period.

Parameters

time

Specifies the fast transmission period, in seconds.

Values 1 to 3600

Default 1

message-fast-tx-init

Syntax

message-fast-tx-init *count*

no message-fast-tx-init

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the number of LLDPDUs to send during the fast transmission period.

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Parameters

count

Specifies the number of LLDPDUs to send during the fast transmission period.

Values 1 to 8

Default 4

notification-interval

Syntax

notification-interval *time*

no notification-interval

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the minimum time between change notifications.

Parameters

time

Specifies the minimum time, in seconds, between change notifications.

Values 5 to 3600

Default 5

reinit-delay

Syntax

reinit-delay *time*

no reinit-delay

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command configures the time before reinitializing LLDP on a port.

Parameters

time

Specifies the time, in seconds, before reinitializing LLDP on a port.

Values 1 to 10

Default 2

tx-credit-max

Syntax

tx-credit-max *count*

no tx-credit-max

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the maximum consecutive LLDPDUs transmitted.

Parameters

count

Specifies the maximum consecutive LLDPDUs transmitted.

Values 1 to 100

Default 5

tx-hold-multiplier

Syntax

tx-hold-multiplier *multiplier*

no tx-hold-multiplier

Context

config>system>lldp

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the multiplier of the tx-interval.

Parameters

multiplier

Specifies the multiplier of the tx-interval.

Values 2 to 10

Default 4

tx-interval

Syntax

tx-interval *interval*

no tx-interval

Context

config>system>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the LLDP transmit interval time.

Parameters

interval

Specifies the LLDP transmit interval time.

Values 1 to 100

Default 5

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6.18.2.1.18 LLDP Ethernet port commands

lldp

Syntax

lldp

Context

config>port>ethernet

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure Link Layer Discovery Protocol (LLDP) parameters on the specified port.

dest-mac

Syntax

dest-mac {*bridge-mac*}

Context

config>port>ethernet>lldp

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures destination MAC address parameters.

Parameters

bridge-mac

Specifies the destination bridge MAC type to use by LLDP.

Values **nearest-bridge** — Specifies to use the nearest bridge.

nearest-non-tpmr — Specifies to use the nearest non-Two-Port MAC Relay (TPMR).

nearest-customer — Specifies to use the nearest customer.

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admin-status

Syntax

admin-status {**rx** | **tx** | **tx-rx** | **disabled**}

Context

config>port>ethernet>lldp>dstmac

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures the administrative status of the local LLDP agent.

Parameters

rx

Specifies the LLDP agent receives but does not transmit LLDP frames on this port.

tx

Specifies that the LLDP agent transmits LLDP frames on this port and does not store information about the remote systems connected.

tx-rx

Specifies that the LLDP agent transmits and receives LLDP frames on this port.

disabled

Specifies that the LLDP agent does not transmit or receive LLDP frames on this port. If remote systems information is received on this port and stored in other tables, before the port admin status becomes disabled, the information naturally ages out.

notification

Syntax

[**no**] **notification**

Context

config>port>ethernet>lldp>dstmac

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command enables LLDP notifications.

The **no** form of this command disables LLDP notifications.

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tx-mgmt-address

Syntax

tx-mgmt-address [**system**]

no tx-mgmt-address

Context

config>port>ethernet>lldp>dstmac

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command configures which management address to transmit.

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

Default

no tx-mgmt-address

Parameters

system

Specifies to use the system IP address. Note that the system address is transmitted only when it has been configured, if this parameter is specified.

tx-tlvs

Syntax

tx-tlvs [**port-desc**] [**sys-name**] [**sys-desc**] [**sys-cap**]

no tx-tlvs

Context

config>port>ethernet>lldp>dstmac

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command specifies which LLDP TLVs to transmit.

The **no** form of this command resets the value to the default.

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Default

no tx-tlvs

Parameters

port-desc

Specifies that the LLDP agent should transmit port description TLVs.

sys-name

Specifies that the LLDP agent should transmit system name TLVs.

sys-desc

Specifies that the LLDP agent should transmit system description TLVs.

sys-cap

Specifies that the LLDP agent should transmit system capabilities TLVs.

6.18.2.1.19 System resource-profile commands

resource-profile

Syntax

[**no**] **resource-profile**

Context

config>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context configure resource-profile parameters on the system.

decommission

Syntax

decommission

Context

config>system>resource-profile

Platforms

7210 SAS-Dxp

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Description

Commands in this context decommission a port. Ports that are decommissioned using this command are not available for provisioning services. The packet buffers are taken away from the decommissioned port and allocated to ports as specified by the entries configured under the **decommission** command. This command allows the user to allocate more packet buffers to a specific port or group of ports and enables those ports to absorb larger bursts.

Note:

- On the 7210 SAS-Dxp 12p, the user can decommission up to two ports and allocate the freed buffers to another port, as required. The user can also decommission four ports and allocate buffers from two ports each to each of the other two ports. For example, the user can decommission ports 1/1/1 and 1/1/2 and allocate buffers to 1/1/3, and decommission ports 1/1/4 and 1/1/5 and allocate buffers to 1/1/6.
- On the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p, the user can decommission up to three ports and allocate freed buffers to another port, as required. The user can also decommission six ports and allocate buffers from three ports each to each of the other two ports. For example, the user can decommission ports 1/1/1, 1/1/2, and 1/1/3 and allocate buffers to 1/1/4, and decommission ports 1/1/5, 1/1/6, and 1/1/7 and allocate buffers to 1/1/8.

entry

Syntax

entry *entry-id* **port** *port-range* **to** *port-range*

no entry *entry-id*

Context

config>system>resource-profile>decommission

Platforms

7210 SAS-Dxp

Description

This command allows the user to decommission a port or group of ports and allocate buffers to those ports which need more packet buffers for absorbing larger bursts. It allows user to configure the entries that list the ports to be decommissioned. Ports whose packet buffers are taken away are presented to the left of the **to** keyword, and ports to which buffers are allocated are presented to the right side.

This command allows users to specify either a port or a group of ports on the left side of the **to** keyword, and a single port on the right side of the **to** keyword. This allows the user to decommission up to two ports and allocate buffer to a single port.

Packet buffers taken away from a port or a group of ports specified on the left side are distributed to the configured port on the right side of the **to** keyword. Packet buffers are added to the MBS pool of the port (the MBS pool is shared by the 8 queues on the port) and the CBS portion of the queues is not modified.

The administrative state or the operational state of the port is not affected by configuring the port in a decommission entry.

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Note:
Any changes to the command, such as modifying the list of ports in existing entries or execution of **no entry** command or addition of new entries, takes effect only after a reboot of the node. The user is allowed to make change when the node is up, but the changes does not happen until a reboot of the system.

The software maintains two lists of entries, one which is in effect currently and one which has been modified by the user and takes effect during the next reboot. These lists can be displayed using the show command. The configuration file always stores the list of entries as configured by the user so that upon reboot, the modified entries and new entries (if any) take effect.

The following guidelines are to be adhered while configuring the entry command:

- A port cannot be specified more than once in any of the entries. If two entries specify the same port ID, the software cancels out the last entry that has the same port ID.
- A port appearing on the left side of the **to** keyword in any entry cannot appear on the right side of any other entries (including the same entry) and the converse is also true.
- If the user has specified a group of ports using a port range, the software expands the range to a list of ports and then makes the required checks (that is, checks listed in the first and second bullets) for each port in the list with the list of currently configured group of ports.
- Either a port ID, a list of port IDs, or a port ID range can be specified on the left side of the **to** keyword. Please see the following description for port ID specification to know more about the restrictions that apply when configuring a port range and list of ports.

  On the 7210 SAS-Dxp, only a single port can be specified on the right side of the **to** keyword.
- The list of entries is processed in the ascending order of the entry IDs, that is, an entry with a lower entry ID is processed before entry with a higher entry ID.
- A maximum of two ports can be specified on the left side of the **to** parameter. Buffers of no more than two ports can be reallocated to a single port.

The **no** form of this command removes the entry from the list of decommissioned ports.

Note:
The **no** form of this command requires a reboot to take effect.

The following examples show the list of ports, range of ports, and a combination of list of ports and range of ports that can be specified.

List of ports can be specified as:

- 1/1/1, 1/1/2 is allowed
- 1/1/10, 1/1/2 is allowed

Range of ports can be specified as:

- 1/1/2-1/1/3 is allowed
- 1/1/10-1/1/2 is not allowed
- 1/1/1 – 1/2/2 is not allowed

Default

no default

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Parameters

entry-id

Specifies the number in the range 1 to 30. A maximum of 30 entries can be created by the user.

Values 1 to 30

port-range

Specifies the port or list of ports or a port range or a combination of these. Identifies the port or group of ports that are being decommissioned when it appears on the left side of the **to** keyword, and identifies the port that receives the packet buffers from the decommissioned ports when it appears on the right side of the **to** keyword. A group of ports can be specified as a list of ports or as a range of ports.

The list of ports can be specified in any order using a comma to separate the list of ports, while a port range must always be specified in the ascending order of port IDs.

Values port or port range. **Example** 1/1/1-1/1/2 or 1/1/1,1/1/4

egress-internal-tcam

Syntax

egress-internal-tcam

Context

config>system>resource-profile

Platforms

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

Description

Commands in this context allocate resources from the egress internal TCAM pool.

The **egress-internal-tcam** resource pool is shared by multiple features. The resources are allocated in chunks of fixed sizes. The user is provided an option to allocate the available resources based on their scaling requirements for the features. The resource usage for different features is provided in the CLI description. It is not possible for a chunk to be shared by multiple features. Software allocates resources from the chunk to the feature to which it is allocated until it runs out of all resources in the chunk. If available, the user can allocate more chunks to the feature by taking away chunks of resources from other features that do not need to be enabled.

To free up the resources for use by other features, the users need to modify the configuration such that the chunks of resources in use by other features are freed. For example, to free up a chunk of resources allocated to egress ACLs **mac-criteria** and allocate it to **ip-criteria**, the user must remove the association of all the SAPs with egress ACLs that use a MAC criteria policy, change the resource profile configuration to allocate the chunk to **ip-criteria**, and then create and associate the SAPs with ip-criteria. As another example, the user can free up a chunk of resources used by egress ACLs and allocate it toward a SAP egress aggregate meter (on platforms that support this feature). To do this, the user must remove the association of all the SAPs with egress ACLs, change the resource profile configuration to reduce the

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chunk of resources allocated to egress ACLs (and reduce the value of chunks in use by the egress ACLs match criteria), then allocate the chunk of resources to the SAP egress aggregate meter feature, and then configure the SAPs with the aggregate meter rate.

The **egress-internal-tcam** resource pool is shared among the following features on different platforms.

- **7210 SAS-D and 7210 SAS-Dxp**

  Egress ACLs (MAC, IPv4 and IPv6 criteria) and per-SAP egress aggregate meter.
- **7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C**

  Egress ACLS (MAC, IPv4 and IPv6 criteria) and primary VLAN.

Note:

- When reassigning chunks of resources among features, a reboot of the node may be required. See the CLI description of the specific feature for information.
- The **egress-internal-tcam** pool of resources is allocated per node on the 7210 SAS-D, 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C.
- The number of chunks and the number of resources per chunk varies among the different platforms. Contact your Nokia technical support representative for more information.
- For some features, a minimum number of chunks (greater than 1) must be allocated to enable the feature functionality. If this is not done, the software cannot allocate the required number of resources, and it fails the command associated with the feature.

acl-sap-egress

Syntax

acl-sap-egress [*num-resources*]

no acl-sap-egress

Context

config>system>resource-profile>egress-internal-tcam

Platforms

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

Description

Commands in this context allocate maximum resources for use by egress filter policies using any of the supported match criteria. This command limits the total amount of chunks allocated for use by egress filter policies to the value specified by *num-resources*. The cumulative sum of chunks allocated to different match criteria supported by filter policies cannot exceed the value configured with *num-resources*.

Note:

- On the 7210 SAS-D and 7210 SAS-Dxp, the resources in the **egress-internal-tcam** resource pool are shared with other features (for example, SAP egress aggregate meter). To assign

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resources to this feature, resources may be reallocated from other features by disabling the policy association with a SAP.

- On the 7210 SAS-D and 7210 SAS-Dxp, some of the egress ACL match criteria require a minimum number of resources greater than 1 to be allocated before the match criteria can be used. Use of the SAP egress aggregate meter and the use of egress ACLs with the following match criteria: mac-ipv4 match, ipv6-128bit match, and mac-ipv6-64bit match, are mutually exclusive. All these match criteria require a minimum of two resources. SAP egress aggregate meter and egress ACLs MAC match criteria can be enabled simultaneously, with each feature sharing the available resources equally among them.
- On the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, when resources are allocated to egress ACLs from the egress internal TCAM pool, these resources can be used by MAC criteria entries, IPv4 entries, and entries that use only IPv6 64-bit addresses.

When the user allocates resources for use by SAP egress ACL policies using this command, the system allocates resources in chunks of 128 entries for the 7210 SAS-D and 7210 SAS-Dxp, 510 entries for the 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T, and 180 entries for the 7210 SAS-K 3SFP+ 8C. The resources are used only for filter entries configured under IPv4 criteria or MAC criteria.

For the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, if the user needs to use IPv6 criteria, resources must be allocated using the **mac-ipv4-ipv6-128-match-enable** command under this command context. The resources allocated using this command are used for filter entries configured under IPv6 criteria, IPv4 criteria, or MAC criteria. Each IPv6, IPv4, or MAC filter entry consumes two resources from this pool, reducing the number of filter entries that can be accommodated in a single chunk to 255 entries for the 7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T, and 108 entries for the 7210 SAS-K 3SFP+ 8C. The user can choose to allocate all the chunks allocated for SAP egress ACL policies for IPv6 criteria or allocate only a portion of it.

For information about resource allocation for the match criteria used in egress filter policies, see the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide*.

The **no** form of this command is blocked by the CLI and cannot be used on the 7210 SAS-K 3SFP+ 8C.

The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies on the 7210 SAS-D, 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T. If no resources are allocated for use, then the software fails all attempts to associate a service entity (for example, SAP, IP interface) with a filter policy using any of the match criteria.

Parameters

num-resources

Specifies the amount of resources that can be allocated for use by ACL policies. The **max** keyword allocates 2 slices in the current release. The following table lists the ACL SAP egress resource values.

Values

Table 35: ACL SAP egress resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	2	2

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Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-Dxp (per node)	0	2	2
7210 SAS-K 2F1C2T (per node)	0	2	0
7210 SAS-K 2F6C4T (per node)	0	2	0
7210 SAS-K 2F6C4T (per node)	n/a	Max (2)	Max (2)

egress-sap-aggregate-meter

Syntax

egress-sap-aggregate-meter *num-resources*

no egress-sap-aggregate-meter

Context

config>system>resource-profile>egress-internal-tcam

Platforms

7210 SAS-D and 7210 SAS-Dxp

Description

This command allocates resources for use by SAP egress aggregate policer from the egress-internal-tcam resource pool. This command limits the total amount of chunks allocated for use by SAP egress aggregate meter to the value specified by *num-resources*.

Note:

- The resources in the egress-internal-tcam resource pool are shared with other features; for example, SAP egress aggregate meter. To assign resources to this feature, resources may be reallocated from other features by disabling the policies association with a SAP, and others.
- On the 7210 SAS platforms, some of the Egress ACL match criteria require a minimum amount of resources greater than 1, to be allocated before the match criteria can be used. In other words, use of SAP egress aggregate meter is mutually exclusive to use of egress ACLs with the following match criteria - mac-ipv4 match, ipv6-128bit match, mac-ipv6-64bit match. All these match criteria require a minimum of 2 resources. SAP egress aggregate meter and egress ACLs MAC match criteria can be enabled simultaneously, with each feature sharing the available resources equally among them.

The **no** form of this command specifies that the software does not allocate any resources for use by SAP egress aggregate policer. If no resources are allocated for use, then the software fails all attempts to enable the configuration of the command for a SAP.

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Default

no egress-sap-aggregate-meter

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

Values 0 to 2

Default 0

mac-auth-res

Syntax

mac-auth-res *num-resources*

no mac-auth-res

Context

config>system>resource-profile>egress-internal-tcam

config>system>resource-profile>ingress-internal-tcam

Platforms

7210 SAS-Dxp

Description

This command reserves a resource chunk for use by the MAC authentication feature.

The **no** form of this command releases any resource chunks that were previously reserved for use by the MAC authentication feature.

Default

no mac-auth-res

Parameters

num-resources

Specifies the number of resource chunks to reserve for use by the MAC authentication feature.

Values 0 to 1

Default 0

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ipv6-128bit-match-enable

Syntax

[**no**] **ipv6-128bit-match-enable** *num-resources*

Context

config>system>resource-profile>egress-internal-tcam>acl-sap-egress

Platforms

7210 SAS-D and 7210 SAS-Dxp

Description

This command allocates maximum resources for use by egress filter policies using IPv6 criteria with 128-bit IPv6 addresses.

The resources cannot be shared with any other egress filter policies that specify other match criteria. See the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide* for more information about resource allocation and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies using ipv6 criteria with 128-bit IPv6 addresses. If no resources are allocated for use, then the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a filter policy using this match criteria.

Default

no ipv6-128bit-match-enable

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria. A minimum value of 2 (indicating two chunks of resources) must be allocated to use this match-criteria. If not, association of a policy with ipv6-128bit criteria to a SAP will fail. It is mutually exclusive to the use of SAP egress aggregate meter. The following table lists the IPv6 128-bit match resource values.

Values

Table 36: IPv6 128-bit match resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	2	0
7210 SAS-Dxp (per node)	0	2	0

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eth-cfm-primary-vlan-enable

Syntax

[**no**] **eth-cfm-primary-vlan-enable**

Context

config>system>resource-profile>egress-internal-tcam

Platforms

7210 SAS-K 2F1C2T and 7210 SAS-K 3SFP+ 8C

Description

This command enables the context of resources for primary VLAN functionality for UP MEPs. There are 128 entries allocated in the egress ACL pool.

Note:
The user must ensure that sufficient resources are free before executing this command. The **tools dump system-resources** command is used to determine the amount of free resources in the egress ACL pool. The scaling of ACL entries reduces when resources are allocated to this feature using this command.

The **no** form of this command frees up the resources allocated to this feature.

Default

no eth-cfm-primary-vlan-enable

mac-ipv4-ipv6-128-match-enable

Syntax

mac-ipv4-ipv6-128-match-enable *num-resources*

no mac-ipv4-ipv6-128-match-enable

Context

config>system>resource-profile>egress-internal-tcam>acl-sap-egress

Platforms

7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command enables IPv6 128-bit address match.

When resources are allocated to egress ACLs from the egress internal TCAM pool using the **config system resource-profile egress-internal-tcam acl-sap-egress** command, these resources can be used

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by either MAC criteria entries or IPv4 entries. To enable IPv6 128-bit address match, the user must allocate resources using the **mac-ipv4-ipv6-128-match-enable** command.

The resources allocated can be shared by MAC criteria, IPv4 criteria, IPv6 64-bit address criteria and IPv6 128-bit address criteria. Each match entry (for all criteria) consumes two resources from this pool, reducing the number of filter entries that can be accommodated in a single chunk to 255 entries for the 7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T, and 108 entries for the 7210 SAS-K 3SFP+ 8C.

The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies using IPv6 criteria with 128-bit IPv6 addresses. If no resources are allocated for use, then the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a filter policy using this match criteria.

Default

no mac-ipv4-ipv6-128-match-enable

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

Values 0 to 2 (7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T)
0 to 4 (7210 SAS-K 3SFP+ 8C)

Default 0

mac-ipv4-match-enable

Syntax

mac-ipv4-match-enable *num-resources*

no mac-ipv4-match-enable

Context

config>system>resource-profile>egress-internal-tcam>acl-sap-egress

Platforms

7210 SAS-D and 7210 SAS-Dxp

Description

This command allocates maximum resources for use by egress filter policies using IPv4 criteria or MAC criteria. The resources allocated are allocated on a first-come-first-serve basis among service entities (for example, SAP and IP interface) using IPv4 and MAC criteria egress filter policies.

The resources cannot be shared with any other egress filter policies that specify other match criteria. See the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide* for more information about resource allocation and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies using MAC or IPv4 criteria. If no resources are allocated for use, then the software fails all

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attempts to associate a service entity (for example, SAP and IP interface) with a filter policy using this match criteria.

Default

mac-ipv4-match-enable 2 (to maintain backward compatibility with earlier releases)

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria. A minimum value of 2 (indicating two chunks of resources) must be allocated to use this match-criteria. If not, association of a policy with MAC and IPv4 criteria to a SAP fails. It is mutually exclusive to the use of SAP egress aggregate meter. The following table lists the MAC IPv4 match resource values.

Values

Table 37: MAC IPv4 match resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	2	0
7210 SAS-Dxp (per node)	0	2	0

mac-ipv6-64bit-match-enable

Syntax

mac-ipv6-64bit-match-enable *num-resources*

no mac-ipv6-64bit-match-enable

Context

config>system>resource-profile>egress-internal-tcam>acl-sap-egress

Platforms

7210 SAS-D and 7210 SAS-Dxp

Description

This command allocates maximum resources for use by egress filter policies using MAC criteria or IPv6 criteria using only the upper 64-bits of the IPv6 addresses. The resources allocated are allocated on a first-come-first-serve basis among service entities (for example, SAP and IP interface) using IPv6 64-bit and MAC criteria egress filter policies.

The resources cannot be shared with any other egress filter policies that specify other match criteria. See the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide* for more information about resource allocation and fields available for use.

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The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies using MAC or IPv6 64-bit criteria. If no resources are allocated for use, then the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a filter policy using this match criteria.

Default

no mac-ipv6-64bit-match-enable

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria. A minimum value of 2 (indicating two chunks of resources) must be allocated to use this match-criteria. If not, association of a policy with mac and ipv6 64bit criteria to a SAP will fail. It is mutually exclusive to the use of SAP egress aggregate meter. The following table lists the MAC IPv6 64-bit match resource values.

Values

Table 38: MAC IPv6 64-bit match resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	2	0
7210 SAS-Dxp (per node)	0	2	0

mac-match-enable

Syntax

mac-match-enable *num-resources*

no mac-match-enable

Context

config>system>resource-profile>egress-internal-tcam>acl-sap-egress

Platforms

7210 SAS-D and 7210 SAS-Dxp

Description

This command allocates maximum resources for use by egress filter policies using MAC criteria. The resources allocated are allocated on a first-come-first-serve basis among service entities (for example, SAP and IP interface) using MAC criteria egress filter policies. This option provides for use of all available resources exclusively by MAC criteria egress filter policies and provide larger number of policies to be used.

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The resources cannot be shared with any other egress filter policies that specify other match criteria. See the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide* for more information about resource allocation and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies using MAC criteria. If no resources are allocated for use, then the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a filter policy using this match criteria.

It is possible to use MAC policies by allocating resources that are shared with other match criteria. This option allows for better scaling.

Default

no mac-match-enable

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

Values 0 to 2

Default 0

ingress-internal-tcam

Syntax

ingress-internal-tcam

Context

config>system>resource-profile

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context allocate ingress internal TCAM resources.

The **ingress-internal-tcam** resource pool is shared by multiple features. The resources are allocated in chunks of fixed sizes. The user is provided an option to allocate the available resources based on their scaling requirements for the features. The resource usage for different features is provided in the CLI description. It is not possible for a chunk to be shared by multiple features. Software allocates resources from the chunk to the feature to which it is allocated until it runs out of all resources in the chunk. If available, the user can allocate more chunks to the feature by taking away chunks of resources from other features that do not need to be enabled.

To free up the resources for use by other features, users must modify the configuration such that the chunks of resources in use by other features are freed. For example, to free up a chunk of resources allocated to ingress ACLs **mac-criteria** and allocate it to **ip-criteria**, the user must remove the association of all the SAPs with ingress ACLs that use a MAC criteria policy, then change the resource profile configuration to allocate the chunk to **ip-criteria**, and then create and associate the SAPs with ip-criteria.

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As another example, the user can free up a chunk of resources used by ingress ACLs and allocate it toward a SAP ingress QoS classification. To do this, the user must remove the association of all the SAPs with ingress ACLs, change the resource profile configuration to reduce the chunk of resources allocated to ingress ACLs (and reduce the value of chunks in use by the ingress ACLs match criteria), then allocate the chunk of resources to the SAP ingress QoS classification feature, and then configure the SAPs with the SAP ingress QoS policies.

The **ingress-internal-tcam** resource pool is shared among the following features on different platforms:

- **7210 SAS-D and 7210 SAS-Dxp**

  SAP ingress QoS classification (using IPv4, IPv6, and MAC match-criteria to match header fields), ingress ACLs (using IPv4, IPv6, and MAC match-criteria), Ethernet CFM UP MEP, SAP ingress aggregate meter

- **7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C**

  SAP ingress QoS classification (using IPv4, IPv6, and MAC match-criteria to match header fields), ingress ACLs (using IPv4, IPv6 and MAC match-criteria)

Note:

- When reassigning chunks of resources among features, a reboot of the node may be required. See the CLI description of the specific feature for information.
- The **ingress-internal-tcam** pool of resources is allocated per node on the 7210 SAS-D, 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C.
- The number of chunks and the number of resources per chunk varies among the different platforms. Contact your Nokia technical support representative for more information.
- For some features, a minimum number of chunks (greater than 1) must be allocated to enable the feature functionality. If this is not done, the software cannot allocate the required number of resources and it will fail the command associated with the feature.

acl-sap-ingress

Syntax

acl-sap-ingress [*num-resources*]

no acl-sap-ingress

Context

config>system>resource-profile>ingress-internal-tcam

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context allocate maximum resources for use by ingress filter policies using any of the supported match criteria. This command limits the total amount of chunks allocated for use by ingress filter policies to the value specified by *num-resources*. In other words, the cumulative sum of chunks allocated to different match criteria supported by ingress filter policies cannot exceed the value configured with *num-resources*.

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Note:
On the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, when resources are allocated to ingress ACLs from the ingress internal TCAM pool, these resources can be used by MAC criteria entries, IPv4 entries and entries that use only IPv6 64-bit addresses.

When the user allocates resources for use by SAP ingress ACL policies using this command, the system allocates resources in chunks of 256 entries for the 7210 SAS-D and 7210 SAS-Dxp, 510 entries for the 7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T, and 192 entries for the 7210 SAS-K 3SFP+ 8C. The resources are used only for filter entries configured under IPv4 criteria or MAC criteria.

For the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, if the user needs to use IPv6 criteria, resources must be allocated using the **mac-ipv4-ipv6-128-match-enable** command under this command context. The resources allocated using this command are used for filter entries configured under IPv6 criteria, IPv4 criteria, or MAC criteria. Each IPv6, IPv4, or MAC filter entry consumes two resources from this pool, reducing the number of filter entries that can be accommodated in a single chunk to 255 entries for the 7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T, and 96 entries for the 7210 SAS-K 3SFP+ 8C. The user can choose to allocate all the chunks allocated for SAP ingress ACL filters for IPv6 criteria or allocate only a portion of it.

See the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide* for more information about resource allocation for the match criteria used in ingress filter policies.

The **no** form of this command specifies that the software does not allocate any resources for use by ingress filter policies on the 7210 SAS-D, 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP, IP interface) with a filter policy using any of the match criteria.

The **no** form of this command is blocked in the CLI and cannot be used on the 7210 SAS-K 3SFP+ 8C.

Parameters

num-resources

Specifies the amount of resources that can be allocated for use by ACL policies. The following table ACL SAP ingress resource values.

Values **max** (7210 SAS-K 3SFP+ 8C)

Table 39: ACL SAP ingress resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	3	2
7210 SAS-Dxp (per node)	0	3	2
7210 SAS-K 2F1C2T (per node)	0	5	1
7210 SAS-K 2F6C4T (per node)	0	5	1

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ipv4-ipv6-128-match-enable

Syntax

[**no**] **ipv4-ipv6-128-match-enable** *num-resource*

Context

config>system>resource-profile>ingress-internal-tcam>acl-sap-ingress

Platforms

7210 SAS-D, 7210 SAS-Dxp

Description

This command allocates maximum resources for use by ingress filter policies using ipv6 criteria with 128-bit IPv6 addresses.

The resources can be shared with IPv4 ingress filter policies. See the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide* for more information about how to allow filter policies using IPv4 criteria to share resources with filter policies that use IPv6 criteria with 128-bit address and resource allocation details and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by ingress filter policies using IPv6 criteria with 128-bit IPv6 addresses. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example: SAP, IP interface) with a ingress filter policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to the service entity associated with a ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam acl-sap-ingress** command) and chunks are available for use. The following table lists the IPv4 and IPv6 128-bit match resource values.

Values

Table 40: IPv4 and IPv6 128-bit match resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	3	0
7210 SAS-Dxp (per node)	0	3	0

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mac-ipv4-ipv6-128-match-enable

Syntax

mac-ipv4-ipv6-128-match-enable *num-resources*

no mac-ipv4-ipv6-128-match-enable

Context

config>system>resource-profile>ingress-internal-tcam>acl-sap-ingress

Platforms

7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command enables IPv6 128-bit address match.

When resources are allocated to ingress ACLs from the ingress internal TCAM pool using the **config system resource-profile ingress-internal-tcam acl-sap-ingress** command, these resources can be used by MAC criteria entries, IPv4 entries and entries that use only IPv6 64-bit addresses. To enable IPv6 128-bit address match, the user must allocate resources using the **mac-ipv4-ipv6-128-match-enable** command.

The resources allocated can be shared by MAC criteria, IPv4 criteria, IPv6 64-bit address criteria and IPv6 128-bit address criteria. Each match entry (for all criteria) consumes two resources from this pool, reducing the number of filter entries that can be accommodated in a single chunk to 255 entries for the 7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T, and 96 entries for the 7210 SAS-K 3SFP+ 8C.

The **no** form of this command specifies that the software does not allocate any resources for use by egress filter policies using IPv6 criteria with 128-bit IPv6 addresses. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a filter policy using this match criteria.

Default

no mac-ipv4-ipv6-128-match-enable

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

Values 0 to 5 (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T)
0 to 7 (7210 SAS-K 3SFP+ 8C)

Default 0

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ipv4-mac-match-enable

Syntax

ipv4-mac-match-enable *num-resource*

no ipv4-mac-match-enable

Context

config>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource

Platforms

7210 SAS-D, 7210 SAS-Dxp

Description

This command allocates maximum resources for use by SAP ingress QoS policies using both MAC (any) and IPv4 criteria (any) criteria in a policy.

The software allocates available resources for SAP ingress policies using the following criteria - either both IPv4 criteria any and MAC criteria any, only MAC criteria any, only ipv4 criteria, dot1p-only criteria, ipv4 dscp-only criteria and ipv6 dscp-only criteria. It is not used for SAP ingress policies that use ipv6 criteria any.

See the *7210 SAS-D, Dxp Quality of Service Guide* for more information about resource allocation and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by SAP ingress QoS policies using both MAC and IPv4 criteria. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a ingress filter policy or SAP ingress QoS policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to the service entity associated with a ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam qos-sap-ingress-resource** command) and chunks are available for use. The following table lists the parameter values.

Values

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Table 41: IPv4 MAC match resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	3	0
7210 SAS-Dxp (per node)	0	3	0

mac-ipv4-ipv6-128-match-enable

Syntax

[**no**] **mac-ipv4-ipv6-128-match-enable** *num-resources*

Context

config>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource

Platforms

7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command allocates maximum resources for use by SAP ingress QoS classification policies using IPv6 criteria with 128-bit IPv6 (source and destination IPv6) addresses.

When resources are allocated to SAP ingress classification from the ingress internal TCAM pool using the **config system resource-profile ingress-internal-tcam qos-sap-ingress-resource** command, these resources can be used by either MAC criteria entries or IPv4 criteria entries. To enable IPv6 128-bit address match, the user must allocate resources using this command.

The resources allocated can be shared by MAC criteria, IPv4 criteria, IPv6 64-bit address criteria and IPv6 128-bit address criteria. Each match entry (for all criteria) consumes two resources from this pool, reducing the number of classification entries that can be accommodated in a single chunk to 255 entries for the 7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T, and 96 entries for the 7210 SAS-K 3SFP+ 8C.

The **no** form of this command specifies that the software does not allocate any resources for use by SAP ingress QoS classification rules using IPv6 criteria. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a policy using the IPv6 match criteria.

Default

no mac-ipv4-ipv6-128-match-enable

Parameters

num-resources

Specifies the maximum amount of resources for use by this match criteria.

Values 0 to 5 (7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T)

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0 to 7 (7210 SAS-K 3SFP+ 8C)

Default 0

ipv4-match-enable

Syntax

[**no**] **ipv4-match-enable** *num-resource*

Context

config>system>resource-profile>ingress-internal-tcam>acl-sap-ingress

Platforms

7210 SAS-D, 7210 SAS-Dxp

Description

This command allocates maximum resources for use by ingress filter policies using ipv4 criteria.

The resource cannot be shared with ingress filter policies using mac criteria or ipv6 criteria. See the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide* for more information about resource allocation details and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by ingress filter policies using ipv4 criteria. If no resources are allocated for use, then software fails all attempts to associate a service entity (for example, SAP and IP interface) with a ingress filter policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to the service entity associated with a ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam qos-sap-ingress-resource** command) and chunks are available for use. The following table lists the parameter values.

Values

Table 42: ACL IPv4 match resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	3	0

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Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-Dxp (per node)	0	3	0

ipv4-match-enable

Syntax

ipv4-match-enable *num-resource*

no ipv4-match-enable

Context

config>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource

Platforms

7210 SAS-D, 7210 SAS-Dxp

Description

This command allocates maximum resources for use by SAP ingress QoS policies using IPv4 criteria (any).

The resource cannot be shared with SAP ingress QoS filter policies using MAC criteria or ipv6 criteria. See the *7210 SAS-K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Quality of Service Guide* for more information about resource allocation details and fields available for use.

The **no** form of this command specifies that the software does not allocate any resources for use by SAP ingress QoS policies using ipv4 criteria. If no resources are allocated for use, then software fails all attempts to associate a service entity (for example, SAP and IP interface) with a SAP ingress QoS policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to the service entity associated with a ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam qos-sap-ingress-resource** command) and chunks are available for use. The following table lists the parameter values.

Values

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Table 43: QoS IPv4 match resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	3	0
7210 SAS-Dxp (per node)	0	3	0

ipv6-64-only-match-enable

Syntax

[**no**] **ipv6-64-only-match-enable** *num-resource*

Context

config>system>resource-profile>ingress-internal-tcam>acl-sap-ingress

Platforms

7210 SAS-D, 7210 SAS-Dxp

Description

This command allocates maximum resources for use by ingress filter policies using ipv6 criteria with 64-bit IPv6 addresses. See the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide* for more information about resource allocation details and fields available for use.

The resources cannot be shared with IPv4 filter policies or IPv6 filter policies specifying 128-bit addresses.

The **no** form of this command specifies that the software does not allocate any resources for use by filter policies using ipv6 criteria with 64-bit IPv6 addresses. If no resources are allocated for use, then software fails all attempts to associate a service entity (for example, SAP and IP interface) with a ingress filter policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to the service entity associated with a ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam qos-sap-ingress-resource** command) and chunks are available for use. The following table lists the parameter values.

Values

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Table 44: ACL IPv6 64-bit only match resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	3	0
7210 SAS-Dxp (per node)	0	3	0

mac-match-enable

Syntax

[**no**] **mac-match-enable** *num-resource*

Context

config>system>resource-profile>ingress-internal-tcam>acl-sap-ingress

Platforms

7210 SAS-D, 7210 SAS-Dxp

Description

This command allocates maximum resources for use by ingress filter policies using MAC criteria.

See the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide* for more information about ingress filter policy and fields available for use with ingress filter policy.

The **no** form of this command specifies that the software does not allocate any resources for use by ingress filter policies using MAC criteria. If no resources are allocated for use, then software fails all attempts to associate a service entity (for example, SAP and IP interface) with a ingress filter policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to the service entity associated with a ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam qos-sap-ingress-resource** command) and chunks are available for use. The following table lists the parameter values.

Values

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Table 45: ACL MAC match resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	3	0
7210 SAS-Dxp (per node)	0	3	0

Note:
On the 7210 SAS-D and 7210 SAS-Dxp, mac-criteria SAP ingress QoS policies get to use an additional 128 classification entries with 64 meters. These entries are allocated to mac-criteria SAP ingress QoS resource pool by default and cannot be reassigned to any another feature or any other match criteria.

mac-match-enable

Syntax

[**no**] **mac-match-enable** *num-resource*

Context

config>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource

Platforms

7210 SAS-D, 7210 SAS-Dxp

Description

This command allocates maximum resources for use by SAP ingress QoS policies using MAC criteria (any).

See the *7210 SAS-K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Quality of Service Guide* for more information about the resource allocation for SAP ingress QoS policy.

The **no** form of this command specifies that the software does not allocate any resources for use by SAP ingress QoS policies using MAC criteria. If no resources are allocated for use, the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a SAP ingress QoS policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to the service entity associated with a ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-**

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internal-tcam qos-sap-ingress-resource command) and chunks are available for use. The following table lists the parameter values.

Values

Table 46: QoS MAC match resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	3	0
7210 SAS-Dxp (per node)	0	3	0

Note:
On the 7210 SAS-D and 7210 SAS-Dxp, mac-criteria SAP ingress QoS policies get to use an additional 128 classification entries with 64 meters. These entries are allocated to mac-criteria SAP ingress QoS resource pool by default and cannot be reassigned to any another feature or any other match criteria.

eth-cfm

Syntax

[**no**] **eth-cfm** *num-resource*

Context

config>system>resource-profile>ingress-internal-tcam

Platforms

7210 SAS-D and 7210 SAS-Dxp

Description

Commands in this context allocate resources for CFM UP MEPs.

The **no** form of this command specifies that the software does not allocate any resources for use by CFM UP MEPs.

Note:
CFM Down MEPs do not require explicit resource allocation by the user.

Parameters

num-resources

Specifies the maximum amount of resources for use by eth-cfm.

The following table lists the parameter values.

Values

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Table 47: ETH-CFM resource values

Platforms	Min value (per node)	Max value (per node)	Default
7210 SAS-D (per node)	0	1	0
7210 SAS-Dxp (per node)	0	1	0

up-mep

Syntax

[**no**] **up-mep** *num-resource*

Context

config>system>resource-profile>ingress-internal-tcam>eth-cfm

Platforms

7210 SAS-D and 7210 SAS-Dxp

Description

This command allocates resources for CFM UP MEPs.

Resources for UP MEPs created on SAP and SDP Bindings are allocated from this pool.

The **no** form of this command specifies that the software does not allocate any resources for use by CFM UP MEPs. If no resources are allocated for use, the software fails all attempts to configure an UP MEP.

Note:

- CFM Down MEPs do not require explicit resource allocation by the user.
- Resource allocation for UP MEPs is only supported on the 7210 SAS-D and 7210 SAS-Dxp.
- On the 7210 SAS-Dxp, when a user-configured MAC address other than the port MAC is used, additional resources are required.

Default

0

Parameters

num-resources

Specifies the maximum amount of resources for use by up-mep.

Values 0 to 2

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ipv6-ipv4-match-enable

Syntax

ipv6-ipv4-match-enable *num-resource*

no ipv6-ipv4-match-enable

Context

config>system>resource-profile>ingress-internal-tcam>qos-sap-ingress-resource

Platforms

7210 SAS-D, 7210 SAS-Dxp

Description

This command allocates resources from the SAP ingress QoS resource pool for ipv6-criteria. Users need to use this command before using IPv6 criteria SAP ingress QoS policies.

These resources can be shared with SAP ingress policies that use IPv4 criteria. See the *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide* for more information about the resource allocation for SAP ingress QoS policy.

The **no** form of this command specifies that the software does not allocate any resources for use by ingress SAP QoS policies using IPv6 criteria. If no resources are allocated for use, then software fails all attempts to associate a service entity (for example, SAP and IP interface) with a ingress filter policy using this match criteria.

Parameters

num-resources

Specifies the maximum amount of resources for use by this SAP ingress Qos policy match criteria.

If the user specifies **max**, the software allocates one chunk when the first SAP is associated with an ingress filter policy using this match criteria. It continues to allocate resources to SAPs associated with a ingress filter policy using this criteria, as long as the total amount of resources allocated does not exceed the resources allocated to ingress filter policies (configured with the **config system resource-profile ingress-internal-tcam qos-sap-ngress-resource** command) and chunks are available for use. The following table lists the parameter values.

Values

Table 48: QoS IPv6 IPv4 match resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	6	max
7210 SAS-Dxp (per node)	0	6	max

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qos-sap-ingress-resource

Syntax

qos-sap-ingress-resource *num-resource*

no qos-sap-ingress-resource

Context

config>system>resource-profile>ingress-internal-tcam

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

Commands in this context allocate maximum resources for use by SAP ingress QoS policies using any of the supported match criteria. This command limits the total amount of chunks allocated for use by SAP ingress QoS policies to the value specified by *num-resources*. The cumulative sum of chunks allocated to different match criteria supported by SAP ingress QoS policies cannot exceed the value configured with *num-resources*.

If no resources are allocated for use, then the software fails all attempts to associate a service entity (for example, SAP and IP interface) with a SAP ingress QoS policy using any of the match criteria .

When the user allocates resources for use by SAP ingress QoS policies using this command, the system allocates resources in chunks of 256 entries for the 7210 SAS-D and 7210 SAS-Dxp, 510 entries for the 7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T, and 192 entries for the 7210 SAS-K 3SFP+ 8C. The resources are used only for classification entries configured under IPv4 criteria or MAC criteria.

For the 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, if the user needs to use IPv6 criteria, resources must be allocated using the CLI command **mac-ipv4-ipv6-128-match-enable** under this command context. The resources allocated using this command are used for classification entries configured under IPv6 criteria, IPv4 criteria, or MAC criteria. Each IPv6, IPv4, or MAC classification entry consumes two resources from this pool, reducing the number of classification entries that can be accommodated in a single chunk to 255 entries for the 7210 SAS-K 2F1C2T and 7210 SAS-K 2F6C4T, and 96 entries for the 7210 SAS-K 3SFP+ 8C. The user can choose to allocate all the chunks allocated for SAP ingress QoS classification for IPv6 criteria or allocate only a portion of it.

See the *7210 SAS-D, Dxp Quality of Service Guide* and *7210 SAS-K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Quality of Service Guide* for more information about resource allocation for the match criteria used in ingress filter policies.

The **no** form of this command specifies that the software does not allocate any resources for use by SAP ingress QoS policies on the 7210 SAS-D, 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, and 7210 SAS-K 2F6C4T.

The **no** form of this command is blocked in the CLI and cannot be used on the 7210 SAS-K 3SFP+ 8C.

Parameters

num-resources

Specifies the amount of resources that can be allocated for use by SAP ingress QoS policies.

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The following table lists the parameter values.

Values

Table 49: QoS ingress SAP resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	3	1
7210 SAS-Dxp (per node)	0	3	1
7210 SAS-K 2F1C2T (per node)	0	5	0
7210 SAS-K 2F6C4T (per node)	0	5	0

Values max (7210 SAS-K 3SFP+ 8C)

sap-aggregate-meter

Syntax

[**no**] **sap-aggregate-meter** *num-resource*

Context

config>system>resource-profile>ingress-internal-tcam

Platforms

7210 SAS-D and 7210 SAS-Dxp

Description

This command allocates maximum resources for use by meters/policers used to implement SAP ingress aggregate meter functionality from the global pool of ingress CAM resources. The user must ensure that resources are allocated to aggregate meters using this command before using the **config service sap ingress aggregate-meter-rate** command.

Note:
For the command to take effect, the node must be rebooted after making the change.

This command allocates meter resources from the available global ingress CAM resource pool. By default, when resources are allocated to SAP ingress QoS policy, along with the CAM classification entries, meter resources are also allocated. If the user needs to use SAP aggregate meter functionality they cannot allocate all the available resources in the global resource pool to SAP ingress QoS policies and ETH-CFM UP MEP. They need to allocate some resources for use by SAP aggregate meter (or SAP ingress ACLs or G8032-fast-flood feature).

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By default, when resources are allocated for ingress ACLs, only classification entries are used and meters resources are not used. SAP aggregate meter resources can use meters from this pool of meter resources. In other words, SAP aggregate meters are stolen from the unused meters in the resources allocated to ingress ACLs.

If the user allocates resources for ingress ACLs and then configures resources for SAP aggregate meter using this command, the software does the following.

- It does not allocate any additional chunks or resources from the available global ingress CAM resource pool to SAP aggregate meter, if it can allocate the required number of meters from the chunks/ resources allocated to ingress ACLs. For example, if user has allocated 2 chunks of 510 entries each for ingress ACLs and then configures sap-aggregate-meter to use 2 chunks to use about 510 aggregate meters, the software does not allocate any additional entries from the available global resource pool.
- If the number of ingress ACL resources allocated by user is less than the number of resources assigned by the user to sap-aggregate-meter (or if no resources are allocated to G8032), the software allocates the difference from the available global ingress CAM resource pool. For example, if user has allocated 1 chunk of 510 entries for ingress ACLs and then configures sap-aggregate-meter to use 2 chunks to use about 510 aggregate meters, the software allocates 1 additional chunk (2 chunks required for SAP aggregate - 1 chunk alloted to ingress ACLs) for use with SAP aggregate meter. The classification entries associated with additional chunk alloted for SAP aggregate-meter can be used by the ingress ACLs policies. It cannot be used by SAP ingress QoS policies and eth-cfm UP MEP.

Similar checks as above are performed when user allocates resources for SAP aggregate meters using this command and then configures resources for ingress ACLs (or for G8032-fast-flood feature). That is, the software does the following.

- It does not allocate any additional entries from the available global ingress CAM resource pool to ingress ACLs, if it can allocate the required number of classification entries from the chunks allocated to SAP aggregate meter feature. For example, if the user has allocated 2 chunks of 510 entries each for SAP aggregate meters, and then configures ingress ACLs to use 2 chunks to use about 510 classification entries, the software does not allocate any additional entries from the available global resource pool.
- If the number of SAP aggregate meter resources allocated by user is less than the number of resources requested by the user for ingress ACLs, the software allocates the difference from the available global ingress CAM resource pool. For example, if the user has allocated 1 chunk of 510 entries for SAP aggregate meters, and then configures ingress ACLs to use 2 chunks, the software allocates 1 additional chunk (2 chunks required for ingress ACLs - 1 chunk alloted to SAP aggregate meter) for use with ingress ACLs. The meter resources associated with additional chunk alloted for ingress ACLs can be assigned to the SAP aggregate feature, if required.

See the *7210 SAS-D, Dxp Quality of Service Guide*, *7210 SAS-K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Quality of Service Guide*, and *7210 SAS-D, Dxp, K 2F1C2T, K 2F6C4T, K 3SFP+ 8C Router Configuration Guide* for more information about the use of SAP aggregate feature, ingress CAM resource allocation and use of ACLs policies.

The **no** form of this command specifies that the software does not allocate any resources for use by SAP ingress aggregate meter. If no resources are allocated for use, then the software fails all attempts to associate an aggregate-meter with SAP ingress.

Parameters

num-resources

Specifies the maximum amount of resources for use by this filter match criteria.

The following table lists the parameter values.

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Values

Table 50: SAP aggregate meter resource values

Platforms	Min value (per node)	Max value (per node)	Default values
7210 SAS-D (per node)	0	1	0
7210 SAS-Dxp (per node)	0	1	0

6.18.2.1.20 Fan controller commands

fan

Syntax

fan {**on** | **off** | **auto**}

Context

config>system

Platforms

7210 SAS-D and 7210 SAS-D ETR variant with 128MB flash

Description

The 7210 SAS-D chassis with 128MB flash has a fan to help in circulating the air inside the chassis. It does not provide for cooling. This command allows the operator to control the operation of the fan.

Operators can choose to either switch **on** or **off** the fan permanently or allow the system control the operation of the fan by setting the value to **auto**.

In **auto** mode, software controls the operation of the fan. It switches the fan **on**, if the system defined temperature threshold is exceeded and switches it **off** when temperature falls back to normal. It also ensures that fan is not switched on and off more than once in 30 minutes.

Default

auto

Parameters

on

Specifies that the operation of the fan is controlled by the user and it is always switched on/operating.

off

Specifies that the operation of the fan is controlled by the user and it is always switched off/not operating.

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auto

Specifies that the fan is controlled by the system. It is switched on when the temperature threshold exceeds a specified value and is switched off when the temperature threshold falls below a specified value.

6.18.2.2 Show commands

6.18.2.2.1 System commands

connections

Syntax

connections [**address** *ip-address* [**interface** *interface-name*]] [**port** *port-number*] [**detail**]

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays UDP and TCP connection information.

If no command line options are specified, a summary of the TCP and UDP connections displays.

Parameters

ip-address

Displays only the connection information for the specified IP address.

Values *ipv4-address* — a.b.c.d (host bits must be 0)
ipv6-address — x:x:x:x:x:x:x:x (eight 16-bit pieces)
x:x:x:x:x:x:d.d.d.d
x — 0 to FFFF (hexadecimal)
d — 0 to 255 (decimal)

port-number

Displays only the connection information for the specified port number.

Values 0 to 65535

detail

Displays TCP statistics.

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Output

The following outputs are examples of system connections information, and the associated tables describe the output fields.

- Sample output, Table 51: Output fields: system connections
- Sample output (detail)

Sample output

```
A:ALA-12# show system connections
===============================================================================
Connections :
===============================================================================
Proto    RecvQ    TxmtQ Local Address         Remote Address        State
-------------------------------------------------------------------------------
TCP          0        0 0.0.0.0.21            0.0.0.0             LISTEN
TCP          0        0 0.0.0.0.23            0.0.0.0             LISTEN
TCP          0        0 0.0.0.0.179           0.0.0.0             LISTEN
TCP          0        0 10.0.0.xxx.51138      10.0.0.104.179      SYN_SENT
TCP          0        0 10.0.0.xxx.51139      10.0.0.91.179       SYN_SENT
TCP          0        0 10.10.10.xxx.646      0.0.0.0             LISTEN
TCP          0        0 10.10.10.xxx.646      10.10.10.104.49406  ESTABLISHED
TCP          0        0 10.1.0.1.51140        10.1.0.2.179        SYN_SENT
TCP          0      993 192.168.x.xxx.23      192.168.x.xx.xxxx   ESTABLISHED
UDP          0        0 0.0.0.0.123           0.0.0.0              ---
UDP          0        0 0.0.0.0.646           0.0.0.0              ---
UDP          0        0 0.0.0.0.17185         0.0.0.0              ---
UDP          0        0 10.10.10.xxx.646      0.0.0.0              ---
UDP          0        0 xxx.0.0.1.50130       xxx.0.0.1.17185      ---
-------------------------------------------------------------------------------
No. of Connections: 14
===============================================================================
A:ALA-12#
```

Table 51: Output fields: system connections

Label	Description
Proto	Displays the socket protocol, either TCP or UDP
RecvQ	Displays the number of input packets received by the protocol
TxmtQ	Displays the number of output packets sent by the application
Local Address	Displays the local address of the socket The socket port is separated by a period.
Remote Address	Displays the remote address of the socket The socket port is separated by a period.
State	Listen — The protocol state is in the listen mode Established — The protocol state is established

Sample output (detail)

```
A:ALA-12# show system connections detail
```


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```
-------------------------------------------------------------------------------
 TCP Statistics
-------------------------------------------------------------------------------
packets sent                                : 659635
data packets                                : 338982 (7435146 bytes)
data packet retransmitted                   : 73 (1368 bytes)
ack-only packets                            : 320548 (140960 delayed)
URG only packet                             : 0
window probe packet                         : 0
window update packet                        : 0
control packets                             : 32
packets received                            : 658893
acks                                        : 338738 for (7435123 bytes)
duplicate acks                              : 23
ack for unsent data                         : 0
packets received in-sequence                : 334705 (5568368 bytes)
completely duplicate packet                 : 2 (36 bytes)
packet with some dup. data                  : 0 (0 bytes)
out-of-order packets                        : 20 (0 bytes)
packet of data after window                 : 0 (0 bytes)
window probe                                : 0
window update packet                        : 3
packets received after close                : 0
discarded for bad checksum                  : 0
discarded for bad header offset field       : 0
discarded because packet too short          : 0
connection request                          : 4
connection accept                           : 24
connections established (including accepts) : 27
connections closed                          : 26 (including 2 drops)
embryonic connections dropped               : 0
segments updated rtt                        : 338742 (of 338747 attempts)
retransmit timeouts                         : 75
connections dropped by rexmit timeout       : 0
persist timeouts                            : 0
keepalive timeouts                          : 26
keepalive probes sent                       : 0
connections dropped by keepalive            : 1
pcb cache lookups failed                    : 0
===============================================================================
A:ALA-12#
```

cpu

Syntax

cpu [**sample-period** *seconds*]

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays CPU utilization per task over a sample period.

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Parameters

seconds

Specifies the number of seconds over which to sample CPU task utilization.

Values 1 to 5

Default 1

Output

The following output is an example of system CPU information, and Table 52: Output fields: system CPU describes the output fields.

Sample output

```
*A:cses-E11# show system cpu sample-period 2
===============================================================================
CPU Utilization (Sample period: 2 seconds)
===============================================================================
Name                                  CPU Time       CPU Usage        Capacity
                                        (uSec)                          Usage
-------------------------------------------------------------------------------
BFD                                         10          ~0.00%          ~0.00%


Cards & Ports                            8,332           0.41%           0.08%


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%

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%


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%

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#
```


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Table 52: Output fields: system CPU

Label	Description
CPU Utilization	The total amount of CPU time
Name	The process or protocol name
CPU Time (uSec)	The CPU time each process or protocol has used in the specified time
CPU Usage	The sum of CPU usage of all the processes and protocols
Capacity Usage	Displays the level the specified service is being used When this number hits 100%, this part of the system is busied out. There may be extra CPU cycles still left for other processes, but this service is running at capacity. This column does not reflect the true CPU utilization value; that data is still available in the **CPU Usage** column. This column is the **busiest** task in each group, where **busiest** is defined as either actually running or blocked attempting to acquire a lock.

cron

Syntax

cron

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command enters the show CRON context.

schedule

Syntax

schedule [*schedule-name*] [**owner** *schedule-owner*]

Context

show>system>cron

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Platforms

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

Description

This command displays cron schedule parameters.

Parameters

schedule-name

Displays information for the specified scheduler name.

schedule-owner

Displays information for the specified scheduler owner.

Output

The following output is an example of CRON schedule information, and Table 53: Output fields: CRON schedule describes the output fields.

Sample output

```
A:sim1>show>system>cron schedule test
===============================================================================
CRON Schedule Information
===============================================================================
Schedule                    : test
Schedule owner              : TiMOS CLI
Description                 : none
Administrative status       : enabled
Operational status          : enabled
Script Policy               : test
Script Policy Owner         : TiMOS CLI
Script                      : test
Script Owner                : TiMOS CLI
Script source location      : ftp://*****:******@192.168.15.1/home/testlab_bgp
                              /cron/test1.cfg
Script results location     : ftp://*****:******@192.168.15.1/home/testlab_bgp
                              /cron/res
Schedule type               : periodic
Interval                    : 0d 00:01:00 (60 seconds)
Repeat count                : 10
Next scheduled run          : 0d 00:00:42
End time                    : none
Weekday                     : tuesday
Month                       : none
Day of month                : none
Hour                        : none
Minute                      : none
Number of schedule runs     : 10
Last schedule run           : 2008/01/01 17:20:52
Number of schedule failures : 0
Last schedule failure       : no error
Last failure time           : never
===============================================================================
A:sim1>show>cron
```


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Table 53: Output fields: CRON schedule

Label	Description
Schedule name	Displays the schedule name
Schedule owner	Displays the owner name of the action
Description	Displays the schedule's description
Administrative status	Enabled — The administrative status is enabled Disabled — Administratively disabled
Operational status	Enabled — The operational status is enabled Disabled — Operationally disabled
Script Policy	Displays the script policy name
Script Policy Owner	Displays the name of script policy owner
Script	Displays the name of the script
Script owner	Displays the name of the of script owner
Script source location	Displays the location of scheduled script
Script results location	Displays the location where the script results have been sent
Schedule type	Periodic — Displays a schedule that ran at a specified interval Calendar — Displays a schedule that ran based on a calendar Oneshot — Displays a schedule that ran one time only
Interval	Displays the interval between runs of an event
Repeat count	Displays the total number of times a CRON "interval" schedule is run
Next scheduled run	Displays the time for the next scheduled run
End time	Displays the end time of the schedule
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

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Label	Description
Last scheduled run	Displays the last scheduled session
Number of scheduled failures	Displays the number of scheduled sessions that failed to execute
Last scheduled failure	Displays the last scheduled session that failed to execute
Last failure time	Displays the system time of the last failure

information

Syntax

information

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays general system information including basic system, SNMP server, last boot and DNS client information.

Output

The following output is an example of system information, and Table 54: Output fields: system information describes the output fields.

Sample output

```
===============================================================================
System Information
===============================================================================
System Name               : PE4-M2
System Type               :
System Version            : B-9.0.F-private
System Contact         :
System Location        :
System Coordinates     :
System Up Time            : 10 days, 06:50:01.84 (hr:min:sec)

SNMP Port                 : 161
SNMP Engine ID            : 0000197f0000c408416161a3
SNMP Engine Boots         : 571
SNMP Max Message Size     : 1500
SNMP Admin State          : Disabled
SNMP Oper State           : Disabled
SNMP Index Boot Status    : Not Persistent
SNMP Sync State           : N/A
```


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```
Tel/Tel6/SSH/FTP Admin    : Disabled/Disabled/Enabled/Disabled
Tel/Tel6/SSH/FTP Oper     : Down/Down/Up/Down

BOF Source                : cf1:
Image Source              : primary
Config Source             : primary
Last Booted Config File   : cf1:\mvpn_head.cfg
Last Boot Cfg Version     : MON SEP 26 04:48:37 2016 UTC
Last Boot Config Header: N/A
Last Boot Index Version   : N/A
Last Boot Index Header : N/A
Last Saved Config         : N/A
Time Last Saved           : N/A
Changes Since Last Save   : Yes
User Last Modified        : admin
Time Last Modified        : 2016/10/25 04:07:16
Max Cfg/BOF Backup Rev    : 5
Cfg-OK Script             : ftp://dhandaym:Alcatel12#@xxx.xxx.xxx.xx/./env.cfg
Cfg-OK Script Status      : success
Cfg-Fail Script           : N/A
Cfg-Fail Script Status    : not used

Management IP Addr        : 10.135.6.77/24
Primary DNS Server        : N/A
Secondary DNS Server      : N/A
Tertiary DNS Server       : N/A
DNS Domain                : (Not Specified)
DNS Resolve Preference    : ipv4-only
DNSSEC AD Validation      : False
DNSSEC Response Control   : drop
BOF Static Routes         :
  To                   Next Hop
  10.0.0.0/8           10.135.6.1

  10.135.25.0/24       10.135.16.1

  10.250.0.0/16       10.135.6.1

  10.254.0.0/16       10.135.6.1


ICMP Vendor Enhancement   : Disabled
EFM OAM Grace Tx Enable   : False
===============================================================================

===============================================================================
System Oper Group Information
===============================================================================
Name                            Oper   Creation Hold   Hold   Members Monitor
                                Status Origin   UpTime DnTime
                                                (secs) (secs)
-------------------------------------------------------------------------------
No Matching Entries
===============================================================================
*7210SAS>show>system#
```

Table 54: Output fields: system information

Label	Description
System Name	The configured system name

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Label	Description
System Contact	A text string that describes the system contact information
System Location	A text string that describes the system location
System Coordinates	A text string that describes the system coordinates
System 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 Disabled — SNMP is administratively shutdown and not running
SNMP Oper State	Enabled — SNMP is operationally enabled Disabled — SNMP is operationally disabled
SNMP Index Boot Status	Persistent — System indexes are saved between reboots 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 Secondary — Indicates that the directory location for runtime image Tertiary — Indicates that the directory location for runtime image file was loaded from the tertiary source file was loaded from the secondary source
Config Source	Primary — Indicates that the directory location for configuration file was loaded from the primary source Secondary — Indicates that the directory location for configuration file was loaded from the secondary source Tertiary — Indicates that the directory location for configuration file was loaded from the tertiary source

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Label	Description
Last Booted Config File	The URL and filename of the last loaded configuration file
Last Boot Cfg Version	The date and time of the last boot
Last Boot Config Header	Displays header information such as image version, date built, date generated
Last Boot Index Version	The version of the persistence index file read when the card was last rebooted
Last Boot Index Header	The header of the persistence index file read when the card was last rebooted
Last Saved Config	The location and filename of the last saved configuration file
Time Last Saved	The date and time of the last time configuration file was saved
Changes Since Last Save	Yes — There are unsaved configuration file changes No — There are no unsaved configuration file changes
Time Last Modified	The date and time of the last modification
Max Cfg/BOF Backup Rev	The maximum number of backup revisions maintained for a configuration file This value also applies to the number of revisions maintained for the BOF file
Cfg-OK Script	URL — The location and name of the CLI script file executed following successful completion of the boot-up configuration file execution
Cfg-OK Script Status	Successful/Failed — The results from the execution of the CLI script file specified in the Cfg-OK Script location Not used — No CLI script file was executed
Cfg-Fail Script	URL — The location and name of the CLI script file executed following a failed boot-up configuration file execution Not used — No CLI script file was executed
Cfg-Fail Script Status	Successful/Failed — The results from the execution of the CLI script file specified in the Cfg-Fail Script location Not used — No CLI script file was executed
DNS Server	The IP address of the DNS server
DNS Domain	The DNS domain name of the node
BOF Static Routes	To — The static route destination

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Label	Description
	Next Hop — The next hop IP address used to reach the destination Metric — Displays the priority of this static route versus other static routes None — No static routes are configured

script-control

Syntax

script-control

Context

show>system

Platforms

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

Description

Commands in this context display script information.

script

Syntax

script [*script-name*] [**owner** *script-owner*]

Context

show>system>script-control

Platforms

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

Description

This command displays script parameters.

Parameters

script-name

Displays information for the specified script.

script-owner

Displays information for the specified script owner.

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Output

The following output is an example of script information, and Table 55: Output fields: script describes the output fields.

Sample output

```
7210SAS>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://*****:******@xxx.xxx.xxx.1/home/testlab_bgp
                               /test1.cfg
Last script error            : none
Last change                  : 2015/01/07 17:10:03
===============================================================================
7210SAS>show>cron#
```

Table 55: Output fields: script

Label	Description
Script	Displays the name of the script
Script owner	Displays the owner name of script
Administrative status	Enabled — Administrative status is enabled Disabled — Administratively disabled
Operational status	Enabled — Operational status is enabled 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

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Platforms

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

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 56: Output fields: script policy describes the output fields.

Sample output

```
show system script-control script-policy run-history terminated
===============================================================================
Script-policy Run History
===============================================================================
Script policy "test"
Owner "TiMOS CLI"
-------------------------------------------------------------------------------
Script Run #17
-------------------------------------------------------------------------------
Start time : 2006/11/06 20:30:09 End time : 2006/11/06 20:35:24
Elapsed time : 0d 00:05:15 Lifetime : 0d 00:00:00
State : terminated Run exit code : noError
Result time : 2006/11/06 20:35:24 Keep history : 0d 00:49:57
Error time : never
Results file : ftp://*:*@192.168.xx.xx/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.xx.xx/home/testlab_bgp/cron/_20061106-203523.
out
Run exit : Success
-------------------------------------------------------------------------------
*A:Redundancy#
```


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```
*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:show#

*A:# show system script-control script-policy run-history initializing
===============================================================================
Script-policy Run History
===============================================================================
Script policy "test"
Owner "TiMOS CLI"
-------------------------------------------------------------------------------
Script Run #21
-------------------------------------------------------------------------------
Start time : never End time : never
Elapsed time : 0d 00:00:00 Lifetime : 0d 01:00:00
State : initializing Run exit code : noError
Result time : never Keep history : 0d 01:00:00
Error time : never
Results file : none
-------------------------------------------------------------------------------
Script Run #22
-------------------------------------------------------------------------------
Start time : never End time : never
Elapsed time : 0d 00:00:00 Lifetime : 0d 01:00:00
State : initializing Run exit code : noError
Result time : never Keep history : 0d 01:00:00
Error time : never
Results file : none
-------------------------------------------------------------------------------
Script Run #23
-------------------------------------------------------------------------------
Start time : never End time : never
Elapsed time : 0d 00:00:00 Lifetime : 0d 01:00:00
State : initializing Run exit code : noError
Result time : never Keep history : 0d 01:00:00
Error time : never
Results file : none
===============================================================================
*A:show#
```

Table 56: Output fields: script policy

Label	Description
Script policy	Displays the name of the script policy

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Label	Description
Script policy owner	Displays the name of the script policy owner
Administrative status	Enabled — Administrative status is enabled 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
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

memory-pools

Syntax

memory-pools

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays system memory status.

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Output

The following output is an example of memory pools information, and Table 57: Output fields: memory pool describes the output fields.

Sample output

```
A:ALA-1# show system memory-pools
===============================================================================
Memory Pools
===============================================================================
Name                Max Allowed    Current Size      Max So Far          In Use
-------------------------------------------------------------------------------
System                No limit      24,117,248      24,117,248      16,974,832
Icc                  8,388,608       1,048,576       1,048,576          85,200
RTM/Policies          No limit       5,242,912       5,242,912       3,944,104
OSPF                  No limit       3,145,728       3,145,728       2,617,384
MPLS/RSVP             No limit       9,769,480       9,769,480       8,173,760
LDP                   No limit               0               0               0
IS-IS                 No limit               0               0               0
RIP                   No limit               0               0               0
VRRP                  No limit       1,048,576       1,048,576              96
Services              No limit       2,097,152       2,097,152       1,589,824
IOM                   No limit     205,226,800     205,226,800     202,962,744
SIM                   No limit       1,048,576       1,048,576             392
IGMP                  No limit               0               0               0
MMPI                  No limit               0               0               0
MFIB                  No limit               0               0               0
PIP                   No limit      79,943,024      79,943,024      78,895,248
MBUF                67,108,864       5,837,328       5,837,328       4,834,280
-------------------------------------------------------------------------------
Current Total Size :    343,495,200 bytes
Total In Use       :    324,492,768 bytes
Available Memory   :    640,178,652 bytes
===============================================================================
A:ALA-1#
```

Table 57: Output fields: memory pool

Label	Description
Name	The name of the system or process
Max Allowed	Integer — The maximum allocated memory size No Limit — No size limit
Current Size	The current size of the memory pool
Max So Far	The largest amount of memory pool used
In Use	The current amount of the memory pool currently in use
Current Total Size	The sum of the Current Size column
Total In Use	The sum of the In Use column
Available Memory	The amount of available memory

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ntp

Syntax

ntp [{**peers** | **peer** *peer-address*} | {**servers** | **server** *server-address*} |[**all**]] [**detail**]

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays NTP protocol configuration and state.

Output

The following output is an example of NTP information, and Table 58: Output fields: NTP describes the output fields.

Sample output

```
A:7210>config>system>time>ntp# show system ntp
===============================================================================
NTP Status
===============================================================================
Enabled : Yes Stratum : 3
Admin Status : up Oper Status : up
Server enabled : No Server keyId : none
System Ref Id : 192.168.15.221 Auth Check : Yes
===============================================================================
A:7210


A:7210# show system ntp all
===============================================================================
NTP Status
===============================================================================
Configured : Yes Stratum : 1
Admin Status : up Oper Status : up
Server Enabled : Yes Server Authenticate : No
Clock Source : PTP
Auth Check : Yes
Current Date & Time: 2013/03/19 20:18:50 UTC
===============================================================================
===============================================================================
NTP Active Associations
===============================================================================
State Reference ID St Type A Poll Reach Offset(ms)
Remote
-------------------------------------------------------------------------------
chosen PTP 0 srvr - 256 YYYYYYYY 0.000
PTP
candidate GPS 1 srvr - 256 YYYYYYYY -0.054
xxx.xxx.xxx.xxx
===============================================================================
```


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```
A:7210#


A:7210>config>system>time>ntp# show system ntp detail
===============================================================================
NTP Status
===============================================================================
Enabled : Yes Stratum : 3
Admin Status : up Oper Status : up
Server enabled : No Server keyId : none
System Ref Id : 192.168.15.221 Auth Check : Yes
Auth Errors : 0 Auth Errors Ignored : 0
Auth Key Id Errors : 0 Auth Key Type Errors : 0
===============================================================================
NTP Configured Broadcast/Multicast Interfaces
===============================================================================
vRouter Interface Address Type Auth Poll
-------------------------------------------------------------------------------
Base i3/1/1 Host-ones bcast yes off
management management 224.0.0.1 mcast no off
Base t2 bclnt no n/a
management management 224.0.0.1 mclnt no n/a
===============================================================================
A:7210>config>system>time>ntp#


A:7210>config>system>time>ntp# show system ntp detail all
===============================================================================
NTP Status
===============================================================================
Enabled : Yes Stratum : 3
Admin Status : up Oper Status : up
Server enabled : No Server keyId : none
System Ref Id : 192.168.15.221 Auth Check : Yes
Auth Errors : 0 Auth Errors Ignored : 0
Auth Key Id Errors : 0 Auth Key Type Errors : 0
===============================================================================
NTP Configured Broadcast/Multicast Interfaces
===============================================================================
vRouter Interface Address Type Auth Poll
-------------------------------------------------------------------------------
Base i3/1/1 Host-ones bcast yes off
management management 224.0.0.1 mcast no off
Base t2 bclnt no n/a
management management 224.0.0.1 mclnt no n/a
===============================================================================
NTP Active Associations
===============================================================================
State Remote Reference ID St Type Auth Poll R Offset
-------------------------------------------------------------------------------
reject 192.168.15.221 192.168.14.50 2 srvr none 64 y 0.901
chosen 192.168.15.221 192.168.1.160 4 mclnt none 64 y 1.101
===============================================================================
A:7210>config>system>time>ntp#
```

Table 58: Output fields: NTP

Label	Description
Enabled	yes — NTP is enabled no — NTP is disabled

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Label	Description
Admin Status	yes — Administrative state is enabled no — Administrative state is disabled
NTP Server	Displays NTP server state of this node
Stratum	Displays stratum level of this node
Oper Status	yes — The operational state is enabled no — The operational state is disabled
Auth Check	Displays the authentication requirement
System Ref. ID	IP address of this node or a 4-character ASCII code showing the state
Auth Error	Displays the number of authentication errors
Auth Errors Ignored	Displays the number of authentication errors ignored
Auth key ID Errors	Displays the number of key identification errors
Auth Key Type Errors	Displays the number of authentication key type errors
Reject	The peer is rejected and is not used for synchronization Rejection reasons could be that the peer is unreachable, the peer is synchronized to this local server so synchronizing with it would create a sync loop, or the synchronization distance is too large. This is the normal startup state.
Invalid	The peer is not maintaining an accurate clock This peer is not used for synchronization
Excess	The peer synchronization distance is greater than ten other peers. This peer is not used for synchronization.
Outlier	The peer is discarded as an outlier This peer is not used for synchronization
Candidate	The peer is accepted as a possible source of synchronization
Selected	The peer is an acceptable source of synchronization, but its synchronization distance is greater than six other peers
Chosen	The peer is chosen as the source of synchronization
ChosenPPS	The peer is chosen as the source of synchronization, but the actual synchronization is occurring from a pulse-per-second (PPS) signal

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Label	Description
Remote	The IP address of the remote NTP server or peer with which this local host is exchanging NTP packets
Reference ID	When stratum is between 0 and 15, this field shows the IP address of the remote NTP server or peer with which the remote is exchanging NTP packets. For reference clocks, this field shows the identification assigned to the clock, such as, ".GPS." For an NTP server or peer, if the client has not yet synchronized to a server/peer, the status cannot be determined and displays the following codes:
	Peer Codes: ACST — The association belongs to any cast server AUTH — Server authentication failed. Please wait while the association is restarted. AUTO — Autokey sequence failed. Please wait while the association is restarted. BCST — The association belongs to a broadcast server. CRPT — Cryptographic authentication or identification failed. The details should be in the system log file or the cryptostats statistics file, if configured. No further messages will be sent to the server. DENY — Access denied by remote server. No further messages will be sent to the server.
	DROP — Lost peer in symmetric mode. Please wait while the association is restarted. RSTR — Access denied as a result of local policy. No further messages will be sent to the server. INIT — The association has not yet synchronized for the first time MCST — The association belongs to a manycast server NKEY — No key found. Either the key was never installed or is not trusted. RATE — Rate exceeded. The server has temporarily denied access because the client exceeded the rate threshold. RMOT — The association from a remote host running ntpdc has had unauthorized attempted access STEP — A step change in system time has occurred, but the association has not yet re-synchronized System Codes: INIT — The system clock has not yet synchronized for the first time

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Label	Description
	STEP — A step change in system time has occurred, but the system clock has not yet re-synchronized
St	Stratum level of this node
Auth	yes — Authentication is enabled no — Authentication is disabled
Poll	Polling interval, in seconds
R	Yes — The NTP peer or server has been reached at least once in the last 8 polls No — The NTP peer or server has not been reached at least once in the last 8 polls
Offset	The time between the local and remote UTC time, in milliseconds

oper-group

Syntax

oper-group [*group-name*]

oper-group *group-name* [**detail**]

oper-group *group-name* [**monitoring**]

Context

show>system

Platforms

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

Description

This command displays the oper-group information, member count, monitor-client count, and status in a single line for each of the configured oper-groups.

Parameters

detail

Displays detailed information.

Output

The following output is an example of oper-group information, and Table 59: Output fields: oper-group describes the output fields.

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Sample output

```
*A:7210SAS>show>system# oper-group

===============================================================================
System Oper Group Information
===============================================================================
Name                            Oper   Creation Hold   Hold   Members Monitor
                                Status Origin   UpTime DnTime
                                                (secs) (secs)
-------------------------------------------------------------------------------
test                            up     manual   4      0      1       1
-------------------------------------------------------------------------------
Entries found: 1
===============================================================================
*A:7210SAS>show>system#

*A:7210SAS>show>system# oper-group test monitoring

===============================================================================
System Oper Group Information
===============================================================================
Oper Group           : test
Creation Origin      : manual              Oper Status      : up
Hold DownTime        : 0 secs              Hold UpTime      : 4 secs
Members              : 0                   Monitoring       : 0
===============================================================================
```

Table 59: Output fields: oper-group

Label	Description
Name	Displays the name of the oper-group
Oper Status	The operational status of the oper-group
Creation Origin	Displays if it was created manually.
Hold Up Time	The configured HOLD UP time
Hold Dn Time	The configured HOLD down time
Members	Displays the number of members of the oper-group
Monitor	Displays the number of monitoring clients.

resource-profile

Syntax

resource-profile [**active** | **configured**]

Context

show>system

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Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays the resource-profile protocol configuration and state.

Parameters

active | configured

Displays active or configured values.

Active values are those in use by the system currently. Configured values are those that have been changed by the user and has not taken effect. For the system resource-profile parameters that need a reboot to take effect, the active and configured values can be different. It typically requires a node reboot or a card reset for it to take effect.

Output

The following outputs are examples of resource profile information, and Table 60: Output fields: resource profile describes the output fields.

- Sample output for 7210 SAS-D
- Sample output for 7210 SAS-K 2F1C2T

Sample output for 7210 SAS-D

```
*A:7210SAS>show>system# resource-profile

===============================================================================
Active System Resource Profile Information
===============================================================================
-------------------------------------------------------------------------------
IPv6 FIB
-------------------------------------------------------------------------------
max-ipv6-routes            : disable

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Ingress Internal CAM
-------------------------------------------------------------------------------
Sap Ingress Qos resource   : 2          Sap  Aggregate Meter       : 1
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 Resource         : disable

-------------------------------------------------------------------------------
Sap Ingress ACL resource   : 1
-------------------------------------------------------------------------------
IPv4 Resource              : max        Mac  Resource              : max
IPv4-IPv6 128 bit Resource : disable    IPv6 64 bit Resource       : disable

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Eth CFM                    : disable
-------------------------------------------------------------------------------
up-mep                     : disable

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
```


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```
Egress Internal CAM
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Sap Egress ACL resource    : 2
-------------------------------------------------------------------------------
Mac and IPv4 Resource      : 2          Mac-only Resource          : disable
IPv6 128 bit Resource      : disable    Mac and IPv6 64 bit Resour*: disable

-------------------------------------------------------------------------------
===============================================================================
* indicates that the corresponding row element may have been truncated.
*A:7210SAS>show>system#
```

Sample output for 7210 SAS-K 2F1C2T

```
*A:7210SAS>show>system# resource-profile

===============================================================================
Active System Resource Profile Information
===============================================================================
-------------------------------------------------------------------------------
Ingress Internal CAM       : 5
-------------------------------------------------------------------------------
Mac-IPv4-IPv6 Resource     : disable
-------------------------------------------------------------------------------
Sap Ingress ACL resource   : 1
-------------------------------------------------------------------------------
Mac-IPv4-IPv6 Resource     : disable
-------------------------------------------------------------------------------
Egress Internal CAM        : 2
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Sap Egress ACL resource    : disable
-------------------------------------------------------------------------------
Mac-IPv4-IPv6 Resource     : disable
===============================================================================
# indicates that the value will take effect only after reboot or clear card.
*A:7210SAS>show>system#
```

Table 60: Output fields: resource profile

Label	Description
Ingress Internal CAM	Displays the applications sharing ingress CAM resource
Sap Ingress ACL resource	Displays the resources configured for use by SAP Ingress ACL policies
IPv4 Resource	Displays the resources configured for use by ingress ACL policies that use ipv4-criteria Disable – No resources are allocated for use by this feature. Therefore, no policies of this type can be associated with a SAP.
IPv4-IPv6 Resource	Displays the resources configured for use by ingress ACL policies that use ipv6 128-bit address match-criteria Disable – No resources are allocated for use by this feature. Therefore, no policies of this type can be associated with a SAP.

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Label	Description
Mac Resource	Displays the resources configured for use by ingress ACL policies that use mac-criteria Disable – No resources are allocated for use by this feature. Therefore, no policies of this type can be associated with a SAP.
IPv6-64 bit Resource	Displays the resources configured for use by ingress ACL policies that use ipv6 64-bit address match-criteria Disable — No resources are allocated for use by this feature. Therefore, no policies of this type can be associated with a SAP.
Eth CFM	Groups the context for resources consumed by Ethernet CFM applications
up-mep	Displays the resources configured for use by UP MEP Disable — No resources are allocated for use by this feature. Therefore, no UP MEPs can be created.
Sap Ingress QoS resource	The total amount of ingress internal CAM chunks configured for use by SAP ingress classification
Mac and IPv4 Resource	The total amount of egress internal CAM chunks configured for use by MAC and IPv4 egress ACL match criteria policies
Mac-only Resource	The total amount of egress internal CAM chunks configured for use only by MAC egress ACL match criteria policies
IPv6 128 bit Resource	The total amount of egress internal CAM chunks configured for use only by IPv6 egress ACL match criteria policies (128-bit IPv6 address can be specified in the match criteria)
Mac and IPv6 64 bit Resource	The total amount of egress internal CAM chunks configured for use by MAC and IPv6 egress ACL match criteria policies (only 64-bit higher order bits of the IPv6 address can be specified in the match criteria)
Sap Egress ACL resource	Displays the egress ACL resource allocation configured for various match criteria
Egress Internal CAM	Displays the resource allocation configured for the egress internal CAM
IPv6 FIB	Displays the amount of IPv6 FIB size configured for use by IPv6 routing

ptp

Syntax

ptp

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Context

show>system

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command displays the parameters for IEEE 1588-2008/ Precision Time Protocol (PTP) information.

Output

The following output is an example of PTP information, and Table 61: Output fields: system PTP describes the output fields.

Sample output

```
A:7210SAS>show>system# ptp
===============================================================================
IEEE 1588/PTP Clock Information
===============================================================================
-------------------------------------------------------------------------------
Local Clock
-------------------------------------------------------------------------------
Clock Type        : boundary           PTP Profile        : IEEE 1588-2008
Domain            : 0                  Network Type       : sdh
Admin State       : up                 Oper State         : up
Announce Interval : 1 pkt/2 s          Announce Rx Timeout: 3 intervals
Clock Id          : 846991fffea8c8f5   Clock Class        : 248 (default)
Clock Accuracy    : unknown            Clock Variance     : ffff (not computed)
Clock Priority1   : 128                Clock Priority2    : 128
PTP Recovery State: acquiring          Last Changed       : 01/07/2020 16:57:06
Frequency Offset  : +0.000 ppb         Frequency Source   : ssu
-------------------------------------------------------------------------------
Parent Clock
-------------------------------------------------------------------------------
IP Address        : 192.168.10.5       Router             : Base
Parent Clock Id   : 00b0aefffe02e5e5   Remote PTP Port    : 1
GM Clock Id       : 00b0aefffe02e5e5   GM Clock Class     : 6
GM Clock Accuracy : within 100 ns      GM Clock Variance  : 0x6400 (3.7E-09)
GM Clock Priority1: 128                GM Clock Priority2 : 128
-------------------------------------------------------------------------------
Time Information
-------------------------------------------------------------------------------
Timescale           : PTP
Current Time        : 2020/01/07 17:43:58.0 (UTC)
Frequency Traceable : yes
Time Traceable      : yes
Time Source         : GPS
===============================================================================
```

```
*A:Dut-F>config>system>ptp# show system ptp
========== ===============================================================================
IEEE 1588/PTP Clock Information
===============================================================================
-------------------------------------------------------------------------------
Local Clock
-------------------------------------------------------------------------------
Clock Type : boundary PTP Profile : ITU-T G.8275.1
```


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```
Domain : 24 Network Type : sdh
Admin State : up Oper State : up
Announce Interval : 8 pkt/s Announce Rx Timeout: 3 intervals
Clock Id : 846991fffea8c8f5 Clock Class : 248 (default)
Clock Accuracy : unknown Clock Variance : ffff (not computed)
Clock Priority1 : 128 Clock Priority2 : 128
PTP Recovery State: disabled
Frequency Offset : n/a Frequency Source : ssu
-------------------------------------------------------------------------------
Parent Clock
-------------------------------------------------------------------------------
Port : 1/1/13 Remote MAC Address : a0:f3:e4:1a:7f:6e
Parent Clock Id : a0f3e4fffe1a7f5d Remote PTP Port : 16
GM Clock Id : 00b0aefffe000030 GM Clock Class : 6
GM Clock Accuracy : within 100 ns GM Clock Variance : 0x4e5d (1.8E-15)
GM Clock Priority1: 128 GM Clock Priority2 : 128
-------------------------------------------------------------------------------
Time Information
-------------------------------------------------------------------------------
Timescale : PTP
Current Time : 2020/01/07 09:22:32.0 (UTC)
Frequency Traceable : yes
Time Traceable : yes
Time Source : GPS
===============================================================================
```

Table 61: Output fields: system PTP

Label	Description
Clock Type	Displays the local PTP clock type: • ordinarySlave — The system is always a timeReceiver clock in the PTP hierarchy. The system derives its timing from one or more timeTransmitter clocks in the network. • ordinaryMaster — The system is a grandmaster clock in the PTP hierarchy. The system provides timing to multiple time Receiver clocks in the network. • boundary — The system is a boundary clock, which may be anywhere in the PTP clock hierarchy. It can obtain timing from a timeTransmitter clock, and provide timing to multiple timeReceiver clocks. • transparent-e2e
PTP Profile	Displays the PTP profile: ieee-1588, itu-telecom-freq, g8275dot1- 2014, g8275dot2-2016
Domain	Displays the PTP device domain
Network Type	Indicates whether SONET or SDH values are being used for encoding synchronous status messages
Local Clock	
Admin State	Up — The local PTP clock is administratively enabled

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Label	Description
	Down — The local clock is administratively shut down and not running
Oper State	Up — The local clock is operationally enabled and running Down — The local clock is operationally disabled and not running
Announce Interval	Displays the configured announce interval value
Announce Rx Timeout	Displays the configured announce Rx timeout value
Clock Id	Displays a unique 64-bit number assigned to the clock
Clock Class	Displays the local clock class
Clock Accuracy	Displays the local clock accuracy designation
Clock Variance	Displays the local clock variance
Clock Priority1	Displays the first priority value of the local clock, used by the Best timeTransmitter Clock Algorithm (BTCA) to determine which clock should provide timing for the network
Clock Priority2	Displays the second priority value of the local clock This value is used by the BTCA to determine which clock should provide timing for the network.
Last Changed	Displays the time the PTP port state was last changed
PTP Recovery State	Displays the clock recovery state: disabled, initial, acquiring, phase-tracking, or locked
Frequency Offset	Displays the frequency offset of the PTP clock, in parts per billion
Frequency Source	Displays the configured clock frequency source
Parent Clock	
IP Address	Displays the IP address
Base	Displays the router ID to which the parent clock IP address belongs
Parent Clock Id	Displays the parent clock identification
Remote PTP Port	Displays the PTP port number at the remote end
GM Clock Id	Displays the grandmaster clock ID
GM Clock Class	Displays the grandmaster clock class

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Label	Description
GM Clock Accuracy	Displays the grandmaster clock accuracy designation
GM Clock Variance	Displays the grandmaster clock variance
GM Clock Priority1	Displays the grandmaster clock priority1 designation
GM Clock Priority2	Displays the grandmaster clock priority2 designation
Time Information	
Timescale	Displays the PTP timescale flag sent in the 1588 announce message
Current Time	Displays the last date and time recovered by the PTP time recovery algorithm
Frequency Traceable	Displays the frequency-traceable flag sent in the 1588 announce message
Time Traceable	Displays the time-traceable flag sent in the 1588 announce message
Time Source	Displays the time-source parameter sent in the 1588 announce message

peer

Syntax

peer *ip-address* [**router** *router-instance* | **service-name** *service-name*] [**detail**]

Context

show>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command displays information for a specific peer.

Parameters

ip-address

Specifies the IP address of the peer.

Values a.b.c.d

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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 to identify the router instance, up to 64 characters.

detail

Displays detailed information.

Output

The following output is an example of PTP information for a single peer, and Table 62: Output fields: PTP peer describes the output fields.

Sample output

```
*A:Dut-F>config>system>ptp# show system ptp peer 1.4.1.21
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router            : Base
IP Address        : 1.4.1.21           Announce Direction : tx
Admin State       : n/a                G.82x5.1 Priority  : n/a
Sync Interval     : 16 pkt/s
Local PTP Port    : 1                  PTP Port State     : master
GM Clock Class    : 0
GM Clock Accuracy : 0x0 (reserved)     GM Clock Variance  : 0x0000 (2.9E-39)
GM Clock Priority1: 0                  GM Clock Priority2 : 0
Steps Removed     : 0                  Parent Clock       : no
===============================================================================
*A:Dut-F>config>system>ptp#
```

Table 62: Output fields: PTP peer

Label	Description
Router	Displays the router
IP Address	Displays the IP address
Announce Direction	Displays the direction of flow of announce packets
Admin State	Up — the PTP peer clock is administratively enabled Down — the PTP peer clock is administratively shut down and not running
Sync Interval	Displays the configured sync interval value
Local PTP Port	Displays the local PTP port
PTP Port State	Displays the PTP port state: initializing, listening, uncalibrated, slave, master, or passive

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Label	Description
Remote PTP Port	Displays the PTP port number at the remote end
GM Clock Class	Displays the grandmaster clock class
GM Clock Accuracy	Displays the grandmaster clock accuracy designation
GM Clock Variance	Displays the grandmaster clock variance
GM Clock Priority1	Displays the grandmaster clock priority1 designation
GM Clock Priority2	Displays the grandmaster clock priority2 designation
Steps Removed	Displays the number of hops from GM
Parent Clock	yes — if the peer is the chosen parent clock no — if the peer is not the chosen parent clock

peers

Syntax

peers [**router** *router-instance* | **service-name** *service-name*] [**detail**]

Context

show>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command displays summary information for all PTP peers.

Parameters

router-instance

Displays only the information for a specific router instance.

Values *router-name*: Base
vprn-svc-id: 1 to 2147483647

service-name

Specifies the service name to identify the router instance, up to 64 characters.

detail

Displays detailed information.

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Output

The following output is an example of PTP information for all peers, and Table 63: Output fields: PTP peers describes the output fields.

Sample output

```
*A:bksim1618# show system ptp peers
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
Base
  10.4.1.21                 tx        n/a         master         no
1
  10.2.1.20                 rx+tx     up          master         no
  10.3.1.19                 rx        up          slave          yes
2
  10.1.1.21                 tx        n/a         master         no
-------------------------------------------------------------------------------
No. of PTP Peers: 4
===============================================================================


*A:bksim1618# show system ptp peers router Base
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
Base
  10.4.1.21                 tx        n/a         master         no
-------------------------------------------------------------------------------
No. of PTP Peers: 1
===============================================================================


*A:bksim1618# show system ptp peers router 1
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
1
  10.2.1.20                 rx+tx     up          master         no
  10.3.1.19                 rx        up          slave          yes
-------------------------------------------------------------------------------
No. of PTP Peers: 2
===============================================================================


*A:bksim1618# show system ptp peers detail
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router            : Base
IP Address        : 10.4.1.21          Announce Direction : tx
Admin State       : n/a                G.8275.1 Priority  : 128
Local PTP Port    : 3                  PTP Port State     : master
```


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```
Clock Id          : ac65fffffe000000   Remote PTP Port    : 1
-------------------------------------------------------------------------------
Router            : 1
IP Address        : 10.2.1.20          Announce Direction : rx+tx
Admin State       : up                 G.8275.1 Priority  : 128
Local PTP Port    : 2                  PTP Port State     : master
Clock Id          : ac5effffe000000    Remote PTP Port    : 1
Locked Out        : no                 Time Remaining     : n/a
-------------------------------------------------------------------------------
Router            : 1
IP Address        : 10.3.1.19          Announce Direction : rx
Admin State       : up                 G.8275.1 Priority  : 128
Local PTP Port    : 1                  PTP Port State     : slave
Clock Id          : ac5dfffffe000000   Remote PTP Port    : 1
GM Clock Id       : ac5dfffffe000000   GM Clock Class     : 13
GM Clock Accuracy : unknown            GM Clock Variance  : ffff (not computed)
GM Clock Priority1: 0                  GM Clock Priority2 : 128
Steps Removed     : 0                  Parent Clock       : yes
Locked Out        : no                 Time Remaining     : n/a
-------------------------------------------------------------------------------
Router            : 2
IP Address        : 10.1.1.21          Announce Direction : tx
Admin State       : n/a                G.8275.1 Priority  : 128
Local PTP Port    : 4                  PTP Port State     : master
Clock Id          : ac65fffffe000000   Remote PTP Port    : 1
===============================================================================


*A:bksim1618# show system ptp peers router 1 detail
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router            : 1
IP Address        : 10.2.1.20          Announce Direction : rx+tx
Admin State       : up                 G.8275.1 Priority  : 128
Local PTP Port    : 2                  PTP Port State     : master
Clock Id          : ac5effffe000000    Remote PTP Port    : 1
-------------------------------------------------------------------------------
Router            : 1
IP Address        : 10.3.1.19          Announce Direction : rx
Admin State       : up                 G.8275.1 Priority  : 128
Local PTP Port    : 1                  PTP Port State     : slave
Clock Id          : ac5dfffffe000000   Remote PTP Port    : 1
GM Clock Id       : ac5dfffffe000000   GM Clock Class     : 13
GM Clock Accuracy : unknown            GM Clock Variance  : ffff (not computed)
GM Clock Priority1: 0                  GM Clock Priority2 : 128
Steps Removed     : 0                  Parent Clock       : yes
===============================================================================
```

Table 63: Output fields: PTP peers

Label	Description
Router	Displays the router
IP Address	Displays the IP address
Announce Direction	Displays the direction of flow of announce packets
Admin State	Up — The PTP peer clock is administratively enabled

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Label	Description
	Down — The PTP peer clock is administratively shut down and not running
G.8275.1 Priority	Displays the g.8275.1 priority value
Local PTP Port	Displays the local PTP port
PTP Port State	Displays the PTP port state
Clock ID	Displays the clock identity value of the local PTP clock
Remote PTP Port	Displays the PTP port number at the remote end
GM Clock Id	Displays the clock identity value of the grandmaster clock
GM Clock Class	Displays the grandmaster clock class
GM Clock Accuracy	Displays the grandmaster clock accuracy designation
GM Clock Variance	Displays the grandmaster clock variance
GM Clock Priority1	Displays the grandmaster clock priority1 designation
GM Clock Priority2	Displays the grandmaster clock priority2 designation
Steps Removed	Displays the number of hops from the GM
Parent Clock	yes — if the peer is the chosen parent clock no — if the peer is not the chosen parent clock

port

Syntax

port *port-id* [**detail**]

Context

show>system>ptp

Platforms

7210 SAS-K 2F6C4T and 7210 SAS-K 3SFP+ 8C

Description

This command displays PTP port information.

Parameters

port-id

Specifies the port ID.

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Values slot/mda/port

detail

Displays detailed information.

Output

The following output is an example of PTP port information, and Table 64: Output fields: PTP port describes the output fields.

Sample output

```
A:bksim1618# show system ptp port
===============================================================================
IEEE 1588/PTP Ethernet Port Summary Information
===============================================================================
Port       PTP Adm/Opr   PTP State    Neighbors   Tx Rate     Rx Rate
-------------------------------------------------------------------------------
10/2/16       up/up         passive         5          12312       4400
1/1/1         up/up         slave           1          12312       4400
1/1/2         up/up         master         61          12312       4400
1/1/3         up/down       disabled        0              0          0
1/1/4         up/up         listening       0              0          0
-------------------------------------------------------------------------------
No. of PTP Ports : 5                           Total  99999     999999

show system ptp port 1/1/2 detail
===============================================================================
IEEE 1588/PTP Ethernet Port Information
===============================================================================
Port              : 1/1/2
PTP Admin State   : up                 PTP Oper State     : up
Local MAC Addr    : d0:00:d5:e7:94:ef  Multicast MAC Addr : 01:1b:19:00:00:00
Cfg Sync Rate     : 16 pkt/s           Cfg Delay Req Rate : 16 pkt/s
Master-Only       : false              G.8275.1 Priority  : 128
PTP Port Number   : 1                  PTP Port State     : slave
Neighbors         : 1                  Timestamp Point    : port
===============================================================================
===============================================================
IEEE 1588/PTP Ethernet Port Neighbor Clocks
===============================================================
Port     MAC Address       Clock Id           Rx Packet Rate
---------------------------------------------------------------
1/1/2    84:69:91:a8:c8:f8 846991fffea8c8f5              33
---------------------------------------------------------------
No. of Neighbor Clocks: 1
===============================================================
===============================================================================
IEEE 1588/PTP Ethernet Port Packet Statistics
===============================================================================
                                                                  Input     Output
-------------------------------------------------------------------------------
PTP Packets                                                         114      15516
  Announce                                                           24       5158
  Sync                                                               47      10315
  Follow Up                                                           0          0
  Delay Request                                                       0         43
  Delay Response                                                     43          0
  Signaling                                                           0          0
  Other                                                               0          0
  Event Packets timestamped at port                                   0          0
  Event Packets timestamped at cpm                                    0          0
```


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```
Discards                                                          0          0
  Bad PTP domain                                                  0          0
  Alternate Master                                                0          0
  Out Of Sequence                                                 0          0
  Other                                                           0          0
===============================================================================
```

Table 64: Output fields: PTP port

Label	Description
Port Summary	
Port	Displays the port numbers
PTP Adm/Opr	Displays the admin and oper state
PTP State	Displays the PTP state for each port: initializing, listening, uncalibrated, slave, master, or passive
Tx Rate	Displays the Tx rate for each port
Rx Rate	Displays the Rx rate for each port
Port Information	
Port	Displays the PTP port number
PTP Admin State	Displays the PTP administrative state of the port
PTP Oper State	Displays the PTP operational state of the port
Local MAC Addr	Displays the local MAC address of the port
Multicast MAC Addr	Displays the multicast MAC address of the port
Cfg Sync Rate	Displays the configured sync packet rate
Cfg Delay Req Rate	Displays the configure delay request packet rate
Master-Only	Displays the **master-only** command value: true or false
G.8275.1 Priority	Displays the configured priority value
PTP Port Number	Displays the internal port number associated with this port
PTP Port State	Displays the PTP port state: disabled, listening, slave, master, passive, or faulty
Neighbors	Displays the number of neighbors
Timestamp Point	Displays the point at which time-stamping is done

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statistics

Syntax

statistics

Context

show>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command displays the message and error statistics for the node.

Output

The following output is an example of PTP statistics information, and Table 65: Output fields: PTP statistics describes the output fields.

Sample output

```
*A:Dut-D>config>system>ptp# show system ptp statistics
===============================================================================
IEEE 1588/PTP Packet Statistics
===============================================================================
                                                                 Input     Output
-------------------------------------------------------------------------------
PTP Packets                                                          0          0
  Announce                                                           0          0
  Sync                                                               0          0
  Follow Up                                                          0          0
  Delay Request                                                      0          0
  Delay Response                                                     0          0
  Signaling                                                          0          0
    Request Unicast Transmission TLVs                                0          0
      Announce                                                       0          0
      Sync                                                           0          0
      Delay Response                                                 0          0
    Grant Unicast Transmission (Accepted) TLVs                       0          0
      Announce                                                       0          0
      Sync                                                           0          0
      Delay Response                                                 0          0
    Grant Unicast Transmission (Denied) TLVs                         0          0
      Announce                                                       0          0
      Sync                                                           0          0
      Delay Response                                                 0          0
    Cancel Unicast Transmission TLVs                                 0          0
      Announce                                                       0          0
      Sync                                                           0          0
      Delay Response                                                 0          0
    Ack Cancel Unicast Transmission TLVs                             0          0
      Announce                                                       0          0
      Sync                                                           0          0
      Delay Response                                                 0          0
```


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```
    Other TLVs                                                      0          0
  Other                                                             0          0
Discards                                                            0          0
  Bad PTP domain                                                    0          0
  Alternate Master                                                  0          0
  Out Of Sequence                                                   0          0
  Peer Disabled                                                     0          0
  Other                                                             0          0
===============================================================================

===============================================================================
*A:Dut-D>config>system>ptp# show system ptp statistics
===============================================================================
IEEE 1588/PTP Packet Statistics
===============================================================================
                                                                  Input     Output
-------------------------------------------------------------------------------
PTP Packets                                                         0          0
  Announce                                                          0          0
  Sync                                                              0          0
  Follow Up                                                         0          0
  Delay Request                                                     0          0
  Delay Response                                                    0          0
  Signaling                                                         0          0
    Request Unicast Transmission TLVs                               0          0
      Announce                                                      0          0
      Sync                                                          0          0
      Delay Response                                                0          0
    Grant Unicast Transmission (Accepted) TLVs                      0          0
      Announce                                                      0          0
      Sync                                                          0
```

Table 65: Output fields: PTP statistics

Label	Description
PTP Packet Statistics	
	The following input/output statistics are provided for PTP packets: • Announce • Sync • Follow Up • Delay Request • Delay Response • Signaling • Other

unicast

Syntax

unicast [**router** *router-instance* | **service-name** *service-name*]

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Context

show>system>ptp

Platforms

7210 SAS-D ETR, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command displays unicast negotiation information.

Parameters

router-instance

Displays only the information for a specific router instance.

Values *router-name*: Base

vprn-svc-id: 1 to 2147483647

service-name

Specifies the service name to identify the router instance, up to 64 characters.

Output

The following output is an example of PTP unicast information, and Table 66: Output fields: PTP unicast describes the output fields.

Sample output

```
*A:Dut-C# show system ptp unicast
===============================================================================
IEEE 1588/PTP Unicast Negotiation Information
===============================================================================
Router
  IP Address      Dir Type     Rate       Duration State    Time
-------------------------------------------------------------------------------
100
  10.0.0.1        Rx  Announce 1 pkt/2 s  300      Granted  02/07/2014 16:52:35
  10.0.0.1        Rx  Sync     64 pkt/s   300      Granted  02/07/2014 16:52:39
  10.0.0.1        Tx  DelayReq 64 pkt/s   300      Granted  02/07/2014 16:52:39
  10.0.0.1        Rx  DelayRsp 64 pkt/s   300      Granted  02/07/2014 16:52:39
200
  192.168.0.2     Tx  Announce 1 pkt/2 s  300      Granted  02/07/2014 16:50:47
  192.168.0.2     Tx  Sync     64 pkt/s   300      Granted  02/07/2014 16:50:52
  192.168.0.2     Rx  DelayReq 64 pkt/s   300      Granted  02/07/2014 16:50:52
  192.168.0.2     Tx  DelayRsp 64 pkt/s   300      Granted  02/07/2014 16:50:52
-------------------------------------------------------------------------------
PTP Peers               : 2
Total Packet Rate       : 385 packets/second
===============================================================================


A:bksim1618# show system ptp router 1 unicast
===============================================================================
IEEE 1588/PTP Unicast Negotiation Information
===============================================================================
Router
  IP Address      Dir Type     Rate       Duration State    Time
-------------------------------------------------------------------------------
```


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```
1
  10.2.1.20       Rx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:14:19
  10.2.1.20       Tx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:13:25
  10.2.1.20       Tx  Sync     64 pkt/s   300      Granted  04/21/2013 19:13:30
  10.2.1.20       Rx  DelayReq 64 pkt/s   300      Granted  04/21/2013 19:13:30
  10.2.1.20       Tx  DelayRsp 64 pkt/s   300      Granted  04/21/2013 19:13:30
  10.3.1.19       Rx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:13:16
  10.3.1.19       Rx  Sync     64 pkt/s   300      Granted  04/21/2013 19:13:21
  10.3.1.19       Tx  DelayReq 64 pkt/s   300      Granted  04/21/2013 19:13:21
  10.3.1.19       Rx  DelayRsp 64 pkt/s   300      Granted  04/21/2013 19:13:21
-------------------------------------------------------------------------------
PTP Peers               : 2
Total Packet Rate       : 385 packets/second
===============================================================================
*A:bksim1618#
```

Table 66: Output fields: PTP unicast

Label	Description
Router IP Address	Displays the IP address of the router
Dir	Displays the direction of the unicast information: either Rx or Tx
Type	Displays the message type
Rate	Displays the rate of the unicast information, in packets per second
Duration	Displays the lease duration for the session
State	Displays the state
Time	Displays the time the unicast information was received
PTP Peers	Displays the number of PTP peers
Total Packet Rate	Displays the total packet rate, in packets per second

sntp

Syntax

sntp

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays SNTP protocol configuration and state.

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Output

The following output is an example of SNTP information, and Table 67: Output fields: system SNTP describes the output fields.

Sample output

```
*A:pc-4.0# show system sntp
===============================================================================
SNTP Status
===============================================================================
Admin Status : up           Oper Status : up           Mode : broadcast
===============================================================================
===============================================================================
SNTP Servers
===============================================================================
SNTP Server            Version            Preference         Interval
-------------------------------------------------------------------------------
10.135.16.90           3                  Preferred          64
-------------------------------------------------------------------------------
No. of SNTP Servers: 1
===============================================================================
*A:pc-4.0#
```

Table 67: Output fields: system SNTP

Label	Description
SNTP Server	The SNTP server address for SNTP unicast client mode
Version	The SNTP version number, expressed as an integer
Preference	Normal — When more than one time server is configured, one server can be configured to have preference over another 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

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command display system monitoring thresholds.

Output

The following output is an example of system threshold information, and Table 68: Output fields: system threshold describes the output fields.

Sample output

```
A:ALA-48# show system thresholds
===============================================================
Threshold Alarms
===============================================================
Variable: tmnxCpmFlashUsed.1.11.1
Alarm Id         : 1        Last Value : 835
Rising Event Id  : 1        Threshold  : 5000
Falling Event Id : 2        Threshold  : 2500
Sample Interval  : 2147483* SampleType : absolute
Startup Alarm    : either   Owner      : TiMOS CLI
Variable: tmnxCpmFlashUsed.1.11.1
Alarm Id         : 2        Last Value : 835
Rising Event Id  : 3        Threshold  : 10000
Falling Event Id : 4        Threshold  : 5000
Sample Interval  : 2147483* SampleType : absolute
Startup Alarm    : rising   Owner      : TiMOS CLI
Variable: sgiMemoryUsed.0
Alarm Id         : 3        Last Value : 42841056
Rising Event Id  : 5        Threshold  : 4000
Falling Event Id : 6        Threshold  : 2000
Sample Interval  : 2147836  SampleType : absolute
Startup Alarm    : either   Owner      : TiMOS CLI
===============================================================
* indicates that the corresponding row element may have been truncated.
===============================================================
Threshold Events
===============================================================
Description: TiMOS CLI - cflash capacity alarm rising event
Event Id         : 1        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - cflash capacity alarm falling event
Event Id         : 2        Last Sent  : 10/31/2006 08:48:00
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - cflash capacity warning rising event
Event Id         : 3        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - cflash capacity warning falling event
Event Id         : 4        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - memory usage alarm rising event
Event Id         : 5        Last Sent  : 10/31/2006 08:48:00
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - memory usage alarm falling event
Event Id         : 6        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI
===============================================================
Threshold Events Log
===============================================================
Description      : TiMOS CLI - cflash capacity alarm falling eve
                   nt : value=835, <=2500 : alarm-index 1, event
                   -index 2 alarm-variable OID tmnxCpmFlashUsed.
                   1.11.1
Event Id         : 2        Time Sent  : 10/31/2006 08:48:00
```


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```
Description      : TiMOS CLI - memory usage alarm rising event :
                      value=42841056, >=4000 : alarm-index 3, even
                   t-index 5 alarm-variable OID sgiMemoryUsed.0
Event Id         : 5        Time Sent  : 10/31/2006 08:48:00
===============================================================
A:ALA-48#
```

Table 68: Output fields: system threshold

Label	Description
Variable	Displays the variable OID
Alarm Id	Displays the numerical identifier for the alarm
Last Value	Displays the last threshold value
Rising Event Id	Displays the identifier of the RMON rising event
Threshold	Displays the identifier of the RMON rising threshold
Falling Event Id	Displays the identifier of the RMON falling event
Threshold	Displays the identifier of the RMON falling threshold
Sample Interval	Displays the polling interval, in seconds, over which the data is sampled and compared with the rising and falling thresholds
Sample Type	Displays the method of sampling the selected variable and calculating the value to be compared against the thresholds
Startup Alarm	Displays the alarm that may be sent when this alarm is first created
Owner	Displays the owner of this alarm
Description	Displays the event cause
Event Id	Displays the identifier of the threshold event
Last Sent	Displays the date and time the alarm was sent
Action Type	log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show system thresholds** command. trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs. both — Both a entry in the RMON-MIB logTable and a TiMOS logger event are generated

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Label	Description
	none — No action is taken
Owner	Displays the owner of the event

time

Syntax

time

Context

show>system

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays the system time and zone configuration parameters.

Output

The following output is an example of system time information, and Table 69: Output fields: system time describes the output fields.

Sample output

```
A:ALA-1# show system time
===============================================================================
Date & Time
===============================================================================
Current Date & Time : 2006/05/05 23:03:13    DST Active            : yes
Current Zone        : PDT                    Offset from UTC       : -7:00
-------------------------------------------------------------------------------
Non-DST Zone        : PST                    Offset from UTC       : -8:00
Zone type           : standard
-------------------------------------------------------------------------------
DST Zone            : PDT                    Offset from Non-DST   : 0:60
Starts              : first sunday in april 02:00
Ends                : last sunday in october 02:00
===============================================================================
A:ALA-1#


A:ALA-1# show system time (with no DST zone configured)
===============================================================================
Date & Time
===============================================================================
Current Date & Time : 2006/05/12 11:12:05       DST Active      :     no
Current Zone    : APA       Offset from UTC :  -8:00
-------------------------------------------------------------------------------
Non-DST Zone    : APA       Offset from UTC :  -8:00
Zone Type           : non-standard
-------------------------------------------------------------------------------
```


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```
No DST zone configured
===============================================================================
A:ALA-1#
```

Table 69: Output fields: system time

Label	Description
Date & Time	The system date and time using the current time zone
DST Active	Yes — Daylight Savings Time is currently in effect No — Daylight Savings Time is not currently in effect
Zone	The zone names for the current zone, the non-DST zone, and the DST zone if configured
Zone type	Non-standard — The zone is user-defined Standard — The zone is system defined
Offset from UTC	The number of hours and minutes added to universal time for the zone, including the DST offset for a DST zone
Offset from Non-DST	The number of hours (always 0) and minutes (0—60) added to the time at the beginning of Daylight Saving Time and subtracted at the end Daylight Saving Time
Starts	The date and time Daylight Saving Time begins
Ends	The date and time Daylight Saving Time ends

time

Syntax

time

Context

show

Platforms

Supported on all 7210 SAS platforms as described in this document

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.

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Output

The following output is an example of current time information.

Sample output

```
A:ALA-49# show time
Tue Oct 31 12:17:15 GMT 2006
```

tod-suite

Syntax

tod-suite [**detail**]

tod-suite associations

tod-suite failed-associations

Context

show>cron

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays information on the configured time-of-day suite.

Output

The following outputs are examples of TOD suite information, and the associated tables describe the output fields.

- Sample output (standard)
- Sample output (associations)
- Sample output (failed associations), Table 70: Output fields: TOD suite failed associations
- Sample output (failed SAP)
- Sample output (filter associations)

Sample output (standard)

```
A:kerckhot_4# show cron tod-suite suite_sixteen detail
===============================================================================
Cron tod-suite details
===============================================================================
Name        : suite_sixteen
Type / Id                       Time-range                      Prio  State
-------------------------------------------------------------------------------
Ingress Qos Policy
  1160                          day                             5     Inact
  1190                          night                           6     Activ
Ingress Scheduler Policy
  SchedPolCust1_Day             day                             5     Inact
  SchedPolCust1_Night           night                           6     Activ
```


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```
Egress Qos Policy
  1160                          day                             5     Inact
  1190                          night                           6     Activ
Egress Scheduler Policy
  SchedPolCust1Egress_Day       day                             5     Inact
===============================================================================
A:kerckhot_4#
```

Sample output (associations)

```
A:kerckhot_4# show cron tod-suite suite_sixteen associations
===============================================================================
Cron tod-suite associations for suite suite_sixteen
===============================================================================
Service associations
-------------------------------------------------------------------------------
Service Id  : 1                         Type   : VPLS
 SAP 1/1/1:1
 SAP 1/1/1:2
 SAP 1/1/1:3
 SAP 1/1/1:4
 SAP 1/1/1:5
 SAP 1/1/1:6
 SAP 1/1/1:20
-------------------------------------------------------------------------------
Number of SAP's : 7
Customer Multi-Service Site associations
-------------------------------------------------------------------------------
Multi Service Site: mss_1_1
-------------------------------------------------------------------------------
Number of MSS's: 1
===============================================================================
A:kerckhot_4#
```

Sample output (failed associations)

```
A:kerckhot_4# show cron tod-suite suite_sixteen failed-associations
===============================================================================
Cron tod-suite associations failed
===============================================================================
tod-suite suite_sixteen : failed association for SAP
-------------------------------------------------------------------------------
Service Id  : 1                         Type   : VPLS
  SAP 1/1/1:2
  SAP 1/1/1:3
  SAP 1/1/1:4
  SAP 1/1/1:5
  SAP 1/1/1:6
  SAP 1/1/1:20
-------------------------------------------------------------------------------
tod-suite suite_sixteen : failed association for Customer MSS
-------------------------------------------------------------------------------
None
-------------------------------------------------------------------------------
Number of tod-suites failed/total : 1/1
===============================================================================
A:kerckhot_4#
```


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Table 70: Output fields: TOD suite failed associations

Label	Description
Service Id	Specifies the service ID
Type	Specifies the service type
Number of tod-suites failed/total	The ratio of failed tod-suites to the total suites

Sample output (failed SAP)
Zooming in on one of the failed SAPs, the assignments of QoS and scheduler policies are shown not as intended:

```
A:kerckhot_4# show service id 1 sap 1/1/1:2
===============================================================================
Service Access Points(SAP)
===============================================================================
Service Id         : 1
SAP                : 1/1/1:2                 Encap             : q-tag
Dot1Q Ethertype    : 0x8100                  QinQ Ethertype    : 0x8100
Admin State        : Up                      Oper State        : Up
Flags              : None
Last Status Change : 10/05/2006 18:11:34
Last Mgmt Change   : 10/05/2006 22:27:48
Max Nbr of MAC Addr: No Limit                Total MAC Addr    : 0
Learned MAC Addr   : 0                       Static MAC Addr   : 0
Admin MTU          : 1518                    Oper MTU          : 1518
Ingress qos-policy : 1130                    Egress qos-policy : 1130
Intend Ing qos-pol*: 1190 Intend Egr qos-po*: 1190
Shared Q plcy      : n/a                     Multipoint shared : Disabled
Ingr IP Fltr-Id    : n/a                     Egr IP Fltr-Id    : n/a
Ingr Mac Fltr-Id   : n/a                     Egr Mac Fltr-Id   : n/a
tod-suite          : suite_sixteen           qinq-pbit-marking : both
Egr Agg Rate Limit : max
ARP Reply Agent    : Unknown                 Host Conn Verify  : Disabled
Mac Learning       : Enabled                 Discard Unkwn Srce: Disabled
Mac Aging          : Enabled                 Mac Pinning       : Disabled
L2PT Termination   : Disabled                BPDU Translation  : Disabled

Multi Svc Site     : None
I. Sched Pol       : SchedPolCust1
Intend I Sched Pol : SchedPolCust1_Night
E. Sched Pol       : SchedPolCust1Egress
Intend E Sched Pol : SchedPolCust1Egress_Night
Acct. Pol          : None                    Collect Stats     : Disabled
Anti Spoofing      : None                    Nbr Static Hosts  : 0
===============================================================================
A:kerckhot_4#

If a time-range is specified for a filter entry, use the show filter command
to view results:
A:kerckhot_4# show filter ip  10
===============================================================================
IP Filter
===============================================================================
Filter Id    : 10                              Applied        : No
Scope        : Template                        Def. Action    : Drop
Entries      : 2
```


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```
-------------------------------------------------------------------------------
Filter Match Criteria : IP
-------------------------------------------------------------------------------
Entry        : 1010
time-range   : day                             Cur. Status    : Inactive
Log Id       : n/a
Src. IP      : 0.0.0.0/0                       Src. Port      : None
Dest. IP     : 10.10.100.1/24                  Dest. Port     : None
Protocol     : Undefined                       Dscp           : Undefined
ICMP Type    : Undefined                       ICMP Code      : Undefined
Fragment     : Off                             Option-present : Off
Sampling     : Off                             Int. Sampling  : On
IP-Option    : 0/0                             Multiple Option: Off
TCP-syn      : Off                             TCP-ack        : Off
Match action : Forward
Next Hop     : 172.22.228.28
Ing. Matches : 0                               Egr. Matches   : 0
Entry        : 1020
time-range   : night                           Cur. Status    : Active
Log Id       : n/a
Src. IP      : 0.0.0.0/0                       Src. Port      : None
Dest. IP     : 10.10.1.1/16                    Dest. Port     : None
Protocol     : Undefined                       Dscp           : Undefined
ICMP Type    : Undefined                       ICMP Code      : Undefined
Fragment     : Off                             Option-present : Off
Sampling     : Off                             Int. Sampling  : On
IP-Option    : 0/0                             Multiple Option: Off
TCP-syn      : Off                             TCP-ack        : Off
Match action : Forward
Next Hop     : 172.22.184.101
Ing. Matches : 0                               Egr. Matches   : 0
===============================================================================
A:kerckhot_4#
```

Sample output (filter associations)
To view the output if a filter is referred to in a TOD Suite assignment, use the **show filter associations** command.

```
A:kerckhot_4# show filter ip 160 associations
===============================================================================
IP Filter
===============================================================================
Filter Id    : 160                             Applied        : No
Scope        : Template                        Def. Action    : Drop
Entries      : 0
-------------------------------------------------------------------------------
Filter Association : IP
-------------------------------------------------------------------------------
Tod-suite "english_suite"
 - ingress, time-range "day" (priority 5)
===============================================================================
A:kerckhot_4#
```

time-range

Syntax

time-range *name* **associations** [**detail**]

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Context

show>cron

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays information about the configured time ranges.

Output

The following outputs are examples of system time-range information, and the associated tables describe the output fields.

- Sample output (detail)
- Sample output (associations)

Sample output (detail)

```
A:ala# show cron time-range time-range2 detail
===============================================================================
Cron time-range
===============================================================================
Name     : time-range1
Periodic    : Start * * * * End * * * *
Absolute     : Start * * * * End * * * *
```

Sample output (associations)

The following example shows output for time-range associations with previously created IP and MAC filters.

```
A:ala# show cron time-range day associations
===============================================================================
Cron time-range associations
===============================================================================
Name          : day                            State  : Inactive
-------------------------------------------------------------------------------
IP Filter associations
-------------------------------------------------------------------------------
IP filter Id  : 10, entry 1010
-------------------------------------------------------------------------------
MAC Filter associations
-------------------------------------------------------------------------------
None
-------------------------------------------------------------------------------
Tod-suite associations
-------------------------------------------------------------------------------
Tod-suite : suite_sixteen, for Ingress Qos Policy "1160"
Tod-suite : suite_sixteen, for Ingress Scheduler Policy "SchedPolCust1_Day"
Tod-suite : suite_sixteen, for Egress Qos Policy "1160"
Tod-suite : suite_sixteen, for Egress Scheduler Policy "SchedPolCust1Egress_Day
===============================================================================
```


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uptime

Syntax

uptime

Context

show

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays the time since the system started.

Output

The following output is an example of uptime information, and Table 71: Output fields: system timing describes the output fields.

Sample output

```
A:ALA-1# show uptime
System Up Time         : 11 days, 18:32:02.22 (hr:min:sec)

A:ALA-1#
```

Table 71: Output fields: system timing

Label	Description
System Up Time	Displays the length of time the system has been up in days, hr:min:sec format

sync-if-timing

Syntax

sync-if-timing

Context

show>system

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-Dxp 16p, 7210 SAS-Dxp 24p, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

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Description

This command displays synchronous interface timing information.

Output

The following outputs are examples of synchronous interface timing information, and Table 72: Output fields: synchronous interface timing describes the output fields.

- Sample output for 7210 SAS-D ETR,
- Sample output for 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C, Table 72: Output fields: synchronous interface timing

Sample output for 7210 SAS-D ETR

```
*7210-SASD># show system sync-if-timing

===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM A                : Master Locked
    Reference Input Mode           : Revertive
    Quality Level Selection        : Enabled
    System Quality Level           : prc

Reference Order                    : ref1 ref2

Reference Input 1
    Admin Status                   : up
    Rx Quality Level               : prc
    Quality Level Override         : none
    Qualified For Use              : Yes
    Selected For Use               : Yes
    Source Port                    : 1/1/3

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                    : 1/1/5
===============================================================================
```

Sample output for 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

```
*A:SAH01-051>show>system# sync-if-timing

===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM A                : Master Free Run
    Reference Input Mode           : Non-revertive
    Quality Level Selection        : Disabled
    Reference Selected             : none
    System Quality Level           : st3

Reference Order                    : ref1 ref2

Reference Input 1
    Admin Status                   : down
```


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```
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
    Source Port                    : None

Reference Input 2
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
    Source Port                    : None

Reference PTP
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
===============================================================================
*A:SAH01-051>show>system#
```

Table 72: Output fields: synchronous interface timing

Label	Description
System Status CPM A	Indicates the system status of CPM A
Reference Input Mode	Indicates the reference input mode
Reference Order	Indicates the reference order
Reference Input 1	Displays information about reference input 1
Admin Status	down — Indicates the ref1 or ref2 configuration is administratively shutdown up — Indicates the ref1 or ref2 configuration is administratively enabled diag — Indicates the reference has been forced using the **force-reference** command
Qualified for Use	Indicates if the reference input 1 (or input 2) is qualified for use
Selected for Use	Indicates if reference input 1(or input 2) is selected for use
Source Port	Displays the source port information
Reference Input 2	Displays information about reference input 2
Not Selected Due to	Indicates the reason if reference input 2 is not selected

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Label	Description
Quality Level Selection	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.
System Quality Level	Indicates the quality level being generated by the system clock
Rx Quality Level	Indicates the QL value received on the interface inv — SSM received on the interface indicates an invalid code for the interface type unknown — No QL value was received on the interface

chassis

Syntax

chassis [**environment**] [**power-supply**]

Context

show

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays general chassis status information.

Parameters

environment

Displays chassis environmental status information.

Default Display all chassis information.

power-supply

Displays only power supply information.

Output

The following outputs are examples of chassis information, and the listed tables describe the output fields.

- Sample output for 7210 SAS-D, Table 73: Output fields: chassis
- Sample output for 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p, Table 74: Output fields: chassis power-supply on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p

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- Sample output for 7210 SAS-K 2F1C2T, Table 73: Output fields: chassis
- Sample output for 7210 SAS-K 3SFP+ 8C, Table 75: Output fields: chassis power-supply on the 7210 SAS-K 3SFP+ 8C DC variant

Sample output for 7210 SAS-D

The following is a sample output if the hardware supports DC source failure.

```
A:7210-SAS-D> show chassis
===============================================================================
Chassis Information
===============================================================================
    Name                          : 128sasdAc48v2573
    Type                          : 7210 SAS-D 6F4T ETR-1
    Location                      :
    Coordinates                   :
    CLLI code                     :
    Number of slots               : 2
    Number of ports               : 10
    Critical LED state            : Off
    Major LED state               : Off
    Minor LED state               : Off
    Over Temperature state        : OK
    Low Temperature state         : OK
    Base MAC address              : 4c:5f:d2:07:39:d0

Hardware Data
    Part number                   : 3HE05676ADAA01
    CLEI code                     : IPMSX10BRA
    Serial number                 : NS1139C0070
    Manufacture date              : 09242011
    Manufacturing string          :
    Manufacturing deviations      :
    Time of last boot             : 2012/04/19 10:44:51
    Current alarm state           : alarm active
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
Power Supply Information
    Number of power supplies      : 2

    Power supply number           : 1
    Configured power supply type  : dc (-48V)
    Status                        : up

    Power supply number           : 2
    Status                        : failed
    Configured power supply type  : ac
===============================================================================
A:7210-SAS-D>


Output for Chassis for 7210 SAS-K 2F2T1C

*A:SAH01-051>show# chassis

===============================================================================
Chassis Information
===============================================================================
  Name                            : SAH01-051
  Type                            : 7210 SAS-K-1
  Location                        :
  Coordinates                     :
  CLLI code                       :
```


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```
  Number of slots                  : 2
  Number of ports                  : 5
      System LED state             : Amber
  Over Temperature state           : OK
  Base MAC address                 : 00:03:fa:27:15:4e
  Number of MAC addresses          : 12
  Hardware Data
    Part number                    :
    CLEI code                      :
    Serial number                  : SAH01-051
    Manufacture date               :
    Manufacturing string           : (Not Specified)
    Manufacturing deviations       : (Not Specified)
    Manufacturing assembly number  :
    Temperature                    : 49C
    Time of last boot              : 2014/01/14 05:13:50
    Current alarm state            : alarm active
-------------------------------------------------------------------------------
Environment Information

  Number of fan trays              : 0
  Number of fans                   : 0
-------------------------------------------------------------------------------
Power Supply Information
  Number of power supplies         : 1

  Power supply number              : 1
    Configured power supply type   : unknown
    Status                         : up
    DC power                       : within range
===============================================================================
*A:SAH01-051>show#
```

Table 73: Output fields: chassis

Label	Description
Name	Specifies the system name for the router
Type	Specifies the router series model number
Location	Specifies the system location for the device
Coordinates	Specifies a user-configurable string that indicates the Global Positioning System (GPS) coordinates for the location of the chassis For example: N 45 58 23, W 34 56 12 N37 37' 00 latitude, W122 22' 00 longitude N36*39.246' W121*40.121'
CLLI Code	Specifies the Common Language Location Identifier (CLLI) that uniquely identifies the geographic location of places and functional categories of equipment unique to the telecommunications industry

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Label	Description
Number of slots	Specifies the number of slots in this chassis that are available for plug-in cards The total number includes card slots
Number of ports	Specifies the total number of ports currently installed in this chassis
Critical LED state	Specifies the current state of the Critical LED in this chassis
Major LED state	Specifies the current state of the Major LED in this chassis
Minor LED state	Specifies the current state of the Minor LED in this chassis
Base MAC address	Specifies the base chassis Ethernet MAC address
Part number	Specifies the part number
CLEI code	Specifies the code used to identify the router
Serial number	Specifies the part number Not user-configurable
Manufacture date	Specifies the chassis manufacture date Not user-configurable
Manufacturing string	Factory-inputted manufacturing text string Not user-configurable
Time of last boot	Specifies the date and time at which the most recent boot occurred
Current alarm state	Displays the alarm conditions for the specific board
Number of fan trays	Specifies the total number of fan trays installed in this chassis
Number of fans	Specifies the total number of fans installed in this chassis
Operational status	Specifies the current status of the fan tray
Fan speed	Half speed — Specifies that the fans are operating at half speed Full speed — Specifies that the fans are operating at full speed
Number of power supplies	Specifies the number of power supplies installed in the chassis
Power supply number	Specifies the ID for each power supply installed in the chassis
AC power	Within range — Specifies that the AC voltage is within range Out of range — Specifies that the AC voltage is out of range
DC power	Within range — Specifies that the DC voltage is within range

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Label	Description
	Out of range — Specifies that the DC voltage is out of range
Over temp	Within range — Specifies that the current temperature is within the acceptable range Out of range — Specifies that the current temperature is above the acceptable range
Status	Up — Specifies that the specified power supply is up Down — Specifies that the specified power supply is down

Sample output for 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p

```
A:NK213210024# show chassis power-supply
===============================================================================
Chassis Information
===============================================================================
Power Supply Information
  Number of power supplies          : 2

  Power supply number               : 1
    Configured power supply type    : ac single
    Configured power supply module  : 100W [3HE06972AB]
    Status                          : up
    AC power                        : within range

  Power supply number               : 2
    Configured power supply type    : dc
    Configured power supply module  : 100W [3HE06972AB]
    Status                          : up
    DC power                        : within range
        Input power                 : within range
        Output power                : within range
===============================================================================
A:NK213210024#
```

Table 74: Output fields: chassis power-supply on the 7210 SAS-Dxp 16p and 7210 SAS-Dxp 24p

Label	Description
Number of power supplies	Displays the total number of available power supplies
Power supply number	Displays the ID for each power supply installed in the chassis
Configured power supply type	ac — Specifies that a AC power supply is configured dc — Specifies that a DC power supply is configured
Configured power supply module	Displays the configured power supply module and the associated part number
Status	up — Specified power supply is up down — Specified power supply is down

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Label	Description
DC power	Within range — DC voltage is within range
Input power	Within range — Input power is within range
Output power	Within range — Output power is in range

Sample output for 7210 SAS-K 2F1C2T
The following is a sample output if the hardware supports DC source failure.

```
Output for Chassis for 7210 SAS-K 2F2T1C

*A:SAH01-051>show# chassis

===============================================================================
Chassis Information
===============================================================================
  Name                              : SAH01-051
  Type                              : 7210 SAS-K-1
  Location                          :
  Coordinates                       :
  CLLI code                         :
  Number of slots                   : 2
  Number of ports                   : 5
      System LED state              : Amber
  Over Temperature state            : OK
  Base MAC address                  : 00:03:fa:27:15:4e
  Number of MAC addresses           : 12
  Hardware Data
    Part number                     :
    CLEI code                       :
    Serial number                   : SAH01-051
    Manufacture date                :
    Manufacturing string            : (Not Specified)
    Manufacturing deviations        : (Not Specified)
    Manufacturing assembly number   :
    Temperature                     : 49C
    Time of last boot               : 2014/01/14 05:13:50
    Current alarm state             : alarm active
-------------------------------------------------------------------------------
Environment Information

  Number of fan trays               : 0
  Number of fans                    : 0
-------------------------------------------------------------------------------
Power Supply Information
  Number of power supplies          : 1

  Power supply number               : 1
    Configured power supply type    : unknown
    Status                          : up
    DC power                        : within range
===============================================================================
*A:SAH01-051>show#
```

Sample output for 7210 SAS-K 3SFP+ 8C

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The following is a sample output when both DC input feeds supply power.

```
A:NS1843C1571# show chassis power-supply
===============================================================================
Chassis Information
===============================================================================
Power Supply Information
  Number of power supplies          : 1

 Power supply number               : 1
    Configured power supply type    : dc
    Status                          : up
    Input Feed Status               : Feed A Up / Feed B Up
    DC power                        : within range
        Input power                 : within range
        Output power                : within range
===============================================================================
A:NS1843C1571#
```

Table 75: Output fields: chassis power-supply on the 7210 SAS-K 3SFP+ 8C DC variant

Label	Description
Number of power supplies	Specifies the total number of power supplies available
Power supply number	Specifies the ID for each power supply installed in the chassis
Configured power supply type	DC — Specifies that a DC power supply is configured
Status	Down — Specifies that the specified power supply is down
Input feed status	Up — Specifies that the specified input feed is up Down — Specifies that the specified input feed is down
DC power	Within range — Specifies that the DC voltage is within range
Input power	Within range — Specifies that the input power is within range
Output power	Within range — Specifies that the output power is in range

alarm-contact-input

Syntax

alarm- contact-input all

Context

show>alarm-contact-input

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command displays information about all the alarm contact input pins.

Output

The following output is an example of alarm contact input information, and Table 76: Output fields: alarm contact input describes the output fields.

Sample output

```
*A:7210-2# show alarm-contact-input 1
===============================================================================
Alarm Contact Input
===============================================================================
    Alarm Input Pin Number        : 1
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
===============================================================================
*A:7210-2#


*A:7210-2# show alarm-contact-input 1 detail
===============================================================================
Alarm Contact Input
===============================================================================
    Alarm Input Pin Number        : 1
    Alarm Input Pin Description   :
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
    Last State Change             : 05/19/2010 11:28:09
===============================================================================
*A:7210-2#


*A:7210SAS>show# alarm-contact-input console-1
===============================================================================
Alarm Contact Input
===============================================================================
    Alarm Input Pin Number        : console-1
    Alarm Input Pin Current State : alarm
    Alarm Output Pin Used         : Major
===============================================================================
*A:7210SAS>show#


*A:7210-2# show alarm-contact-input all
===============================================================================
Alarm Contact Input
===============================================================================
    Alarm Input Pin Number        : 1
    Alarm Input Pin Description   :
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
    Last State Change             : 05/19/2010 11:28:09
    Alarm Input Pin Number        : 2
    Alarm Input Pin Description   :
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
    Last State Change             : 05/19/2010 11:28:09
    Alarm Input Pin Number        : 3
    Alarm Input Pin Description   :
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
```


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```
    Last State Change             : 05/19/2010 11:28:09
    Alarm Input Pin Number        : 4
    Alarm Input Pin Description   :
    Alarm Input Pin Current State : Disabled
    Alarm Output Pin Used         : Major
    Last State Change             : 05/19/2010 11:28:09
===============================================================================
*A:7210-2#
```

Table 76: Output fields: alarm contact input

Label	Description
Alarm input pin Number	Indicates the pin alarm input pin number
Alarm input pin Description	Describes the alarm indicating its usage or attribute
Alarm Input Pin Current State	Indicates the current state of the alarm contact input pin
Alarm Output Pin Used	Indicates the alarm output pin used
Last State Change	Indicates the previous state change time

6.18.2.3 Clear commands

screen

Syntax

screen

Context

clear

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command clears the Telnet or console screen.

ptp

Syntax

ptp inactive-peers

ptp statistics

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ptp peer *ip-address* **statistics**

Context

clear>system

Platforms

7210 SAS-D ETR, 7210 SAS-Dxp 12p ETR, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command clears PTP statistics.

Parameters

inactive-peers

Keyword to remove PTP peers which are not currently exchanging PTP packets with the router.

peer *ip-address* statistics

Clears statistics for the specified peer.

statistics

Clears all PTP statistics.

script-control

Syntax

script-control

Context

clear>system

Platforms

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

Description

This command clears script information.

script-policy

Syntax

script-policy

Context

clear>system>script-control

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Platforms

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

Description

Commands in this context clear script policy information.

completed

Syntax

completed [*script-policy-name*] [**owner** *owner-name*]

Context

clear>system>script-control>script-policy

Platforms

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

Description

This command clears completed script run history entries.

Parameters

script-policy-name

Specifies to only clear history entries for the specified script-policy, up to 32 characters.

owner-name

Specifies to only clear history entries for script-policies with the specified owner, up to 32 characters.

Default TiMOS CLI

sync-if-timing

Syntax

sync-if-timing {**ref1** | **ref2**}

Context

clear>system

Platforms

7210 SAS-D ETR, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

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Description

This command individually clears (re-enable) a previously failed reference. As long as the reference is one of the valid options, this command is always executed. An inherent behavior enables the revertive mode which causes a re-evaluation of all available references.

Parameters

ref1

Clears the first timing reference.

ref2

Clears the second timing reference.

6.18.2.4 Debug commands

sync-if-timing

Syntax

sync-if-timing

Context

debug

Platforms

7210 SAS-D ETR, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

This command debugs synchronous interface timing references.

force-reference

Syntax

force-reference {**ref1** | **ref2** | **ptp**}

no force-reference

Context

debug>sync-if-timing

Platforms

7210 SAS-D ETR, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, and 7210 SAS-K 3SFP+ 8C

Description

Commands in this context force the system synchronous timing output to use a specific reference.

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Note:
This command should be used for testing and debugging purposes only. After the system timing reference input has been forced, it does not revert to another reference at any time. The state of this command is not persistent between system boots.

When the **debug force-reference** command is executed, the current system synchronous timing output is immediately referenced from the specified reference input. If the specified input is not available (shutdown), or in a disqualified state, the timing output enters the holdover state based on the previous input reference.

Parameters

ref1

Specifies that the clock uses the first timing reference.

ref2

Specifies that the clock uses the second timing reference.

ptp

Specifies that the clock uses PTP as a timing reference.

system

Syntax

[**no**] **system**

Context

debug

Platforms

Supported on all 7210 SAS platforms as described in this document

Description

This command displays system debug information.

ntp

Syntax

ntp [**router** *router-name*] [**interface** *ip-int-name*]

Context

debug>system

Platforms

Supported on all 7210 SAS platforms as described in this document

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Description

This command enables and configures debugging for NTP.

The **no** form of this command disables debugging for NTP.

Parameters

router-name

Specifies the router name. Base is the default and the only router name supported currently.

Values Base

Default Base

ip-int-name

Specifies the name of the IP interface. The name can be up to 32 characters and must begin with a letter. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

6.18.2.5 Fan controller debug commands

fan-stats

Syntax

fan-stats

Context

tools>dump

Platforms

7210 SAS-D ETR

Description

This command provides details of the fan operation.

Output

The following output is an example of fan-stats information, and Table 77: Output fields: show fan statistics describes the output fields.

Sample output

```
A:7210SAS# tools dump system fan-stats

Fan Configuration Mode : Auto
Fan Status : Off
Auto Mode Duration : 70 hr:24 min
Fan ON Count : 2
```


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Note:
When the fan mode is changed by the user, the values displayed above are automatically reset by the software.

Table 77: Output fields: show fan statistics

Label	Description
Fan Configuration Mode	Displays the user configured mode for fan operation It can be On/Off/Auto
Fan Status	Displays the current status of the fan It can be On/Off
Auto Mode Duration	Displays the total duration since the fan has been in auto mode Displayed in HH:MM format to indicate hours and minutes Valid only when the Fan configuration mode is auto
Fan ON count	Displays the total number of times the Fan has been switched 'ON' in auto mode Valid only in auto mode

6.18.2.6 Tools commands

ssh

Syntax

ssh

Context

tools>perform>system

Platforms

7210 SAS-Dxp

Description

Commands in this context perform SSH operations.

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gen-keypair

Syntax

gen-keypair *url-string* **curve** {**secp256r1** | **secp384r1** | **secp521r1**} [**secure-download-type**]

gen-keypair *url-string* **ed25519** [**secure-download-type**]

gen-keypair *url-string* **rsa** *key-size* [**secure-download-type**]

Context

tools>perform>system>ssh

Platforms

7210 SAS-Dxp

Description

This command generates a key-pair for SSH authentication.

Parameters

url-string

Specifies the location on the local CF card where the generated key files are stored.

Values url-string: <local-url> [up to 99 characters]
local-url: <cflash-id>/<file-path>
cflash-id: cf1:

curve

Keyword to specify the elliptic curve algorithm to use for key generation.

Values secp256r1, secp384r1, secp521r1

key-size

Specifies the key size when RSA is used for key generation.

Values 2048 to 4096

Default 3072

secure-download-type

Keyword to specify the type of secure download.

Values autoinit-secure-download - Keyword to specify that the generated SFTP client key files are used for first-time bootup during auto-init.

boot-secure-download - Keyword to specify that the generated SFTP client key files are used for a subsequent reboot of the node.

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7 Appendix: 7210 SAS boot procedures

This chapter describes the booting procedures for 7210 SAS devices.

This chapter provides information about booting a factory-shipped 7210 SAS device for the first time. It also includes information to boot the 7210 SAS device after subsequent reboots that are initiated by issuing the **admin reboot** command. For subsequent reboots, the BOF and the TiMOS image are stored on the local flash.

The 7210 SAS supports two modes for a first-time boot of a factory-shipped node or to boot the node after the **admin>reboot auto-init** command is executed. The supported boot modes are:

- **auto-init mode**

  In this mode, the boot procedure uses an external DHCP server to provide the IP address and other IP parameters, and the BOF configuration, which contains the image location and the configuration file location. This mode does not require user intervention and provides an option for zero-touch provisioning of the node.

  This method also provides an option to modify the default values of the BOF parameters used for auto-init and customize a specific set of BOF parameters so that auto-init is supported in the customer network environment. See Auto-init mode for a list of BOF parameters that the user can modify.

  The user requires console access to modify BOF parameters. After the partial BOF is saved, the system continues using the auto-init mode procedure to boot, with auto-init using the modified values of the BOF parameters that the user has provided.

- **manual mode**

  In this mode, the boot procedure requires user intervention to complete the process. During the boot process, the user must log in to the console on the node and configure the IP address, other IP parameters, and the location of the image file and configuration file. The following options are supported to boot the 7210 SAS device in manual mode:

  – boot from the image on flash

  – boot from the network using uplink ports

  – boot from the network using the OOB Ethernet management port

The following table lists the supported boot procedures for 7210 SAS devices.

Table 78: 7210 SAS boot procedure overview

Section	Overview
Procedure to boot using auto-init mode	This procedure uses the auto-init mode to boot the 7210 SAS device: • Procedure to boot with auto-init mode using SFTP for secure download of files This procedure uses auto-init mode with SFTP for the secure download of files to boot the 7210 SAS device.

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Section	Overview
Procedures to boot using manual mode	This procedure uses the manual mode to boot the 7210 SAS device. In manual mode, the device can be booted from the local flash or it can be booted from the network using an uplink port or the OOB Ethernet management port. The following procedures apply: • Procedure to boot from the image on flash in manual mode This procedure uses the manual mode to boot the 7210 SAS device from the local flash. • Procedure to boot from the network in manual mode using uplink ports This procedure uses the manual mode to boot the 7210 SAS device from the network using an uplink port. • Procedure to boot from the network in manual mode using the OOB Ethernet management port This procedure uses the manual mode to boot from the 7210 SAS device from the network using the OOB Ethernet management port.
Procedure to boot when the BOF is present locally	This procedure uses the BOF that is present locally to boot the 7210 SAS device.
Procedure to boot in the satellite mode	This procedure boots the 7210 SAS device in the satellite mode.
Procedure to boot in the standalone-VC mode	This procedure boots the 7210 SAS device in the standalone-VC mode.

Note:
Console outputs shown in this chapter are examples only; actual displays may differ depending on the 7210 SAS platform, supported functionality, and user configuration.

7.1 Procedure to boot using auto-init mode

About this task

Note:
The auto-init mode is supported on all 7210 SAS platforms, except the 7210 SAS-R6, 7210 SAS-R12, and 7210 SAS platforms that are configured in the standalone-VC or satellite modes of operation.

This section describes the procedure to boot the 7210 SAS using the auto-init mode.

To boot using the auto-init mode requires a DHCP server to be configured in the network and reachable by the system. The 7210 SAS device uses the auto-init mode to obtain the BOF from the network using the IP address and file location provided by the DHCP server, and uses the parameters specified in the BOF

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to download the TiMOS image file and configuration file required to boot the node. See Auto-init mode for more information about the auto-init procedure and the DHCP parameters used.

The auto-init mode is used to boot the 7210 SAS device in the following scenarios:

- user boots the device for the first time
- user boots the device after a reset to the factory default settings
- user boots the device after the execution of the **admin>reboot auto-init** command
- Perform the following steps to boot the 7210 SAS device using the auto-init mode.

Procedure

Step 1. Connect the console port to the serial port of the PC and power on the 7210 SAS device to display log messages generated on the screen.

Note:
This is an optional step. Perform this step only if you need to diagnose issues with the auto-init procedure, if any.

The system starts booting and the following console output is displayed.

Example

```
Nokia 7xxx Boot ROM. Copyright 2000-2020 Nokia.
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Build: X-20.3.B1-1 on Wed Feb 12 15:29:52 IST 2020 by sasbuild
Version: 0x38
Processor core is CN66xx
COLD boot on processor #1
?Preparing for jump to RAM...
Starting bootrom RAM code...
Boot rom version is v56
CPU #1 booted from working sector
CPU Control FPGA version is 0x3D
FPGA A version is 0x3D. FPGA B version is 0x3D. FPGA C version is 0x3D.
Restart type = 0x01
>>>Validate SDRAM from 0x000000007fdfff80 to 0x0000000080000000 (decrementing)
>>>Testing  SDRAM from 0x0000000002200000 to 0x000000007fdfff80
>>>Testing  SDRAM from 0xfffffffffe0000000 to 0xfffffffffe2000000
Power on Diagnostics passed
Board Serial Number is 'NS1715T0019'

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-V-20.3.B1-1 bootrom/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
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Built on Wed Feb 12 15:28:49 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/m
Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Version L-20.3.B1-1, Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(13818400-->40990080) + data:(3162656-->19580220)
Starting at 0x18000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-L-20.3.B1-1 boot/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
2020 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/
main
```


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```
TiMOS BOOT LOADER
Time from clock is WED MAR 04 09:23:22 2020 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : factory-default
```

Step 2. The system lists the default settings and the following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading

Contents of Boot Options File on cf1:
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/65
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/66
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled

Hit a key within 1 second to change boot parameters...
```

Step 3. At the prompt, wait until the specified wait time has elapsed. The system will direct DHCP requests from the uplink ports to reach a DHCP server.

The following console output is displayed.

Example

```
Trying DHCP on Port 1/1/65 (Priority tagged)
Chassis MAC Address: D0:99:D5:97:02:41
DHCP failed on Port 1/1/65
Failure reason: SFP not present on port

Trying DHCP on Port 1/1/65 (Untagged)
Chassis MAC Address: D0:99:D5:97:02:41
DHCP failed on Port 1/1/65
Failure reason: SFP not present on port

Trying DHCP on Port 1/1/66 (Priority tagged)
Chassis MAC Address: D0:99:D5:97:02:41
DHCP failed on Port 1/1/66
Failure reason: SFP not present on port

Trying DHCP on Port 1/1/66 (Untagged)
Chassis MAC Address: D0:99:D5:97:02:41
DHCP failed on Port 1/1/66
Failure reason: SFP not present on port

Trying DHCP on Port 1/1/67 (Priority tagged)
```


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```
Chassis MAC Address: D0:99:D5:97:02:41
Port 1/1/67, Speed:100000, Duplex:Full, Link:Up.
DHCP failed on Port 1/1/67

Trying DHCP on Port 1/1/67 (Untagged)
Chassis MAC Address: D0:99:D5:97:02:41
Port 1/1/67, Speed:100000, Duplex:Full, Link:Up.

DHCP Server:192.168.2.8
    Boot device addr: 192.168.2.9
    Subnet mask: 24
    Boot host: 192.168.2.8
    Url from Boot file: tftp://192.168.2.8/images-pf/SASS/voy/bof.cfg
Initial DNS resolving preference is ipv4-only
```

Step 4. The DHCP server responds to the system request and supplies an IP address, default gateway information, and a BOF location.

The following console output is displayed.

Example

```
Looking for tftp://192.168.2.8/images-pf/SASS/voy/bof.cfg ... OK, reading
Successfully saved the new settings in cf1:/bof.cfg
```

Step 5. The system applies the IP configuration and downloads the BOF from the location specified by the DHCP server. The BOF is saved on the flash drive.

The 7210 SAS device initiates the boot using the BOF, and the following console output is displayed.

Example

```
My New Settings
------------
    primary-image      ftp://*:*@192.168.2.8/./images-pf/SASS/voy/hops-both.tim
    primary-config     ftp://*:*@192.168.2.8/./images-pf/SASS/voy/dut-h.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   192.168.2.9/24 active
    eth-mgmt-route     135.250.0.0/16 next-hop 192.168.2.8
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
    host-type        standalone
Setting the chassis role to standalone.

Configuring Network with eth-mgmt Port Setting.....
Primary config file location: ftp://*:*@192.168.2.8/./images-pf/SASS/voy/dut-h.cfg
Initial DNS resolving preference is ipv4-only
Downloading 'ftp://*:*@192.168.2.8/./images-pf/SASS/voy/dut-h.cfg'...OK

Sap Index file location: ftp://*:*@192.168.2.8/./images-pf/SASS/voy/dut-h.sdx
Downloading 'ftp://*:*@192.168.2.8/./images-pf/SASS/voy/dut-h.sdx'...OK

Primary image location: ftp://*:*@192.168.2.8/./images-pf/SASS/voy/hops-both.tim
Initial DNS resolving preference is ipv4-only
Loading image ftp://*:*@192.168.2.8/./images-pf/SASS/voy/hops-both.tim
```


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```
Version B-20.3.B1-1, Wed Feb 12 15:33:08 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(41664192-->183719312)
```

Step 6. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
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Built on Wed Apr 20 14:32:04 IST 2011 by builder in /builder/3.0B5/panos/main
Login:
```

Step 7. At the prompt, enter “admin” for the default username and password, and log in to the 7210 SAS device.

7.1.1 Procedure to boot with auto-init mode using SFTP for secure download of files

About this task

Note:
This feature is only supported on the 7210 SAS-Dxp.

This section describes the procedure to boot the 7210 SAS with auto-init mode using SFTP for the secure download of files.

Procedure

Step 1. Connect the console port to the serial port of the PC and power on the 7210 SAS device to display log messages generated on the screen.

Note:
This is an optional step. Perform this step only if you need to diagnose issues with the auto-init procedure, if any.

The system starts booting and the following console output is displayed.

Example

```
Nokia SAS-DR16 7210 Boot ROM. Copyright 2000-2025 Nokia.
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Build: X-25.9.B1-6 on Wed Oct 29 16:10:53 IST 2025 by sasbuild
Version: 0xC
SAS-DR16
Shmoo tuning data in flash is valid, load it
DDR Tuning Complete.
Hit any key to abort auto boot...
Passed!
Copying code from FLASH to RAM....
Done
Board CPLD Version: 0x0b
Reboot Reason: 0x05
Boot rom version is v12
>>> RAM: Testing DDR Passed!
Board Serial Number is 'NK221410012'
DDR Tuning Complete.

Tuning values already saved. Skip saving to flash.
Memory Test Passed!
```


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```
Jumping to vxrom at 0x61400000 now.................

Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Unlocking all the sectors
Locking all the sectors
Version L-26.9.B1-4, Fri Sep 11 11:17:15 IST 2026 by sasbuild in /home/sasbuild/
26.9B1/panos/main
text:(17920256-->59502752) + data:(5540160-->26035508)
Starting at 0x6f000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x68
TiMOS-L-26.9.B1-4 boot/ARMiproc Nokia SAS-Dxp16p 10T4F2SFP+ ETR 7210 Copyright (c)
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All rights reserved. All use subject to applicable license agreements.
Built on Fri Sep 11 11:17:15 IST 2026 by sasbuild in /home/sasbuild/26.9B1

TiMOS BOOT LOADER
Time from clock is THU JAN 01 00:02:53 2026 UTC
Switching serial output to sync mode...   done
```

Step 2. The system lists the default settings and the following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading

Contents of Boot Options File on cf1:
#uplinkA Port Settings:
    uplinkA-port       1/1/11
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/12
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled

Hit a key within 1 second to change boot parameters...
```

Step 3. At the prompt, wait until the specified wait time has elapsed. The system will direct DHCP requests from the uplink ports to reach a DHCP server.

The following console output is displayed.

Example

```
Trying DHCP on Port 1/1/11 (Priority tagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/11
Failure reason: Port link down

Trying DHCP on Port 1/1/11 (Untagged)
```


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```
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/11
Failure reason: Port link down

Trying DHCP on Port 1/1/12 (Priority tagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/12
Failure reason: Port link down

Trying DHCP on Port 1/1/12 (Untagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/12
Failure reason: Port link down

Trying DHCP on Port 1/1/13 (Priority tagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/13
Failure reason: Port link down

Trying DHCP on Port 1/1/13 (Untagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
DHCP failed on Port 1/1/13
Failure reason: Port link down

Trying DHCP on Port 1/1/14 (Priority tagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
Port 1/1/14-->Mode:GIGE-SX, Speed:1000, Duplex:Full Autoneg: On, Link:Up.
DHCP failed on Port 1/1/14


Trying DHCP on Port 1/1/14 (Untagged)
Chassis MAC Address: 50:E0:EF:DE:04:BD
Port 1/1/14-->Mode:GIGE-SX, Speed:1000, Duplex:Full Autoneg: On, Link:Up.

DHCP Server:xxx.xxx.xx.y
    Boot device addr: xxx.xxx.xx.x
    Subnet mask: 24
    Boot host: xxx.xxx.xx.y
    Boot Url Path: sftp://*@xxx.xxx.xx.y:10001/home/user31/secAutoInitFiles/bof-ipv4-
a-1-1-14-1g-user.cfg
Initial DNS resolving preference is ipv4-only
```

Step 4. The DHCP server responds to the system request and supplies an IP address, default gateway information, and a BOF location (using the SFTP URL).

The following console output is displayed.

Example

```
Looking for sftp://*@xxx.xxx.xx.y:10001/home/user31/secAutoInitFiles/bof-ipv4-a-1-1-
14-1g-user.cfg ... OK, reading
Successfully saved the new settings in cf1:/bof.cfg
```

Step 5. The system applies the IP configuration and downloads the BOF from the location specified by the DHCP server using the SFTP client and PKI files provisioned in the node using the procedure detailed in Secure download of image and configuration files using SFTP. The BOF is saved on the flash drive.

The 7210 SAS device initiates the boot using the BOF, and the following console output is displayed.

In the following BOF output, SFTP is used to specify the URL and location for the image and configuration file using the `primary-image` and `primary-config` BOF parameters.

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Example

```
My New Settings
------------
    primary-image      sftp://*@xxx.xxx.xx.y:10001/./images/bcmiproc-both.tim
    primary-config     sftp://*@xxx.xxx.xx.y:10001/./secAutoInitFiles/Router-1-1-1-14-
1g-cfg.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/14
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100
    uplinkA-address    xxx.xxx.xx.x/24
    uplinkA-vlan       null
    uplinkA-route      xxx.xxx.0.0/16 next-hop xxx.xxx.xx.y
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled
```

Step 6. The bootloader applies the uplink port configuration (such as IP address, IP route, port speed, Port VLAN, and so on) provided in the BOF file and then attempts to down the TiMOS image and configuration file from the location specified in the SFTP URL. In this case, the SFTP client is used to download the image and configuration file as shown below.

Example

```
Configuring Network with uplinkA Port Setting.....
Primary config file location: sftp://*@xxx.xxx.xx.y:10001/./secAutoInitFiles/Router-1-
1-1-14-1g-cfg.cfg
Port 1/1/14-->Mode:GIGE-SX, Speed:1000, Duplex:Full Autoneg: On, Link:Up.
Initial DNS resolving preference is ipv4-only
Downloading 'sftp://*@xxx.xxx.xx.y:10001/./secAutoInitFiles/Router-1-1-1-14-1g-
cfg.cfg'...OK

Sap Index file location: sftp://*@xxx.xxx.xx.y:10001/./secAutoInitFiles/Router-1-1-1-
14-1g-cfg.sdx
Downloading 'sftp://*@xxx.xxx.xx.y:10001/./secAutoInitFiles/Router-1-1-1-14-1g-
cfg.sdx'...OK

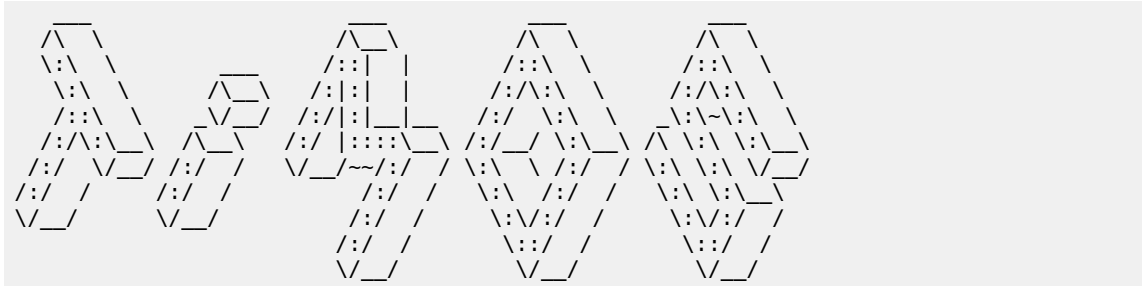
Primary image location: sftp://*@xxx.xxx.xx.y:10001/./images/bcmiproc-both.tim
Port 1/1/14-->Mode:GIGE-SX, Speed:1000, Duplex:Full Autoneg: On, Link:Up.
Initial DNS resolving preference is ipv4-only
Loading image sftp://*@xxx.xxx.xx.y:10001/./images/bcmiproc-both.tim
Version B-26.9.B1-4, Fri Sep 11 11:27:16 IST 2026 by sasbuild in /home/sasbuild/
26.9B1/panos/main
text:(44382560-->245613185) + data:(7270112-->49646452)
Executing TiMOS image at 0x60100000
```

Step 7. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x68
TiMOS-B-26.9.B1-4 both/ARMiproc Nokia SAS-Dxp16p 10T4F2SFP+ ETR 7210 Copyright (c)
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Built on Fri Sep 11 11:27:16 IST 2026 by sasbuild in /home/sasbuild/26.9B1
```


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```
Running 32 bit architecture
Time from clock is THU JAN 01 00:11:06 2026 UTC
lldpInit done

Attempting to exec primary configuration file:
   'cf1:/default.cfg' ...

MAJOR: CLI #1013 The system will be reconfigured without persistent indexes because
 there is a mismatch between configuration and SDX files.
System Configuration
System Security Configuration
Log Configuration
Port Configuration
Service Configuration
Static Route Configuration
Executed 124 lines in 0.2 seconds from file cf1:\default.cfg


Attempting to exec successful configuration extension file:
    'cf1:/env.cfg' ...

Further access may require a token with the following parameters
Current Time:  THU JAN 01 00:00:02 UTC 2026
Token version: 1
System nonce:  Nm0wYk6bDSKkH51oz5/CJabmfrcBn/99+zlSKChUSiQ=
Session info:  BbFad0ey+byfljkMoWkyTeZ8KLfB548F93nx7MKKwJU=
OLD PASSWORDS EXECUTED

Further access may require a token with the following parameters
Current Time:  THU JAN 01 00:00:02 UTC 2026
Token version: 1
System nonce:  Nm0wYk6bDSKkH51oz5/CJabmfrcBn/99+zlSKChUSiQ=
Session info:  BbFad0ey+byfljkMoWkyTeZ8KLfB548F93nx7MKKwJU=
NEW TOKEN PASSWORDS EXECUTED
Result of 'StartNetLog' = 0 = 0x0
Reboot on Crash : OFF
Result of 'CrashReboot' = 0 = 0x0
Executed 129 lines in 0.7 seconds from file cf1:\env.cfg
user31 -  Router-1
Login: admin
Password:
A:Router-1#
```

Step 8. At the prompt, enter “admin” for the default username and password, and log in to the 7210 SAS device.

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7.2 Procedures to boot using manual mode

Note:
The manual mode is supported on all 7210 SAS platforms, except those operating in satellite mode.

This section describes the procedures to boot the 7210 SAS from the network or flash using the manual mode.

The manual mode can be used to boot the 7210 SAS device in the following scenarios:

- user boots the device for the first time
- user boots the device after a reset to the factory default settings, or after executing the **admin>reboot auto-init** command (this command is not supported on the 7210 SAS-R6 and 7210 SAS-R12, and 7210 SAS platforms configured in the standalone-VC mode of operation)

In all scenarios, the user must create a local BOF by connecting a console to the node and interrupting the boot process to configure the BOF parameters. The following sections provide the details for configuring the BOF parameters under different scenarios.

The manual mode has two options:

- 7210 SAS device is booted from the local image on flash; see section Procedure to boot from the image on flash in manual mode (supported on all 7210 SAS platforms, except those operating in the satellite mode)
- 7210 SAS device is booted from the network using an uplink port (section Procedure to boot from the network in manual mode using uplink ports; supported on all 7210 SAS platforms, except the 7210 SAS-R6 and 7210 SAS-R12) or the Ethernet management port (section Procedure to boot from the network in manual mode using the OOB Ethernet management port; supported on all 7210 SAS platforms when the Ethernet management port is available)

7.2.1 Procedure to boot from the image on flash in manual mode

About this task

Note:
This procedure is not supported for 7210 SAS platforms configured in the satellite mode of operation.

The 7210 SAS-D is factory-shipped with the `boot.tim` and `both.tim` (TiMOS image) on the internal flash. This device attempts to boot using the auto-init mode when they are booted for the first time from factory. If the auto-init mode fails, the node loads with the image on the flash. If the user wants to continue using this image, they must connect to a console and execute the **admin auto-init stop** command in the TiMOS prompt. If the user does not execute this command, the device reboots and attempts the auto-init mode procedure again.

For the 7210 SAS-Dxp, 7210 SAS-K 2F1C2T, 7210 SAS-K 2F6C4T, 7210 SAS-K 3SFP+ 8C, 7210 SAS-Mxp, 7210 SAS-R6, 7210 SAS-R12, 7210 SAS-Sx/S 1/10GE, 7210 SAS-Sx 10/100GE, and 7210 SAS-T, the user must buy a software license that is factory-shipped with the TiMOS image on a flash or SD card device. The user must plug the flash or SD card device in the designated slot for the external flash or SD card device and power on the unit.

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Note:
See the corresponding 7210 SAS chassis installation guide for information about equipment required to setup the device.

Perform the following steps to boot the system in the manual mode from the local image on the flash.

Procedure

Step 1. Connect the 7210 SAS console port to the serial port of the PC, and power on the 7210 SAS device.

The system starts booting and the following console output is displayed.

Example

```
Nokia 7xxx Boot ROM. Copyright 2000-2020 Nokia.
All rights reserved. All use is subject to applicable license agreements.
Build: X-20.3.B1-1 on Wed Feb 12 15:29:52 IST 2020 by sasbuild
Version: 0x38
Processor core is CN66xx
COLD boot on processor #1
?Preparing for jump to RAM...
Starting bootrom RAM code...
Boot rom version is v56
CPU #1 booted from working sector
CPU Control FPGA version is 0x3D
FPGA A version is 0x3D. FPGA B version is 0x3D. FPGA C version is 0x3D.
Restart type = 0x01
>>>Validate SDRAM from 0x000000007fdfff80 to 0x0000000080000000 (decrementing)
>>>Testing  SDRAM from 0x0000000002200000 to 0x000000007fdfff80
>>>Testing  SDRAM from 0xffffffffe0000000 to 0xffffffffe2000000
Power on Diagnostics passed
Board Serial Number is 'NS1720T0009'

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-V-20.3.B1-1 bootrom/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
2020 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Feb 12 15:28:49 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/m

Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Version L-20.3.B1-1, Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(13818400-->40990080) + data:(3162656-->19580220)
Starting at 0x18000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-L-20.3.B1-1 boot/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
2020 Nokia.
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Built on Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/
main

TiMOS BOOT LOADER
Time from clock is SUN MAR 15 15:19:08 2020 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : factory-default
```

Step 2. The system lists the default settings and the following console output is displayed.

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Example

```
Looking for cf1:/bof.cfg ... OK, reading
Contents of Boot Options File on cf1:
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/65
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/66
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
Hit a key within 3 seconds to change boot parameters...
```

Step 3. At the prompt, press any key to initiate boot parameter updates.

The following console output is displayed.

Example

```
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Waiting for 30 seconds to enter password
Password:
```

Step 4. At the prompt, enter the default password “password”, and initiate the BOF edit.

The system accepts the password and the following console output is displayed.

Example

```
You must supply some required Boot Options. At any prompt, you can type:
"restart" - restart the query mode.
"reboot" - reboot.
"exit" - boot with with existing values.
"diag" - enter the diag shell.
"reset" - reset the bof and reboot.

Press ENTER to begin, or 'flash' to enter firmware update...
```

Step 5. At the prompt, press Enter to edit the BOF. The following console output is displayed.

Example

```
Chassis-Role
-------------
Current chassis-role is : factory-default
You can change it to { satellite | standalone }.
Press ENTER to continue OR "edit" to change the chassis-role :
```


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```
Chassis-role is set to factory-default, Do you wish to continue with this (yes/no) :
```

Step 6. At the prompt, enter “yes”. The following console output is displayed.

Example

```
Software Location
-----------------
   You must enter the URL of the TiMOS software.
   The location can be on a Compact Flash device,
   a USB flash drive, or on the network.

   Here are some examples
      cf1:/timos1.0R1
      uf1:/timos1.0R1
      ftp://user:passwd@192.168.1.150/./timos1.0R1
      ftp://user:passwd@[3FFE::1]/./timos1.0R1

or Type 'auto' to retrieve BOF configuration through DHCP.

Software Image URL:
```

Step 7. At the prompt, enter the location of the image.

In factory-shipped 7210 SAS devices, the image is typically available at `cf1:\both.tim` or `cf2:\both.tim`.

The following console output is displayed.

Example

```
Configuration File Location
---------------------------
   You must enter the location of configuration
   file to be used by TiMOS.  The file can be on
   a Compact Flash device, a USB flash drive, or
   on the network.

   Here are some examples
      uf1:/config.cfg
      cf1:/config.cfg
      ftp://user:passwd@192.168.1.150/./config.cfg
      ftp://user:passwd@[3FFE::1]/./config.cfg
      tftp://192.168.1.150/./config.cfg
      tftp://[3FFE::1]/./config.cfg

Config File URL:
```

Step 8. Enter the location of the configuration file, or press Enter to skip this step.

The following console output is displayed.

Example

```
Current configuration enables use of console (setting is "no console-disabled")
Press ENTER to proceed with existing setting  or 'disable' to disable console access
:
```

Step 9. At the prompt, press Enter.

The following console output is displayed.

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Example

```
New Settings
------------
    primary-image      cf2:/both.tim
    primary-config     uf1:/sassx64.cfg
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/65
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/66
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
Do you want to overwrite cf1:/bof.cfg with the new settings? (yes/no):
```

Step 10. At the prompt, enter "yes". The 7210 SAS device begins to boot with the new settings. The following console output is displayed.

Example

```
Successfully saved the new settings in cf1:/bof.cfg

Configuring Network with uplinkA Port Setting.....
Primary config file present at: uf1:/sassx64.cfg

Skipping missing or bad Sap index file 'uf1:/sassx64.sdx'

Primary image location: cf2:/both.tim
Loading image cf2:\both.tim
Version B-20.3.B1-1, Wed Feb 12 15:33:08 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(41664192-->183719312) + data:(7133216-->49945144)
Executing TiMOS image at 0x2800000
```

Step 11. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
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Built on Wed Apr 20 14:32:04 IST 2011 by builder in /builder/3.0B5/panos/main
Login:
```

Step 12. At the prompt, enter “admin” for the default username and password, and log into the 7210 SAS device.

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Note:
The SYS LED is green after the device has successfully completed the boot process and is running normally.

7.2.2 Procedure to boot from the network in manual mode using uplink ports

About this task

Note:
This procedure is supported on all 7210 SAS platforms, except the 7210 SAS-R6 and 7210 SAS-R12, and all platforms configured in the satellite mode of operation.

Perform this procedure to boot a 7210 SAS device from the network without using the auto-init mode.

Note:
See the corresponding 7210 SAS chassis installation guide for information about equipment required to setup the device.

The front panel ports (referred to as uplinkA and uplinkB in the sample output used in this procedure) are used to boot the device from the network.

Note:
Nokia recommends that the TiMOS image should be stored on the internal flash so that it is available for use in the case where booting the system from the flash is required later on subsequent reboot.

Perform the following steps to boot from the network in the manual mode using uplink ports.

Procedure

Step 1. Power on the 7210 SAS device.

Step 2. Use the uplink ports to boot from the network.

Example

```
Nokia SASDxp 7210 Boot ROM. Copyright 2000-2020 Nokia.
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Build: X-20.3.B1-1 on Wed Feb 12 15:29:18 IST 2020 by sasbuild
Version: 0x8
SASDxp-DC Board
Shmoo tuning data in flash is valid, load it
DDR Tuning Complete.
Passed!
Copying code from FLASH to RAM....
Done
Board CPLD Version: 0x0e
Reboot Reason: 0x05
Boot rom version is v8
>>> RAM: Testing DDR Passed!
Board Serial Number is 'NS1917T0023'
DDR Tuning Complete.

Tuning values already saved. Skip saving to flash.
Memory Test Passed!
Jumping to vxrom at 0x61400000 now.................
```


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```
^[[6~^[[6~
Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Version L-20.3.B1-1, Wed Feb 12 15:30:14 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(12972416-->39659312) + data:(4504352-->20039220)
Starting at 0x6f000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x4e
TiMOS-L-20.3.B1-1 boot/ARMiproc Nokia SAS-Dxp 6T4F2SFP+ 7210 Copyright (c) 2000-
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Built on Wed Feb 12 15:30:14 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/m

TiMOS BOOT LOADER
Time from clock is SUN MAR 15 05:09:48 2020 UTC
Switching serial output to sync mode...   done
```

Step 3. The system lists the default settings and the following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading
Contents of Boot Options File on cf1:
#uplinkA Port Settings:
    uplinkA-port       1/1/11
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/12
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled
Hit a key within 1 second to change boot parameters...
```

Step 4. At the prompt, press any key to initiate boot parameter updates.

The following console output is displayed.

Example

```
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Waiting for 30 seconds to enter password
Password:
```

Step 5. At the prompt, enter the default password “password”.

The system accepts the password and the following console output is displayed.

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Example

```
You must supply some required Boot Options. At any prompt, you can type:
"restart" - restart the query mode.
"reboot"  - reboot.
"exit"    - boot with with existing values.
"diag"    - enter the diag shell.
"reset"   - reset the bof and reboot.

Press ENTER to begin, or 'flash' to enter firmware update...
```

Step 6. At the prompt, press Enter to initiate the update.

The following console output is displayed.

Example

```
Software Location
-----------------
   You must enter the URL of the TiMOS software.
   The location can be on a Compact Flash device,
 or on the network.

   Here are some examples
      cf1:/timos1.0R1
      ftp://user:passwd@192.168.1.150/./timos1.0R1
      ftp://user:passwd@[3FFE::1]/./timos1.0R1

or Type 'auto' to retrieve BOF configuration through DHCP.

Software Image URL:
```

Step 7. At the prompt, enter the URL location of the software; for example, `ftp://<user>:<password>@10.10.170.22/./images/both.tim`.

The following console output is displayed.

Example

```
Configuration File Location
---------------------------
   You must enter the location of configuration
   file to be used by TiMOS.  The file can be on
   a Compact Flash device, or on the network.

   Here are some examples
      cf1:/config.cfg
      ftp://user:passwd@192.168.1.150/./config.cfg
      ftp://user:passwd@[3FFE::1]/./config.cfg
      tftp://192.168.1.150/./config.cfg
      tftp://[3FFE::1]/./config.cfg

Config File URL:
```

Step 8. At the prompt, enter the URL location of the configuration file.

The following console output is displayed.

Example

```
Boot Interface Management
-------------------------
   You specified a network location for either the
```


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```
   software or the configuration file. You need to
   configure either eth-mgmt or uplinkA or uplinkB ports.
   You will be asked to configure the port number, IP(v6) address,
   static routes, and VLAN Id in case of uplink ports.

Existing uplinkA port settings are:

   uplinkA-port       1/1/11
   no uplinkA-autoneg
   uplinkA-duplex     full
   uplinkA-speed      10000
   uplinkA-address    0
   uplinkA-address    0
   uplinkA-vlan       0

   uplinkA port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:
```

Step 9. At the prompt, enter “edit” to change the port settings.

The following console output is displayed.

Example

```
Existing uplinkA port for Boot Interface Management is port 1/1/11.
Press ENTER to keep it.
Enter the new uplinkA port number for Boot Interface Management:
```

Step 10. At the prompt, enter the front-panel port that is connected to the network (for example, 1/1/10).

The following console output is displayed.

Example

```
Enter uplinkA speed and duplex settings:
```

Step 11. At the prompt, enter uplink port speed and duplex settings.

The following console output is displayed.

Example

```
Auto-Negotiation is currently disabled.
Press ENTER to proceed with existing setting or 'auto' to enable auto-negotiation.
auto
Auto-negotiation will be enabled on uplinkA port.

   You need to configure the VLAN Id for this port
   VLAN Id can be between 0 to 4094. To send out
   packets with out any VLAN tags, type "null".

Existing VLAN Id for uplinkA port is VLAN Id 0.
Press ENTER to keep it.
Enter the new VLAN Id for uplinkA port:
```

Step 12. At the prompt, perform one of the following.

a. Enter “null” to send out packets without VLAN tags.

b. Enter the a VLAN tag ID for the uplink port.

The following console output is displayed.

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Example

```
Using port 1/1/1 as uplinkA port for Boot Interface Management

   You need to assign an IP address for this port.
   The IP address should be entered in standard
   dotted decimal form with a network length.
   example:   192.168.1.169/24
   Or type "0" to obtain IP address and static route
   through DHCP. Existing IP address and static routes
   will be deleted.

Enter uplinkA  IP Address (Type 0 if none desired):
```

Step 13. At the prompt, enter the port IP address and mask that the device should use (for example, 10.135.4.172/10).

Step 14. Because the FTP server is on a different subnet, enter the IP routing information.

The following console output is displayed.

Example

```
You specified network locations which might require
static routes to reach. You will be asked to
enter static routes until all the locations become
reachable.
Static routes should be entered in the following format:
prefix/mask next-hop ip-address
example:     192.168.0.0/16 next-hop 192.168.1.254

Would you like to add a static route? (yes/no)
```

Step 15. At the prompt, type “yes” and press Enter to add a static route.

Example

```
Enter route:
```

Step 16. Enter a static route to the FTP server subnet (for example, 10.10.170.0/10 next-hop 10.135.4.1).

The following console output is displayed.

Example

```
Existing uplinkB port settings are:

   uplinkB-port       1/1/12
   no uplinkB-autoneg
   uplinkB-duplex     full
   uplinkB-speed      10000
   uplinkB-address    0
   uplinkB-address    0
   uplinkB-vlan       0

   uplinkB port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:
```

Step 17. At the prompt, press Enter to proceed existing port settings.

The following console output is displayed.

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Example

```
Current configuration enables use of console (setting is "no console-disabled")
Press ENTER to proceed with existing setting  or 'disable' to disable console access
:
```

Step 18. At the prompt, press Enter to proceed with the existing settings.

The following console output is displayed.

Example

```
New Settings
------------
    primary-image      ftp://*:*@135.254.173.17/usr/global/images/20.3/B1-1/7xxx/
bcmiproc-both.tim
    primary-config     ftp://*:*@135.254.173.5/tmp/dxp/dxp2537.cfg
#uplinkA Port Settings:
    uplinkA-port       1/1/1
    uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      1000
    uplinkA-address    10.135.25.37/24
    uplinkA-vlan       null
    uplinkA-route      135.0.0.0/8 next-hop 10.135.25.1
#uplinkB Port Settings:
    uplinkB-port       1/1/12
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    uplink-mode        access-uplink
    no  console-disabled

Do you want to overwrite cf1:/bof.cfg with the new settings? (yes/no):
```

Step 19. Enter “yes” to overwrite the `bof.cfg` file.

The 7210 SAS device starts booting. The following console output is displayed.

Example

```
Successfully saved the new settings in cf1:/bof.cfg

Configuring Network with uplinkA Port Setting.....
Primary config file location: ftp://*:*@135.254.173.5/tmp/dxp/dxp2537.cfg
Initializing uplinkA port using IP addr 10.135.25.37.
Port 1/1/1-->Mode:Fix-Cu, Speed:100, Duplex:Full Autoneg: On, Link:Up.
Initial DNS resolving preference is ipv4-only
Downloading 'ftp://*:*@135.254.173.5/tmp/dxp/dxp2537.cfg'...OK

Sap Index file location: ftp://*:*@135.254.173.5/tmp/dxp/dxp2537.sdx
Downloading 'ftp://*:*@135.254.173.5/tmp/dxp/dxp2537.sdx'...OK

Primary image location: ftp://*:*@135.254.173.17/usr/global/images/20.3/B1-1/7xxx/
bcmiproc-both.tim
Port 1/1/1-->Mode:Fix-Cu, Speed:100, Duplex:Full Autoneg: On, Link:Up.
Initial DNS resolving preference is ipv4-only
```


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```
Loading image ftp://*:*@135.254.173.17/usr/global/images/20.3/B1-1/7xxx/bcmiproc-
both.tim
Version B-20.3.B1-1, Wed Feb 12 15:32:56 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(41388544-->175510640) + data:(6606080-->43372008)
Executing TiMOS image at 0x60100000
```

Step 20. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
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Built on Wed Apr 20 22:44:35 IST 2011 by builder in /builder/3.0B5/R4/panos/main
Login:
```

Step 21. At the prompt, enter “admin” for the default username and password, and log into the 7210 SAS device.

Note:
The Sys LED is green when the device has successfully completed the boot process and is running normally.

7.2.3 Procedure to boot from the network in manual mode using the OOB Ethernet management port

About this task

Note:
This procedure is not supported for 7210 SAS platforms configured in the satellite mode of operation. This procedure is supported on all 7210 SAS platforms that are equipped with an OOB Ethernet management port.

Perform the following steps to boot from the network using the OOB Ethernet management port without using the auto-init mode.

Procedure

Step 1. Power on the 7210 SAS device.

Step 2. Use the OOB Ethernet Management port to boot from the network.

Example

```
Nokia 7xxx Boot ROM. Copyright 2000-2020 Nokia.
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Build: X-20.3.B1-1 on Wed Feb 12 15:29:52 IST 2020 by sasbuild
Version: 0x38
Processor core is CN66xx
COLD boot on processor #1
?Preparing for jump to RAM...
Starting bootrom RAM code...
Boot rom version is v56
CPU #1 booted from working sector
CPU Control FPGA version is 0x3D
FPGA A version is 0x3D. FPGA B version is 0x3D. FPGA C version is 0x3D.
Restart type = 0x01
>>>Validate SDRAM from 0x000000007fdfff80 to 0x0000000080000000 (decrementing)
```


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```
>>>Testing  SDRAM from 0x0000000002200000 to 0x000000007fdfff80
>>>Testing  SDRAM from 0xffffffffe0000000 to 0xffffffffe2000000
Power on Diagnostics passed
Board Serial Number is 'NS1720T0009'

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-V-20.3.B1-1 bootrom/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
2020 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Feb 12 15:28:49 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/m

Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Version L-20.3.B1-1, Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(13818400-->40990080) + data:(3162656-->19580220)
Starting at 0x18000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-L-20.3.B1-1 boot/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
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Built on Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/
main

TiMOS BOOT LOADER
Time from clock is THU MAR 12 17:12:50 2020 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : factory-default
```

Step 3. The system lists the default settings and the following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading
Contents of Boot Options File on cf1:
    primary-image      ftp://*:*@135.254.173.3/tmp/sass/b/both.tim
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   10.135.25.36/24 active
    eth-mgmt-route     135.0.0.0/8 next-hop 10.135.25.1
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#uplinkA Port Settings:
    uplinkA-port       1/1/65
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/66
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
```


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```
Hit a key within 3 seconds to change boot parameters...
```

Step 4. At the prompt, press any key to initiate boot parameter updates.

The following console output is displayed.

Example

```
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Waiting for 30 seconds to enter password
Password:
```

Step 5. At the prompt, enter the default password “password”.

The system accepts the password and the following console output is displayed.

Example

```
You must supply some required Boot Options. At any prompt, you can type:
"restart" - restart the query mode.
"reboot"  - reboot.
"exit"    - boot with with existing values.
"diag"    - enter the diag shell.
"reset"   - reset the bof and reboot.

Press ENTER to begin, or 'flash' to enter firmware update...
```

Step 6. At the prompt, press Enter to initiate the update.

The following console output is displayed.

Example

```
Chassis-Role
------------
Current chassis-role is : factory-default
You can change it to { satellite | standalone }.
Press ENTER to continue OR "edit" to change the chassis-role :
Chassis-role is set to factory-default, Do you wish to continue with this (yes/no) :
```

Step 7. At the prompt, enter “yes”.

The following console output is displayed.

Example

```
Software Location
-----------------
You must enter the URL of the TiMOS software.
The location can be on a Compact Flash device,
or on the network.

Here are some examples
cf1:/timos1.0R1
ftp://user:passwd@192.168.1.150/./timos1.0R1
tftp://192.168.1.150/./timos1.0R1

Software Image URL:
```

Step 8. At the prompt, enter the URL location of the software; for example, `ftp://<user>:<password>@10.10.170.22/./images/both.tim`.

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The following console output is displayed.

Example

```
Configuration File Location
---------------------------
You must enter the location of configuration
file to be used by TiMOS.  The file can be on
a Compact Flash device, or on the network.

Here are some examples
cf1:/config.cfg
ftp://user:passwd@192.168.1.150/./config.cfg
tftp://192.168.1.150/./config.cfg

No existing Config URL
Press ENTER, or type 'none' for no Config URL.
Config File URL:
```

Step 9. At the prompt, enter “none”.

The following console output is displayed.

Example

```
Boot Interface Management
-------------------------
   You specified a network location for either the
   software or the configuration file. You need to
   configure either eth-mgmt or uplinkA or uplinkB ports.
   You will be asked to configure the port number, IP(v6) address,
   static routes, and VLAN Id in case of uplink ports.

Existing eth-mgmt port settings are:
   eth-mgmt-port
   eth-mgmt-address    10.135.25.36/24
   eth-mgmt-address    0
   eth-mgmt-route      135.0.0.0/8 next-hop 10.135.25.1

   eth-mgmt port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:
```

Step 10. At the prompt, enter “edit” to change the port settings.

The following console output is displayed.

Example

```
You need to assign an IP address for this port.
   The IP address should be entered in standard
   dotted decimal form with a network length.
   example:   192.168.1.169/24
The existing eth-mgmt  IP address is 10.135.25.36/24. Press ENTER to keep it.
Enter eth-mgmt  IP Address (Type 0 if none desired):
```

Step 11. At the prompt, enter the port IP address and mask that the device should use (for example, 10.135.4.172/10).

The following console output is displayed.

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Example

```
In case of an IPv6, the IPv6 address should be
   entered in standard colon hexadecimal notation
   with a prefix length.
       example:   3FFE::1/112

Enter eth-mgmt  IPv6 Address (Type 0 if none desired):
```

Step 12. At the prompt, enter 0.

The following console output is displayed.

Example

```
No eth-mgmt IPv6 Address configured

   You specified network locations which might require
   static routes to reach. You will be asked to
   enter static routes until all the locations become
   reachable.
   Static routes should be entered in the following format:
   prefix/mask next-hop ip-address
   example:     192.168.0.0/16 next-hop 192.168.1.254

A static route to the Primary Image exists: 135.0.0.0/8 next-hop 10.135.25.1
Do you want to keep it? (yes/no)
```

Step 13. At the prompt, enter “no”.

The following console output is displayed.

Example

```
Enter route to Primary Image at 135.254.173.3:
```

Step 14. At the prompt, enter the static route for the specified primary image location.

The following console output is displayed.

Example

```
A static route to the Primary Config exists: 135.0.0.0/8 next-hop 10.135.25.1
Do you want to keep it? (yes/no)
```

Step 15. At the prompt, enter “yes”.

The following console output is displayed.

Example

```
Enter route to Primary Config at 135.254.173.3135.0.0.0/8 next-hop 10.135.25.1
```

Step 16. At the prompt, enter a static route for the specified primary configuration location.

The following console output is displayed.

Example

```
Would you like to add a static route? (yes/no)
```

Step 17. At the prompt, enter “yes”.

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The following console output is displayed.

Example

```
Enter ip route:
```

Step 18. At the prompt, enter a static route to the FTP server subnet (for example, 10.10.170.0/10 next-hop 10.135.4.1).

The following console output is displayed.

Example

```
Would you like to add another static route? (yes/no)
```

Step 19. At the prompt, enter “no”.

The following console output is displayed.

Example

```
Would you like to add another static IPv6 route?
```

Step 20. At the prompt, enter “no”.

The following console output is displayed.

Example

```
Existing uplinkA port settings are:

   uplinkA-port       1/1/65
   no uplinkA-autoneg
   uplinkA-duplex     full
   uplinkA-speed      100000
   uplinkA-address    0
   uplinkA-address    0
   uplinkA-vlan       0

   uplinkA port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:
```

Step 21. At the prompt, enter “disable” to proceed with no backup link.

The following console output is displayed.

Example

```
Existing uplinkB port settings are:

   uplinkB-port       1/1/66
   no uplinkB-autoneg
   uplinkB-duplex     full
   uplinkB-speed      100000
   uplinkB-address    0
   uplinkB-address    0
   uplinkB-vlan       0

   uplinkB port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
```


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```
   Or "edit" to change the port settings:
```

Step 22. At the prompt, enter “disable” to proceed with no backup link.

The following console output is displayed.

Example

```
Current configuration enables use of console (setting is "no console-disabled")
Press ENTER to proceed with existing setting  or 'disable' to disable console access
:
```

Step 23. At the prompt, press Enter.

The following console output is displayed.

Example

```
New Settings
------------
    primary-image      ftp://*:*@135.254.173.3/tmp/sass/b/both.tim
    primary-config     ftp://*:*@135.254.173.3/tmp/sass/sassx64.cfg
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   10.135.25.36/24 active
    eth-mgmt-route     10.135.0.0/16 next-hop 10.135.25.1
    eth-mgmt-route     135.0.0.0/8 next-hop 10.135.25.1
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#uplinkA Port Settings:
    uplinkA-port       1/1/65
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/66
    no  uplinkB-autoneg
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled

Do you want to overwrite cf1:/bof.cfg with the new settings? (yes/no):
```

Step 24. At the prompt, enter “yes”.

The following console output is displayed.

Example

```
Successfully saved the new settings in cf1:/bof.cfg

Configuring Network with eth-mgmt Port Setting.....
Primary config file location: ftp://*:*@135.254.173.3/tmp/sass/sassx64.cfg
Initial DNS resolving preference is ipv4-only
Downloading 'ftp://*:*@135.254.173.3/tmp/sass/sassx64.cfg'...OK
```


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```
Sap Index file location: ftp://*:*@135.254.173.3/tmp/sass/sassx64.sdx
Downloading 'ftp://*:*@135.254.173.3/tmp/sass/
sassx64.sdx'...Cannot open input file ftp://*:*@135.254.173.3/tmp/sass/sassx64.sdx
0 files copied
Failed

Primary image location: ftp://*:*@135.254.173.3/tmp/sass/b/both.tim
Initial DNS resolving preference is ipv4-only
Loading image ftp://*:*@135.254.173.3/tmp/sass/b/both.tim
Version B-20.3.B1-1, Wed Feb 12 15:33:08 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(41664192-->183719312) + data:(7133216-->49945144)
Executing TiMOS image at 0x2800000
================================================
```

Step 25. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
All rights reserved. All use subject to applicable license agreements.
Built on Wed Apr 20 22:44:35 IST 2011 by builder in /builder/3.0B5/R4/panos/main
Login:
```

Step 26. At the prompt, enter “admin” for the default username and password, and log into the 7210 SAS device.

Note:
The Sys LED is green when the device has successfully completed the boot process and is running normally.

7.3 Procedure to boot when the BOF is present locally

About this task

This section describes the procedure to boot the 7210 SAS after a reboot, when the BOF and image files are present locally, or when the node is shipped from factory with a BOF and an image on the flash.

See Table 19: Contents shipped with the system on 7210 SAS for a list of factory-shipped contents for each 7210 SAS device.

Procedure

Step 1. Execute a reboot of the 7210 SAS device.

The system starts booting and the following console output is displayed.

Example

```
Resetting...OK

Nokia 7xxx Boot ROM. Copyright 2000-2020 Nokia.
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Build: X-20.3.B1-1 on Wed Feb 12 15:29:52 IST 2020 by sasbuild
Version: 0x38
Processor core is CN66xx
COLD boot on processor #1
?Preparing for jump to RAM...
```


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```
Starting bootrom RAM code...
Boot rom version is v56
CPU #1 booted from working sector
CPU Control FPGA version is 0x3D
FPGA A version is 0x3D. FPGA B version is 0x3D. FPGA C version is 0x3D.
Restart type = 0x01
>>>Validate SDRAM from 0x000000007fdfff80 to 0x0000000080000000 (decrementing)
>>>Testing  SDRAM from 0x0000000002200000 to 0x000000007fdfff80
>>>Testing  SDRAM from 0xffffffffe0000000 to 0xffffffffe2000000
Power on Diagnostics passed
Board Serial Number is 'NS1715T0019'

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-V-20.3.B1-1 bootrom/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
2020 Nokia.
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Built on Wed Feb 12 15:28:49 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/m

Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Cannot open "cf1:/boot.tim".
Attempting to load file cf2:/boot.tim
Cannot open "cf2:/boot.tim".
Attempting to load file uf1:/boot.tim
Version L-20.3.B1-1, Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(13818400-->40990080) + data:(3162656-->19580220)
Starting at 0x18000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-L-20.3.B1-1 boot/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
2020 Nokia.
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Built on Wed Feb 12 15:31:09 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/
main

TiMOS BOOT LOADER
Time from clock is WED MAR 04 11:18:16 2020 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : standalone

Looking for uf1:/bof.cfg ... OK, reading
```

Step 2. The system locates the BOF on a local drive. The system reads the contents of the BOF and displays it on the console.

The following console output is displayed.

Example

```
Contents of Boot Options File on uf1:
    primary-image      uf1:\both.tim
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/67
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      100000
    uplinkA-address    0
    uplinkA-vlan       0
#uplinkB Port Settings:
    uplinkB-port       1/1/68
    no  uplinkB-autoneg
```


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```
    uplinkB-duplex     full
    uplinkB-speed      100000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled

Hit a key within 1 second to change boot parameters...
```

Step 3. At the prompt, wait until the specified wait time has elapsed.

The boot process can be interrupted at the prompt if necessary to change the boot parameters (for example, the image location). In this example, it is assumed that changes to the BOF are not required.

The following console output is displayed.

Example

```
Configuring Network with uplinkA Port Setting.....
No existing config file URL

Primary image location: uf1:\both.tim
Loading image uf1:\both.tim
Version B-20.3.B1-1, Wed Feb 12 15:33:08 IST 2020 by sasbuild in /home/sasbuild/
20.3B1/panos/main
text:(41664192-->183719312) + data:(7133216-->49945144)
Executing TiMOS image at 0x2800000
```

Step 4. The system loads the TiMOS image and the 7210 SAS device boots up.

The following console output is displayed.

Example

```
Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x43
TiMOS-B-20.3.B1-1 both/hops Nokia SAS-Sx 64SFP+4QSFP28 7210 Copyright (c) 2000-
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All rights reserved. All use subject to applicable license agreements.
Built on Wed Feb 12 15:33:08 IST 2020 by sasbuild in /home/sasbuild/20.3B1/panos/
main
Running 32 bit architecture
Time from clock is WED MAR 04 11:19:24 2020 UTC
Login:
```

Step 5. At the prompt, enter “admin” for the default username and password, and log in to the 7210 SAS device.

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7.4 Procedure to boot in the satellite mode

About this task

Note:
See Table 1: Supported modes of operation and configuration methods for the list of 7210 SAS platforms that support the satellite mode of operation.

See the *7210 SAS-Mxp, R6, R12, S, Sx, T Basic System Configuration Guide* for information about the satellite mode on 7210 SAS devices.

See the specific 7210 SAS chassis installation guide for more information about prerequisites to boot the system in the satellite mode of operation.

Perform the following steps to boot the 7210 SAS device in the satellite mode of operation.

Procedure

Step 1. Configure the 7750 SR host with the 7210 SAS `both.tim` image location (the software repository).

a. Create the software repository to store the images by using the **software-repository** command:

```
*A:dut-h# configure system software-repository "7210-SAS-Sx-9.0R7-Images" create
```

b. Provide a description for the software repository by using the **description** command:

```
*A:dut-h>config>system>sw-repos# description "7210-SAS-Sx-Release-9.0R7-Images"
```

c. Manually copy the `boot.tim` and `both.tim` files to the repository created in Step i.

Do not copy the files to a sub-folder in the repository.

d. Configure the location of the 7210 SAS `both.tim` and `boot.tim` by using the **primary-location** command:

```
*A:dut-h>config>system>sw-repos# primary-location "cf1:/7210-SAS-Sx-9.0R7/images/"
```

e. From the **config>system>software-repository** context, issue the **info** command to verify the configuration of the image location. The following output is displayed.

```
*A:dut-h>config>system>sw-repos# info
----------------------------------------------------------------
            description "7210-SAS-Sx-Release-9.0R7-Images"
            primary-location "cf1:/7210-SAS-Sx-9.0R7/images/"
----------------------------------------------------------------
*A:dut-h>config>system>sw-repos#
```

Step 2. Configure the Ethernet satellite on the 7750 SR host.

See the *7210 SAS-Mxp, R6, R12, S, Sx, T Basic System Configuration Guide* for information about uplink ports used on 7210 SAS platforms operating in the satellite mode.

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Note:
In this example, the 7210 SAS device is identified by satellite ID 1 and its type is set to es64-10gb-sfpp+4-100gb-qsfp28. The satellite identifier (that is, esat-1, in this example) is used to refer to the entire satellite node when configuring services on the 7750 SR host.

a. Configure the Ethernet satellite with ID 1 by using the **eth-sat** command:

```
*A:dut-h#configure system satellite eth-sat 1 create
```

b. Configure the Ethernet satellite description by using the **description** command:

```
A:dut-h>config>system>eth-sat# description "Ethernet Satellite 1"
```

c. Configure the 7210 SAS device MAC address connected to the 7750 SR host by using the **mac-address** command:

```
A:dut-h>config>system>eth-sat#mac-address a4:7b:2c:13:bc:48
```

The MAC address is used by the 7750 SR host to provide the correct configuration to the system. If the MAC address is not configured, the 7750 SR host does not respond to DHCP requests from the system.

d. Configure the software repository by using the **software-repository** command:

```
*A:dut-h>config>system>eth-sat# software-repository "7210-SAS-Sx-9.0R7-Images"
```

The software repository provides the system with the correct image (`both.tim`). The software repository name must match the software repository created in Step1.

e. Configure the satellite type by using the **sat-type** command:

```
*A:dut-h>config>system>eth-sat# sat-type es64-10gb-sfpp+4-100gb-qsfp28
```

The satellite type allows the 7750 SR host to correctly initialize the satellite and set up the appropriate resources on the 7750 SR host to manage the satellite.

f. From the **config>system>eth-sat** context, issue the **info** CLI command to verify the configuration of the Ethernet satellite. The following output is displayed.

```
*A:dut-h>config>system>eth-sat# info
----------------------------------------------
                shutdown
                description "ESat1OnPort1/1/1"
                mac-address a4:7b:2c:13:bc:48
                software-repository "7210-SAS-Sx-9.0R7-Images"
----------------------------------------------
*A:dut-h>config>system>eth-sat#
```

g. From the **config>system>eth-sat** context, issue the **no shutdown** command:

```
*A:dut-h>config>system>eth-sat# no shutdown
```

h. On the 7750 host, for a 7210 SAS-Sx 10/100GE 64SFP+ 4QSFP28 variant, configure the breakout connection on **esat-1/1/c65** (and any other uplink ports) by using the **config>port>esat-1/1/c65/1>connector>breakout c1-100g** command.

i. Power on the satellite.

Step 3. On the 7750 SR host, configure the port connected to the 7210 SAS device.

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a. On the 7750 SR host, configure the port to which the satellite is connected by using the **port** command:

```
*A:dut-h# configure system port-topology port 1/1/1 to esat-1/1/c65/
u1 create
```

b. Issue the **show system port-topology** command to display the 7750 SR host ports associated with the Ethernet satellite ports.

The following output is displayed.

```
*A:dut-h# show system port-topology
===============================================================================
Port Topology
===============================================================================
Port              Far-end
Id                Port Id
-------------------------------------------------------------------------------
esat-1/1/c65/u1   1/1/1
-------------------------------------------------------------------------------
No. of Number of port-topology associations: 1
===============================================================================
```

c. Issue the **show system satellite** command to display the status of the satellite.

The following output is displayed.

```
*A:dut-h# show system satellite
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                        Admin         Oper
              Equipped Type (if different)        State         State
-------------------------------------------------------------------------------
esat-1    es64-10gb-sfpp+4-100gb-qsfp28           up            provisioned
              (not equipped)
-------------------------------------------------------------------------------
No. of Satellites: 1
===============================================================================
*A:dut-h#
```

Step 4. Power on the Ethernet satellite.

a. Power on the 7210 SAS device.

The satellite uses the bootloader on the SD card inserted in `cf2:\` (SD card slot on the rear of the chassis) and initiate the boot procedure.

The 7210 SAS device sends DHCP requests out of its uplink ports.

The 7750 SR host uses the MAC address in the received packets and matches it against MAC addresses provided in the Ethernet satellite configuration on the 7750 SR host.

After finding a match, the 7750 SR host uses the configured image and an appropriate configuration file, generates a BOF, and sends it to the system (the **host-type** parameter in the BOF generated by the 7750 SR host is set to **satellite**).

The 7750 SR boot loader uses the BOF to retrieve the images and the configuration file, and uses them to boot the platform in the satellite mode (because the **host-type** is set to **satellite**).

The satellite transitions through the following states: provisioned, booting, and up.

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b. Issue the **show system satellite** command to determine the boot status of the satellite.

The following output is displayed.

```
*A:dut-h# show system satellite
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                          Admin         Oper
              Equipped Type (if different)          State         State
-------------------------------------------------------------------------------
esat-1    es64-10gb-sfpp+4-100gb-qsfp28             up            provisioned
              (not equipped)
-------------------------------------------------------------------------------
No. of Satellites: 1
===============================================================================
*A:dut-h#
*A:dut-h# show system satellite
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                          Admin         Oper
              Equipped Type (if different)          State         State
-------------------------------------------------------------------------------
esat-1    es64-10gb-sfpp+4-100gb-qsfp28             up            booting
-------------------------------------------------------------------------------
No. of Satellites: 1
===============================================================================
*A:dut-h# show system satellite
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                          Admin         Oper
              Equipped Type (if different)          State         State
-------------------------------------------------------------------------------
esat-1    es64-10gb-sfpp+4-100gb-qsfp28             up            booting
-------------------------------------------------------------------------------
No. of Satellites: 1
===============================================================================
*A:dut-h# show system satellite
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                          Admin         Oper
              Equipped Type (if different)          State         State
-------------------------------------------------------------------------------
esat-1    es64-10gb-sfpp+4-100gb-qsfp28             up            up
-------------------------------------------------------------------------------
No. of Satellites: 1
===============================================================================
```

c. After the device has booted successfully, issue the **show system satellite eth-sat** command on the 7750 SR host to display detailed information about the 7210 SAS device connected in satellite mode.

The following output is displayed.

```
*A:SR7# show system satellite eth-sat 15
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                          Admin         Oper
```


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```
              Equipped Type (if different)         State         State
-------------------------------------------------------------------------------
esat-15   es64-10gb-sfpp+4-100gb-qsfp28            up            up
Description         : SASSx Mariner 100G QSFP28
MAC Address         : d0:99:d5:a6:34:41
Software Repository : SASS-HW64
SyncE               : Enabled
PTP-TC              : Disabled
Client-Down-Delay   : Disabled
Console Access      : Enabled
Hardware Data
    Platform type                 : N/A
    Part number                   : 3HE11597AARA01
    CLEI code                     : INM3110ARA
    Serial number                 : NS1734T0028
    Manufacture date              : 09182017
    Manufacturing deviations      : (Not Specified)
    Manufacturing assembly number :
    Administrative state          : up
    Operational state             : up
    Temperature                   : 48C
    Temperature threshold         : 85C
    Software boot (rom) version   : X-11.0.R4 on Wed Jul 10 13:44:15 IST 2019
                                    by sasbuild
    Software version              : TiMOS-B-20.3.B1-3 both/hops Nokia SAS-Sx
                                    64SFP+4QSFP28 7210 Copyright (c) 2000-2020
                                    Nokia.
                                    All rights reserved. All use subject to
                                    applicable license agreements.
                                    Built on Fri Mar 20 16:50:24 IST 2020 by
                                    sasbuild in /home/sasbuild/20.3B1/panos/ma
    Time of last boot             : 2019/11/14 13:16:39
    Current alarm state           : alarm cleared
    Base MAC address              : d0:99:d5:a6:34:41
============
```

7.5 Procedure to boot in the standalone-VC mode

About this task

Note:

- This procedure is only supported on the 7210 SAS-S 1/10GE, 7210 SAS-Sx 1/10GE, and their variants.
- See "Provisioning and Booting Up the VC in Standalone Mode" in the *7210 SAS-Mxp, R6, R12, S, Sx, T Basic System Configuration Guide* for more information.

Perform the following steps to boot the 7210 SAS device in the standalone-VC mode of operation.

Procedure

Step 1. Power on the 7210 SAS device.

Step 2. Use the OOB Ethernet management port to boot form the network.

Example

```
A:NS1722T0086# admin reboot now
```


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```
Resetting...OK

Nokia SAS-S 7210 Boot ROM. Copyright 2000-2018 Nokia.
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Build: X-11.0.B1-6 on Thu Dec 6 15:22:31 IST 2018 by sasbuild
Version: 0x1F

DRAM test first stage
?Boot rom version is v31
CPLD Version: 0x0C
Board Serial Number is 'NS1722T0086'
DRAM test second stage
>>>Testing  SDRAM from 0x0000000002200000 to 0x0000000080000000
>>>Testing  SDRAM from 0xfffffffe0000000 to 0xfffffffe2000000

Loading VxRom image .......

Board Serial Number is 'NS1722T0086'

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x14
TiMOS-V-11.0.B1-6 bootrom/hops Nokia SAS-S 24T4SFP+ 7210 Copyright (c) 2000-
2018 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Thu Dec 6 15:21:48 IST 2018 by sasbuild in /home/sasbuild/11.0B1/panos/main

Searching for boot.tim on local drives:
Attempting to load file cf1:/boot.tim
Version L-11.0.B1-21, Wed Feb 27 12:30:02 IST 2019 by sasbuild in /home/sasbuild/
11.0B1/panos/main
text:(13790784-->40910320) + data:(3160736-->19576100)
Starting at 0x18000000...

Total Memory: 2GB  Chassis Type: 0xa  Card Type: 0x14
TiMOS-L-11.0.B1-21 boot/hops Nokia SAS-S 24T4SFP+ 7210 Copyright (c) 2000-
2019 Nokia.
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Built on Wed Feb 27 12:30:02 IST 2019 by sasbuild in /home/sasbuild/11.0B1/panos/
main

TiMOS BOOT LOADER
Time from clock is SAT JAN 01 00:15:24 2000 UTC
Switching serial output to sync mode...   done
Chassis-role is set to : standalone
```

Step 3. The system lists the default settings and the following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading

Contents of Boot Options File on cf1:
#eth-mgmt Port Settings:
    eth-mgmt-disabled
#uplinkA Port Settings:
    uplinkA-port       1/1/27
    no  uplinkA-autoneg
    uplinkA-duplex     full
    uplinkA-speed      10000
    uplinkB-address    0
    uplinkB-vlan       0
#System Settings:
    wait               3
    persist            off
    console-speed      115200
```


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```
    no  console-disabled

Hit a key within 3 seconds to change boot parameters...
```

Step 4. At the prompt, press any key to initiate boot parameter updates.

The following console output is displayed.

Example

```
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Waiting for 30 seconds to enter password
Password:
```

Step 5. At the prompt, enter the default password “password”, and initiate the BOF edit.

The system accepts the password and the following console output is displayed.

Example

```
You must supply some required Boot Options. At any prompt, you can type:
"restart" - restart the query mode.
"reboot" - reboot.
"exit" - boot with with existing values.
"diag" - enter the diag shell.
"reset" - reset the bof and reboot.

Press ENTER to begin, or 'flash' to enter firmware update...
```

Step 6. At the prompt, press Enter to edit the BOF. The following console output is displayed.

Example

```
Chassis-Role
-------------
Current chassis-role is : standalone
You can change it to { satellite | standalone-vc | factory-default }.
Press ENTER to continue OR "edit" to change the chassis-role : standalone-vc
Press "edit" to change OR ENTER to continue :
```

Step 7. At the prompt, enter “edit”. The following console output is displayed.

Example

```
Enter the new chassis-role { satellite | standalone-vc | factory-
default } :
```

Step 8. At the prompt, enter “standalone-vc” for the chassis-role. The following output is displayed.

Example

```
Are you sure you want to set the chassis-role as standalone-vc? (yes/no) :
```

Step 9. At the prompt, enter “yes”. The following console output is displayed.

Example

```
Looking for cf1:/bof.cfg ... OK, reading
Contents of Boot Options File on cf1:
#eth-mgmt Port Settings:
```


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```
    no  eth-mgmt-disabled
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
    vc-stack-node-type imm-only

Hit a key within 2 seconds to change boot parameters...
```

Step 10. At the prompt, press any key to initiate boot parameter updates.

The following console output is displayed.

Example

```
Enter password to edit the Boot Options File
Or CTRL-D to exit the prompt

Waiting for 30 seconds to enter password
Password:
```

Step 11. At the prompt, enter the default password “password”, and initiate the BOF edit.

The system accepts the password and the following console output is displayed.

Example

```
You must supply some required Boot Options. At any prompt, you can type:
"restart" - restart the query mode.
"reboot" - reboot.
"exit" - boot with with existing values.
"diag" - enter the diag shell.
"reset" - reset the bof and reboot.

Press ENTER to begin, or 'flash' to enter firmware update...
```

Step 12. At the prompt, press Enter to edit the BOF. The following console output is displayed.

Example

```
Chassis-Role
-------------
Current chassis-role is : standalone-vc
you can change it to { satellite | standalone | factory-default }.
Press ENTER to continue OR "edit" to change the chassis-role : standalone
Press "edit" to change OR ENTER to continue :
```

Step 13. At the prompt, press Enter. The following output is displayed.

Example

```
Chassis-role is set to standalone-vc, Do you wish to continue with this (yes/
no) :
```

Step 14. At the prompt, enter “yes”. The following console output is displayed.

Example

```
VC Stack Node Type
```


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```
-------------------
Current Vc Stack Node type of this card is : imm-only
Press ENTER to retain this,
 or { cpm-imm } to change it to cpm-imm :
```

Step 15. At the prompt, enter “cpm-imm”. The following output is displayed.

Example

```
Setting the Card role to 'cpm-imm'.

VC Stack Name
-------------
Current VC Stack Name in Bof is :
Enter the VC Stack name (max 32 characters) you wish to use : VC123
```

Step 16. At the prompt, enter the name of the VC stack. The following output is displayed.

Example

```
Changing the VC Stack Name to VC123
Setting the VC name to 'VC123'.
Mac Address of this node is d0:99:d5:9a:6a:41

vc-stack-node field of First cpm-imm Node (cpmA)
-----------------------------------------------
   You must enter the VC Stack Slot Num that you intend to use
   and the node's mac address seperated by a space.

Example, to use slot-num '1' and mac address 'aa:bb:cc:dd:ee:ff'
Type - '1 aa:bb:cc:dd:ee:ff'

Accepted VC Stack Slot Num values are - [1 to 8]
The existing vc-stack-node and mac field in bof is 'none'

vc-stack-node entry of cpmA [1 to 8] [mac address] : 1 d0:99:d5:9a:6a:41
```

Step 17. At the prompt, enter the VC stack slot number and MAC address for CPM-A. The following output is displayed.

Example

```
Using 1 as Vc Stack Slot Id of Node with mac d0:99:d5:9a:6a:41

VC Stack Slot Num of Second cpm-imm Node (cpmB)
-----------------------------------------------
   You must enter the VC Stack Slot Num that you intend to use.
   type 'none' if you do not have the details of second cpm-imm node.

Accepted VC Stack Slot num values are - [1 to 8]
The existing vc-stack-node and mac field in bof is 'none'

vc-stack-node entry of cpmB [1 to 8] [mac address] :
```

Step 18. At the prompt, enter the VC stack slot number and MAC address for CPM-B. The following output is displayed.

Example

```
Using 2 as Vc Stack Slot Id of Node with mac d0:99:d5:94:de:41

Software Location
```


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```
-----------------
   You must enter the URL of the TiMOS software.
   The location can be on a Compact Flash device,
   a USB flash drive, or on the network.

   Here are some examples
      cf1:/timos1.0R1
      uf1:/timos1.0R1
      ftp://user:passwd@192.168.1.150/./timos1.0R1
      ftp://user:passwd@[3FFE::1]/./timos1.0R1

or Type 'auto' to retrieve BOF configuration through DHCP.

Software Image URL:
```

Step 19. At the prompt, enter the URL location of the software image; for example, `ftp://<user>:<password>@10.10.170.22/./images/both.tim`.

The following console output is displayed.

Example

```
Configuration File Location
---------------------------
   You must enter the location of configuration
   file to be used by TiMOS.  The file can be on
   a Compact Flash device, a USB flash drive, or
   on the network.

   Here are some examples
      uf1:/config.cfg
      cf1:/config.cfg
      ftp://user:passwd@192.168.1.150/./config.cfg
      ftp://user:passwd@[3FFE::1]/./config.cfg
      tftp://192.168.1.150/./config.cfg
      tftp://[3FFE::1]/./config.cfg

Config File URL:
```

Step 20. At the prompt, enter the URL location of the configuration file. The following console output is displayed.

Example

```
Network Configuration
---------------------

Boot Interface Management
-------------------------
   You specified a network location for either the
   software or the configuration file. You need to
   configure either eth-mgmt or uplinkA or uplinkB ports.
   You will be asked to configure the port number, IP(v6) address,
   static routes, and VLAN Id in case of uplink ports.

Existing eth-mgmt port settings are:

   eth-mgmt-port
   eth-mgmt-address    0 active
   eth-mgmt-address    0 standby
   eth-mgmt-address    0 active
   eth-mgmt-address    0 standby
```


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```
   eth-mgmt port is configured for Boot Interface Management,
   Press ENTER to proceed with existing port settings
   Or "disable" to disable the port for Boot Interface Management
   Or "edit" to change the port settings:
```

Step 21. At the prompt, enter “edit”. The following output is displayed.

Example

```
   You need to assign an IP address for this port.
   The IP address should be entered in standard
   dotted decimal form with a network length.
   example:   192.168.1.169/24

Enter eth-mgmt Active IP Address :
```

Step 22. At the prompt, enter the active port IP address and mask that the device should use (for example, 10.135.4.172/10). The following console output is displayed.

Example

```
   In case of an IPv6, the IPv6 address should be
   entered in standard colon hexadecimal notation
   with a prefix length.
       example:   3FFE::1/112

Enter eth-mgmt Active IPv6 Address (Type 0 if none desired):
```

Step 23. At the prompt, enter 0. The following console output is displayed.

Example

```
Enter eth-mgmt Standby IP Address (Type 0 if none desired):
```

Step 24. At the prompt, enter the standby port IP address and mask that the device should use. The following output is displayed.

Example

```
   In case of an IPv6, the IPv6 address should be
   entered in standard colon hexadecimal notation
   with a prefix length.
       example:   3FFE::1/112

Enter eth-mgmt Standby IPv6 Address (Type 0 if none desired):
```

Step 25. At the prompt, enter 0. The following output is displayed.

Example

```
   You specified network locations which might require
   static routes to reach. You will be asked to
   enter static routes until all the locations become
   reachable.
   Static routes should be entered in the following format:
   prefix/mask next-hop ip-address
   example:     192.168.0.0/16 next-hop 192.168.1.254

Would you like to add a static route? (yes/no)
```

Step 26. At the prompt, enter “yes”. The following output is displayed.

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Example

```
Enter ip route:
```

Step 27. At the prompt, enter the static IP route. The following output is displayed.

Example

```
OK

Would you like to add another static route? (yes/no)
```

Step 28. At the prompt, enter “no”. The following output is displayed.

Example

```
Would you like to add another static IPv6 route? (yes/no)
```

Step 29. At the prompt, enter “no”. The following console output is displayed.

Example

```
Current configuration enables use of console (setting is "no console-disabled")
Press ENTER to proceed with existing setting  or 'disable' to disable console access
:
```

Step 30. At the prompt, press Enter. The following console output is displayed.

Example

```
New Settings
------------
    primary-image      ftp://*:*@10.135.24.85/./img/sass/both.tim
    primary-config     ftp://*:*@10.135.24.85/./cfg/sass/dutE_vcCfg.txt
#eth-mgmt Port Settings:
    no  eth-mgmt-disabled
    eth-mgmt-address   10.135.24.94/24 active
    eth-mgmt-address   10.135.24.95/24 standby
    eth-mgmt-route     135.0.0.0/8 next-hop 10.135.24.1
    eth-mgmt-autoneg
    eth-mgmt-duplex    full
    eth-mgmt-speed     100
#System Settings:
    wait               3
    persist            off
    console-speed      115200
    no  console-disabled
    vc-stack-name      VC123
    vc-stack-node-type cpm-imm
    vc-stack-node cpmA slot-num 1 mac-addr d0:99:d5:9a:6a:41
    vc-stack-node cpmB slot-num 2 mac-addr d0:99:d5:94:de:41

Do you want to overwrite cf1:/bof.cfg with the new settings? (yes/no):
```

Step 31. At the prompt, enter “yes”. The 7210 SAS device begins to boot with the new settings. The following console output is displayed.

Example

```
Successfully saved the new settings in cf1:/bof.cfg
```


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```
****************** VC Mode ********************
Configuring Network with eth-mgmt Port Setting.....
Primary config file location: ftp://*:*@10.135.24.85/./cfg/sass/dutE_vcCfg.txt
Initial DNS resolving preference is ipv4-only
Downloading 'ftp://*:*@10.135.24.85/./cfg/sass/dutE_vcCfg.txt'...OK

Sap Index file location: ftp://*:*@10.135.24.85/./cfg/sass/dutE_vcCfg.sdx
Downloading 'ftp://*:*@10.135.24.85/./cfg/sass/dutE_vcCfg.sdx'...OK

Primary image location: ftp://*:*@10.135.24.85/./img/sass/both.tim
Initial DNS resolving preference is ipv4-only
Loading image ftp://*:*@10.135.24.85/./img/sass/both.tim
Version B-11.0.S127b, Tue May  7 04:46:24 IST 2019 by sasbuild in /home/sasbuild/
11.0S/panos/main
text:(41482848-->183530192) + data:(7134144-->49884044)
Executing TiMOS image at 0x2800000
```

Step 32. After the 7210 SAS device boots up, the following login prompt is displayed.

Example

```
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Built on Wed Apr 20 14:32:04 IST 2011 by builder in /builder/3.0B5/panos/main
Login:
```

Step 33. At the prompt, enter “admin” for the default username and password, and log into the 7210 SAS device.

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8 Standards and protocol support

Note:
The information provided in this chapter is subject to change without notice and may not apply to all platforms.

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The following conventions are used in this section:

- T(A,N) indicates 7210 SAS-T in both Access-uplink mode and Network mode. Similarly, T(N) indicates 7210 SAS-T in network mode only.
- K5 indicates 7210 SAS-K 2F2T1C.
- K12 indicates 7210 SAS-K 2F4T6C.
- K30 indicates 7210 SAS-K 3SFP+ 8C.
- Sx/S-1/10GE indicates all variants of 7210 SAS-Sx 1/10GE and 7210 SAS-S 1/10GE platforms.
- Sx-10/100GE indicates only the variants of 7210 SAS-Sx 10/100GE. Sx-10/100GE QSFP28 indicates the 7210 SAS-Sx 10/100GE 64 SFP+ 4QSFP28 variant.
- Sx/S-1/10GE-VC indicates 7210 SAS-Sx 1/10GE and 7210 SAS-S 1/10GE platforms in standalone VC mode.
- R6 indicates 7210 SAS-R6.
- R12 indicates 7210 SAS-R12.
- D indicates 7210 SAS-D and 7210 SAS-D ETR. If a line item applies only to 7210 SAS-D ETR, then it is indicated as D-ETR.
- Dxp indicates 7210 SAS-Dxp-12p (2SFP+ 4F6T) 7210 SAS-Dxp-12p ETR (2SFP+ 4F6T), 7210 SAS-Dxp 16p (2SFP+ 4F10T), and 7210 SAS-Dxp-24p (2SFP+ 6F16T). If a line item applies only to a particular variant, the variant name will be called out explicitly against that item.
- This standards list is not applicable to platforms in the satellite mode of operation, as most of the features are supported on 7x50 SR platforms. For this reason, the host platforms standards compliance must be consulted for the satellite mode of operation.

8.1 BGP

draft-ietf-idr-add-paths-04, Advertisement of Multiple Paths in BGP is supported on T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

draft-ietf-sidr-origin-validation-signaling-04, BGP Prefix Origin Validation State Extended Community is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1772, Application of the Border Gateway Protocol in the Internet is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1997, BGP Communities Attribute is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 2385, Protection of BGP Sessions via the TCP MD5 Signature Option is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2439, BGP Route Flap Damping is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2545, Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing is supported on K12, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2858, Multiprotocol Extensions for BGP-4 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2918, Route Refresh Capability for BGP-4 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3107, Carrying Label Information in BGP-4 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3392, Capabilities Advertisement with BGP-4 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4271, A Border Gateway Protocol 4 (BGP-4) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4360, BGP Extended Communities Attribute is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4364, BGP/MPLS IP Virtual Private Networks (VPNs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4456, BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only R6 and R12 supports RR server functionality. Rest of the platforms support only client function.

RFC 4659, BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4684, Constrained Route Distribution for Border Gateway Protocol/MultiProtocol Label Switching (BGP/MPLS) Internet Protocol (IP) Virtual Private Networks (VPNs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4760, Multiprotocol Extensions for BGP-4 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4798, Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4893, BGP Support for Four-octet AS Number Space is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5004, Avoid BGP Best Path Transitions from One External to Another is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5291, Outbound Route Filtering Capability for BGP-4 is supported on K12, K30, T(N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5668, 4-Octet AS Specific BGP Extended Community is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 6811, Prefix Origin Validation is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

8.2 Certificate Management

RFC 5280, Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 7468, Textual Encodings of PKIX, PKCS, and CMS Structures is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only PKIX and PKCS is supported.

8.3 Ethernet

IEEE 802.1AB, Station and Media Access Control Connectivity Discovery is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

TIA-1057, LLDP for Media endpoint devices is supported on Dxp, Sx/S-1/10GE, and Sx/S-1/10GE-VC

IEEE 802.1ad, Provider Bridges is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1ag, Connectivity Fault Management is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1ah, Provider Backbone Bridges is supported on T(N)

IEEE 802.1ax, Link Aggregation is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1D, MAC Bridges is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1p, Traffic Class Expediting is supported on D, E, Dxp, K5, K12, K30, T(A,N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1Q, Virtual LANs is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1s, Multiple Spanning Trees is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1w, Rapid Reconfiguration of Spanning Tree is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.1X, Port Based Network Access Control is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3ab, 1000BASE-T is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3ac, VLAN Tag is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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IEEE 802.3ad, Link Aggregation is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3ae, 10 Gb/s Ethernet is supported on Dxp, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3ah, Ethernet in the First Mile is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3ba, 40 Gb/s and 100 Gb/s Ethernet is supported on R6, R12, and Sx-10/100GE

IEEE 802.3i, Ethernet is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3u, Fast Ethernet is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3z, Gigabit Ethernet is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE 802.3af, Power Over Ethernet (PoE) is supported on Dxp, T-ETR, Mxp-ETR, Sx/S-1/10GE, and Sx/S-1/10GE-VC

Note:
Sx/S-1/10GE only on PoE variant and Sx-1/10GE fiber variant with two fixed copper ports. Only on Dxp-16p and Dxp-24p.

IEEE 802.3at, Power Over Ethernet (PoE+) is supported on Dxp, T-ETR, Mxp-ETR, Sx/S-1/10GE, and Sx/S-1/10GE-VC

Note:
Sx/S-1/10GE only on PoE variant and Sx-1/10GE fiber variant with two fixed copper ports. Only on Dxp-16p and Dxp-24p.

IEEE 802.3bt, Power Over Ethernet (PoE++/HPoE) is supported on Dxp

Note:
Only on Dxp-16p and Dxp-24p.

ITU-T G.8032, Ethernet Ring Protection Switching is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

ITU-T Y.1731, OAM functions and mechanisms for Ethernet based networks is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

8.4 EVPN

draft-snr-bess-evpn-proxy-arp-nd-00, Proxy-ARP/ND function in EVPN networks is supported on K12, K30, Mxp, Sx/S-1/10GE, R6, and R12

Note:
Sx/S-/10GE standalone mode only.

RFC 7432, BGP MPLS-Based Ethernet VPN is supported on K12, K30, Mxp, Sx/S-1/10GE, R6, and R12

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Note:
Sx/S-/10GE standalone mode only.

draft-ietf-bess-evpn-vpws-14, Virtual Private Wire Service support in Ethernet VPN is supported on Mxp

8.5 Fast Reroute

draft-ietf-rtgwg-lfa-manageability-08, Operational management of Loop Free Alternates is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
With Segment Routing.

RFC 5286, Basic Specification for IP Fast Reroute: Loop-Free Alternates is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
With Segment Routing.

RFC 7490, Remote Loop-Free Alternate (LFA) Fast Reroute (FRR) is supported on K12, K30, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
With Segment Routing.

8.6 Internet Protocol (IP) — General

draft-grant-tacacs-02, The TACACS+ Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-vrrp-unified-spec-02, Virtual Router Redundancy Protocol Version 3 for IPv4 and IPv6 is supported on Mxp

RFC 768, User Datagram Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 793, Transmission Control Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 854, TELNET Protocol Specifications is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 951, Bootstrap Protocol (BOOTP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1034, Domain Names - Concepts and Facilities is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1035, Domain Names - Implementation and Specification is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1350, The TFTP Protocol (revision 2) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 1534, Interoperation between DHCP and BOOTP is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1542, Clarifications and Extensions for the Bootstrap Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2131, Dynamic Host Configuration Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2132, DHCP Options and BOOTP Vendor Extensions is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2347, TFTP Option Extension is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2348, TFTP Blocksize Option is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2349, TFTP Timeout Interval and Transfer Size Options is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2428, FTP Extensions for IPv6 and NATs is supported on D, Dxp, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2865, Remote Authentication Dial In User Service (RADIUS) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2866, RADIUS Accounting is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3046, DHCP Relay Agent Information Option (Option 82) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3596, DNS Extensions to Support IP version 6 is supported on D, Dxp, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3768, Virtual Router Redundancy Protocol (VRRP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4250, The Secure Shell (SSH) Protocol Assigned Numbers is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4251, The Secure Shell (SSH) Protocol Architecture is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4252, The Secure Shell (SSH) Authentication Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
All 7210 platforms support password and public key based user authentication. 7210 SAS-D support only password based authentication.

RFC 4253, The Secure Shell (SSH) Transport Layer Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4254, The Secure Shell (SSH) Connection Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5246, The Transport Layer Security (TLS) Protocol Version 1.2 – TLS client, RSA public key is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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Note:
Only TLS client.

RFC 5425, Transport Layer Security (TLS) Transport Mapping for Syslog – RFC 3164 with TLS is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only TLS client.

RFC 5656, Elliptic Curve Algorithm Integration in the Secure Shell Transport Layer – ECDSA is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 7301, Transport Layer Security (TLS) Application Layer Protocol Negotiation Extension is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only TLS client.

RFC 8446, The Transport Layer Security (TLS) Protocol Version 1.3 is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only TLS client.

RFC 4632, Classless Inter-domain Routing (CIDR): The Internet Address Assignment and Aggregation Plan is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5880, Bidirectional Forwarding Detection (BFD) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
IPv4 only on all platforms listed. IPv4 and IPv6 only on Mxp.

RFC 5881, Bidirectional Forwarding Detection (BFD) IPv4 and IPv6 (Single Hop) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
IPv4 only on all platforms listed. IPv4 and IPv6 only on Mxp.

RFC 5883, Bidirectional Forwarding Detection (BFD) for Multihop Paths is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
IPv4 only on all platforms listed. IPv4 and IPv6 only on Mxp.

RFC 6528, Defending against Sequence Number Attacks is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 7130, Bidirectional Forwarding Detection (BFD) on Link Aggregation Group (LAG) Interfaces is supported on T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

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8.7 IP — Multicast

RFC 1112, Host Extensions for IP Multicasting is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
IGMP v1, v2, v3 is supported.

RFC 2236, Internet Group Management Protocol, Version 2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3306, Unicast-Prefix-based IPv6 Multicast Addresses is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3376, Internet Group Management Protocol, Version 3 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3446, Anycast Rendevous Point (RP) mechanism using Protocol Independent Multicast (PIM) and Multicast Source Discovery Protocol (MSDP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
MSDP supported only on Sx/S-1/10GE standalone.

RFC 3618, Multicast Source Discovery Protocol (MSDP) is supported on Sx/S-1/10GE

Note:
Only in standalone mode.

RFC 4601, Protocol Independent Multicast - Sparse Mode (PIM-SM): Protocol Specification (Revised) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4604, Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
MLD is not supported.

RFC 4607, Source-Specific Multicast for IP is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4608, Source-Specific Protocol Independent Multicast in 232/8 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4610, Anycast-RP Using Protocol Independent Multicast (PIM) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5059, Bootstrap Router (BSR) Mechanism for Protocol Independent Multicast (PIM) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5384, The Protocol Independent Multicast (PIM) Join Attribute Format is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6513, Multicast in MPLS/BGP IP VPNs is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

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Note:
Only IPv4.

RFC 6514, BGP Encodings and Procedures for Multicast in MPLS/IP VPNs is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

RFC 6515, IPv4 and IPv6 Infrastructure Addresses in BGP Updates for Multicast VPNs is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

RFC 6625, Wildcards in Multicast VPN Auto-Discover Routes is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

RFC 6826, Multipoint LDP In-Band Signaling for Point-to-Multipoint and Multipoint-to-Multipoint Label Switched Path is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

RFC 7246, Multipoint Label Distribution Protocol In-Band Signaling in a Virtual Routing and Forwarding (VRF) Table Context is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

RFC 7385, IANA Registry for P-Multicast Service Interface (PMSI) Tunnel Type Code Points is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only IPv4.

8.8 IP — Version 4

RFC 791, Internet Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 792, Internet Control Message Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 826, An Ethernet Address Resolution Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1519, Classless Inter-Domain Routing (CIDR): an Address Assignment and Aggregation Strategy is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 1812, Requirements for IPv4 Routers is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1981, Path MTU Discovery for IP version 6 is supported on K12, K30, T(N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2401, Security Architecture for Internet Protocol is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Supported only for OSPFv3 authentication. Not supported for services.

RFC 2460, Internet Protocol, Version 6 (IPv6) Specification is supported on D, Dxp, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, and T(A) for Management only.

8.9 IP — Version 6

RFC 2464, Transmission of IPv6 Packets over Ethernet Networks is supported on D, Dxp, K5 K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 3021, Using 31-Bit Prefixes on IPv4 Point-to-Point Links is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3122, Extensions to IPv6 Neighbor Discovery for Inverse Discovery Specification is supported on K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3587, IPv6 Global Unicast Address Format is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4007, IPv6 Scoped Address Architecture is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4193, Unique Local IPv6 Unicast Addresses is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4291, Internet Protocol Version 6 (IPv6) Addressing Architecture is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4443, Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4861, Neighbor Discovery for IP version 6 (IPv6) is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 4862, IPv6 Stateless Address Autoconfiguration (Router Only) is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 5095, Deprecation of Type 0 Routing Headers in IPv6 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5952, A Recommendation for IPv6 Address Text Representation is supported on D, Dxp, K5, K12, K30, T(A, N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
D, Dxp, K5, and T(A) for Management only.

RFC 6106, IPv6 Router Advertisement Options for DNS Configuration is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6164, Using 127-Bit IPv6 Prefixes on Inter-Router Links is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

8.10 IPsec

RFC 2401, Security Architecture for the Internet Protocol is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only for use with OSPFv3 authentication. Not supported for services.

RFC 2406, IP Encapsulating Security Payload (ESP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
Only for use with OSPFv3 authentication. Not supported for services.

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8.11 IS-IS

draft-ietf-isis-mi-02, IS-IS Multi-Instance is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-isis-segment-routing-extensions-04, IS-IS Extensions for Segment Routing is supported on K12, K30, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

draft-kaplan-isis-ext-eth-02, Extended Ethernet Frame Size Support is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

ISO/IEC 10589:2002, Second Edition, Nov. 2002, Intermediate system to Intermediate system intra-domain routeing information exchange protocol for use in conjunction with the protocol for providing the connectionless-mode Network Service (ISO 8473) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1195, Use of OSI IS-IS for Routing in TCP/IP and Dual Environments is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3359, Reserved Type, Length and Value (TLV) Codepoints in Intermediate System to Intermediate System is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3719, Recommendations for Interoperable Networks using Intermediate System to Intermediate System (IS-IS) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3787, Recommendations for Interoperable IP Networks using Intermediate System to Intermediate System (IS-IS) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4971, Intermediate System to Intermediate System (IS-IS) Extensions for Advertising Router Information is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5120, M-ISIS: Multi Topology (MT) Routing in IS-IS is supported on K12, T(N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 5130, A Policy Control Mechanism in IS-IS Using Administrative Tags is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5301, Dynamic Hostname Exchange Mechanism for IS-IS is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5302, Domain-wide Prefix Distribution with Two-Level IS-IS is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5303, Three-Way Handshake for IS-IS Point-to-Point Adjacencies is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5304, IS-IS Cryptographic Authentication is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5305, IS-IS Extensions for Traffic Engineering TE is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5306, Restart Signaling for IS-IS (Helper Mode) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5308, Routing IPv6 with IS-IS is supported on K12, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

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RFC 5309, Point-to-Point Operation over LAN in Link State Routing Protocols is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5310, IS-IS Generic Cryptographic Authentication is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6232, Purge Originator Identification TLV for IS-IS is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6233, IS-IS Registry Extension for Purges is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-isis-mi-02, IS-IS Multi-Instance is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

Note:
K12, K30 support only a single instance and can operate in multi-instance deployment as it supports the processing of TLVs for multi-instance support.

draft-ietf-isis-segment-routing-extensions-04, IS-IS Extensions for Segment Routing is supported on K12, K30, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

8.12 Management

draft-ieft-snmpv3-update-mib-05, Management Information Base (MIB) for the Simple Network Management Protocol (SNMP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-idr-bgp4-mib-05, Definitions of Managed Objects for the Fourth Version of Border Gateway Protocol (BGP-4) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-isis-wg-mib-06, Management Information Base for Intermediate System to Intermediate System (IS-IS) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-mboned-msdp-mib-01, Multicast Source Discovery protocol MIB is supported on Sx/S-1/10GE

Note:
Only in standalone mode.

draft-ietf-mpls-ldp-mib-07, Definitions of Managed Objects for the Multiprotocol Label Switching, Label Distribution Protocol (LDP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-mpls-lsr-mib-06, Multiprotocol Label Switching (MPLS) Label Switching Router (LSR) Management Information Base Using SMIv2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-mpls-te-mib-04, Multiprotocol Label Switching (MPLS) Traffic Engineering Management Information Base is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-ospf-mib-update-08, OSPF Version 2 Management Information Base is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

ianaaddressfamilynumbers-mib, IANA-ADDRESS-FAMILY-NUMBERS-MIB is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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ianaiftype-mib, IANAifType-MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

ianaiprouteprotocol-mib, IANA-RTPROTO-MIB is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE8021-CFM-MIB, IEEE P802.1ag(TM) CFM MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE8021-PAE-MIB, IEEE 802.1X MIB is supported on D, Dxp, K5, K12, K30, T(A,N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

IEEE8023-LAG-MIB, IEEE 802.3ad MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

LLDP-MIB, IEEE P802.1AB(TM) LLDP MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1157, A Simple Network Management Protocol (SNMP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1215, A Convention for Defining Traps for use with the SNMP is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 1724, RIP Version 2 MIB Extension is supported on Mxp and Sx/S-1/10GE

Note:
Only in standalone mode.

RFC 2021, Remote Network Monitoring Management Information Base Version 2 using SMIv2 is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2138, Remote Authentication Dial In User Service (RADIUS) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2206, RSVP Management Information Base using SMIv2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2213, Integrated Services Management Information Base using SMIv2 is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2571, An Architecture for Describing SNMP Management Frameworks is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2572, Message Processing and Dispatching for the Simple Network Management Protocol (SNMP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2573, SNMP Applications is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2575, View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP) is supported on D, E, Dxp, K5, K12, K30, T(A,N), X, Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2578, Structure of Management Information Version 2 (SMIv2) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2579, Textual Conventions for SMIv2 is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 2787, Definitions of Managed Objects for the Virtual Router Redundancy Protocol is supported on K12, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2819, Remote Network Monitoring Management Information Base is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2856, Textual Conventions for Additional High Capacity Data Types is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2863, The Interfaces Group MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2864, The Inverted Stack Table Extension to the Interfaces Group MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2933, Internet Group Management Protocol MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3014, Notification Log MIB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3164, The BSD syslog Protocol is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3165, Definitions of Managed Objects for the Delegation of Management Scripts is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3231, Definitions of Managed Objects for Scheduling Management Operations is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3273, Remote Network Monitoring Management Information Base for High Capacity Networks is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3414, User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3416. Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3417, Transport Mappings for the Simple Network Management Protocol (SNMP) (SNMP over UDP over IPv4) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3419, Textual Conventions for Transport Addresses is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3584, Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3593, Textual Conventions for MIB Modules Using Performance History Based on 15 Minute Intervals is supported on Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3635, Definitions of Managed Objects for the Ethernet-like Interface Types is supported on D, E, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 3826, The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3877, Alarm Management Information Base (MIB) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4001, Textual Conventions for Internet Network Addresses is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4022, Management Information Base for the Transmission Control Protocol (TCP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4113, Management Information Base for the User Datagram Protocol (UDP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4220, Traffic Engineering Link Management Information Base is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4292, IP Forwarding Table MIB is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4293, Management Information Base for the Internet Protocol (IP) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5101, Specification of the IP Flow Information Export (IPFIX) Protocol for the Exchange of IP Traffic Flow Information is supported on Mxp, Sx/S-1/10GE, and R6

RFC 6241, Network Configuration Protocol (NETCONF) is supported on K5, K12, T(N), Mxp, Sx/S-1/10GE, R6, and R12

RFC 6242, Using the NETCONF Protocol over Secure Shell (SSH) is supported on K5, K12, T(N), Mxp, Sx/S-1/10GE, R6, and R12

8.13 MPLS — General

RFC 3031, Multiprotocol Label Switching Architecture is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3032, MPLS Label Stack Encoding is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3443, Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4182, Removing a Restriction on the use of MPLS Explicit NULL is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5332, MPLS Multicast Encapsulations is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

8.14 MPLS — GMPLS

draft-ietf-ccamp-rsvp-te-srlg-collect-04, RSVP-TE Extensions for Collecting SRLG Information is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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8.15 MPLS — LDP

draft-ietf-mpls-ldp-ipv6-15, Updates to LDP for IPv6 is supported on Mxp

draft-pdutta-mpls-ldp-adj-capability-00, LDP Adjacency Capabilities is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-pdutta-mpls-ldp-v2-00, LDP Version 2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-pdutta-mpls-tldp-hello-reduce-04, Targeted LDP Hello Reduction is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3037, LDP Applicability is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3478, Graceful Restart Mechanism for Label Distribution Protocol (Helper Mode) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5036, LDP Specification is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5283, LDP Extension for Inter-Area Label Switched Paths (LSPs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5443, LDP IGP Synchronization is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5561, LDP Capabilities is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6388, Label Distribution Protocol Extensions for Point-to-Multipoint and Multipoint-to-Multipoint Label Switched Paths is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

Note:
P2MP LSPs only.

8.16 MPLS — MPLS-TP

RFC 5586, MPLS Generic Associated Channel is supported on T(N), R6, and R12

RFC 5921, A Framework for MPLS in Transport Networks is supported on T(N), R6, and R12

RFC 5960, MPLS Transport Profile Data Plane Architecture is supported on T(N), R6, and R12

RFC 6370, MPLS Transport Profile (MPLS-TP) Identifiers is supported on T(N), R6, and R12

RFC 6378, MPLS Transport Profile (MPLS-TP) Linear Protection is supported on T(N), R6, and R12

RFC 6426, MPLS On-Demand Connectivity and Route Tracing is supported on T(N), R6, and R12

RFC 6428, Proactive Connectivity Verification, Continuity Check and Remote Defect indication for MPLS Transport Profile is supported on T(N), R6, and R12

RFC 6478, Pseudowire Status for Static Pseudowires is supported on T(N), R6, and R12

RFC 7213, MPLS Transport Profile (MPLS-TP) Next-Hop Ethernet Addressing is supported on T(N), R6, and R12

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8.17 MPLS — OAM

RFC 6424, Mechanism for Performing Label Switched Path Ping (LSP Ping) over MPLS Tunnels is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6425, Detecting Data Plane Failures in Point-to-Multipoint Multiprotocol Label Switching (MPLS) - Extensions to LSP Ping is supported on T(N), Mxp, R6, and R12

8.18 MPLS — RSVP-TE

RFC 2702, Requirements for Traffic Engineering over MPLS is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2747, RSVP Cryptographic Authentication is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2961, RSVP Refresh Overhead Reduction Extensions is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3097, RSVP Cryptographic Authentication -- Updated Message Type Value is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3209, RSVP-TE: Extensions to RSVP for LSP Tunnels is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3477, Signalling Unnumbered Links in Resource ReSerVation Protocol - Traffic Engineering (RSVP-TE) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4090, Fast Reroute Extensions to RSVP-TE for LSP Tunnels is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4561, Definition of a Record Route Object (RRO) Node-Id Sub-Object is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4875, Extensions to Resource Reservation Protocol - Traffic Engineering (RSVP-TE) for Point-to-Multipoint TE Label Switched Paths (LSPs) is supported on T(N), Mxp, Sx/S-1/10GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4950, ICMP Extensions for Multiprotocol Label Switching is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5817, Graceful Shutdown in MPLS and Generalized MPLS Traffic Engineering Networks is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

8.19 OSPF

draft-ietf-ospf-prefix-link-attr-06, OSPFv2 Prefix/Link Attribute Advertisement is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-ospf-segment-routing-extensions-04, OSPF Extensions for Segment Routing is supported on K12, K30, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 1765, OSPF Database Overflow is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 2328, OSPF Version 2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3101, The OSPF Not-So-Stubby Area (NSSA) Option is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3509, Alternative Implementations of OSPF Area Border Routers is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3623, Graceful OSPF Restart Graceful OSPF Restart (Helper Mode) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3630, Traffic Engineering (TE) Extensions to OSPF Version 2 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4222, Prioritized Treatment of Specific OSPF Version 2 Packets and Congestion Avoidance is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4552, Authentication/Confidentiality for OSPFv3 is supported on K12, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4576, Using a Link State Advertisement (LSA) Options Bit to Prevent Looping in BGP/MPLS IP Virtual Private Networks (VPNs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4577, OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 4970, Extensions to OSPF for Advertising Optional Router Capabilities is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5185, OSPF Multi-Area Adjacency is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5187, OSPFv3 Graceful Restart (Helper Mode) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

RFC 5243, OSPF Database Exchange Summary List Optimization is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5250, The OSPF Opaque LSA Option is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5309, Point-to-Point Operation over LAN in Link State Routing Protocols is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5340, OSPF for IPv6 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5838, Support of Address Families in OSPFv3 is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6987, OSPF Stub Router Advertisement is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

draft-ietf-ospf-prefix-link-attr-06, OSPFv2 Prefix/Link Attribute Advertisement is supported on K12, K30, Mxp, Sx/S-1/10GE, R6, and R12

draft-ietf-ospf-segment-routing-extensions-04, OSPF Extensions for Segment Routing is supported on K12, K30, Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

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8.20 Pseudowire

draft-ietf-l2vpn-vpws-iw-oam-04, OAM Procedures for VPWS Interworking is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3916, Requirements for Pseudo- Wire Emulation Edge-to-Edge (PWE3) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3985, Pseudo Wire Emulation Edge-to-Edge (PWE3) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4385, Pseudo Wire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4446, IANA Allocations for Pseudowire Edge to Edge Emulation (PWE3) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4447, Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 4448, Encapsulation Methods for Transport of Ethernet over MPLS Networks is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5659, An Architecture for Multi-Segment Pseudowire Emulation Edge-to-Edge is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6073, Segmented Pseudowire is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6310, Pseudowire (PW) Operations, Administration, and Maintenance (OAM) Message Mapping is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6391, Flow-Aware Transport of Pseudowires over an MPLS Packet Switched Network is supported on K12, K30, Mxp, R6, and R12

RFC 6718, Pseudowire Redundancy is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6870, Pseudowire Preferential Forwarding Status bit is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 7023, MPLS and Ethernet Operations, Administration, and Maintenance (OAM) Interworking is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 7267, Dynamic Placement of Multi-Segment Pseudowires is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

8.21 Quality of Service

RFC 2430, A Provider Architecture for Differentiated Services and Traffic Engineering (PASTE) is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 2474, Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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RFC 2598, An Expedited Forwarding PHB is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3140, Per Hop Behavior Identification Codes is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 3260, New Terminology and Clarifications for Diffserv is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

8.22 RIP

RFC 1058, Routing Information Protocol is supported on Mxp and Sx/S-1/10GE

Note:
Only in standalone mode.

RFC 2082, RIP-2 MD5 Authentication is supported on Mxp and Sx/S-1/10GE

Note:
Only in standalone mode.

RFC 2453, RIP Version 2 is supported on Mxp and Sx/S-1/10GE

Note:
Only in standalone mode.

8.23 Timing

GR-1244-CORE, Clocks for the Synchronized Network: Common Generic Criteria, Issue 3, May 2005 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

GR-253-CORE, SONET Transport Systems: Common Generic Criteria. Issue 3, September 2000 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

IEEE 1588-2008, IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, IEEE default profile is supported only includes the Dxp-12p ETR, Dxp-16p, Dxp-24p. Sx-10/100GE does not support IEEE default profile.

ITU-T G.781, Synchronization layer functions, issued 09/2008 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

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Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

ITU-T G.813, Timing characteristics of SDH equipment slave clocks (SEC), issued 03/2003 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

ITU-T G.8261, Timing and synchronization aspects in packet networks, issued 04/2008 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

ITU-T G.8262, Timing characteristics of synchronous Ethernet equipment slave clock (EEC), issued 08/2007 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

ITU-T G.8264, Distribution of timing information through packet networks, issued 10/2008 is supported on D-ETR, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, R6, and R12

Note:
For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, and Dxp-24p.

ITU-T G.8265.1, Precision time protocol telecom profile for frequency synchronization, issued 10/2010 is supported on D-ETR, K5, K12, K30, T(A,N), Mxp, Sx-1/10GE, R6, and R12

ITU-T G.8275.1, Precision time protocol telecom profile for phase/time synchronization with full timing support from the network, issued 07/2014 is supported on Dxp, K12, K30, T(A,N), Mxp, Sx-1/10GE, Sx-10/100GE, R6, and R12

Note:
For 7210 SAS-Sx 10/100GE, the support only includes the Sx 10/100GE QSFP28 variant. For Dxp, the support only includes the Dxp-12p ETR, Dxp-16p, Dxp-24p.

IEC/IEEE 61850-9-3-2016, Communication networks and systems for power utility automation - Part 9-3: Precision time protocol profile for power utility automation is supported on Dxp-16p and Dxp-24p

IEEE C37.238-2017 - IEEE Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Applications is supported on Dxp-16p and Dxp-24p

RFC 5905, Network Time Protocol Version 4: Protocol and Algorithms Specification is supported on D, Dxp, K5, K12, K30, T(A,N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

8.24 VPLS

RFC 4761, Virtual Private LAN Service (VPLS) Using BGP for Auto-Discovery and Signaling is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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Note:
On 7210 platforms, only BGP-AD is supported with TLDP signalling for PW. No BGP signalling is supported for PW establishment.

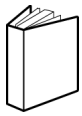
RFC 4762, Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 5501, Requirements for Multicast Support in Virtual Private LAN Services is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

RFC 6074, Provisioning, Auto-Discovery, and Signaling in Layer 2 Virtual Private Networks (L2VPNs) is supported on K12, K30, T(N), Mxp, Sx/S-1/10GE, Sx-10/100GE, Sx/S-1/10GE-VC, R6, and R12

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