Alcatel-Lucent

Service Router | Release 12.0 R4

7750 SR-OS Basic System Configuration Guide

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Preface

About This Guide

This guide describes system concepts and provides configuration explanations and examples to configure SR-OS boot option file (BOF), file system and system management functions.

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

Audience

This manual is intended for network administrators who are responsible for configuring the 7750 SR-Seriesrouters. It is assumed that the network administrators have an understanding of networking principles and configurations. Protocols, standards, and processes described in this manual include the following:

- CLI concepts
- File system concepts
- Boot option, configuration, image loading, and initialization procedures
- Basic system management functions such as the system name, router location and coordinates, and CLLI code, time zones, Network Time Protocol (NTP), Simple Network Time Protocol (SNTP), and synchronization properties

List of Technical Publications

The 7750 SR documentation set is composed of the following books:

- 7750 SR OS Basic System Configuration Guide

  This guide describes basic system configurations and operations.

- 7750 SR OS System Management Guide

  This guide describes system security and access configurations as well as event logging and accounting logs.

- 7750 SR OS Interface Configuration Guide

  This guide describes card, Media Dependent Adapter (MDA) and port provisioning.

- 7750 SR OS Router Configuration Guide

  This guide describes logical IP routing interfaces and associated attributes such as an IP address, as well as IP and MAC-based filtering, and VRRP and Cflowd.

- 7750 SR OS Routing Protocols Guide

  This guide provides an overview of routing concepts and provides configuration examples for RIP, OSPF, IS-IS, BGP, and route policies.

- 7750 SR OS MPLS Guide

  This guide describes how to configure Multiprotocol Label Switching (MPLS) and Label Distribution Protocol (LDP).

- 7750 SR OS Services Guide

  This guide describes how to configure service parameters such as service distribution points (SDPs), customer information, and user services.

- 7750 SR OAM and Diagnostic Guide
- This guide describes how to configure features such as service mirroring and Operations, Administration and Management (OAM) tools.

- 7750 SR OS Triple Play Guide

  This guide describes Triple Play services and support provided by the 7750 SR and presents examples to configure and implement various protocols and services.

- 7750 SR OS Quality of Service Guide

  This guide describes how to configure Quality of Service (QoS) policy management.

- OS Multi-Service ISA Guide

  This guide describes services provided by integrated service adapters such as Application Assurance, IPSec, ad insertion (ADI) and Network Address Translation (NAT).

- 7750 SR OS RADIUS Attributes Reference Guide

This guide describes all supported RADIUS Authentication, Authorization and Accounting attributes.

- 7750 SR OS Gx AVPs Reference Guide
  This guide describes Gx Attribute Value Pairs (AVP).

Technical Support

If you purchased a service agreement for your 7750 SR router and related products from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance. If you purchased an Alcatel-Lucent service agreement, contact your welcome center:

http://www.alcatel-lucent.com/wps/portal/support

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Include document name, version, part number and page(s) affected.

Getting Started

In This Chapter

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.

Alcatel-Lucent 7750 SR-Series System Configuration Process

Table 1 lists the tasks necessary to configure boot option files (BOF) and system and file management functions. Each chapter in this book is presented in an overall logical configuration flow. Each section describes a software area and provides CLI syntax and command usage to configure parameters for a functional area. After the hardware installation has been properly completed, proceed with the 7750 SR-Series router configuration tasks in the following order:

Table 1: Configuration Process

Area	Task	Chapter
CLI Usage	The CLI structure	CLI Usage on page 19
	Basic CLI commands	Basic CLI Commands on page 24
	Configure environment commands	CLI Environment Commands on page 27
	Configure monitor commands	CLI Monitor Commands on page 28
Operational functions	Directory and file management	File System Management on page 167

Table 1: Configuration Process

Area	Task	Chapter (Continued)
Boot options	Configure boot option files (BOF)	Boot Options on page 193
System configuration	Configure system functions, including host name, address, domain name, and time parameters.	System Management on page 241
Reference	List of IEEE, IETF, and other proprietary entities.	Standards and Protocol Support on page 573

Note: In SR OS 12.0.R4 any function that displays an IPv6 address or prefix changes to reflect rules described in RFC 5952, *A Recommendation for IPv6 Address Text Representation*. Specifically, hexadecimal letters in IPv6 addresses are now represented in lowercase, and the correct compression of all leading zeros is displayed. This changes visible display output compared to previous SR OS releases. Previous SR OS behavior can cause issues with operator scripts that use standard IPv6 address expressions and with libraries that have standard IPv6 parsing as per RFC 5952 rules. See the section on IPv6 Addresses in the Router Configuration Guide for more information.

CLI Usage

In This Chapter

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

Topics in this chapter include:

CLI Structure

Alcatel-Lucent's SR 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 SR OS routers.

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

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

Figure 1 and Figure 2 display the major contexts for router configuration.

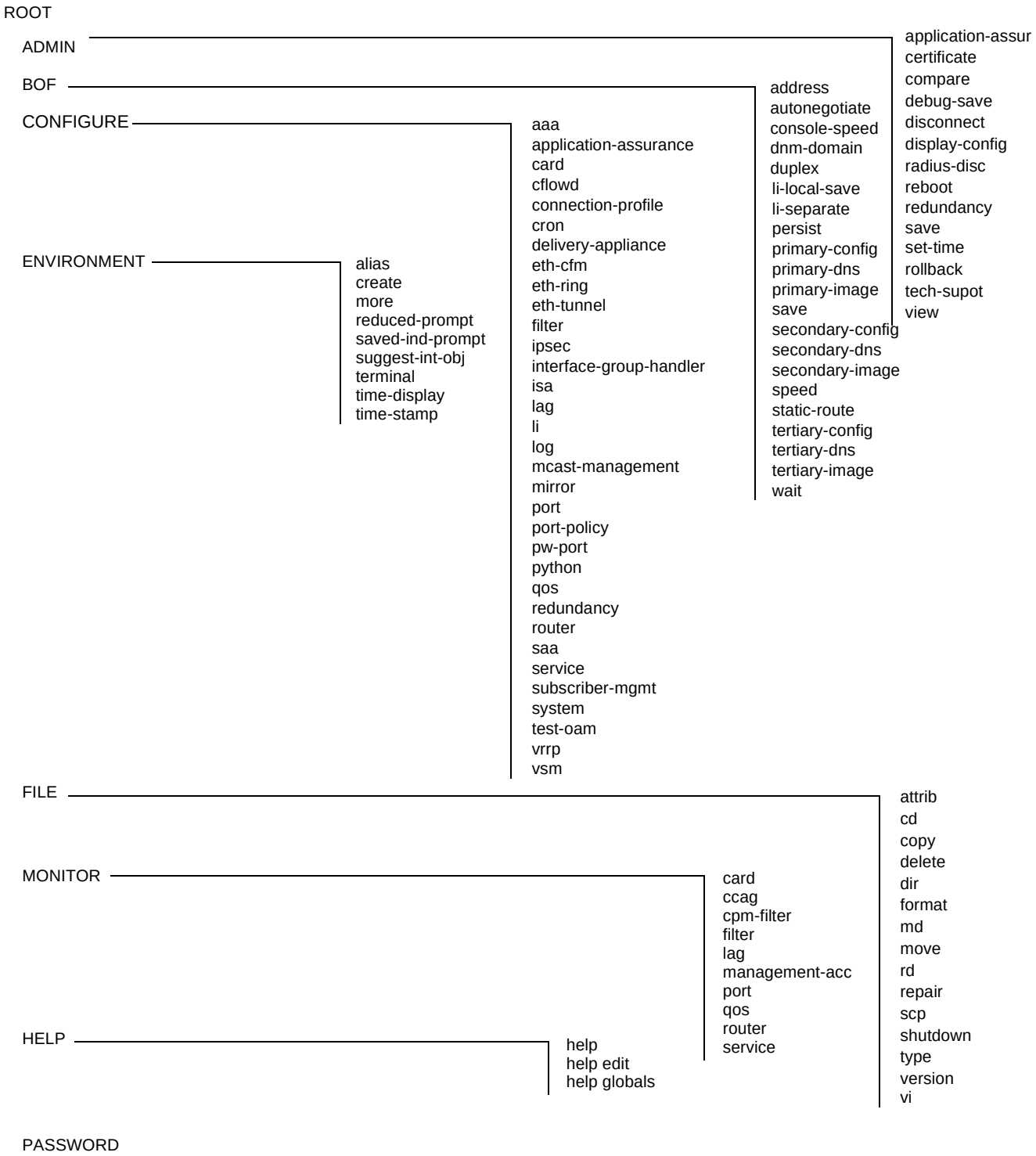


Figure 1: Root Commands

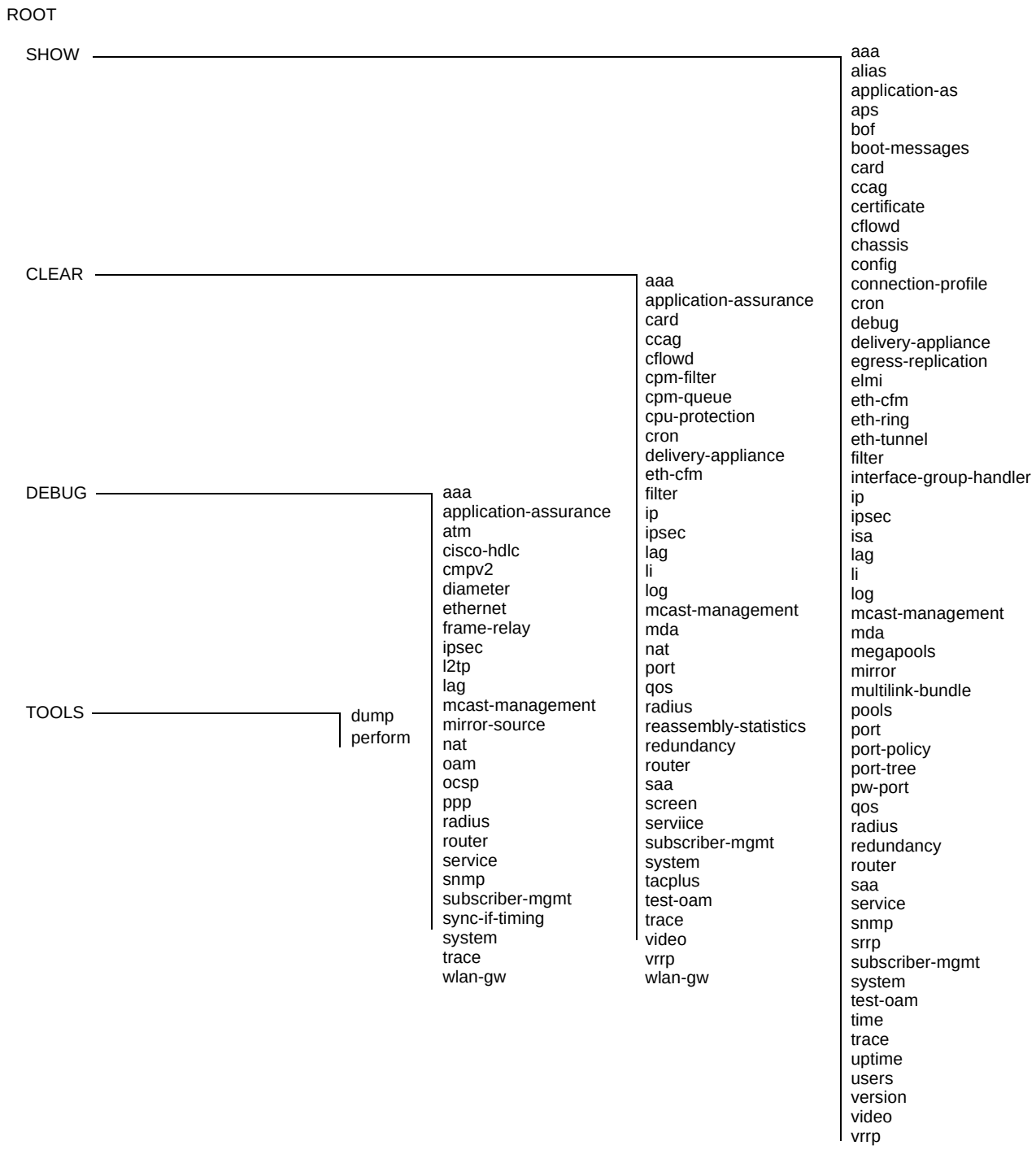


Figure 2: Operational Root Commands

Navigating in the CLI

The following sections describe additional navigational and syntax information.

CLI Contexts

Use the CLI to access, configure, and manage Alcatel-Lucent's SR OS routers. CLI commands are entered at the command line prompt. Access to specific CLI commands is controlled by the permissions set by your system administrator. Entering a CLI command makes navigation possible from one command context (or level) to another.

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

```
A:ALA-12# config
A:ALA-12>config#
```

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

The following example shows two methods to navigate to a service SDP ingress level:
Method 1:

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

Method 2:

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

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

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

Basic CLI Commands

The console control commands are the commands that are used for navigating within the CLI and displaying information about the console session. Most of these commands are implemented as global commands. They can be entered at any level in the CLI hierarchy with the exception of the `password` command which must be entered at the ROOT level. The console control commands are listed in Table 2.

Table 2: Console Control Commands

Command	Description	Page
`<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.	76
`clear`	Clears statistics for a specified entity or clears and resets the entity.	76
`echo`	Echos the text that is typed in. Primary use is to display messages to the screen within an `exec` file.	77
`exec`	Executes the contents of a text file as if they were CLI commands entered at the console.	77
`exit`	Returns the user to the previous higher context.	77
`exit all`	Returns the user to the ROOT context.	78
`help` `?`	Displays help in the CLI.	79
`history`	Displays a list of the most recently entered commands.	80
`info`	Displays the running configuration for a configuration context.	81
`logout`	Terminates the CLI session.	83
`oam`	Provides OAM test suite options. See the OAM section of the SR OS OAM and Diagnostic Guide.	
`password`	Changes the user CLI login password. The password can only be changed at the ROOT level.	85
`ping`	Verifies the reachability of a remote host.	86
`pwc`	Displays the present or previous working context of the CLI session.	88

Table 2: Console Control Commands (Continued)

Command	Description	Page
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.	88
ssh	Opens a secure shell connection to a host.	89
telnet	Telnet to a host.	89
traceroute	Determines the route to a destination address.	90
tree	Displays a list of all commands at the current level and all sublevels.	91
write	Sends a console message to a specific user or to all users with active console sessions.	91

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

```
*A:ALA-12>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
      mrinfo           - Request multicast router information
      mstat            - Trace multicast path from a source to a receiver and
                         display multicast packet rate and loss information
      mtrace           - Trace multicast path from a source to a receiver
      oam              + OAM Test Suite
      ping             - Verify the reachability of a remote host
      pwc              - Show the present working context
      sleep            - Sleep for specified number of seconds
      ssh              - SSH to a host
      telnet           - Telnet to a host
      traceroute       - Determine the route to a destination address
      tree             - Display command tree structure from the context of
                         execution
      write            - Write text to another user
*A:ALA-12>config>service#
```

Table 3 lists describes command syntax symbols.

Table 3: Command Syntax Symbols

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

CLI Environment Commands

The CLI **environment** commands are found in the **root>environment** context of the CLI tree and controls session preferences for a single CLI session. The CLI **environment** commands are listed in Table 4.

Table 4: CLI Environment Commands

Command	Description	Page
`alias`	Enables the substitution of a command line by an alias.	92
`create`	Enables or disables the use of a create parameter check.	92
`more`	Configures whether CLI output should be displayed one screen at a time awaiting user input to continue.	92
`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.	93
`saved-ind-prompt`	Saves the indicator in the prompt.	93
`suggest-internal-objects`	Enables the suggestion of internally created objects while auto completing.	93
`terminal`	Configures the terminal screen length for the current CLI session.	94
`time-display`	Specifies whether time should be displayed in local time or UTC.	94

CLI Monitor Commands

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

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

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

The CLI monitor command contexts are listed in Table 5.

Table 5: CLI Monitor Command Contexts

Command	Description	Page
card	Enables monitoring of ingress FP queue groups.	113
`ccag`	Enables CCAG port monitoring for traffic statistics.	97
`cpm-filter`	Monitor command output for CPM filters.	97
`filter`	Enables IP and MAC filter monitoring at a configurable interval until that count is reached.	99
`lag`	Enables Link Aggregation Group (LAG) monitoring to display statistics for individual port members and the LAG.	104
`management-access-filter`	Enables management access filter monitoring.	105
`port`	Enables port traffic monitoring. The specified port(s) statistical information displays at the configured interval until the configured count is reached.	107
`qos`	Enables arbiter and scheduler statistics monitoring.	111
`router`	Enables virtual router instance monitoring at a configurable interval until that count is reached.	122
`service`	Monitors commands for a particular service.	147

Getting Help in the CLI

The **help** system commands and the **?** key display different types of help in the CLI. Table 6 lists the different help commands.

Table 6: Online Help Commands

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

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

The following example displays a partial list of the **tree** and **tree detail** command output entered for the router node.

```
*A:cses-E11>config# tree
...
+---router
|   +---aggregate
|   +---allow-icmp-redirect
|   +---allow-icmp6-redirect
|   +---autonomous-system
|   +---bfd
|   |   +---abort
|   |   +---begin
|   |   +---bfd-template
|   |   |   +---echo-receive
|   |   |   +---multiplier
|   |   |   +---receive-interval
|   |   |   +---transmit-interval
|   |   |   +---type
|   |   +---commit
|   +---bgp
|   |   +---add-paths
|   |   |   +---ipv4
|   |   |   +---ipv6
|   |   |   +---vpn-ipv4
|   |   |   +---vpn-ipv6
|   |   +---advertise-external
|   |   +---advertise-inactive
|   |   +---aggregator-id-zero
|   |   +---auth-keychain
|   |   +---authentication-key
|   |   +---backup-path
|   |   +---best-path-selection
|   |   |   +---always-compare-med
|   |   |   +---as-path-ignore
|   |   |   +---deterministic-med
|   |   |   +---ignore-nh-metric
|   |   |   +---ignore-router-id
|   |   +---bfd-enable
|   |   +---cluster
...
```

```
*A:cses-E11>config# tree detail
...
+---router [<router-name>]
|   +---no aggregate <ip-prefix/ip-prefix-length>
|   |   aggregate <ip-prefix/ip-prefix-length> [summary-only] [as-set]
[aggregator <as-number:ip-address>] [black-hole [generate-icmp]]
[community <comm-id>]
|   |   aggregate <ip-prefix/ip-prefix-length> [summary-only] [as-set]
[aggregator <as-number:ip-address>] [community <comm-id>] [in-
direct <ip-address>]
|   +---allow-icmp-redirect
|   |   no allow-icmp-redirect
|   +---allow-icmp6-redirect
|   |   no allow-icmp6-redirect
|   +---autonomous-system <autonomous-system>
|   |   no autonomous-system
|   +---bfd
|   |   +---abort
|   |   +---begin
|   |   +---bfd-template <[32 chars max]>
|   |   |   no bfd-template <[32 chars max]>
|   |   |   +---echo-receive <milli-seconds>
|   |   |   |   no echo-receive
|   |   |   +---multiplier <[3..20]>
|   |   |   |   no multiplier
|   |   |   +---no receive-interval
|   |   |   |   receive-interval <milli-seconds>
|   |   |   +---no transmit-interval
|   |   |   |   transmit-interval <milli-seconds>
|   |   |   +---no type
|   |   |   |   type {cpm-np}
|   |   +---commit
|   +---bgp
|   |   no bgp
|   |   +---add-paths
|   |   |   no add-paths
|   |   |   +---ipv4 send <send-limit>
|   |   |   |   ipv4 send <send-limit> receive [none]
|   |   |   |   no ipv4
|   |   |   +---no ipv6
|   |   |   |   ipv6 send <send-limit>
|   |   |   |   ipv6 send <send-limit> receive [none]
|   |   |   +---no vpn-ipv4
|   |   |   |   vpn-ipv4 send <send-limit>
|   |   |   |   vpn-ipv4 send <send-limit> receive [none]
|   |   |   +---no vpn-ipv6
|   |   |   |   vpn-ipv6 send <send-limit>
|   |   |   |   vpn-ipv6 send <send-limit> receive [none]
|   |   +---advertise-external [ipv4] [ipv6]
|   |   |   no advertise-external [ipv4] [ipv6]
|   |   +---advertise-inactive
|   |   |   no advertise-inactive
|   |   +---aggregator-id-zero
|   |   |   no aggregator-id-zero
|   |   +---auth-keychain <name>
|       |       +---authentication-key   <authentication-key|hash-key>
[hash|hash2]
...
```

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.

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

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

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

When changes are made to the configuration file a "*" appears in the prompt string (*A:ALA-1) indicating that the changes have not been saved. When an admin save command is executed the "*" disappears. This behavior is controlled in the **saved-ind-prompt** command in the **environment** context.

Displaying Configuration Contexts

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

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


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

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.

Entering CLI Commands

Command Completion

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

Unordered Parameters

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

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

```
*A:ALA-12>config>router# static-route ?
- [no] static-route {<ip-prefix/mask>|<ip-prefix> <netmask>} [preference <preference>]
    [metric <metric>] [tag <tag>] [enable|disable] next-hop <ip-address|ip-int-name>
  - [no] static-route {<ip-prefix/mask>|<ip-prefix> <netmask>} [preference <preference>]
    [metric <metric>] [tag <tag>] [enable|disable] indirect <ip-address> [ldp
    [disallow-igp]]
  - [no] static-route {<ip-prefix/mask>|<ip-prefix> <netmask>} [preference <preference>]
    [metric <metric>] [tag <tag>] [enable|disable] black-hole
*A:ALA-12>config>router# static-route preference 1 10.1.0.0/16 metric
```

Editing Keystrokes

When entering a command, special keystrokes allow for editing of the command. Table 7 lists the command editing keystrokes.

Table 7: Command Editing Keystrokes

Editing Action	Keystrokes
Delete current character	<Ctrl-d>
Delete text up to cursor	<Ctrl-u>
Delete text after cursor	<Ctrl-k>
Move to beginning of line	<Ctrl-a>
Move to end of line	<Ctrl-e>
Get prior command from history	<Ctrl-p>
Get next command from history	<Ctrl-n>
Move cursor left	<Ctrl-b>
Move cursor right	<Ctrl-f>
Move back one word	<Esc><b>
Move forward one word	<Esc><f>
Convert rest of word to uppercase	<Esc><c>
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>

Absolute Paths

CLI commands can be executed in any context by specifying the full path from the CLI root. To execute an out-of-context command enter a forward slash "/" or backward slash "\" at the beginning of the command line. The forward slash "/" or backward slash "\" cannot be used with the **environment alias** command.The commands are interpreted as absolute path. Spaces between the slash and the first command will return an error. Commands that are already global (such as ping, telnet, exit, back, etc.) 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 or not it is a leaf command. This is the same behavior the CLI performs when CLI commands are entered individually, for example:

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

or

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

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

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

CLI Syntax: `config>service>ies> /clear card 1`

behaves the same as the following series of commands.

Example:
```
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:

CLI Syntax: `config>service>ies>/configure service ies 5 create`

becomes

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

History

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

```
*A:ALA-1# history
   1 environment terminal length 48
   2 environment no create
   3 show version
   4 configure port 1/1/1
   5 info
   6 \configure router isis
   7 \port 1/1/2
   8 con port 1/1/2
   9 \con port 1/1/2
  10 \configure router bgp
  11 info
  12 \configure system login-control
  13 info
  14 history
  15 show version
  16 history
*A:ALA-1# !3
```

Entering Numerical Ranges

The SR OS 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.

Specifying a range in the CLI does have limitations. These limitations are summarized in Table 8.

Table 8: 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.

Table 8: CLI Range Use Limitations (Continued)

Limitation	Description
The range cannot cause a change in contexts.	Commands should be formed in such a way that there is no context change upon command completion. For example, `configure port 1/1/[1..10]` will attempt to change ten different contexts. When a range is specified in the CLI, the commands are executed in a loop. On the first loop execution, the command changes contexts, but the new context is no longer valid for the second iteration of the range loop. A “Bad Command” error is reported and the command aborts.
Command completion may cease to work when entering a range.	After entering a range in a CLI command, command and key completion, which normally occurs by pressing the <Tab> or spacebar, may cease to work. If the command line entered is correct and unambiguous, the command works properly; otherwise, an error is returned.

Pipe/Match

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

Note: When using the pipe/match command the variables and attributes must be spelled correctly. The attributes following the command and must come before the expression/pattern. The following 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” > cf1:\test\echo_list.txt
- Task: Display all the lines that do not include “echo”:

  admin display-config | match invert-match “echo”
- Task: Display the first match of “vpls” in the configuration file:

  admin display-config | match max-count 1 “vpls”
- Task: Display everything in the configuration after finding the first instance of “interface”:

  admin display-config | match post-lines 999999 interface
- Task: Display a count of the total number of lines of output instead of displaying the output itself.

  admin display-config | match interface | count

Command syntax:

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

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

where:

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

For example:

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


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



A:Dut-C# admin display-config | match post-lines 5 max-count 2 expression "OSPF.*Config"
echo "OSPFv2 Configuration"
#--------------------------------------------------
        ospf
            timers
                spf-wait 1000 1000 1000
            exit
echo "OSPFv2 (Inst: 1) Configuration"
#--------------------------------------------------
        ospf 1
            asbr
            router-id 1.0.0.1
            export "testall"
*A:Dut# admin display-config | match debug_mirror
            profile "debug_mirror"


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


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


*A:Dut# show log event-control | match ignore-case pre-lines 10 SyncStatus
L  2016 tmnxLogOnlyEventThrottled        MA  gen          0           0
MCPATH:
   2001 tmnxMcPathSrcGrpBlkHole          MI  gen          0           0
   2002 tmnxMcPathSrcGrpBlkHoleClear     MI  gen          0           0
   2003 tmnxMcPathAvailBwLimitReached    MI  gen          0           0
   2004 tmnxMcPathAvailBwValWithinRange  MI  gen          0           0
MC_REDUNDANCY:
   2001 tmnxMcRedundancyPeerStateChanged WA  gen          0           0
   2002 tmnxMcRedundancyMismatchDetected WA  gen          0           0
   2003 tmnxMcRedundancyMismatchResolved WA  gen          0           0
   2004 tmnxMcPeerSyncStatusChanged      WA  gen          0           0
```

Table 9 describes regular expression symbols and interpretation (similar to what is used for route policy regexp matching). Table 10 describes special characters.

Table 9: Regular Expression Symbols

String	Description
.	Matches any single character.
[ ]	Matches a single character that is contained within the brackets. [abc] matches “a”, “b”, or “c”. [a-z] matches any lowercase letter. [A-Z] matches any uppercase letter. [0-9] matches any number.
[^]	Matches a single character that is not contained within the brackets. [^abc] matches any character other than “a”, “b”, or “c”. [^a-z] matches any single character that is not a lowercase letter.
^	Matches the start of the line (or any line, when applied in multiline mode)
$	Matches the end of the line (or any line, when applied in multiline mode)
()	Define a “marked subexpression”. Every matched instance will be available to the next command as a variable.
*	A single character expression followed by “*” matches zero or more copies of the expression.
{m,n}	Matches least m and at most n repetitions of the term
{m}	Matches exactly m repetitions of the term
{m,}	Matches m or more repetitions of the term
?	The preceding item is optional and matched at most once.
+	The preceding item is matched one or more times.
-	Used between start and end of a range.
\	An escape character to indicate that the following character is a match criteria and not a grouping delimiter.
>	Redirect output

Table 10: Special Characters

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

Table 10: Special Characters (Continued)

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

Pipe/Count

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

For example:

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

===============================================================================
Services [vprn]
===============================================================================
ServiceId    Type      Adm  Opr  CustomerId Service Name
-------------------------------------------------------------------------------
1            VPRN      Down Down 1
44           VPRN      Up   Up   1
100          VPRN      Down Down 1
102          VPRN      Up   Up   1
235          VPRN      Down Down 1
1000         VPRN      Down Down 1000
-------------------------------------------------------------------------------
Matching Services : 6
-------------------------------------------------------------------------------
===============================================================================
*A:dut-c# show service service-using vprn | match Down | count
Count: 4 lines
*A:dut-c#
```

Redirection

The SR OS upports 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.alcatel.com/ping/result.txt’
```

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

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

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

VI Editor

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

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

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

When opening a file, a resource check verifies that sufficient resources are available to process that file. If there are not enough resources, then the operation is denied and the operator is informed of that event.

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

Summary of vi Commands

The `vi` editor operates in two modes:

- Command mode — This mode causes actions to be taken on the file.

  In the this mode, each character entered is a command that does something to the text file being edited; a character typed in the command mode may even cause the `vi` editor to enter the insert mode.

- Insert mode — Entered text is inserted into the file.

  In the insert mode, every character typed is added to the text in the file. Hitting the `Esc` (Escape) key turns off the insert mode.

Using the vi Commands

Use the following commands to start and end **vi** edit sessions, move around in a file, enter new text, modify, move, and delete old text, as well as read from and write to files other files. Although there are numerous **vi** commands, only a few are usually sufficient to vi users. The following tables list **vi** commands.

Table 11: Cutting and Pasting/Deleting Text in vi

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

Table 12: Inserting New Text

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

Table 13: Moving the Cursor Within the File

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

Table 13: Moving the Cursor Within the File

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

Table 14: Moving the Cursor Around the Screen

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

Table 15: Replacing Text

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

Table 16: Searching for Text or Characters

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

Table 16: Searching for Text or Characters (Continued)

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

Table 17: Manipulating Character/Line Formatting

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

Table 18: Saving and Quitting

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

Table 19: Miscellaneous

vi Command	Description
^G	Show the current filename and the status.
^L	Clear and redraw the screen.
^R	Redraw the screen removing false lines.
^[	Escape key. Cancels partially formed command.
^^	Go back to the last file edited.
!	Execute a shell. Not supported

Table 19: Miscellaneous (Continued)

vi Command	Description (Continued)
&	Repeat the previous `:s` command.
.	Repeat the last command that modified the file.
:	Begin typing an EX editor command. The command is executed once the user types return.
@	Type the command stored in the specified buffer.
U	Restore the current line to the previous state before the cursor entered the line.
m	Mark the current position with the character specified after the 'm' command.
u	Undo the last change to the file. Typing 'u' again will re-do the change.

EX Commands

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

Table 20: EX commands

vi Command	Description
:ab string strings	Abbreviation. If a word is typed in vi corresponding to string1, the editor automatically inserts the corresponding words. For example, the abbreviation :ab usa United States of America would insert the words, United States of America whenever the word usa is typed in.
:map keys new_seq	Mapping. This lets you map a key or a sequence of keys to another key or a sequence of keys.
:q	Quit vi. If there have been changes made, the editor will issue a warning message.
:q!	Quit vi without saving changes.
:s/pattern/ to_pattern/ options	Substitute. This substitutes the specified pattern with the string in the to_pattern. Without options, it only substitutes the first occurrence of the pattern. If a 'g' is specified, then all occurrences are substituted. For example, the command :1,$s/Alcatel/Alcatel-Lucent/g substitutes all occurrences of Alcatel to Alcatel-Lucent.
:set [all]	Sets some customizing options to vi and EX. The :set all command gives all the possible options.
:una string	Removes the abbreviation previously defined by :ab.
:unm keys	Removes the remove mapping defined by :map.
:vi filename	Starts editing a new file. If changes have not been saved, the editor will give you a warning.
:w	Write out the current file.
:w filename	Write the buffer to the filename specified.
:w >> filename	Append the contents of the buffer to the filename.
:wq	Write the buffer and quit.

Configuration Rollback

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

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

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

The advantage of this feature are the following:

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

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

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

A history of changes is preserved (checkpoint ids) that allows rollback to different points, as well as examination of changes made as shown in Figure 3.

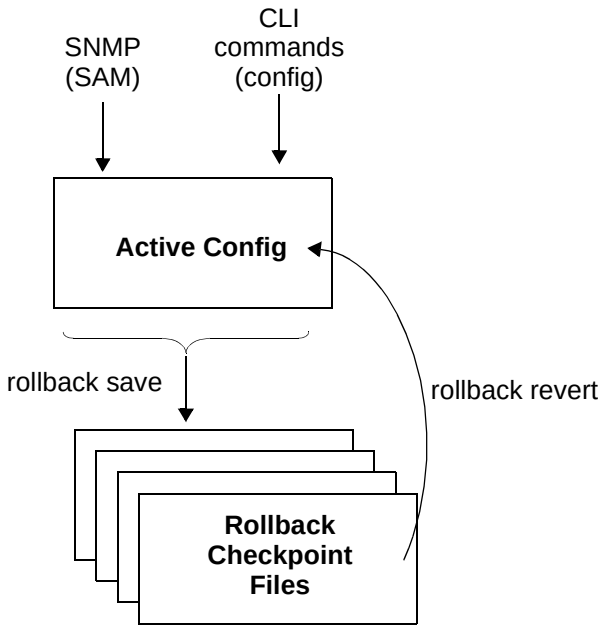


Figure 3: Rollback Operation

Feature Behavior

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

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

```
admin>rollback# save [comment <comment-string>]
comment-string: an 255 char comment associated with the checkpoint
```

- Rollback checkpoints include all current operationally active configuration:
  - Changes from direct CLI commands in the configuration branch.
  - SNMP sets
- Rollback checkpoints do not include bof configurations. The BOF file (and bof config) is not part of a rollback-save or rollback. A rollback does not change any of the bof configuration. The BOF contains basic information for the node and does not change frequently (mostly during initial commissioning of the node).
- A rollback save feature can be automatically executed (scheduled, for example, monthly) using the cron facility of SR-OS.
- The latest rollback checkpoint file uses a suffix of ".rb". The next latest rollback checkpoint file has a suffix of ".rb.1", the next oldest has a suffix of "rb.2" etc:

```
file-url.rb    <--- latest rollback file
file-url.rb.1
…
file-url.rb.9  <--- oldest rollback file
```

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

```
config>system>rollback# rollback-location <file-url>
```

- There is no default rollback-location. If one is not specified (or it is cleared using "no rollback-location") and a rollback save is attempted, the rollback save will fail and return an error message.
- The entire set of rollback checkpoint files can be copied from the active CPM CF to the inactive CPM CF. This synchronization is done via the following command:

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

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

Note: The automatic sync only causes the ONE new checkpoint file to be copied to both CFs (the other 9 checkpoints are not automatically copied from active to standby but that can be done manually with admin red rollback-sync).

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

- "**config red sync** {boot-env|config}" and "**admin red sync** {boot-env|config}" do not apply to rollback checkpoint files. These commands do not manually or automatically sync rollback checkpoint files. The dedicated rollback-sync commands must be used to sync rollback checkpoint files.
- Rollback files can be deleted using a dedicated rollback checkpoint deletion command.

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

  - Deleting a rollback checkpoint causes the suffixes to be adjusted (decremented) for all checkpoints older that the one that was deleted (to close the "hole" in the list of checkpoint files and create room to create another checkpoint)
  - If "config redundancy rollback-sync" is enabled, a rollback delete will also delete the equivalent checkpoint on the standby CF and shuffle the suffixes on the standby CF.
  - If an operator manually deletes a rollback checkpoint file (using file delete) then the suffixes of the checkpoint files are NOT shuffled, nor is the equivalent checkpoint file deleted from the standby CF. This manual deletion creates a "hole" in the checkpoint file list until enough new checkpoints have been created to roll the "hole" off the end of the list.
- As shown in Figure 4, support for rolling back to a previous configuration (a saved rollback checkpoint) with minimal impact on services. The previous configuration will be loaded and take operational effect:

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

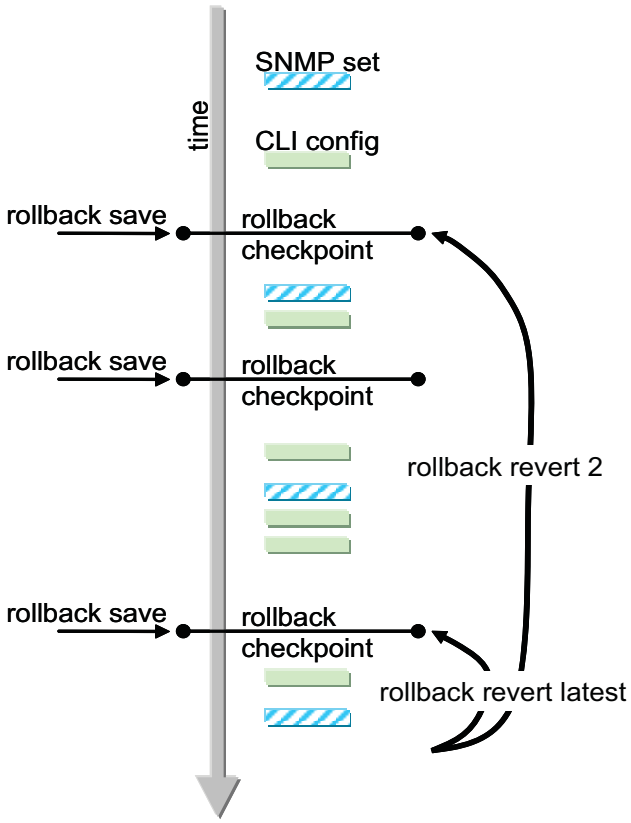


Figure 4: Configuration Rollback

- A rollback revert does not affect the currently stored rollback checkpoint files (no deletions or renumbering). This means that if an operator issues a “rollback revert 3” and then issues a “rollback-save”, the resulting rollback checkpoint files “file-url.rb” and “file-url.rb.4” will contain the same rollback state/configuration.
- The **boot-good-exec** or **bad-exec** are not automatically executed after a rollback.
- impacts to the running services are minimized during a rollback:
  - no impact in areas of configuration that did not change
  - configuration parameters that changed (or items that changed config have dependencies on) are first removed (revert to default) and the previous values are then restored (can be briefly service impacting in changed areas). Some examples are the following:
    - If the currently active config contains **configure port 5/1/1 dwdm tdcm dispersion -1000** and the rollback checkpoint contains **configure port 5/1/1 dwdm tdcm dispersion -1010**, then the operational dispersion will transition from -1000, to 0 and then back to -1010 for port 5/1/1 which will cause a traffic interruption.
    - Changing the neighbor of a MC-APS port will start with neighbor 1, then be configured as no neighbor, and then will be configured with neighbor 2. Moving through the **no neighbor** intermediate state requires the working and protect circuits to be torn down and then rebuilt.

- A Rollback will undo any SNMP sets or direct CLI config commands that occurred since the last checkpoint creation.
- During the period when an SR-OS node is processing a rollback revert, both CLI commands (from other users) and SNMP commands will continue to be processed. The only commands that are blocked during a rollback revert are other rollback commands including **revert**, **save**, and **compare** (only one **rollback** command can be executing at a time in one node).
- Commands are available to view and compare the various rollback checkpoints to current operating and candidate configurations.
- Rollback checkpoint files are not guaranteed to be in any particular format. They are not interchangeable with normal config files or exec scripts. A normal config file (from an admin save) cannot be renamed as a rollback checkpoint and then referenced for a rollback revert operation. Only rollback checkpoint files generated with rollback save can be used to rollback revert.
- If a hardware change is made after a rollback-save then:
  - a rollback can be executed as long as the hardware change was an addition of hardware to the node (for example, added a new IOM into a previously empty slot).
  - a rollback is not guaranteed to work if hardware was removed or changed (for example, IOM was removed, or MDA was swapped for a different MDA type).
- Rollback across a change to the following parameters is not supported:
  - chassis-mode
  - mixed-mode
  - the SR | SS capability of a card (**configure card capability sr|ess**)
  - configure isa application-assurance-group minimum-isa-generation
- Rollback is supported even after an **admin reboot** is performed (or changes the primary config in the bof is changed and an **admin reboot** is performed). **Admin reboot** does not “break the chain” for rollback.
- The Configuration Rollback feature is incompatible with the use of Time Of Day (ToD) policies and functionality. Rollback save and rollback revert operations are blocked if any ToD policies are active (for example, assigned to objects such as a SAP).
- Lawful Intercept configuration under the **config>li** branch is not affected by a rollback or rescue. LI configuration is not saved in the rollback checkpoint or rescue file, and a rollback revert does not touch any config under the **config>li** branch.
- Any configuration or state change performed under the debug branch of CLI is not saved in the rollback checkpoint file nor impacted by a rollback.
- Rollbacks to a checkpoint created in a more recent release is not supported (for example, node running in 9.0r5 cannot rollback to a checkpoint created in 9.0r7).

- The following list captures some side effects and specific behaviors of a Rollback revert. Some of these side effects are not related purely to configuration (that is, in the CLI config branch) and may have interactions with tools commands, RADIUS, etc.
  - SAA jobs that are running when a rollback revert is initiated, and need configuration changes due to the rollback, will be stopped. If the SAA job is a continuous type then it will be re-started as part of the rollback revert after the config changes have been applied (just as if the operator had typed “no shutdown” for the continuos SAA job). Non-continuous SAA jobs that were modified by the rollback would need to be manually restarted if they need to be run again.
  - If **max-nbr-mac-addr** is reduced as part of the revert and the number of mac addresses in the forwarding database is greater than the max-nbr-mac-addr, then the rollback is aborted (before any actions are taken) and an informative error message is provided. The operator must take actions to remove the mac addresses if they wish to proceed with the rollback.
  - If active subscribers and/or subscriber hosts and/or DHCP lease state are present in the system then some associated configuration changes may be blocked (just as those same changes would be blocked if an operator tried to make them via CLI – trying to delete an sla-profile being used by active subscriber hosts, or trying to change a nat-policy in a sub-profile). If certain configuration changes associated with the hosts or lease states are required as part of the rollback but those changes are blocked, then for each blocked configuration item a warning will be printed, that particular configuration item will not be changed and the rollback will continue.
  - If a **force-switchover** command (for example, **tools perform service id 1 endpoint "x" force-switchover spoke-sdp-fec 1**) has been applied to a spoke-sdp-fec of a dynamic multi-segment pseudo wire, and a rollback revert needs to change the admin state of the spoke-sdp-fec (for example, to modify spoke-sdp-fec parameters that may

be dependant on admin state), then the rollback revert will automatically remove the force-switchover and the node will revert to whatever is the best spoke-sdp in the redundant set.

- Rollback impacts the configuration state of the router, and as with normal operator CLI or SNMP configuration changes, additional actions or steps may need to occur before certain configuration changes take operational effect. Some examples include:
  - Configuration changes that require a **shutdown** and then **no-shutdown** to be done by an operator in order to take operational effect also need this manual shut/no-shut to be performed by the operator in order to take operational effect after a rollback if the rollback changes those configuration items. Some examples include:
  - Changes to Autonomous System or Confederation value require a BGP shut/no-shut.
  - Changes to VPRN Max-routes requires a shut/no-shut on the VPRN service.
  - Changes to OSPF/ISIS export-limit require a shut/no-shut on OSPF/ISIS.
  - Configuration changes to an msap-policy that normally requires a **tools perform subscriber-mgmt eval-msap** command to take operational effect on subscribers that are already active. Rollback will change the msap-policy configuration, but if it is required to have the configuration changes applied to the active subscribers then the operator will have to run the eval-msap tools command.
- Any uncommitted changes (that is, the **begin** command was entered, some changes made, but the **commit** command was never entered) in the following areas will be lost/cleared when a rollback revert is initiated:
  - **configure>application-assurance>group policy**
  - **configure>router>policy-options**
  - **configure>system>sync-if-timing**

- Some **card** and **mda** commands require a reboot, remove or rebuild of an entire card or MDA. When these commands need to be executed as part of a rollback, the impacted cards/mdas will be listed in a warning and the operator will be prompted with a single y/n prompt to decide whether to proceed or not. This prompting will not occur for a rollback initiated via SNMP, nor if the operator uses the **now** keyword with the rollback revert command. Some examples of card and mda commands that may cause a prompt are:
  - **configure>card>card-type**
  - **configure>card>named-pool-mode**
  - **configure>card>mda**
  - **configure>card>mda>mda-type**
- Although the use of the Control-C key combination is not recommended during a rollback revert, it is supported (via CLI or SNMP). Interrupting a rollback revert may leave the router in a state that is not necessarily something between the old active config and the rollback checkpoint since the rollback processing may have been in the middle of tearing things down or rebuilding configurations. A strong warning is issued in this case to indicate that the operator must examine the config and potentially issue another rollback revert to return to a known (and coherent) configuration.

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

Rollback and SNMP

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

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

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

Rescue Configuration

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

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

The location and filename of the rescue file are configurable. SR-OS appends an ".rc" suffix to the specified rescue filename.

Operational Guidelines

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

- Both **admin save** and **rollback save** should be performed periodically:
- Use **admin save** to backup a complete configuration file that can be used during router reboot.
  - Used with a reboot as a last resort.
  - Do an admin save after any major h/w changes or major service changes.
  - Should be performed after any software upgrade.
- Use **rollback-save** to create a rollback checkpoint.
  - Used for intermediate checkpoints that can be recovered with minimal impacts to services.
  - Should be performed each time that a moderate amount configuration changes have been made.
  - Should be performed after any h/w changes.
  - Should be performed after any s/w upgrade.
  - Could also be scheduled with cron (for example, once every 1 or 2 weeks).
- A new **rescue-save** must be created when hardware is changed.
- Rollback-checkpoint files are not editable nor compatible/interchangeable with config files (generated with **admin save**).
- Do not continue to repeat the **rollback save**, **rollback save**, **rollback save** over the course of weeks/months without also doing executing an occasional **admin save**. In a serious situation, use one of the saved configs to use as the primary config for an **admin reboot**.
- Software Upgrade: It is recommended to create a Rollback Checkpoint (**admin rollback save**), in addition to saving the configuration (**admin save**), after an upgrade has been performed and the system is operating as expected. This will ensure a good checkpoint fully compatible with the new release is available at a point shortly after the upgrade.
- An operator could create a set of rollback checkpoints to support busy/quiet days or weekend/weekday and use cron to shift between them.
- It is beneficial to create a rollback checkpoint before a rollback revert is initiated (especially if there have been significant config changes since the last checkpoint was created). If the rollback is especially significant (a lot of major changes) it is also a good practice to do perform an **admin save** in case a full reboot is required to recover from an issue.
- A rollback failure may occur in some limited cases where the node needs a long time to complete one of the resulting configuration changes. Some examples include X and Y. If a rollback (for example, rollback revert 5) fails during execution, it should be attempted again. The second attempt will typically complete the remaining configuration changes required to fully revert to the desired checkpoint.

- When a new backup CPM is commissioned, the user execute the **admin redundancy rollback-sync** command to copy the entire set of rollback files from the active CPM cf to the new standby CPM cf. If the operator wants the system to automatically copy new rollback checkpoints to both cfs whenever a new checkpoint is created, then the **config redundancy rollback-sync** should be configured.
- An HA CPM switchover during a rollback revert will cause the rollback operation to abort. The newly active CPM will have an indeterminate configuration. A log event is created in this case to warn the operator. When an HA switchover occurs during a rollback (or within a few seconds of a rollback completing), the operator is advised to repeat the rollback revert operation to the same checkpoint.
- A rollback checkpoint stores the rollback-location and the local/remote-max-checkpoint values, and as such a rollback revert operation can change those values. If an operator changes the local/remote-max-checkpoint values it is recommended to delete all the existing checkpoints (otherwise a subsequent rollback revert could change the max back to a previous value).
- If a warning prompt (**y/n**) is displayed when a rollback revert is initiated, it is highly suggested to respond **no** to the warning prompt the first time, save a rollback checkpoint before attempting this rollback revert, and then executing the revert again and responding **yes**. If the rollback encounters problems then a revert to the saved checkpoint can be used to go back to the initial configuration state.

Transactional Configuration

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

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

Transactional Configuration and Configuration Rollback support combine to provide the operational model depicted in Figure 5.

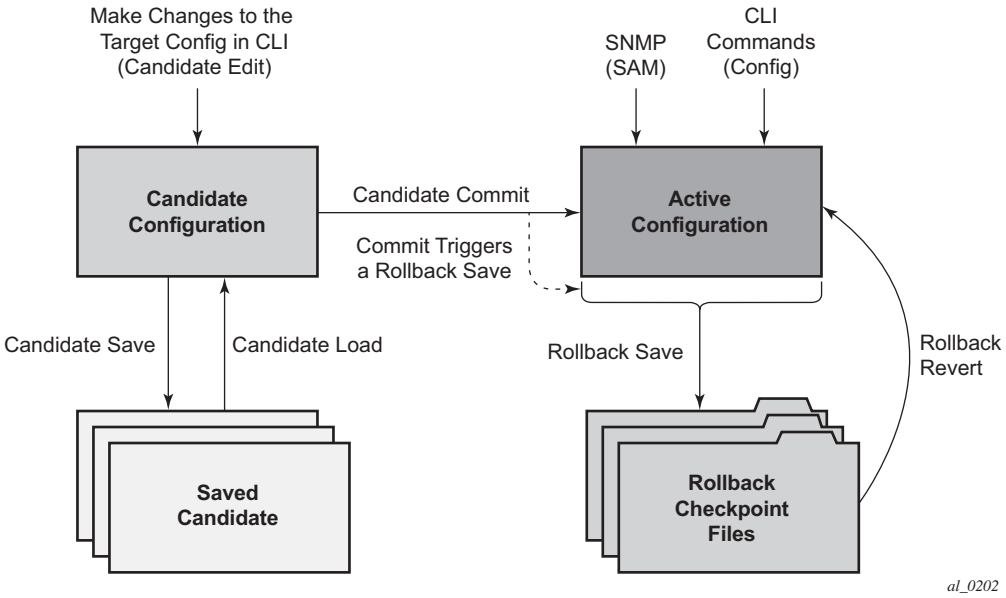


Figure 5: Router Configuration with Rollback and Transactions

Basic Operation

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Transactions and Rollback

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

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

Transactional configuration relies on the rollback mechanism to operate. Any commands and configuration that is not supported in a rollback revert are also not supported in edit-cfg mode (examples include changes to chassis-mode or the existence of time-of-day suites).

Authorization

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

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

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

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

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

Basic Command Reference

Command Hierarchies

Basic CLI Commands

- **back**
- **clear**
- **echo** [*text-to-echo*] [*extra-text-to-echo*] [*more-text*]
- **enable-admin**
- **exec** [**-echo**] [**-syntax**] *filename*
- **exit** [**all**]
- **help**
- **history**
- **info** [**detail**]
- **logout**
- **mrinfo** [*ip-address* | *dns-name*] [**router** *router-instance*]
- **mstat source** [*ip-address* | *dns-name*] [**group** *grp-ip-address*] [**destination** *dst-ip-address*] [**hop** *hop*] [**router** *router-instance*] [**wait-time** *wait-time*]
- **mtrace source** [*ip-address* | *dns-name*] [**group** *grp-ip-address*] [**destination** *dst-ip-address*] [**hop** *hop*] [**router** *router-instance*] [**wait-time** *wait-time*]
- **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*][**timeout** *time-out*]
- **pwc** [**previous**]
- **sleep** [**seconds**]
- **ssh** [*ip-addr* | *dns-name* |*username@ip-addr*] [**-l** *username*] [**-v** *SSH-version*] [**router** *router-instance*| **service-name** *service-name*]
- **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*]
- **tree** [**detail**]
- **write** {*user* | **broadcast**} *message-string*

Monitor Commands

monitor

- **card** *slot-number* **fp** *fp-number* **ingress {access | network} queue-group** *queue-group-name* **instance** *instance-id* **[interval** *seconds***][repeat** *repeat***] policer** *policer-id* **[absolute | percent-rate |** *reference-rate***]**
- **ccag** *ccag-id* [**path** {**a** | **b**}] [**type** {**sap-sap** | **sap-net** | **net-sap**}] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **cpm-filter**
  - **ip entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **ipv6 entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **mac entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **filter**
  - **ip** ***ip-filter-id*** **entry** ***entry-id*** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **ipv6** ***ipv6-filter-id*** **entry** ***entry-id*** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **mac** ***mac-filter-id*** **entry** ***entry-id*** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **lag** *lag-id* [*lag-id*...(up to 5 max)] [**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**]
- **port** ***port-id*** [*port-id*...(up to 5 max)] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **port atm** [**interval** *seconds*] [**repeat** *repeat*] [**absolute**|**rate**]
- **qos**
  - **arbiter-stats**
    - **card** *slot-number* **fp** *fp-number* **queue-group** *queue-group-name* **instance** *instance-id* **[ingress] [access** | **networks] [interval** *seconds***][repeat** *repeat***] [absolute** | **percent-rate** | *reference-rate***] [arbiter** *root* | *name***]**
    - **customer** *customer-id* **site** *customer-site-name* **[arbiter** *root*|*name***] [ingress**|**egress] [interval** *seconds***] [repeat** *repeat***] [absolute**|**rate]**
    - **port** *port-id* **egress** *network* **queue-group** *queue-group-name* **instance** *instance-id* **[interval** *seconds***] [repeat** *repeat***] [absolute** | **rate] [arbiter** *root* | *name***]**
    - **sap** *sap-id* [**arbiter** *name* | *root*] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **subscriber** *sub-ident-string* **[arbiter** *name*|*root***] [ingress**|**egress] [interval** *seconds***] [repeat** *repeat***] [absolute**|**rate]**
  - **port** *port-id* **exp-secondary-shaper** *shaper-name* **[interval** *seconds***] [repeat** *repeat***] [absolute**|**rate]**
  - **port** *port-id* **vport** *name* **[interval** *seconds***] [repeat** *repeat***]**
  - **scheduler-stats**
    - **customer** *customer-id* **site** *customer-site-name* [**scheduler** *scheduler-name*] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **port** *port-id* **queue-group** *queue-group-name* **[ingress** | **egress] [interval** *seconds***] [repeat** *repeat***] [absolute** | **rate] [access** | **network] [instance** *instance-id***]**
    - **port** *port-id* **vport** *name* **[interval** *seconds***] [repeat** *repeat***] [absolute**|**rate]**
    - **sap** ***sap-id*** [**scheduler** *scheduler-name*] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **sap** *sap-id* **encap-group** *group-name* **[member** *encap-id***] [scheduler** *scheduler-name***] [interval** *seconds***] [repeat** *repeat***] [absolute**|**rate]**
    - **subscriber** *sub-ident-string* [**scheduler** *scheduler-name*] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **subscriber** *sub-ident-string* **[interval** *seconds***] [repeat** *repeat***] [absolute**|**rate] sap** *sap-id* **sla-profile** *sla-profile-name*
- **router** [***router-instance***]
  - **bgp**

- **neighbor** ***ip-address*** [*ip-address*...(up to 5 max)] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **isis**
  - **statistics** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **ldp**
  - **session** ***ldp-id*** [*ldp-id*...(up to 5 max)] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **statistics** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **mpls**
  - **interface** ***interface*** [*interface*...(up to 5 max)] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **lsp-egress-statistics** *lsp-name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **lsp-ingress-statistics** *ip-address* **lsp** *lsp-name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **ospf** [*ospf-instance*]
- **ospf3**
  - **interface** ***interface*** [*interface*...(up to 5 max)][**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **neighbor** ***ip-address*** [*ip-address*...(up to 5 max)] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **virtual-link** ***nbr-rtr-id*** **area** ***area-id*** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **virtual-neighbor** ***nbr-rtr-id*** **area** ***area-id*** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **pim**
  - **group** *grp-ip-address* [**source** *ip-address*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **rip**
  - **neighbor** ***neighbor*** **[*neighbor...***(up to 5 max)] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **rsvp**
  - **interface** ***interface*** [*interface*...(up to 5 max)][**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
- **vrrp**
  - **instance** **interface** *interface-name* **vr-id** *virtual-router-id* [**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**]
  - **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [**base** | **ingress-queue-id** *ingress-queue-id* | **egress-queue-id** *egress-queue-id*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Environment Commands

```
<root>
    — environment
        — alias alias-name alias-command-name
        — no alias alias-name
        — [no] create
        — [no] more
        — reduced-prompt [no. of nodes in prompt]
        — no reduced-prompt
        — [no] saved-ind-prompt
        — suggest-internal-objects
        — terminal
            — length lines
            — width width
        — time-display {local | utc}
```

Candidate Commands

```
<root>
    — candidate
        — edit [exclusive]
        — commit [confirmed timeout] [comment comment]
        — commit no-checkpoint [confirmed timeout]
        — confirm
        — copy [line]
        — delete [line]
        — discard [now]
        — goto line
        — insert [line]
        — load file-url [overwrite | insert | append]
        — quit
        — redo [count]
        — replace [line]
        — save file-url
        — undo [count]
        — view [line]
    — info operational operational

show
    — system
        — candidate
```

Basic CLI Commands

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, then any user can enter a special administrative mode by entering the **enable-admin** command.

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

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

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

The following displays a password configuration example:

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

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

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

```
A: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>

Description This command moves the context back one level of 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>

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

Parameters **card —** Reinitializes a I/O module in the specified slot.

cflowd — Clears cflowd.

cpm-filter — Clears IP filter entry IDs.

cron — Clears CRON history.

filter — Clears IP, MAC, and log filter counters.

lag — Clears LAG-related entities.

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

mda — Reinitializes the specified MDA in a particular slot.

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, bgp, bfd, dhcp, dhcp6, forwarding-table, icmp-redirect-route, icmp6, igmp, interface, isis, ldp, mpls, neighbor, ospf, ospf3, pim, rip, router-advertisement, rsvp

saa — Clears the SAA test results.

screen — Clears the console or telnet screen.

service — Clears service ID and statistical entities.

subscriber-mgmt — Clears subscriber management data.

system — Clears (re-enables) a previously failed reference.

tacplus — Clears the TACACS+ server state.

trace — Clears the trace log.

vrrp — Clears and resets the VRRP interface and statistical entities.

echo

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

Context <GLOBAL>

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

Parameters *text-to-echo* — Specifies a text string to be echoed up to 256 characters.

extra-text-to-echo — Specifies more text to be echoed up to 256 characters.

more-text — Specifies more text to be echoed up to 256 characters.

exec

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

Context <GLOBAL>

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.

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

Default Echo disabled.

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

Default Execute file commands.

filename — The text file with CLI commands to execute.

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

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

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

Default <Ctrl-C>, EOF

Related Commands

boot-bad-exec command on page 381 — Use this command to configure a URL for a CLI script to exec following a failed configuration boot.

boot-good-exec command on page 381 — Use this command to configure a URL for a CLI script to exec following a successful configuration boot.

exit

Syntax **exit** [**all**]

Context <GLOBAL>

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

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

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

```
A:ALA-1# configure router ospf
A:ALA-1>config>router>ospf# exit
A:ALA-1#
The exit all command moves the cursor all the way back to the root level.

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

Parameters **all** — Exits back to the root CLI context.

help

Syntax **help**
help edit
help global
help special-characters
<GLOBAL>

Description This command provides a brief description of the help system. The following information displays:

```
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 explana-
tion of all parameters.
In case of sub-commands, a brief description is provided.
Global Commands:
     Help on global commands can be observed by issuing "help globals" at any time.
Editing Commands:
     Help on editing commands can be observed by issuing "help edit" at any time.
```

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

help edit — Displays help on editing.

Available editing keystrokes:

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

help global — Displays help on global commands.

Available global commands:

```
back            - Go back a level in the command tree
echo            - Echo the text that is typed in
exec            - Execute a file - use -echo to show the commands and
                  prompts on the screen
exit            - Exit to intermediate mode - use option all to exit to
                  root prompt
help            - Display help
history         - Show command history
info            - Display configuration for the present node
logout          - Log off this system
oam             + OAM Test Suite
ping            - Verify the reachability of a remote host
pwc             - Show the present working context
```

```
sleep           - Sleep for specified number of seconds
ssh             - SSH to a host
telnet          - Telnet to a host
traceroute      - Determine the route to a destination address
tree            - Display command tree structure from the context of
                  execution
write           - Write text to another user
```

help special-characters — Displays help on special characters.

Use the following CLI commands to display more information about commands and command syntax:

? — Lists all commands in the current context.

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

command ? — Display command's syntax and associated keywords.

string<Tab> or **string<Space> —** Complete a partial command name (auto-completion) or list available commands that match the string.

history

Syntax **history**

Context <GLOBAL>

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

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

For example:

```
A:ALA-1# history
  68 info
  69 exit
  70 info
  71 filter
  72 exit all
  73 configure
  74 router
  75 info
  76 interface "test"
  77 exit
  78 reduced-prompt
  79 info
  80 interface "test"
  81 icmp unreachables exit all
  82 exit all
  83 reduced-prompt
  84 configure router
  85 interface
  86 info
  87 interface "test"
  88 info
  89 reduced-prompt
  90 exit all
  91 configure
  92 card 1
```

```
  93 card-type
  94 exit
  95 router
  96 exit
  97 history
A:ALA-1# !91
A:ALA-1# configure
A:ALA-1>config#
```

info

Syntax **info** [**detail**]

Context <GLOBAL>

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.

For example,

```
A:ALA-48>config>router>mpls# info
----------------------------------------------
            admin-group "green" 15
            admin-group "red" 25
            admin-group "yellow" 20
            interface "system"
            exit
            interface "to-104"
                admin-group "green"
                admin-group "red"
                admin-group "yellow"
                label-map 35
                    swap 36 nexthop 10.10.10.91
                    no shutdown
                exit
            exit
            path "secondary-path"
                hop 1 10.10.0.111  strict
                hop 2 10.10.0.222  strict
                hop 3 10.10.0.123  strict
                no shutdown
            exit
            path "to-NYC"
                hop 1 10.10.10.104  strict
                hop 2 10.10.0.210  strict
                no shutdown
            exit
            path "to-104"
                no shutdown
            exit
            lsp "to-104"
                to 10.10.10.104
                from 10.10.10.103
                rsvp-resv-style ff
```

```
                cspf
...
-----------------------------------------------
A:ALA-48>config>router>mpls#
A:ALA-48>config>router>mpls# info detail
-----------------------------------------------
            frr-object
            no resignal-timer
            admin-group "green" 15
            admin-group "red" 25
            admin-group "yellow" 20
            interface "system"
                no admin-group
                no shutdown
            exit
            interface "to-104"
                admin-group "green"
                admin-group "red"
                admin-group "yellow"
                label-map 35
                    swap 36 nexthop 10.10.10.91
                    no shutdown
                exit
                no shutdown
            exit
            path "secondary-path"
                hop 1 10.10.0.111  strict
                hop 2 10.10.0.222  strict
                hop 3 10.10.0.123  strict
                no shutdown
            exit
            path "to-NYC"
                hop 1 10.10.10.104  strict
                hop 2 10.10.0.210  strict
                no shutdown
            exit
            path "to-104"
                no shutdown
            exit
            lsp "to-104"
                to 10.10.10.104
                from 10.10.10.103
                rsvp-resv-style ff
                adaptive
                cspf
                include "red"
                exclude "green"
                adspec
                fast-reroute one-to-one
                    no bandwidth
                    no hop-limit
                    node-protect
                exit
                hop-limit 10
                retry-limit 0
                retry-timer 30
                secondary "secondary-path"
                    no standby
                    no hop-limit
                    adaptive
                    no include
```

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

Parameters **detail —** Displays all configuration parameters including parameters at their default values.

logout

Syntax **logout**

Context <GLOBAL>

Description This command logs out of the router session.

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

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

mrinfo

Syntax **mrinfo** [*ip-address* | *dns-name*] [**router** *router-instance*]

Context <GLOBAL>

Description This command is used to print relevant multicast information from the target multicast router. Information displayed includes adjacency information, protocol, metrics, thresholds, and flags from the target multicast route

Parameters *ip-address* — Specify the ip-address of the multicast capable target router.

dns-name — Specify the DNS name (if DNS name resolution is configured).

Values 63 characters maximum

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

Values *router-name*: Base, management
service-id: 1 — 2147483647

Default Base

mstat

Syntax **mstat source** [*ip-address* | *dns-name*] [**group** *grp-ip-address*] [**destination** *dst-ip-address*] [**hop** *hop*] [**router** *router-instance*] [**wait-time** *wait-time*]

Context <GLOBAL>

Description This command traces a multicast path from a source to a receiver and displays multicast packet rate and loss information.

Parameters **source** *ip-address* **—** Specify the IP address of the multicast-capable source.

ip-address — Specify the ip-address of the multicast capable target router.

dns-name — Specify the DNS name (if DNS name resolution is configured).

Values 63 characters maximum

group *group-ip-address* **—** Specify the multicast address of the group to be displayed.

destination *dst-ip-address* **—** Specify the unicast destination address.

hop count **—** Specify the maximum number of hops that will be traced from the receiver back toward the source.

Values 1 — 255

Default 32 hops (infinity for the DVMRP routing protocol).

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

Values *router-name*: Base, management
service-id: 1 — 2147483647

Default Base

wait-time ***wait-time*** **—** Specify the number of seconds to wait for the response.

Values 1 — 60

mtrace

Syntax **mtrace source** [*ip-address* | *dns-name*] [**group** *grp-ip-address*] [**destination** *dst-ip-address*] [**hop** *hop*] [**router** *router-instance*] [**wait-time** *wait-time*]

Context <GLOBAL>

Description This command traces a multicast path from a source to a receiver.

Parameters *ip-address* — Specify the ip-address of the multicast capable target router.

dns-name — Specify the DNS name (if DNS name resolution is configured).

Values 63 characters maximum

group *group-ip-address* **—** Specify the multicast address or DNS name of the group that resolves to the multicast group address that will be used. If the group is not specified, address 224.2.0.1 (the MBone audio) will be used. This will suffice if packet loss statistics for a particular multicast group are not needed.

destination *dst-p-address* **—** Specify either the IP address or the DNS name of the unicast destination. If this parameter is omitted the IP address of the system where the command is entered will be used. The receiver parameter can also be used to specify a local interface address as the destination address for sending the trace query. The response will also be returned to the address specified as the receiver.

hop *hop* **—** Specify the maximum number of hops that will be traced from the receiver back toward the source.

Values 1 — 255

Default 32 hops (infinity for the DVMRP routing protocol).

router-instance — Specify the router name or service ID.

Values *router-name*: Base, management
service-id: 1 — 2147483647

Default Base

wait-time ***wait-time*** **—** Specify the number of seconds to wait for the response.

Values 1 — 60

password

Syntax **password**

Context <ROOT>

Description This command changes a user CLI login password.

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

When invoked, the user is prompted to enter the old password, the new password, and then 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 not allowed access to the CLI.

ping

Syntax **ping** {*ip-address*| *ipv6-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*] [**timeout** *timeout*]

Context <GLOBAL>

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

Parameters *ip-address* | *dns-name* — The remote host to ping. The IP address or the DNS name (if DNS name resolution is configured) can be specified.

ipv6-address — The IPv6 IP address.

Values 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

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

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

Example output:

```
A:ALA-1# ping 192.168.xx.xx4 detail
PING 192.168.xx.xx4: 56 data bytes
64 bytes from 192.168.xx.xx4 via fei0: icmp_seq=0 ttl=64 time=0.000 ms.
64 bytes from 192.168.xx.xx4 via fei0: icmp_seq=1 ttl=64 time=0.000 ms.
64 bytes from 192.168.xx.xx4 via fei0: icmp_seq=2 ttl=64 time=0.000 ms.
64 bytes from 192.168.xx.xx4 via fei0: icmp_seq=3 ttl=64 time=0.000 ms.
64 bytes from 192.168.xx.xx4 via fei0: icmp_seq=4 ttl=64 time=0.000 ms.

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

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

Values 0 —128

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

Values 0 **—** 255

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

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

Values 0 **—** 65507

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

Values 0 **—** 65535

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

Default The IP address of the egress IP interface.

Values 0.0.0.0 **—** 255.255.255.255

interval *seconds* **—** The interval in seconds between consecutive ping requests, expressed as a decimal integer.

Default 1

Values 1 **—** 10000

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

Default Per the routing table.

Values A valid IP next hop IP address.

interface *interface-name* **—** Specify the interface name.

bypass-routing — 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* **—** The number of ping requests to send to the remote host, expressed as a decimal integer.

Default 5

Values 1 **—** 10000

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

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

Default Base

Values

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

timeout *timeout* **—** Specify the timeout in seconds.

Default 5

Values 1 **—** 10

pwc

Syntax **pwc** [**previous**]

Context <GLOBAL>

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.
For example,

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

For example,

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.

For example,

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

Parameters **previous —** Specifies to display the previous present working context.

sleep

Syntax **sleep** [*seconds*]

Context <GLOBAL>

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

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

Default 1

Values 1 — 100

ssh

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

Context <GLOBAL>

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

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* — The remote host to which to open an SSH session. The IP address or the DNS name (providing DNS name resolution is configured) can be specified.

-l *user* **—** The user name to use when opening the SSH session.

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

Values *router-name*: Base, management
service-id: 1 — 2147483647

Default Base

telnet

Syntax **telnet** [*ip-address* | *dns-name*] [*port*] [**router** *router-instance*]

Context <GLOBAL>

Description This command opens a Telnet session to a remote host. Telnet servers in 7750 SRnetworks limit a Telnet clients to three retries to login. The Telnet server disconnects the Telnet client session after three retries. The number of retry attempts for a Telnet client session is not user-configurable.

Parameters *ip-address* — The IP address or the DNS name (providing 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:d.d.d.d[-interface]
x: [0 — FFFF]H
d: [0 — 255]Dipv6-address

dns-name — Specify the DNS name (if DNS name resolution is configured).

Values 128 characters maximum

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

Default 23

Values 1 — 65535

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

Values *router-name*: Base, management
service-id: 1 — 2147483647

Default Base

traceroute

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

Context <GLOBAL>

Description The TCP/IP traceroute utility determines the route to a destination address. Note that aborting a traceroute with the <Ctrl-C> command could require issuing a second <Ctrl-C> command before the prompt is returned.

```
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* — 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[-interface] x:x:x:x:x:x:d.d.d.d[-interface] x: [0 — FFFF]H d: [0 — 255]Dipv6-address
dns-name	128 characters maximum

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

Values 1 — 255

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

Default 5000

Values 1 — 60000

no-dns — When the **no-dns** keyword is specified, a DNS lookup for the specified host name will not be performed.

Default DNS lookups are performed

source *ip-address* — The source IP address to use as the source of the probe packets in dotted decimal notation. If the IP address is not one of the device's interfaces, an error is returned.

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

Values 0 **—** 255

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

Values *router-name*: Base, management
service-id: 1 — 2147483647

Default Base

tree

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

Context <GLOBAL>

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

Parameters **detail —** Includes parameter information for each command displayed in the tree output.

write

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

Context <GLOBAL>

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

Parameters *user* — The name of a user with an active console session to which to send a console message.

Values Any valid CLI username

broadcast — Specifies that the *message-string* is to be sent to all users logged into the router.

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

CLI Environment Commands

alias

Syntax **alias** *alias-name alias-command-line*
no alias *alias-name*

Context environment

Description This command enables the substitution of a command line by an alias. Use the **alias** command to create alternative or easier to remember/understand names for an entity or command string. If the string contains special characters (#, $, spaces, etc.), 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 **root>environment** context.
For example, to create an alias named **soi** to display OSPF interfaces, enter:

alias soi "show router ospf interface"

Parameters *alias-name* — 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 — The command line to be associated.

create

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

Context environment

Description By default, the **create** command is required to create a new OS entity.

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

Default **create** — The create keyword is required.

more

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

Context environment

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

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

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

Default **more** — CLI output pauses at the end of each screen waiting for the user input to continue.

reduced-prompt

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

Context environment

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

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

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

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

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

Default **no reduced-prompt** — Displays all context nodes in the CLI prompt.

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

Default 2

Values 0 — 15

saved-ind-prompt

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

Context environment

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

```
*A:ALA-48# admin save
Writing file to ftp://128.251.10.43/./sim48/sim48-config.cfg
Saving configuration .... Completed.
A:ALA-48#
```

suggest-internal-objects

Syntax [**no**] **suggest-internal-objects**

Context environment

Description This command enables suggesting of internally created objects while auto completing.

The **no** form of the command disables the command.

terminal

Syntax **terminal**
no terminal

Context environment

Description This command enables the context to configure the terminal screen length for the current CLI session.

length

Syntax **length** *lines*

Context environment>terminal

Description This command sets the number of lines on a screen.

Default **24** — Terminal dimensions are set to 24 lines long by 80 characters wide.

Parameters *lines* — The number of lines for the terminal screen length, expressed as a decimal integer.

Values 1 — 512

width

Syntax **width** *width*

Context environment>terminal

Description This command determines display terminal width.

Default 80 — Terminal dimensions are set to 24 lines long by 80 characters wide.

Parameters *width* — Sets the width of the display terminal.

Values 1 — 512

time-display

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

Context environment

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

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

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

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

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

Monitor CLI Commands

card

Syntax **card** *slot-number* **fp** *fp-number* **ingress {access | network} queue-group** *queue-group-name* **instance** *instance-id* **[interval** *seconds* **] [repeat** *repeat***] policer** *policer-id* **[absolute | percent-rate |** *reference-rate***]**

Context monitor

Description This command monitors policer statistics in an ingress FP queue group.

Parameters **card** *slot-number* **—** Specifies the slot number associated with the queue group, expressed as an integer.

Values 1 — 20

fp *fp-number* **—** Specifies the FP number associated with the queue group, expressed as an integer.

Values 1 — 2

ingress — Displays policer statistics applied on the ingress FP.

access — Displays policer statistics on the FP access.

network — Displays policer statistics on the FP network.

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

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

Values 1— 65535

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

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

Values 1 — 8

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

percent-rate — When the percent-rate keyword is specified, the rate-per-second for each statistic is displayed based on the reference rate of 10G.

Default 10

Values 1 — 999

reference-rate — When a reference-rate value is specified, the rate-per-second for each statistic is displayed as a percentage based on the reference rate specified.

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

ccag

Syntax **ccag** *ccag-id* [**path** {**a** | **b**}] [**type** {**sap-sap** | **sap-net** | **net-sap**}] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor

Description Displays monitor command output of traffic statistics for Cross Connect Aggregation Groups (CCAGs) ports.

Parameters *ccag-id* — Specifies the CCAG instance to monitor.

path — Specifies the CCA path nodal context where the CCA path bandwidth, buffer and accounting parameters are maintained. The path context must be specified with either the **a** or **b** keyword specifying the CCA path context to be entered.

type — Specify cross connect type.

Values **sap-sap**, **sap-net**, **net-sap**

interval — Configures the interval for each display in seconds.

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

cpm-filter

Syntax **cpm-filter**

Context monitor

Description Displays monitor command output for CPM filters.

ip

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

Context monitor>cpm-filter

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

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

Values 1 — 65535

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

ipv6

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

Context monitor>cpm-filter

Description This command displays monitor command statistics for IPv6 filter entries.

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

Values 1 — 65535

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

mac

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

Context monitor>cpm-filter

Description This command displays monitor command statistics for MAC filter entries.

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

Values 1 — 65535

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

filter

Syntax **filter**

Context monitor

Description This command enables the context to 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

Description This command enables IP filter monitoring. The statistical information for the specified IP filter entry displays at the configured interval until the configured count is reached.
The first screen displays the current statistics related to the specified IP filter. The subsequent statistical information listed for each interval is displayed as a delta to the previous display.
When the keyword **rate** is specified, the "rate per second" for each statistic is displayed instead of the delta.

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

Parameters *ip-filter-id* — Displays detailed information for the specified filter ID and its filter entries.

Values 1 — 65535

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

Values 1 — 65535

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

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


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

```
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Rate)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------------
Ing. Matches: 0                                 Egr. Matches    : 0
===============================================================================
A:ALA-1>monitor#
```

ipv6

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

Context monitor>filter

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

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

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

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

Parameters *iv6p-filter-id* — Displays detailed information for the specified IPv6 filter ID and its filter entries.

Values 1 — 65535

entry *entry-id* — Displays information on the specified IPv6 filter entry ID for the specified filter ID only.

Values 1 — 65535

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

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

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


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

mac

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

Context monitor>filter

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

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

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

Parameters *mac-filter-id* — The MAC filter policy ID.

Values 1 — 65535

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

Values 1 — 65535

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

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

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

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

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

Parameters *lag-id* — The number of the LAG.

Default none — The LAG ID value must be specified.

Values 1 — 200

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

Default 5 seconds

Values 3 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

```
A:ALA-12# monitor lag 12
```

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

lsp-egress-stats

Syntax **lsp-egress-stats**
lsp-egress-stats *lsp-name*

Context show>router>mpls

Description This command displays MPLS LSP egress statistics information.

lsp-ingress-stats

Syntax **lsp-ingress-stats**
lsp-ingress-stats *ip-address* **lsp** *lsp-name*

Context show>router>mpls

Description This command displays MPLS LSP ingress statistics information.

management-access-filter

Syntax **management-access-filter**

Context monitor

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

ip

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

Context monitor>management-access-filter

Description This command nonitors statistics for the MAF IP filter entry.

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

Values 1 — 9999

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

Default 10

Values 3 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

ipv6

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

Context monitor>management-access-filter

Description This command nonitors statistics for the MAF IPv6 filter entry.

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

Values 1 — 9999

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

Default 10

Values 3 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

mac

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

Context monitor>management-access-filter

Description This command nonitors statistics for the MAF MAC filter entry.

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

Values 1 — 9999

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

Default 10

Values 3 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

rate — When the **rate** keyword is specified, 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

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

The first screen displays the current statistics related to the specified port(s). The subsequent statistical information listed for each interval is displayed as a delta to the previous display. When the 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** *port-id* — Specify up to 5 port IDs.

Syntax: *port-id* slot/mda/port[.channel]
aps-id aps-*group-id*[.*channel*]
aps keyword
group-id 1 — 64
bundle ID bundle-*type-slot/mda.bundle-num*
bundle keyword
type ima, ppp
bundle-num 1 — 128

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

Default 5 seconds

Values 3 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

```
A:ALA-12>monitor# port 2/1/4 interval 3 repeat 3 absolute
===============================================================================
Monitor statistics for Port 2/1/4
===============================================================================
                                                Input                  Output
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Octets                                            0                       0
Packets                                          39                     175
Errors                                            0                       0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Octets                                            0                       0
Packets                                          39                     175
Errors                                            0                       0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Octets                                            0                       0
Packets                                          39                     175
Errors                                            0                       0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Octets                                            0                       0
Packets                                          39                     175
Errors                                            0                       0
===============================================================================
A:ALA-12>monitor#


A:ALA-12>monitor# port 2/1/4 interval 3 repeat 3 rate
===============================================================================
Monitor statistics for Port 2/1/4
===============================================================================
                                                Input                  Output
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
```

```
-------------------------------------------------------------------------------
Octets                                          0                           0
Packets                                        39                         175
Errors                                          0                           0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Rate)
-------------------------------------------------------------------------------
Octets                                          0                           0
Packets                                         0                           0
Errors                                          0                           0
-------------------------------------------------------------------------------
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#
```

atm

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

Context monitor>port

Description This command enables ATM port traffic monitoring.

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

port

Syntax **port** *port-id* **atm** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
port *port-id* **atm aal-5** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
port *port-id* **atm ilmi** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
port *port-id* **atm interface-connection** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
port *port-id* **atm pvc** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
port *port-id* **atm pvp** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
port *port-id* **atm pvt** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor

Description This command monitors ATM port traffic statistics.

Parameters *port-id* — Specify up to 5 port IDs.

Syntax: *port-id* slot/mda/port[.channel]
aps-id aps-*group-id*[.*channel*]
aps keyword
group-id 1 — 64
bundle ID bundle-*type-slot/mda.bundle-num*
bundle keyword
type ima, ppp
bundle-num 1 — 128

atm — keyword specifying ATM information.

interface-connection — Monitors ATM interface statistics.

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

Default Default mode delta

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

Default Default mode delta

aal-5 — Displays ATM Adaptation Layer 5 (AAL5) information.

ilmi — Monitors ATM ILMI statistics.

pvc — Identifies the port by the PVC identifier (vpi/vci).

pvp — Identifies the port by the permanent virtual path.

pvt — Identifies the port by the permanent virtual tunnel.

oam — Identifies the port by the OAM test suite ID.

qos

Syntax **qos**

Context monitor

Description This command enables the context to configure criteria to monitor QoS scheduler statistics for specific customers and SAPs.

arbiter-stats

Syntax **arbiter-stats**

Context monitor>qos

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

port

Syntax **port**

Context monitor>qos

Description This command enables the context to configure monitor commands for port related statistics.

port

Syntax **port** *port-id* **exp-secondary-shaper** *shaper-name* **[interval** *seconds***] [repeat** *repeat***] [absolute|rate]**

Context monitor>qos

Description This command monitors expanded secondary shaper statistics.

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

Values slot/mda/port

exp-secondary-shaper *shaper-name* **—** Displays statistics for the named exp secondary shaper.

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the absolute keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

rate — When the rate keyword is specified, the rate-per-second for each statistic is displayed.

port

Syntax **port** *port-id* **vport** *name* **[interval** *seconds***] [repeat** *repeat***]**

Context monitor>qos

Description This command monitors VPORT statistics.

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

Values slot/mda/port [.channel]

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

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

scheduler-stats

Syntax **scheduler-stats**

Context monitor>qos

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

card

Syntax **card** *slot-number* **fp** *fp-number* **queue-group** *queue-group-name* **instance** *instance-id* **[ingress] [access | networks] [interval** *seconds***] [repeat** *repeat***] [absolute | percent-rate |** *reference-rate***] [arbiter** *root* **|** *name***]**

Context monitor>qos>arbiter-stats

Description This command monitors arbiter statistics in an ingress FP queue group.

Parameters **card** *slot-number* **—** Specifies the slot number associated with the queue group, expressed as an integer.

Values 1 — 20

fp *fp-number* **—** Specifies the FP number associated with the queue group, expressed as an integer.

Values 1 — 2

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

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

Values 1— 65535

ingress — Displays arbiter-name statistics applied on the ingress FP.

access — Displays arbiter-name statistics applied on the FP access.

network — Displays arbiter-name statistics applied on the FP network.

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the absolute keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

percent-rate — When the percent-rate keyword is specified, the rate-per-second for each statistic is displayed based on the reference rate of 10G.

reference-rate — When a reference-rate value is specified, the rate-per-second for each statistic is displayed as a percentage based on the reference rate specified.

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

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

Values An existing arbiter-name in the form of a string up to 32 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

root — Specifies the root arbiter.

customer

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

Context monitor>qos>arbiter-stats

Description This command monitors arbiter statistics for a customer site.

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

Values 1 — 2147483647

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

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

Values Values An existing arbiter-name in the form of a string up to 32 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

root — Specify the root arbiter.

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

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

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the absolute keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

rate — When the rate keyword is specified, the rate-per-second for each statistic is displayed.

port

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

Context monitor>qos>arbiter-stats

Description This command monitors arbiter statistics for a customer site.

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

Values slot/mda/port

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

Values network

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

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

Values 1— 65535

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the absolute keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

rate — When the rate keyword is specified, the rate-per-second for each statistic is displayed.

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

Values An existing arbiter-name in the form of a string up to 32 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

root — Specify the root arbiter.

sap

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

Context monitor>qos>arbiter-stats

Description This command monitors arbiter statistics for a SAP.

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

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

Values An existing *scheduler-name* in the form of a string up to 32 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

root — Specify the scheduler to which this queue would be feeding.

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

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

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

subscriber

Syntax **subscriber** *sub-ident-string* [**arbiter** *name* | *root*] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>qos>arbiter-stats

Description This command monitors arbiter statistics for a subscriber.

Parameters *sub-ident-string* — Specifies an existing subscriber a identification policy name.

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

Values An existing *scheduler-name* in the form of a string up to 32 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

root — Specify the scheduler to which this queue would be feeding.

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

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

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics. customer

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

customer

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

Context monitor>qos>scheduler-stats

Description Use this command to monitor scheduler statistics per customer multi-service-site. The first screen displays the current statistics related to the specified customer ID and customer site name. The subsequent statistical information listed for each interval is displayed as a delta to the previous display. When the keyword **rate** is specified, the "rate per second" for each statistic is displayed instead of the delta.
Monitor commands are similar to **show** commands but only statistical information displays. These commands display selected statistics per the configured number of times at the interval specified.

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

Values 1 — 2147483647

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

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

Values An existing *scheduler-name* is in the form of a string up to 32 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

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

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

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

sap

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

Context monitor>qos>scheduler-stats

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

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

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

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

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

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

Values An existing *scheduler-name* in the form of a string up to 32 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

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

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

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

Default 11 seconds

Values 11 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

subscriber

Syntax **subscriber** *sub-ident-string* [**scheduler** *scheduler-name*] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>qos>scheduler-stats

Description This command monitors cheduler statistics for a subscriber.

Parameters *sub-ident-string* — Specifies an existing subscriber a identification policy name.

scheduler *scheduler-name* — Specify an existing QoS scheduler policy name. Scheduler names are configured in the `config>qos>scheduler-policy>tier level` context.

Values An existing *scheduler-name* in the form of a string up to 32 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

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

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

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

Default 11 seconds

Values 11 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

port

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

Context monitor>qos>scheduler-stats

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

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

Values slot/mda/port

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

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

Values 1— 65535

ingress — Specifies statistics are for an ingress queue group.

egress — Specifies statistics are for an egress queue group.

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the absolute keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

rate — When the rate keyword is specified, the rate-per-second for each statistic is displayed.

access — Displays scheduler statistics applied on an access port.

network — Displays scheduler statistics applied on a network port.

port

Syntax **port** *port-id* **vport** *name* **[interval** *seconds***] [repeat** *repeat***][absolute|rate]**

Context monitor>qos>scheduler-stats

Description This command monitors scheduler statistics in a VPORT.

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

Values slot/mda/port

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

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the absolute keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

rate — When the rate keyword is specified, the rate-per-second for each statistic is displayed.

sap

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

Context monitor>qos>scheduler-stats

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

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

encap-group *group-name* **—** Displays statistics for the encap group.

member *encap-id* **—** The value of the encap-id to be displayed.

Values 0 - 16777215

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

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

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the absolute keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

rate — When the rate keyword is specified, the rate-per-second for each statistic is displayed.

subscriber

Syntax **subscriber** *sub-ident-string* **[interval** *seconds***] [repeat** *repeat***] [absolute|rate] sap** *sap-id* **sla-profile** *sla-profile-name*

Context monitor>qos>scheduler-stats

Description This command monitors scheduler statistics for an SLA profile.

Parameters **subscriber** *sub-ident-string* **—** Specifies an existing subscriber a identification policy name.

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the absolute keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

rate — When the rate keyword is specified, the rate-per-second for each statistic is displayed.

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

sla-profile *sla-profile-name* **—** Specifies the SLA profile belonging to the subscriber host.

router

Syntax **router** *router-instance*

Context monitor

Description This command enables the context to configure criteria to monitor statistical information for BGP, LDP, MPLS, OSPF, OSPF3, PIM,RIP, and RSVP protocols.

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

Values

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

Default Base

neighbor

Syntax **neighbor** *ip-address* [*ip-address*...(up to 5 max)] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>router>bgp

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

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

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

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

Parameters **neighbor** *ip-address* **—** Displays damping information for entries received from the BGP neighbor. Up to 5 IP addresses can be specified.

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

```
A:ALA-12>monitor>router>bgp# neighbor 180.0.0.10 interval 3 repeat 3 absolute
===============================================================================
Monitor statistics for BGP Neighbor 180.0.0.10
===============================================================================
At time t = 0 sec
-------------------------------------------------------------------------------
Recd. Prefixes   : 2                    Sent Prefixes    : 0
Recd. Paths      : 0                    Suppressed Paths : 0
Num of Flaps     : 0
i/p Messages     : 916                  o/p Messages     : 916
i/p Octets       : 17510                o/p Octets       : 17386
i/p Updates      : 2                    o/p Updates      : 0
-------------------------------------------------------------------------------
At time t = 3 sec
-------------------------------------------------------------------------------
Recd. Prefixes   : 0                    Sent Prefixes    : 0
Recd. Paths      : 0                    Suppressed Paths : 0
Num of Flaps     : 0
i/p Messages     : 0                    o/p Messages     : 0
i/p Octets       : 0                    o/p Octets       : 0
i/p Updates      : 0                    o/p Updates      : 0
-------------------------------------------------------------------------------
At time t = 6 sec
-------------------------------------------------------------------------------
Recd. Prefixes   : 0                    Sent Prefixes    : 0
Recd. Paths      : 0                    Suppressed Paths : 0
Num of Flaps     : 0
i/p Messages     : 0                    o/p Messages     : 0
i/p Octets       : 0                    o/p Octets       : 0
i/p Updates      : 0                    o/p Updates      : 0
-------------------------------------------------------------------------------
At time t = 9 sec
-------------------------------------------------------------------------------
Recd. Prefixes   : 0                    Sent Prefixes    : 0
Recd. Paths      : 0                    Suppressed Paths : 0
Num of Flaps     : 0
i/p Messages     : 0                    o/p Messages     : 0
i/p Octets       : 6                    o/p Octets       : 0
i/p Updates      : 0                    o/p Updates      : 0
===============================================================================
A:ALA-12>monitor>router>bgp#
```

statistics

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

Context monitor>router>isis

Description This command displays statistical IS-IS traffic information at the configured interval until the configured count is reached.

The first screen displays the current statistics related to the specified router statistics. The subsequent statistical information listed for each interval is displayed as a delta to the previous display. When the keyword **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 **interval** *seconds* **—** Configures the interval for each display in seconds.

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

```
A:ALA-12>monitor>router>isis# statistics interval 3 repeat 2 absolute
===============================================================================
ISIS Statistics
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
ISIS Instance     : 1                       SPF Runs       : 2
Purge Initiated   : 0                       LSP Regens.    : 11

CSPF Statistics

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

```
Purge Initiated   : 0                       LSP Regens.    : 11

CSPF Statistics

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

CSPF Statistics

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


A:ALA-12>monitor>router>isis# statistics interval 3 repeat 2 rate
===============================================================================
ISIS Statistics
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
ISIS Instance     : 1                       SPF Runs       : 2
Purge Initiated   : 0                       LSP Regens.    : 11

CSPF Statistics

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

```
CSPF Statistics

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

CSPF Statistics

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

session

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

Context monitor>router>ldp

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

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

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

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

Parameters *ldp-id* — Specify the IP address of the LDP session to display.

Values *ip-address*[:*label-space*]
ip-address — a.b.c.d
label-space — [0..65535]

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

Default 5 seconds

Values 3 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

```
A:ALA-103>monitor>router>ldp# session 10.10.10.104 interval 3 repeat 3 absolute
===============================================================================
Monitor statistics for LDP Session 10.10.10.104
===============================================================================
                            Sent                    Received
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
FECs                        1                       2
Hello                       5288                    5289
Keepalive                   8225                    8225
Init                        1                       1
Label Mapping               1                       4
Label Request               0                       0
Label Release               0                       0
Label Withdraw              0                       0
Label Abort                 0                       0
Notification                0                       0
Address                     1                       1
Address Withdraw            0                       0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Absolute)
-------------------------------------------------------------------------------
FECs                        1                       2
Hello                       5288                    5289
Keepalive                   8226                    8226
Init                        1                       1
Label Mapping               1                       4
Label Request               0                       0
Label Release               0                       0
Label Withdraw              0                       0
Label Abort                 0                       0
Notification                0                       0
Address                     1                       1
Address Withdraw            0                       0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Absolute)
-------------------------------------------------------------------------------
FECs                        1                       2
Hello                       5288                    5290
```

```
Keepalive                     8226                    8226
Init                          1                       1
Label Mapping                 1                       4
Label Request                 0                       0
Label Release                 0                       0
Label Withdraw                0                       0
Label Abort                   0                       0
Notification                  0                       0
Address                       1                       1
Address Withdraw              0                       0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Absolute)
-------------------------------------------------------------------------------
FECs                          1                       2
Hello                         5288                    5290
Keepalive                     8226                    8226
Init                          1                       1
Label Mapping                 1                       4
Label Request                 0                       0
Label Release                 0                       0
Label Withdraw                0                       0
Label Abort                   0                       0
Notification                  0                       0
Address                       1                       1
Address Withdraw              0                       0
===============================================================================
A:ALA-12>monitor>router>ldp#


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

```
Notification                0                         0
Address                     0                         0
Address Withdraw            0                         0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Rate)
-------------------------------------------------------------------------------
FECs                        0                         0
Hello                       0                         0
Keepalive                   0                         0
Init                        0                         0
Label Mapping               0                         0
Label Request               0                         0
Label Release               0                         0
Label Withdraw              0                         0
Label Abort                 0                         0
Notification                0                         0
Address                     0                         0
Address Withdraw            0                         0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------------
FECs                        0                         0
Hello                       0                         0
Keepalive                   0                         0
Init                        0                         0
Label Mapping               0                         0
Label Request               0                         0
Label Release               0                         0
Label Withdraw              0                         0
Label Abort                 0                         0
Notification                0                         0
Address                     0                         0
Address Withdraw            0                         0
===============================================================================
A:ALA-12>monitor>router>ldp#
```

statistics

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

Context monitor>router>ldp

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

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

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

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

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


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

```
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------------
Addr FECs Sent    : 0                    Addr FECs Recv     : 0
Serv FECs Sent    : 0                    Serv FECs Recv     : 0
===============================================================================
A:ALA-12>monitor>router>ldp#
```

interface

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

Context monitor>router>mpls

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

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

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

Parameters *interface* — Specify the interface's IP address (*ip-address*) or interface name (*ip-int-name*). Up to 5 interfaces can be specified. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

```
A:ALA-12>monitor>router>mpls# interface system interval 3 repeat 3 absolute
===============================================================================
Monitor statistics for MPLS Interface "system"
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
  Transmitted  : Pkts - 0                    Octets - 0
  Received     : Pkts - 0                    Octets - 0
-------------------------------------------------------------------------------
```

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


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

lsp-egress-statistics

Syntax **lsp-egress-stats** *lsp-name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>router>mpls

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

Default **no lsp-egress-statistics**

Parameters **repeat** *repeat* **—** Specifies how many times the command is repeated.

Values 10

Values 1 — 999

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

Values 10

Values 3 — 60

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample

```
B:Dut-C-cpm2# monitor router mpls lsp-egress-stats sample repeat 3 interval 10 absolute
===============================================================================
Monitor egress statistics for MPLS LSP "sample"
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
LSP Name      : sample
-------------------------------------------------------------------------------
Collect Stats : Enabled                Accting Plcy. : 5
Adm State     : Up                     PSB Match     : True
FC BE
InProf Pkts   : 0                      OutProf Pkts  : 551
InProf Octets : 0                      OutProf Octets: 560918
FC L2
InProf Pkts   : 0                      OutProf Pkts  : 551
InProf Octets : 0                      OutProf Octets: 560918
FC AF
InProf Pkts   : 551                    OutProf Pkts  : 0
InProf Octets : 560918                 OutProf Octets: 0
FC L1
InProf Pkts   : 551                    OutProf Pkts  : 0
InProf Octets : 560918                 OutProf Octets: 0
FC H2
InProf Pkts   : 0                      OutProf Pkts  : 551
InProf Octets : 0                      OutProf Octets: 560918
FC EF
InProf Pkts   : 0                      OutProf Pkts  : 551
InProf Octets : 0                      OutProf Octets: 560918
FC H1
InProf Pkts   : 0                      OutProf Pkts  : 551
InProf Octets : 0                      OutProf Octets: 560918
FC NC
InProf Pkts   : 551                    OutProf Pkts  : 0
InProf Octets : 560918                 OutProf Octets: 0
-------------------------------------------------------------------------------
At time t = 10 sec (Mode: Absolute)
-------------------------------------------------------------------------------
LSP Name      : sample
```

```
-------------------------------------------------------------------------------
Collect Stats : Enabled                Accting Plcy. : 5
Adm State     : Up                     PSB Match     : True
FC BE
InProf Pkts   : 0                      OutProf Pkts  : 580
InProf Octets : 0                      OutProf Octets: 590440
FC L2
InProf Pkts   : 0                      OutProf Pkts  : 580
InProf Octets : 0                      OutProf Octets: 590440
FC AF
InProf Pkts   : 580                    OutProf Pkts  : 0
InProf Octets : 590440                 OutProf Octets: 0
FC L1
InProf Pkts   : 580                    OutProf Pkts  : 0
InProf Octets : 590440                 OutProf Octets: 0
FC H2
InProf Pkts   : 0                      OutProf Pkts  : 580
InProf Octets : 0                      OutProf Octets: 590440
FC EF
InProf Pkts   : 0                      OutProf Pkts  : 580
InProf Octets : 0                      OutProf Octets: 590440
FC H1
InProf Pkts   : 0                      OutProf Pkts  : 580
InProf Octets : 0                      OutProf Octets: 590440
FC NC
InProf Pkts   : 580                    OutProf Pkts  : 0
InProf Octets : 590440                 OutProf Octets: 0
-------------------------------------------------------------------------------
At time t = 20 sec (Mode: Absolute)
-------------------------------------------------------------------------------
LSP Name      : sample
-------------------------------------------------------------------------------
Collect Stats : Enabled                Accting Plcy. : 5
Adm State     : Up                     PSB Match     : True
FC BE
InProf Pkts   : 0                      OutProf Pkts  : 609
InProf Octets : 0                      OutProf Octets: 619962
FC L2
InProf Pkts   : 0                      OutProf Pkts  : 609
InProf Octets : 0                      OutProf Octets: 619962
FC AF
InProf Pkts   : 609                    OutProf Pkts  : 0
InProf Octets : 619962                 OutProf Octets: 0
FC L1
InProf Pkts   : 609                    OutProf Pkts  : 0
InProf Octets : 619962                 OutProf Octets: 0
FC H2
InProf Pkts   : 0                      OutProf Pkts  : 609
InProf Octets : 0                      OutProf Octets: 619962
FC EF
InProf Pkts   : 0                      OutProf Pkts  : 609
InProf Octets : 0                      OutProf Octets: 619962
FC H1
InProf Pkts   : 0                      OutProf Pkts  : 609
InProf Octets : 0                      OutProf Octets: 619962
FC NC
InProf Pkts   : 609                    OutProf Pkts  : 0
InProf Octets : 619962                 OutProf Octets: 0
-------------------------------------------------------------------------------
At time t = 30 sec (Mode: Absolute)
-------------------------------------------------------------------------------
```

```
LSP Name      : sample
-------------------------------------------------------------------------------
Collect Stats : Enabled                Accting Plcy. : 5
Adm State     : Up                     PSB Match     : True
FC BE
InProf Pkts   : 0                      OutProf Pkts  : 638
InProf Octets : 0                      OutProf Octets: 649484
FC L2
InProf Pkts   : 0                      OutProf Pkts  : 638
InProf Octets : 0                      OutProf Octets: 649484
FC AF
InProf Pkts   : 638                    OutProf Pkts  : 0
InProf Octets : 649484                 OutProf Octets: 0
FC L1
InProf Pkts   : 638                    OutProf Pkts  : 0
InProf Octets : 649484                 OutProf Octets: 0
FC H2
InProf Pkts   : 0                      OutProf Pkts  : 638
InProf Octets : 0                      OutProf Octets: 649484
FC EF
InProf Pkts   : 0                      OutProf Pkts  : 638
InProf Octets : 0                      OutProf Octets: 649484
FC H1
InProf Pkts   : 0                      OutProf Pkts  : 638
InProf Octets : 0                      OutProf Octets: 649484
FC NC
InProf Pkts   : 638                    OutProf Pkts  : 0
InProf Octets : 649484                 OutProf Octets: 0
===============================================================================
B:Dut-C-cpm2#
```

lsp-ingress-statistics

Syntax **lsp-ingress-stats lsp** *lsp-name* **sender** *sender-address* [**interval** *seconds*] [**repeat** *repeat*] [**absolute | rate**]

Context monitor>router>mpls

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

Parameters **repeat** *repeat* **—** Specifies how many times the command is repeated.

Values 10

Values 1 — 999

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

Values 10

Values 3 — 60

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

```
B:Dut-C-cpm2# monitor router mpls lsp-ingress-stats lsp sample 1.1.1.1 repeat 3 interval 10
absolute
===============================================================================
Monitor ingress statistics for MPLS LSP "sample"
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
LSP Name      : sample
Sender        : 1.1.1.1
-------------------------------------------------------------------------------
Collect Stats : Enabled                Accting Plcy. : None
Adm State     : Up                     PSB Match     : True
FC BE
InProf Pkts   : 539                    OutProf Pkts  : 0
InProf Octets : 548702                 OutProf Octets: 0
FC L2
InProf Pkts   : 0                      OutProf Pkts  : 539
InProf Octets : 0                      OutProf Octets: 548702
FC AF
InProf Pkts   : 0                      OutProf Pkts  : 0
InProf Octets : 0                      OutProf Octets: 0
FC L1
InProf Pkts   : 1078                   OutProf Pkts  : 0
InProf Octets : 1097404                OutProf Octets: 0
FC H2
InProf Pkts   : 0                      OutProf Pkts  : 539
InProf Octets : 0                      OutProf Octets: 548702
FC EF
InProf Pkts   : 539                    OutProf Pkts  : 0
InProf Octets : 548702                 OutProf Octets: 0
FC H1
InProf Pkts   : 539                    OutProf Pkts  : 0
InProf Octets : 548702                 OutProf Octets: 0
FC NC
InProf Pkts   : 0                      OutProf Pkts  : 539
InProf Octets : 0                      OutProf Octets: 548702
-------------------------------------------------------------------------------
At time t = 10 sec (Mode: Absolute)
-------------------------------------------------------------------------------
LSP Name      : sample
Sender        : 1.1.1.1
-------------------------------------------------------------------------------
Collect Stats : Enabled                Accting Plcy. : None
Adm State     : Up                     PSB Match     : True
FC BE
InProf Pkts   : 568                    OutProf Pkts  : 0
InProf Octets : 578224                 OutProf Octets: 0
FC L2
InProf Pkts   : 0                      OutProf Pkts  : 568
InProf Octets : 0                      OutProf Octets: 578224
FC AF
InProf Pkts   : 0                      OutProf Pkts  : 0
InProf Octets : 0                      OutProf Octets: 0
FC L1
InProf Pkts   : 1136                   OutProf Pkts  : 0
InProf Octets : 1156448                OutProf Octets: 0
FC H2
InProf Pkts   : 0                      OutProf Pkts  : 568
```

```
InProf Octets : 0                       OutProf Octets: 578224
FC EF
InProf Pkts   : 568                     OutProf Pkts  : 0
InProf Octets : 578224                  OutProf Octets: 0
FC H1
InProf Pkts   : 568                     OutProf Pkts  : 0
InProf Octets : 578224                  OutProf Octets: 0
FC NC
InProf Pkts   : 0                       OutProf Pkts  : 568
InProf Octets : 0                       OutProf Octets: 578224
-------------------------------------------------------------------------------
At time t = 20 sec (Mode: Absolute)
-------------------------------------------------------------------------------
LSP Name      : sample
Sender        : 1.1.1.1
-------------------------------------------------------------------------------
Collect Stats : Enabled                 Accting Plcy. : None
Adm State     : Up                      PSB Match     : True
FC BE
InProf Pkts   : 597                     OutProf Pkts  : 0
InProf Octets : 607746                  OutProf Octets: 0
FC L2
InProf Pkts   : 0                       OutProf Pkts  : 597
InProf Octets : 0                       OutProf Octets: 607746
FC AF
InProf Pkts   : 0                       OutProf Pkts  : 0
InProf Octets : 0                       OutProf Octets: 0
FC L1
InProf Pkts   : 1194                    OutProf Pkts  : 0
InProf Octets : 1215492                 OutProf Octets: 0
FC H2
InProf Pkts   : 0                       OutProf Pkts  : 597
InProf Octets : 0                       OutProf Octets: 607746
FC EF
InProf Pkts   : 597                     OutProf Pkts  : 0
InProf Octets : 607746                  OutProf Octets: 0
FC H1
InProf Pkts   : 597                     OutProf Pkts  : 0
InProf Octets : 607746                  OutProf Octets: 0
FC NC
InProf Pkts   : 0                       OutProf Pkts  : 597
InProf Octets : 0                       OutProf Octets: 607746
-------------------------------------------------------------------------------
At time t = 30 sec (Mode: Absolute)
-------------------------------------------------------------------------------
LSP Name      : sample
Sender        : 1.1.1.1
-------------------------------------------------------------------------------
Collect Stats : Enabled                 Accting Plcy. : None
Adm State     : Up                      PSB Match     : True
FC BE
InProf Pkts   : 627                     OutProf Pkts  : 0
InProf Octets : 638286                  OutProf Octets: 0
FC L2
InProf Pkts   : 0                       OutProf Pkts  : 627
InProf Octets : 0                       OutProf Octets: 638286
FC AF
InProf Pkts   : 0                       OutProf Pkts  : 0
InProf Octets : 0                       OutProf Octets: 0
FC L1
InProf Pkts   : 1254                    OutProf Pkts  : 0
```

```
InProf Octets : 1276572                OutProf Octets: 0
FC H2
InProf Pkts   : 0                      OutProf Pkts  : 627
InProf Octets : 0                      OutProf Octets: 638286
FC EF
InProf Pkts   : 627                    OutProf Pkts  : 0
InProf Octets : 638286                 OutProf Octets: 0
FC H1
InProf Pkts   : 627                    OutProf Pkts  : 0
InProf Octets : 638286                 OutProf Octets: 0
FC NC
InProf Pkts   : 0                      OutProf Pkts  : 627
InProf Octets : 0                      OutProf Octets: 638286
===============================================================================
B:Dut-C-cpm2#
```

ospf

Syntax **ospf** [*ospf-instance*]

Context monitor>router>ospf

Description This command enables the context to configure monitor commands for the OSPF instance.

Parameters *ospf-instance* — Specifies the OSPF instance.

Values 1 — 31

ospf3

Syntax **ospf3**

Context monitor>router

Description This command enables the context to configure monitor commands for the OSPF3 instance.

interface

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

Context monitor>router>ospf
monitor>router>ospf3

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

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

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

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

Parameters *interface* — Specify the interface's IP address (*ip-address*s) or interface name (*ip-int-name*). Up to 5 interfaces can be specified. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

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

```
Bad Auth Types : 0                    Auth Failures  : 0
Bad Neighbors  : 0                    Bad Pkt Types  : 0
Bad Lengths    : 0                    Bad Hello Int. : 0
Bad Dead Int.  : 0                    Bad Options    : 0
Bad Versions   : 0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Tot Rx Packets : 8380                 Tot Tx Packets : 8529
Rx Hellos      : 8226                 Tx Hellos      : 8369
Rx DBDs        : 6                    Tx DBDs        : 12
Rx LSRs        : 2                    Tx LSRs        : 1
Rx LSUs        : 55                   Tx LSUs        : 95
Rx LS Acks     : 91                   Tx LS Acks     : 52
Retransmits    : 2                    Discards       : 0
Bad Networks   : 0                    Bad Virt Links : 0
Bad Areas      : 0                    Bad Dest Addrs : 0
Bad Auth Types : 0                    Auth Failures  : 0
Bad Neighbors  : 0                    Bad Pkt Types  : 0
Bad Lengths    : 0                    Bad Hello Int. : 0
Bad Dead Int.  : 0                    Bad Options    : 0
Bad Versions   : 0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Tot Rx Packets : 8380                 Tot Tx Packets : 8529
Rx Hellos      : 8226                 Tx Hellos      : 8369
Rx DBDs        : 6                    Tx DBDs        : 12
Rx LSRs        : 2                    Tx LSRs        : 1
Rx LSUs        : 55                   Tx LSUs        : 95
Rx LS Acks     : 91                   Tx LS Acks     : 52
Retransmits    : 2                    Discards       : 0
Bad Networks   : 0                    Bad Virt Links : 0
Bad Areas      : 0                    Bad Dest Addrs : 0
Bad Auth Types : 0                    Auth Failures  : 0
Bad Neighbors  : 0                    Bad Pkt Types  : 0
Bad Lengths    : 0                    Bad Hello Int. : 0
Bad Dead Int.  : 0                    Bad Options    : 0
Bad Versions   : 0
===============================================================================
A:ALA-12>monitor>router>ospf#


A:ALA-12>monitor>router>ospf# interface to-104 interval 3 repeat 3 rate
===============================================================================
Monitor statistics for OSPF Interface "to-104"
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Tot Rx Packets : 8381                 Tot Tx Packets : 8530
Rx Hellos      : 8227                 Tx Hellos      : 8370
Rx DBDs        : 6                    Tx DBDs        : 12
Rx LSRs        : 2                    Tx LSRs        : 1
Rx LSUs        : 55                   Tx LSUs        : 95
Rx LS Acks     : 91                   Tx LS Acks     : 52
Retransmits    : 2                    Discards       : 0
Bad Networks   : 0                    Bad Virt Links : 0
Bad Areas      : 0                    Bad Dest Addrs : 0
Bad Auth Types : 0                    Auth Failures  : 0
Bad Neighbors  : 0                    Bad Pkt Types  : 0
Bad Lengths    : 0                    Bad Hello Int. : 0
```

```
Bad Dead Int.  : 0                      Bad Options    : 0
Bad Versions   : 0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Rate)
-------------------------------------------------------------------------------
Tot Rx Packets : 0                      Tot Tx Packets : 0
Rx Hellos      : 0                      Tx Hellos      : 0
Rx DBDs        : 0                      Tx DBDs        : 0
Rx LSRs        : 0                      Tx LSRs        : 0
Rx LSUs        : 0                      Tx LSUs        : 0
Rx LS Acks     : 0                      Tx LS Acks     : 0
Retransmits    : 0                      Discards       : 0
Bad Networks   : 0                      Bad Virt Links : 0
Bad Areas      : 0                      Bad Dest Addrs : 0
Bad Auth Types : 0                      Auth Failures  : 0
Bad Neighbors  : 0                      Bad Pkt Types  : 0
Bad Lengths    : 0                      Bad Hello Int. : 0
Bad Dead Int.  : 0                      Bad Options    : 0
Bad Versions   : 0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Rate)
-------------------------------------------------------------------------------
Tot Rx Packets : 0                      Tot Tx Packets : 0
Rx Hellos      : 0                      Tx Hellos      : 0
Rx DBDs        : 0                      Tx DBDs        : 0
Rx LSRs        : 0                      Tx LSRs        : 0
Rx LSUs        : 0                      Tx LSUs        : 0
Rx LS Acks     : 0                      Tx LS Acks     : 0
Retransmits    : 0                      Discards       : 0
Bad Networks   : 0                      Bad Virt Links : 0
Bad Areas      : 0                      Bad Dest Addrs : 0
Bad Auth Types : 0                      Auth Failures  : 0
Bad Neighbors  : 0                      Bad Pkt Types  : 0
Bad Lengths    : 0                      Bad Hello Int. : 0
Bad Dead Int.  : 0                      Bad Options    : 0
Bad Versions   : 0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------------
Tot Rx Packets : 0                      Tot Tx Packets : 0
Rx Hellos      : 0                      Tx Hellos      : 0
Rx DBDs        : 0                      Tx DBDs        : 0
Rx LSRs        : 0                      Tx LSRs        : 0
Rx LSUs        : 0                      Tx LSUs        : 0
Rx LS Acks     : 0                      Tx LS Acks     : 0
Retransmits    : 0                      Discards       : 0
Bad Networks   : 0                      Bad Virt Links : 0
Bad Areas      : 0                      Bad Dest Addrs : 0
Bad Auth Types : 0                      Auth Failures  : 0
Bad Neighbors  : 0                      Bad Pkt Types  : 0
Bad Lengths    : 0                      Bad Hello Int. : 0
Bad Dead Int.  : 0                      Bad Options    : 0
Bad Versions   : 0
===============================================================================
A:ALA-12>monitor>router>ospf#
```

neighbor

Syntax **neighbor** *ip-address* [*ip-address*...(up to 5 max)] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>router>ospf

Description This command displays statistical OSPF or OSPF3 neighbor information at the configured interval until the configured count is reached.

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

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

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

Parameters **neighbor** *ip-address* **—** The IP address to display information for entries received from the specified OPSF neighbor. Up to 5 IP addresses can be specified.

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

Sample Output

```
A:ALA-12>monitor>router# ospf neighbor 10.0.0.104 interval 3 repeat 3 absolute
===============================================================================
Monitor statistics for OSPF Neighbor 10.0.0.104
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Bad Nbr States   : 0                    LSA Inst fails   : 0
Bad Seq Nums     : 0                    Bad MTUs         : 0
Bad Packets      : 0                    LSA not in LSDB  : 0
Option Mismatches: 0                    Nbr Duplicates   : 0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Bad Nbr States   : 0                    LSA Inst fails   : 0
Bad Seq Nums     : 0                    Bad MTUs         : 0
Bad Packets      : 0                    LSA not in LSDB  : 0
Option Mismatches: 0                    Nbr Duplicates   : 0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Absolute)
-------------------------------------------------------------------------------
```

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


A:ALA-12>monitor>router# ospf neighbor 10.0.0.104 interval 3 repeat 3 absolute
===============================================================================
Monitor statistics for OSPF Neighbor 10.0.0.104
===============================================================================
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Bad Nbr States   : 0                    LSA Inst fails   : 0
Bad Seq Nums     : 0                    Bad MTUs         : 0
Bad Packets      : 0                    LSA not in LSDB  : 0
Option Mismatches: 0                    Nbr Duplicates   : 0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Rate)
-------------------------------------------------------------------------------
Bad Nbr States   : 0                    LSA Inst fails   : 0
Bad Seq Nums     : 0                    Bad MTUs         : 0
Bad Packets      : 0                    LSA not in LSDB  : 0
Option Mismatches: 0                    Nbr Duplicates   : 0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Rate)
-------------------------------------------------------------------------------
Bad Nbr States   : 0                    LSA Inst fails   : 0
Bad Seq Nums     : 0                    Bad MTUs         : 0
Bad Packets      : 0                    LSA not in LSDB  : 0
Option Mismatches: 0                    Nbr Duplicates   : 0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------------
Bad Nbr States   : 0                    LSA Inst fails   : 0
Bad Seq Nums     : 0                    Bad MTUs         : 0
Bad Packets      : 0                    LSA not in LSDB  : 0
Option Mismatches: 0                    Nbr Duplicates   : 0
===============================================================================
A:ALA-12>monitor>router#
```

neighbor

Syntax **neighbor** [*router-id*] [*interface-name*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>router>ospf3

Description This command displays statistical OSPF or OSPF3 neighbor information at the configured interval until the configured count is reached.

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

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

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

Parameters **neighbor** *ip-address* **—** The IP address to display information for entries received from the specified OSPF neighbor. Up to 5 IP addresses can be specified.

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

router-id — The router ID for an existing IP interface.

virtual-link

Syntax **virtual-link** *nbr-rtr-id* **area** *area-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>router>ospf
monitor>router>ospf3

Description This command displays statistical OSPF virtual link information at the configured interval until the configured count is reached.

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

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

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

Parameters *nbr-rtr-id* — The IP address to uniquely identify a neighboring router in the autonomous system.

area *area-id* — The OSPF area ID, expressed in dotted decimal notation or as a 32-bit decimal integer.

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

Default 5 seconds

Values 3 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

virtual-neighbor

Syntax **virtual-neighbor** *nbr-rtr-id* **area** *area-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>router>ospf
monitor>router>ospf3

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

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

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

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

Parameters *nbr-rtr-id* — The IP address to uniquely identify a neighboring router in the autonomous system.

area *area-id* — The OSPF area ID, expressed in dotted decimal notation or as a 32-bit decimal integer.

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

group

Syntax **group** *grp-ip-address* [**source** *ip-address*] [**interval** *interval*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>router>pim

Description This command monitors statistics for a PIM source group.

Parameters *grp-ip-address* — The IP address of an multicast group that identifies a set of recipients that are interested in a particular data stream.

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

Default The IP address of the egress IP interface.

Values 0.0.0.0 — 255.255.255.255

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

Default 10 seconds

Values 10|20|30|40|50|60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

neighbor

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

Context monitor>router>rip

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

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

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

Parameters **neighbor** *ip-address* **—** The IP address to display information for entries received from the specified RIP neighbor. Up to 5 IP addresses can be displayed.

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

Default 5 seconds

Values 3 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

interface

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

Context monitor>router>rsvp

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

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

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

Parameters *interface* — Specify the interface's IP address (*ip-address*s) or interface name (*ip-int-name*). Up to 5 interfaces can be specified. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

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

Default 5 seconds

Values 3 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

service

Syntax **service**

Context monitor

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

id

Syntax **id** *service-id*

Context monitor>service

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

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

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

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

sap

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

Context monitor>service>id *service-id*

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.

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

Values

sap-id:	null	[*port-id* | *bundle-id* | *bpgrp-id* | *lag-id* | *aps-id*]
	dot1q	[*port-id* | *bundle-id* | *bpgrp-id* | *lag-id* | *aps-id*]:*qtag1*
	qinq	[*port-id* | *bundle-id* | *bpgrp-id* | *lag-id*]:*qtag1.qtag2*
	atm	[*port-id* | *aps-id* | *bundle-id* | *bpgrp-id*][:*vpi*/*vci* |*vpi* |*vpi1.vpi2*]
	frame	[*port-id* | *bundle-id*]:*dlci*
	cisco-hdlc	*slot/mda/port.channel*
	port-id	*slot/mda/port*[.*channel*]

aps-id	aps-*group-id*[.*channel*]	
	aps	keyword
	group-id	1 — 64
bundle-*type-slot/mda.bundle-num*		
	bundle	keyword
	type	ima, fr, ppp
	bundle-num	1 — 128
bpgrp-id:	bpgrp-*type-bpgrp-num*	
	bpgrp	keyword
	type	ima
	bpgrp-num	1 — 1280
ccag-id	ccag-*id*.*path-id*[*cc-type*]:*cc-id*	
	ccag	keyword
	id	1 — 8
	path-id	a, b
	cc-type	.sap-net, .net-sap
	cc-id	0 — 4094
lag-id	lag-*id*	
	lag	keyword
	id	1 — 200
qtag1	0 — 4094	
qtag2	*, 0 — 4094	
vpi	NNI	0 — 4095
	UNI	0 — 255
vci	1, 2, 5 — 65535	
dlci	16 — 1022	

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

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

The *port-id* must reference a valid port type. When the *port-id* parameter represents SONET/SDH and TDM channels, the port ID must include the channel ID. A period "." separates the physical port from the *channel-id*. The port must be configured as an access port.

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

bundle-id — Specifies the multilink bundle to be associated with this IP interface. The **bundle** keyword must be entered at the beginning of the parameter.
The command syntax must be configured as follows:

bundle-id: **bundle**-*type-slot-id*/*mda-slot.bundle-num*
bundle-id value range: 1 — 128

For example:

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

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

The command syntax must be configured as follows:

bpgrp-id: bpgrp-*type-bpgrp-num*
type: ima
bpgrp-num value range: 1 — 1280

For example:

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

qtag1, *qtag2* — Specifies the encapsulation value used to identify the SAP on the port or sub-port. If this parameter is not specificially defined, the default value is 0.

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

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

Port Type	Encap-Type	Allowed Values	Comments
Ethernet	Null	0	The SAP is identified by the port.
Ethernet	Dot1q	0 — 4094	The SAP is identified by the 802.1Q tag on the port. Note that a 0 qtag1 value also accepts untagged packets on the dot1q port.
Ethernet	QinQ	qtag1: 0 — 4094 qtag2: 0 — 4094	The SAP is identified by two 802.1Q tags on the port. Note that a 0 qtag1 value also accepts untagged packets on the dot1q port.
SONET/SDH	IPCP	-	The SAP is identified by the channel. No BCP is deployed and all traffic is IP.
SONET/SDH TDM	BCP-Null	0	The SAP is identified with a single service on the channel. Tags are assumed to be part of the customer packet and not a service delimiter.
SONET/SDH TDM	BCP-Dot1q	0 — 4094	The SAP is identified by the 802.1Q tag on the channel.
SONET/SDH TDM	Frame Relay	16 — 991	The SAP is identified by the data link connection identifier (DLCI).
SONET/SDH ATM	ATM	vpi (NNI) 0 — 4095 vpi (UNI) 0 — 255 vci 1, 2, 5 — 65535 -	The SAP is identified by port or by PVPC or PVCC identifier (vpi, vpi/vci, or vpi range)

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

Default 11 seconds

Values 11 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the absolute rate-per-second value for each statistic is displayed.

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

Sample Output

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

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

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

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

sdp

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

Context monitor>service>id *service-id*

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

Parameters *sdp-id* — Specify the SDP identifier.

Values 1 — 17407

far-end *ip-address* **—** The system address of the far-end SR OS router for the SDP in dotted decimal notation.

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

Default 11 seconds

Values 11 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the absolute rate-per-second value for each statistic is displayed.

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

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#
```

vrrp

Syntax **vrrp**

Context monitor>router

Description This command enables the context to configure criteria to monitor VRRP statistical information for a VRRP enabled on a specific interface.

instance

Syntax **instance interface** *interface-name* **vr-id** *virtual-router-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>router>vrrp

Description Monitor statistics for a VRRP instance.

Parameters *interface-name* — The name of the existing IP interface on which VRRP is configured.

vr-id *virtual-router-id* **—** The virtual router ID for the existing IP interface, expressed as a decimal integer.

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

Default 5 seconds

Values 3 **—** 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

subscriber

Syntax **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [**base** | **ingress-queue-id** *ingress-queue-id* | **egress-queue-id** *egress-queue-id*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>service

Description This command monitors statistics for a subscriber.

Parameters **sub-ident-string —** Specifies an existing subscriber identification profile to monitor.

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

Values dlci 16 — 1022

sla-profile *sla-profile-name* **—** Specifies an existing SLA profile.

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

Default 11

Values 11 — 60

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

Default 10

Values 1 — 999

absolute — When the **absolute** keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

Default mode delta

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

base — Monitor base statistics.

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

Values 1 — 32

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

Values 1 — 8

Sample Output

```
A:Dut-A# monitor service subscriber alcatel_100 sap 1/2/1:101 sla-profile sla_default
===============================================================================
Monitor statistics for Subscriber alcatel_100
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
SLA Profile Instance statistics
-------------------------------------------------------------------------------
                         Packets                 Octets
Off. HiPrio           : 0                       0
Off. LowPrio          : 94531                   30704535
Off. Uncolor          : 0                       0

Queueing Stats (Ingress QoS Policy 1000)
Dro. HiPrio           : 0                       0
Dro. LowPrio          : 7332                    2510859
For. InProf           : 0                       0
For. OutProf          : 87067                   28152288

Queueing Stats (Egress QoS Policy 1000)
Dro. InProf           : 880                     127660
Dro. OutProf          : 0                       0
For. InProf           : 90862                   12995616
For. OutProf          : 0                       0
-------------------------------------------------------------------------------
SLA Profile Instance per Queue statistics
-------------------------------------------------------------------------------
                         Packets                 Octets
```

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

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

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

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

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

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

Egress Queue 3
Dro. InProf           : 0                       0
Dro. OutProf          : 0                       0
For. InProf           : 0                       0
For. OutProf          : 0                       0
===============================================================================
A:Dut-A#


A:Dut-A# monitor service subscriber alcatel_100 sap 1/2/1:101 sla-profile sla_default base
rate
===============================================================================
Monitor statistics for Subscriber alcatel_100
```

```
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
SLA Profile Instance statistics
-------------------------------------------------------------------------------
                        Packets                 Octets
Off. HiPrio           : 0                       0
Off. LowPrio          : 109099                  35427060
Off. Uncolor          : 0                       0
Queueing Stats (Ingress QoS Policy 1000)
Dro. HiPrio           : 0                       0
Dro. LowPrio          : 8449                    2894798
For. InProf           : 0                       0
For. OutProf          : 100523                  32489663
Queueing Stats (Egress QoS Policy 1000)
Dro. InProf           : 880                     127660
Dro. OutProf          : 0                       0
For. InProf           : 105578                  15104553
For. OutProf          : 0                       0
-------------------------------------------------------------------------------
At time t = 11 sec (Mode: Rate)
-------------------------------------------------------------------------------
SLA Profile Instance statistics
-------------------------------------------------------------------------------
                        Packets                 Octets                  % Port
                                                                        Util.
Off. HiPrio           : 0                       0                       0.00
Off. LowPrio          : 1469                    477795                  0.38
Off. Uncolor          : 0                       0                       0.00
Queueing Stats (Ingress QoS Policy 1000)
Dro. HiPrio           : 0                       0                       0.00
Dro. LowPrio          : 119                     40691                   0.03
For. InProf           : 0                       0                       0.00
For. OutProf          : 1349                    437350                  0.34
Queueing Stats (Egress QoS Policy 1000)
Dro. InProf           : 0                       0                       0.00
Dro. OutProf          : 0                       0                       0.00
For. InProf           : 1469                    209129                  0.16
For. OutProf          : 0                       0                       0.00
===============================================================================
A:Dut-A#


A:Dut-A# monitor service subscriber alcatel_100 sap 1/2/1:101 sla-profile sla_default
ingress-queue-id 1
===============================================================================
Monitor statistics for Subscriber alcatel_100
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
                        Packets                 Octets
Ingress Queue 1 (Unicast) (Priority)
Off. HiPrio           : 0                       0
Off. LowPrio          : 0                       0
Off. Uncolor          : 0                       0
Dro. HiPrio           : 0                       0
Dro. LowPrio          : 0                       0
For. InProf           : 0                       0
For. OutProf          : 0                       0
===============================================================================
A:Dut-A#
```

```
A:Dut-A# monitor service subscriber alcatel_100 sap 1/2/1:101 sla-profile sla_default
egress-queue-id 1
===============================================================================
Monitor statistics for Subscriber alcatel_100
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
                        Packets                 Octets
Egress Queue 1
Dro. InProf           : 880                     127660
Dro. OutProf          : 0                       0
For. InProf           : 164366                  23506178
For. OutProf          : 0                       0
===============================================================================
A:Dut-A#
```

Candidate Commands

candidate

Syntax **candidate**

Context <root>

Description This command enables the context to edit candidate configurations.

Commands in the **candidate** CLI branch, except **candidate edit**, are available only when in edit-cfg mode.

edit

Syntax **edit** [**exclusive**]

Context candidate

Description This command enables the edit-cfg mode where changes can be made to the candidate configuration and sets the edit-point to the end of the candidate. In edit-cfg mode the CLI prompt contains **edit-cfg** near the root of the prompt. Commands in the **candidate** CLI branch, except **candidate edit**, are available only when in edit-cfg mode.

Parameters **exclusive —** Allows a user to exclusively create a candidate configuration by blocking other users (and other sessions of the same user) from entering edit-cfg mode. Exclusive edit-cfg mode can only be entered if the candidate configuration is empty and no user is in edit-cfg mode. Once a user is in exclusive edit-cfg mode no other users/sessions are allowed in edit-cfg mode. The user must either commit or discard the exclusive candidate before leaving exclusive edit-cfg mode. If the CLI session times out while a user is in exclusive edit-cfg mode then the contents of the candidate are discarded. The **admin disconnect** command can be used to force a user to disconnect (and to clear the contents of the candidate) if they have the candidate locked.

commit

Syntax **commit** [**confirmed** *timeout*] [**comment** *comment*]
commit no-checkpoint [**confirmed** *timeout*]

Context candidate

Description This command applies the changes in the candidate configuration to the active running configuration. The candidate changes will take operational effect.

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

By default SR OS will automatically create a new rollback checkpoint after a commit operation. The rollback checkpoint will contain the new configuration changes made by the commit. An optional **no-checkpoint** keyword can be used to avoid the auto-creation of a rollback checkpoint after a commit.

A commit operation is blocked if a rollback revert is currently being processed.

Parameters **confirmed —** Specifies that the commit operation (if successful) should be automatically reverted (undone) at the end of the timeout period unless the operator issues the confirm command before the timeout period expires. A rollback checkpoint is created after the commit operation (if successful) and will remain available whether the commit is auto-reverted or not. The contents of the candidate will remain visible (candidate view) and changes to the candidate are blocked until the timeout is completed or the candidate confirm command is executed. If the timeout expires and an auto-revert occurs, then the original candidate config will be available in edit-cfg mode.

Standard line-by-line non-transactional configuration commands (including via SNMP) are not blocked during the countdown period and any changes made to the configuration during the countdown period will be rolled back if the timeout expires. The confirmed option is useful when changes are being made that could impact management reachability to the router.

A rollback revert is blocked during the countdown period until the commit has been confirmed.

timeout — The auto-revert timeout period in minutes.

Values 1 — 168

no-checkpoint — Used to avoid the automatic creation of a rollback checkpoint for a successful commit.

comment *comment* **—** Adds a comment up to 255 characters in length to the automatic rollback checkpoint.

confirm

Syntax **confirm**

Context candidate

Description This command is used to stop an automatic reversion to the previous configuration after the **candidate commit confirmed** command was used. If the confirm command is not executed before the commit confirmed timeout period expires then the previous commit changes will be undone and the previous candidate configuration will be available for editing and a subsequent commit.

During the countdown the contents of the candidate will remain visible (candidate view) and changes to the candidate are blocked until the timeout is completed or the candidate confirm command is executed. Executing the confirm command clears the contents of the candidate and allows editing of the candidate.

copy

Syntax **copy** [**line**]

Context candidate

Description This command copies the selected CLI node (which includes all sub-branches) into a temporary buffer that can be used for a subsequent insert. The contents of the temporary buffer are deleted when the operator exits the candidate edit mode.

Parameters **line —**

Values line, offset, first, edit-point last
line Absolute line number.
offset Relative line number to current edit point. Prefixed with '+' or '-'
first Keyword - first line
edit-point Keyword - current edit point
last Keyword - last line that is not 'exit'

delete

Syntax **delete** [**line**]

Context candidate

Description This command deletes the selected CLI node (which includes all sub-branches). The deleted lines are also copied into a temporary buffer that can be used for a subsequent insert.

Parameters **line —**

Values line, offset, first, edit-point last
line Absolute line number.
offset Relative line number to current edit point. Prefixed with '+' or '-'.
first Keyword - first line
edit-point Keyword - current edit point
last Keyword - last line that is not 'exit'

discard

Syntax **discard** [**now**]

Context candidate

Description This command deletes the entire contents of the candidate configuration and exits the edit-cfg mode. Undo cannot be used to recover a candidate that has been discarded with **candidate discard**.

Parameters **now —** Avoids a confirmation prompt for the discard.

goto

Syntax **goto line**

Context candidate

Description This command changes the edit point of the candidate configuration. The edit point is the point after which new commands are inserted into the candidate configuration as an operator navigates the CLI and issues commands in edit-cfg mode.

Parameters **line —**

Values line, offset, first, edit-point last
line Absolute line number.
offset Relative line number to current edit point. Prefixed with '+' or '-'.
first Keyword - first line
edit-point Keyword - current edit point
last Keyword - last line that is not 'exit'

insert

Syntax **insert** [**line**]

Context candidate

Description This command inserts the contents of the temporary buffer (populated by a previous copy or delete command) into the candidate configuration. The contents are inserted by default after the current edit point. Optional parameters allow the insertion after some other point of the candidate. The contents of the temporary buffer are deleted when the operator exits candidate edit mode.

Insertions are context-aware. The temporary buffer always stores the CLI context (such as the current CLI branch) for each line deleted or copied. f the lines to be inserted are supported at the context of the insertion point then the lines are simply inserted into the configuration. If the lines to be inserted are not supported at the context of the insertion point, then the context at the insertion point is first closed using multiple exit statements, the context of the lines to be inserted is built (added) into the candidate at the insertion point, then the lines themselves are added, the context of the inserted lines is closed using exit statements and finally the context from the original insertion point is built again leaving the context at the same point as it was before the insertion.

Parameters **line —**

Values line, offset, first, edit-point last
line Absolute line number.
offset Relative line number to current edit point. Prefixed with '+' or '-'.
first Keyword - first line
edit-point Keyword - current edit point
last Keyword - last line that is not 'exit'

load

Syntax **load file-url** [**overwrite** | **insert** | **append**]

Context candidate

Description This command loads a previously saved candidate configuration into the current candidate. The edit point will be set to the end of the loaded configuration lines. The candidate configuration cannot be modified while a load is in progress.

Default If the candidate is empty then a load without any of the optional parameters (such as overwrite, etc) will simply load the file-url into the candidate. If the candidate is not empty then one of the options, such as overwrite, insert, etc., must be specifed.

Parameters **file-url —** The directory and filename to load.

overwrite — Discards the contents of the current candidate and replace it with the contents of the file.

insert — Inserts the contents of the file at the current edit point.

append — Inserts the contents of the file at the end of the current candidate.

quit

Syntax **quit**

Context candidate

Description This command exits the edit-cfg mode. The contents of the current candidate will not be deleted and the operator can continue editing the candidate later.

redo

Syntax **redo** [*count*]

Context candidate

Description This command reapplies the changes to the candidate that were removed using a previous undo. All undo/redo history is lost when the operator exists edit-cfg mode.

A **redo** command is blocked if another user has made changes in the same CLI branches that would be impacted during the redo.

Parameters **count —** The number of previous changes to reapply.

Values 1 — 50

Default 1

replace

Syntax **replace** [**line**]

Context candidate

Description This command displays the specified line (a single line only) and allows it to be changed.

Parameters **line —**

Values line, offset, first, edit-point last

line	Absolute line number.
offset	Relative line number to current edit point. Prefixed with '+' or '-'.
first	Keyword - first line
edit-point	Keyword - current edit point
last	Keyword - last line that is not 'exit'

save

Syntax **save** *file-url*

Context candidate

Description This command saves the current candidate to a file.

Parameters *file-url* — The directory and filename,

undo

Syntax **undo** [*count*]

Context candidate

Description This command removes the most recent change(s) done to the candidate. The changes can be reapplied using the redo command. All undo/redo history is lost when the operator exists edit-cfg mode. Undo can not be used to recover a candidate that has been discarded with **candidate discard**.

An undo command is blocked if another user has made changes in the same CLI branches that would be impacted during the undo.

Parameters **count —** The number of previous changes to remove.

Values 1 — 50

Default 1

view

Syntax **view** [**line**]

Context candidate

Description This command displays the candidate configuration along with line numbers that can be used for editing the candidate configuration.

Parameters **line —** displays the candidate starting at the point indicated by the following options (the display is not limited to the current CLI context/branch)

Values line, offset, first, edit-point last

line Absolute line number.
offset Relative line number to current edit point. Prefixed with '+' or '-'.
first Keyword - first line
edit-point Keyword - current edit point
last Keyword - last line that is not 'exit'

info operational

Syntax **info** {**operational**}

Context <root>

Description In edit-cfg mode, the operational keyword is mandatory when using the **info** command.

candidate

Syntax **candidate**

Context show>system

Description This command shows candidate configuration information.

Output **Candidate Output —** The following table describes the candidate output fields.

Label	Description
Candidate configuration state	• empty — Indicates there are no uncommitted changes in the candidate config. • modified — Indicates there are uncommitted changes in the candidate config. • unconfirmed — Indicates there are no uncommitted changes in the candidate config but the result of the last commit will be auto-reverted unless it is confirmed before the timeout expires.
Num editors/viewers	The number of CLI sessions currently in edit-cfg mode.
Candidate cfg exclusive locked	Indicates if a user has exclusively locked the candidate using the **candidate edit exclusive com**mand.
Last commit state	• none , — Indicates there have been no commits since the last reboot of the node. • in-progress — Indicates the system is currently committing the candidate config. • success — Indicates the last commit finished successfully. • revert-pending — Indicates the last commit finished successfully but has not been confirmed yet, and will be auto-reverted if it is not confirmed before the timeout expires. • failed — Indicates the last commit failed and has been undone. •revert-in-progress — Indicates the last commit finished successfully but was not confirmed in time and is currently being reverted. • reverted — Indicates the last commit finished successfully but was not confirmed in time and has been reverted. • revert-failed — Indicates the last commit finished successfully but was not confirmed in time and the system attempted to revert it but failed.
Last commit time	The time at which the last commit attempt was started.
Checkpoint created with last commit	indicates if a rollback checkpoint was created after the previous commit completed.

Label	Description (Continued)
Scheduled revert time	Used to indicate the currently scheduled auto-revert time based on the confirmed option being used with a candidate commit.
Last commit revert time	The time the commit was last reverted.
Users in edit-cfg mode	Lists all the user sessions that are currently in edit-cfg mode.
Type (from)	Indicates the type of session (such as Console, Telnet, etc.) and also the source of the session (such as the the source IP address of the remote host).

Sample Output

```
*A:bksim3107# show system candidate
===============================================================================
Candidate Config Information
===============================================================================
Candidate configuration state          : modified
Num editors/viewers                    : 0
Candidate cfg exclusive locked         : no
Last commit state                      : revert-failed
Last commit time                       : 10/23/2012 17:21:47
Checkpoint created with last commit    : yes
Scheduled revert time                  : N/A
Last commit revert time                : 10/23/2012 17:22:47

===============================================================================
Users in edit-cfg mode
===============================================================================
Username         Type (from)
===============================================================================
admin            Console
Joris            Telnet (172.31.117.239)
===============================================================================
```

Show Commands

alias

Syntax **alias**

Context <root>

Description This command displays a list of existing aliases.

Output **Show Alias Fields —** The following table describes alias output fields.

Table 21: Show Alias Output Fields

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

Sample Output

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

File System Management

In This Chapter

This chapter provides information about file system management.

Topics in this chapter include:

The File System

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

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

Compact Flash Devices

The file system is based on a DOS file system In the 7750 SR-Series, each control processor can have up to three compact flash devices numbered one through three. The names for these devices are:

- cf1:
- cf2:
- cf3:

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

The compact flash devices on the 7750 SR-Series routers are removable and have an administrative state (shutdown/no shutdown).

NOTE: To prevent corrupting open files in the file system, you should only remove a compact flash that is administratively shutdown. SR OS gracefully closes any open files on the device, so it can be safely removed.

URLs

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

The 7750 SR OS supports operations on both the local file system and on remote files. For the purposes of categorizing the applicability of commands to local and remote file operations, URLs are divided into three types of URLs: local, ftp and tftp. The syntax for each of the URL types are listed in Table 22.

Table 22: URL Types and Syntax

URL Type	Syntax	Notes
local-url	[*cflash-id***:**\]*path*	*cflash-id* is the compact flash device name. Values: cf1:, cf2:, cf3:
ftp-url	**ftp:**//[*username*[**:***password*]**@**]*host*/*path*	An absolute ftp path from the root of the remote file system. *username* is the ftp user name *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.
tftp-url	**tftp:**//*host*[/*path*]/*filename*	tftp is only supported for operations on file-urls.

Note that if the host portion of the URL is an IPv6 address, then the address should be enclosed in square brackets. For example:

```
ftp://user:passw@[3ffe::97]/./testfile.txt
tftp://[1111:2222:3333:4444:5555:6666:7777:8888]/./testfile.txt
```

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

For example, a destination directory specified as "cf1:\dir1\file1" will be transmitted to the SCP server as "cf1:dir1file1" where the backslash escape characters are stripped by the SCP client

system before transmission. On systems where the client treats the backslash like an “escape” character, a double backslash “\\” or the forward slash “/” can typically be used to properly delimit directories and the filename.

Wildcards

7750 SR OS supports the standard DOS wildcard characters. The asterisk (*) can represent zero or more characters in a string of characters, and the question mark (?) can represent any one character.

Example:
```
A:ALA-1>file cf3:\ # copy test*.cfg siliconvalley
cf1:\testfile.cfg
1 file(s) copied.
A:ALA-1>file cf3:\ # cd siliconvalley
A:ALA-1>file cf3:\siliconvalley\ # dir
 Volume in drive cf1 on slot A has no label.
Directory of cf3:\siliconvalley\
05/10/2006 11:32p      <DIR>          .
05/10/2006 11:14p      <DIR>          ..
05/10/2006 11:32p                7597 testfile.cfg
           1 File(s)                  7597 bytes.
           2 Dir(s)                1082368 bytes free.
A:ALA-1>file cf3:\siliconvalley\ #
```

As in a DOS file system, the wildcard characters can only be used in some of the file commands.

Another example of wildcard usage:

```
A:21# show router mpls lsp l-63-8*
===============================================================================
MPLS LSPs (Originating)
===============================================================================
LSP Name                            To                 Fastfail
Adm   Opr
Config
-------------------------------------------------------------------------------
l-63-8-cc                           213.224.245.8      No
Up    Dwn
l-63-8-cw                           213.224.245.8      No
Up    Dwn
-------------------------------------------------------------------------------
LSPs : 2
===============================================================================
A:21#
```

All the commands can operate on the local file system. Table 23 indicates which commands also support remote file operations.

Table 23: File Command Local and Remote File System Support

Command	local-url	ftp-url	tftp-url
attrib	X		
cd	X	X	
copy	X	X	X
delete	X	X	
dir	X	X	
md		X	
move	X	X	
rd		X	
repair			
scp	source only		
type	X	X	X
version	X	X	X
shutdown			

File Management Tasks

The following sections are basic system tasks that can be performed.

Note that when a file system operation is performed with the copy, delete, move, rd, or scp commands that can potentially delete or overwrite a file system entry, a prompt appears to confirm the action. The **force** keyword performs the copy, delete, move, rd, and scp actions without displaying the confirmation prompt.

Modifying File Attributes

The system administrator can change the read-only attribute in the local file. Enter the `attrib` command with no options to display the contents of the directory and the file attributes.
Use the CLI syntax displayed below to modify file attributes:

CLI Syntax:
```
file>
    attrib [+r | -r] file-url
```

The following displays an example of the command syntax:

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

The following displays the file configuration:

```
        A:ALA-1>file cf3:\ # attrib
        cf3:\bootlog.txt
        cf3:\bof.cfg
        cf3:\boot.ldr
        cf3:\bootlog_prev.txt
        cf3:\BOF.SAV
    A:ALA-1>file cf3:\ # attrib +r BOF.SAV
    A:ALA-1>file cf3:\ # attrib
        cf3:\bootlog.txt
        cf3:\bof.cfg
        cf3:\boot.ldr
        cf3:\bootlog_prev.txt
    R   cf3:\BOF.SAV
```

Creating Directories

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

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

Use the CLI syntax displayed below to modify file attributes:

CLI Syntax:
```
file>
 md file-url
```

The following displays an example of the command syntax:

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

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 7750 SR-Series router. The destination file has to be of the format: user@host:file-name. The destination does not need to be local.

Use the CLI syntax displayed below to copy files:

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

The following displays an example of the copy command syntax:

Example:
```
A:ALA-1>file cf1:\ # copy 104.cfg cf1:\test1\test2\test3\test.cfg
A:ALA-1>file cf1:\ # scp file1 admin@192.168.x.x:cf1:\file1
A:ALA-1>file cf1:\ # scp file2 user2@192.168.x.x:/user2/file2
A:ALA-1>file cf1:\ # scp cf2:/file3 admin@192.168.x.x:cf1:\file3
```

Moving Files

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

Use the CLI syntax displayed below to move files:

CLI Syntax:
```
file>
 move old-file-url new-file-url [force]
```

The following displays an example of the command syntax:

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

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

Removing Files and Deleting Directories

Use the `delete` and `rd` commands to delete files and remove directories. Directories must be empty in order to delete them. When file or directories are deleted they cannot be recovered.

Use the CLI syntax displayed below to delete files and remove directories:

CLI Syntax:
```
file>
 delete file-url [force]
 rd file-url [force]
```

The following displays an example of the command syntax:

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

Displaying Directory and File Information

Use the **dir** command to display a list of files on a file system.
The **type** command displays the contents of a file.
The **version** command displays the version of a *.tim file.

Use the CLI syntax displayed below to display directory and file information:

CLI Syntax:
```
file>
 dir [file-url]
 type file-url
 version file-url
```

The following displays an example of the command syntax:

```
A:ALA-1>file cf1:\ # dir
 Volume in drive cf1 on slot A has no label.
Directory of cf1:\
01/01/1980  12:00a               7597 test.cfg
01/01/1980  12:00a                957 b.
08/19/2001  02:14p             230110 BOOTROM.SYS
01/01/1980  12:00a                133 NVRAM.DAT
04/03/2003  05:32a               1709 103.ndx
01/28/2003  05:06a               1341 103.cftg.ndx
01/28/2003  05:06a              20754 103.cftg
04/05/2003  02:20a      <DIR>         test
              15 File(s)                338240 bytes.
               3 Dir(s)                1097728 bytes free.
A:ALA-1>file cf1:\ # type fred.cfg
# Saved to /cflash1/fred.cfg
# Generated THU FEB 21 01:30:09 2002 UTC
exit all
config
#------------------------------------------
# Chassis Commands
#------------------------------------------
card 2 card-type faste-tx-32
exit
#------------------------------------------
# Interface Commands
#------------------------------------------
# Physical port configuration
interface faste 2/1
    shutdown
    mode network
exit
interface faste 2/2
    shutdown
exit
interface faste 2/3
```

```
    shutdown
exit
interface faste 2/4
A:ALA-1>file cf1:\ # version boot.tim
TiMOS-L-1.0.B3-8
A:ALA-1>file cf1:\ #
```

Repairing the File System

Use the repair command to check a compact flash device for errors and repair any errors found.

Use the CLI syntax displayed below to check and repair a compact flash device:

CLI Syntax: `file`
`repair [`*`cflash-id`*`]`

The following displays an example of the command syntax:

```
A:ALA-1>file cf3:\ # repair
Checking drive cf3: on slot A for errors...
Drive cf31: on slot A is OK.
```

File Command Reference

Command Hierarchy

Configuration Commands

file
- — **attrib** [**+r** | **-r**] *file-url*
- — **attrib**
- — **cd** [*file-url*]
- — **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* [**reliable**]
- — **md** *file-url*
- — **move** *old-file-url new-file-url* [**force**]
- — **rd** *file-url* **rf**
- — **rd** *file-url* [**force**]
- — **repair** [*cflash-id*]
- — **scp** *local-file-url destination-file-url* [**router** *router-instance*] [**force**]
- — [**no**] **shutdown** [**active**] [**standby**]
- — [**no**] **shutdown** *cflash-id*
- — **type** *file-url*
- — **version** *file-url* [**check**]
- — **vi** *local-url*

Configuration Commands

File System Commands

shutdown

Syntax [**no**] **shutdown** [**active**] [**standby**]
[**no**] **shutdown** [*cflash-id*]

Context file

Description This command shuts down (unmounts) the specified CPM(s).

Use the **no shutdown** [**active**] [**standby**] command to enable one or both CPM.

Use the **no shutdown** [*cflash-id*] command to enable a compact flash (cf1:, cf2:, or cf3:) on the SF/CPM card. The **no shutdown** command can be issued for a specific slot when no compact flash is present. When a flash card is installed in the slot, the card will be activated upon detection.

In redundant systems, use the **no shutdown** command on cf3: on both SF/CPMs in order to facilitate synchronization. See the **synchronize** command on **page 461**.

NOTE: The **shutdown** command must be issued prior to removing a flash card. If no parameters are specified, then the drive referred to by the current working directory will be shut down.

LED Status Indicators — The following states are possible for the compact flash:

Operational:

If a compact flash is present in a drive and operational (**no shutdown**), the respective LED is lit green. The LED flickers when the compact flash is accessed.

NOTE: *Do not remove* the compact flash during a read/write operation.

State: admin = up, operational = up, equipped

Flash defective:

If a compact flash is defective, the respective LED blinks amber to reflect the error condition and a trap is raised.

State: admin = up/down, operational = faulty, equipped = no

Flash drive shut down:

When the compact flash drive is shut down and a compact flash present, the LED is lit amber. In this state, the compact flash can be ejected.

State: admin = down, operational = down, equipped = yes

No compact flash present, drive shut down:

If no compact flash is present and the drive is shut down the LED is unlit.

State: admin = down, operational = down, equipped = no

No compact flash present, drive enabled:

If no compact flash is present and the drive is not shut down the LED is unlit.

State: admin = up, operational = down, equipped = no

Ejecting a compact flash:

The compact flash drive should be shut down before ejecting a compact flash card. The LED should turn to solid (not blinking) amber. This is the only mode to safely remove the flash card.

If a compact flash drive is not shut down before a compact flash is ejected, the LED blinks amber for approximately 5 seconds before shutting off.

State: admin = down, operational = down, equipped = yes

The **shutdown** or **no shutdown** state is not saved in the configuration file. Following a reboot all compact flash drives are in their default state.

Default **no shutdown** — compact flash device administratively enabled

Parameters *cflash-id* — Enter the compact flash slot ID to be shut down or enabled. When a specific *cflash-id* is specified, then that drive is shutdown. If no *cflash-id* is specified, the drive referred to by the current working directory is assumed. If a slot number is not specified, then the active CPM is assumed.

Default The current compact flash device

Values cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

active — If **active** is selected, then all drives on the active CPM are shutdown or enabled.

standby — If **standby** is selected, then all drives on the standby CPM are shutdown or enabled.

Note: When both **active** and **standby** keywords are specified, then all drives on both CPM are shutdown.

File Commands

attrib

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

Context file

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

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

```
ALA-1>file cf3:\ # attrib
     cf3:\bootlog.txt
     cf3:\bof.cfg
     cf3:\boot.ldr
     cf3:\sr1.cfg
     cf3:\test
     cf3:\bootlog_prev.txt
     cf3:\BOF.SAV
```

Parameters *file-url* — The URL for the local file.

Values

local-url | *remote-url*:	255 chars max	
local-url:	[*cflash-id*/][*file-path*]	
remote-url	[ftp://*login*:*pswd@remote-locn*/][*file-path*]	
cf1:,cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:		

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

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

cd

Syntax **cd** [*file-url*]

Context file

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

Parameters *file-url* — Syntax: [*local-url* | *remote-url* (255 chars max)
local-url - [*cflash-id*/][*file-path*]
remote-url - [{ftp://|tftp://}*login*:*pswd@remote-locn*/][*file-path*]
cf1,cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:

<*none*> — Displays the current working directory.

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

directory-url — The destination directory.

copy

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

Context file

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

"Overwrite destination file (y/n)?"

For example:

To copy a file named **srcfile** in a directory called *test* on *cf2* in slot B to a file called **destfile** in a directory called *production* on *cf1* in slot A, the syntax is:

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

To FTP a file named **121201.cfg** in directory *mydir* stored on *cf1* in slot A to a network FTP server with IP address 131.12.31.79 in a directory called *backup* with a destination file name of **121201.cfg,** the FTP syntax is:

```
copy cf1-A/mydir/121201.cfg 131.12.31.79/backup/121201.cfg
```

Parameters *source-file-url* — The location of the source file or directory to be copied.

dest-file-url — The destination of the copied file or directory.

force — Forces an immediate copy of the specified file(s).

file copy force executes the command without displaying a user prompt message.

delete

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

Context file

Description This command deletes the specified file.

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

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

file-url — The file name to delete.

Values *local-url* | *remote-url*: 255 chars max
local-url: [*cflash-id*/][*file-path*]
remote-url [ftp://*login*:*pswd@remote-locn*/][*file-path*]
cf1:,cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:

force — Forces an immediate deletion of the specified file(s).

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

dir

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

Context file

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

Parameters *file-url* — The path or directory name.

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

Default Lists all files in the present working directory

sort-order { **d** | **n** | **s —** Specifies the sort order.

Values d — date
n — name
s — size

reverse — Specifies to reverse the sort order.

Sample Output

```
A:cses-E12>file cf3:\ # dir
  - dir [<file-url>] [sort-order { d | n | s}] [reverse]

 <file-url>           : <local-url>|<remote-url>
                        local-url      - [<cflash-id>/][<file-path>]
                                         200 chars max, including cflash-id
                                         directory length 99 chars max each
                        remote-url     - [ftp://<login>:<pswd>@<remote-locn>/
                                         ][<file-path>]
                                         255 chars max
                                         directory length 99 chars max each
                        remote-locn    - [ <hostname> | <ipv4-address> |
                                         "["<ipv6-address>"]" ]
                        ipv4-address   - a.b.c.d
                        ipv6-address   - x:x:x:x:x:x:x:x[-interface]
                                         x:x:x:x:x:x:d.d.d.d[-interface]
                                         x - [0..FFFF]H
                                         d - [0..255]D
                                         interface - 32 chars max, for link
                                         local addresses
```

```
                          cflash-id      - cf1:|cf1-A:|cf1-B:|cf2:|cf2-A:|
                                           cf2-B:|cf3:|cf3-A:|cf3-B:
 < d | n | s>          : Sort order: d - date, n - name, s - size
 <reverse>             : keyword - reverse order
A:cses-E12>file cf3:\ # dir
```

file

Syntax **file**

Context root

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

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

format

Syntax **format cflash** *cflash-id* [**reliable**]

Context root>file

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

Parameters *cflash-id* — The compact flash type.

cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:**reliable —** Enables the reliance file system and disables the default DOS file system. This option is valid only on compact flashes 1 and 2.

md

Syntax **md** *file-url*

Context file

Description This command creates a new directory in a file system.

Directories can only be created one level at a time.

Parameters *file-url* — The directory name to be created.

Values

local-url | *remote-url*:	255 chars max	
local-url:	[*cflash-id*/][*file-path*]	
remote-url	[ftp://*login*:*pswd@remote-locn*/][*file-path*]	
cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:		

move

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

Context file

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)?"

Parameters *old-file-url* — The file or directory to be moved.

Values

local-url | *remote-url*:	255 chars max	
local-url:	[*cflash-id*/][*file-path*]	
remote-url	[ftp://*login*:*pswd@remote-locn*/][*file-path*]	
cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:		

new-file-url — The new destination to place the *old-file-url.*

Values

local-url | *remote-url*:	255 chars max	
local-url:	[*cflash-id*/][*file-path*]	
remote-url	[ftp://*login*:*pswd@remote-locn*/][*file-path*]	
cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:		

force — Forces an immediate move of the specified file(s).

file move force executes the command without displaying a user prompt message.

rd

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

Context file

Description The **rd** command is used to delete a directory.

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

If a directory has sub-directories, then the **force** option will fail and the **rf** parameter should be used instead to force delete that directory including the sub-directories.

Example:

```
A:nE1>file cf1:\ # rd alcateltest
Are you sure (y/n)? y
Deleting directory cf1:\alcateltest ..MINOR: CLI Cannot delete cf1:\alcateltest.
A:nE1>file cf1:\ # rd alcateltest force
Deleting directory cf1:\alcateltest .MINOR: CLI Cannot delete cf1:\alcateltest.
```

```
A:nE1>file cf1:\ # rd hussein rf
Deleting all subdirectories and files in specified directory. y/n ?y
Deleting directory cf1:\hussein\hussein1 ..OK
Deleting directory cf1:\alcateltest .OK
```

Parameters *file-url* — The directory to be removed.

local-url | *remote-url*: 255 chars max
local-url: [*cflash-id*/][*file-path*]
remote-url [ftp://*login*:*pswd@remote-locn*/][*file-path*]
cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:**rf —** The parameter forces a recursive delete.

force — Forces an immediate deletion of the specified directory.
For example, **rd** *file-url* **force** executes the command without displaying a user prompt message.

repair

Syntax **repair** [*cflash-id*]

Context file

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

Parameters *cflash-id* — Specify the compact flash slot ID to be shut down or enabled. When a specific *cflash-id* is specified, then that drive is shutdown. If no *cflash-id* is specified, the drive referred to by the current working directory is assumed. If a slot number is not specified, then the active SF/CPMCFM is assumed.

Default The current compact flash device

Values cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

scp

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

Context file

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

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

Parameters *local-file-url* — The local source file or directory.

Values [*cflash-id*/][*file-path*]: Up to 256 characters.

destination-file-url — The destination file.

Values user@hostname:destination-file

user — The SSH user.

host — The remote host IP address of DNS name.

file-path — The destination path.

router-instance — Specify the router name or service ID.

Values *router-name*: Base , management
service-id: 1 — 2147483647

Default Base

force — Forces an immediate copy of the specified file.

file scp *local-file-url destination-file-url* [**router**] **force** executes the command without displaying a user prompt message.

type

Syntax **type** *file-url*

Context file

Description Displays the contents of a text file.

Parameters *file-url* — The file contents to display.

Values file-url <local-url>|<remote-url>
local-url [<cflash-id>/][<file-path>]
200 chars max, including cflash-id
directory length 99 chars max each
remote-url [{ftp://|tftp://}<login>:<pswd>@<remote-locn>/][<file-path>] 255 chars max
directory length 99 chars max each
remote-locn [<hostname> | <ipv4-address> |<ipv6-address>]
ipv4-address a.b.c.d
ipv6-address x:x:x:x:x:x:x:x[-interface]
x:x:x:x:x:x:d.d.d.d[-interface]
x - [0..FFFF]H
d - [0..255]D
interface - 32 chars max, for link local addresses
cflash-id cf1:, cf1-A:, cf1-B:

version

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

Context file

Description This command displays the version of an SR OS *.tim file.

Parameters *file-url* — The file name of the target file.

Values		
	local-url | remote-url:	255 characters maximum
	local-url:	[*cflash-id*/][*file-path*]
	remote-url:	[{ftp://|tftp://}*login*:*pswd@remote-locn*/][*file-path*]
	cflash-id:	cf1:, cf1-A:, cf1-B:

check — Validates the *.tim* file.

Sample Output

```
A:Redundancy>file cf3:\ # version  ftp://test:1234@xxx.xxx.xxx.xx/usr/global/images/6.1/
R4/cpm.tim
TiMOS-C-6.1.R4 for 7750
Thu Oct 30 14:21:09 PDT 2008 by builder in /rel6.1/b1/R4/panos/main
A:Redundancy>file cf3:\ # version check ftp://test:1234@xxx.xxx.xxx.xx/usr/global/images/
6.1/R4/cpm.tim
TiMOS-C-6.1.R4 for 7750
Thu Oct 30 14:21:09 PDT 2008 by builder in /rel6.1/b1/R4/panos/main
Validation successful
A:Redundancy>file cf3:\ #
```

vi

Syntax **vi** *local-url*

Context file

Description Edit files using the vi editor. Refer to VI Editor on page 46.

Parameters *local-url* — Specifies the local source file or directory.

Values	
	[*cflash-id*>/]*file-path*
	cflash-id: cf1:, cf2:, cf3:

Boot Options

In This Chapter

This chapter provides information about configuring boot option parameters.

Topics in this chapter include:

System Initialization

The primary copy of SR OS software is located on a compact flash card. The removable media is shipped with each 7750 SR-Seriesrouter and contains a copy of the OS image.

Notes:

- The modules contain three slots for removable compact flash cards. The drives are named Compact Flash Slot #1 (cf1), Compact Flash Slot #2 (cf2), and Compact Flash Slot #3 (cf3). Configurations and executable images can be stored on flash cards or an FTP file location. There are six Compact Flash slots on the 7750 SR-c12, three for CFM-A and three for CFM-B.
- The flash card containing the bootstrap and boot option files *must* be installed in Compact Flash Slot #3 (*cf3*) on the .
- You must have a console connection.

Starting a 7750 SR-Seriesrouter begins with hardware initialization (a reset or power cycle). By default, the system searches Compact Flash Slot #3 (*cf3*) for the `boot.ldr` file (also known as the bootstrap file). The `boot.ldr` file is the image that reads and executes the system initialization commands configured in the boot option file (BOF). The default value to initially search for the `boot.ldr` file on *cf3* cannot be modified.

The following is an example of console display output when the `boot.ldr` file cannot be located on *cf3*.

```
...
(memory test messages)
(serial number information)
Searching for boot.ldr on local drives:
No disk in cf3
No disk in cf3
No disk in cf3
Error - file boot.ldr not found on any drive
Please insert CF containing boot.ldr. Rebooting in 5 seconds.
```

When the bootstrap image is loaded, the BOF is read to obtain the location of the image and configuration files. The BOF must be located on the same compact flash drive as the `boot.ldr` file.

Figure 6 displays the system initialization sequence.

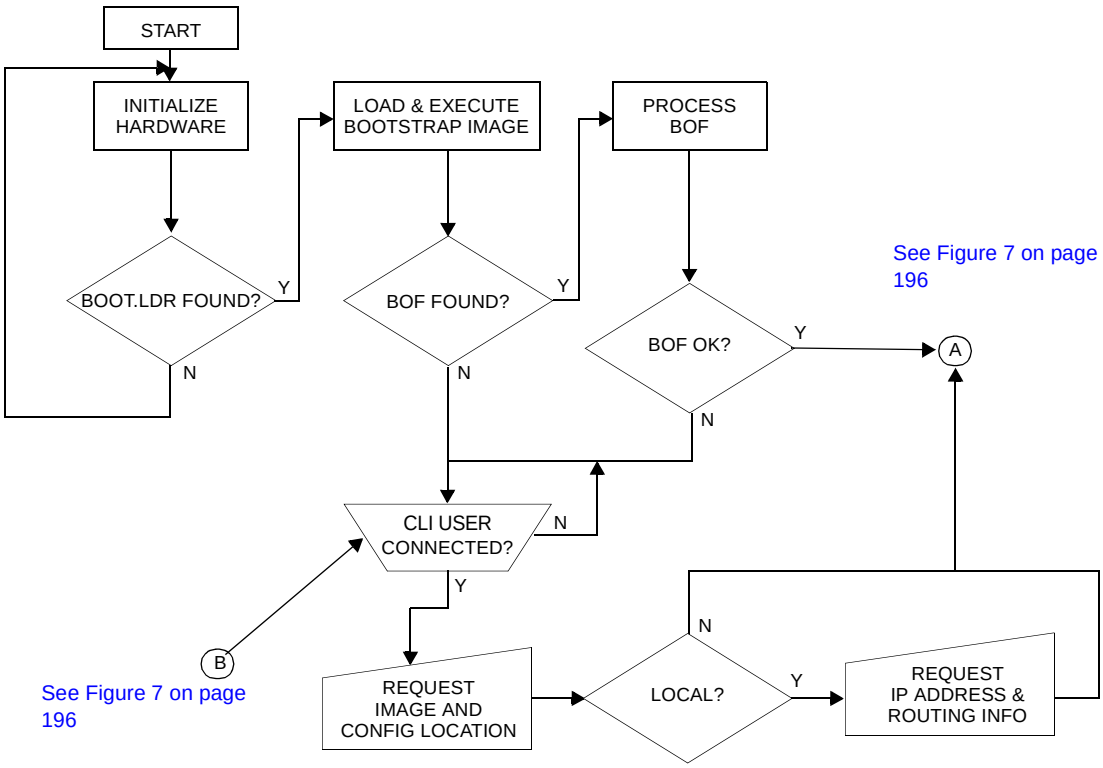


Figure 6: System Initialization - Part 1

Figure 7 displays the compact flash directory structure and file names for the redundant chassis models.

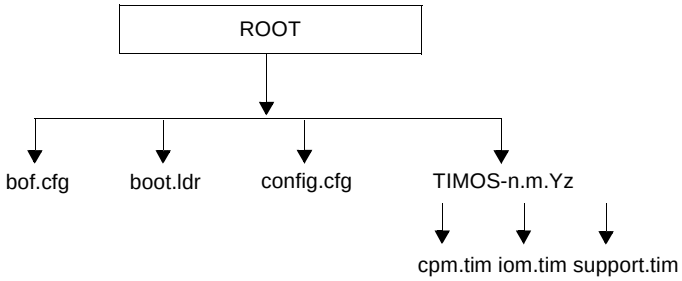


Figure 7: Files on the Compact Flash

Files on the compact flash are:

- bof.cfg — Boot option file
- boot.ldr — Bootstrap image
- config.cfg — Default configuration file
- TIMOS-m.n.Yz:

  m — Major release number

  n — minor release number

  Y: A — Alpha release

  B — Beta release

  M — Maintenance release

  R — Released software

  z — Version number

  → cpm.tim — CPM image file

  → iom.tim — IOM image file

  → support.tim — required data for SR OS .tim files

Figure 8 displays the compact flash directory structure and file names for the 1-slot models (non-redundant).

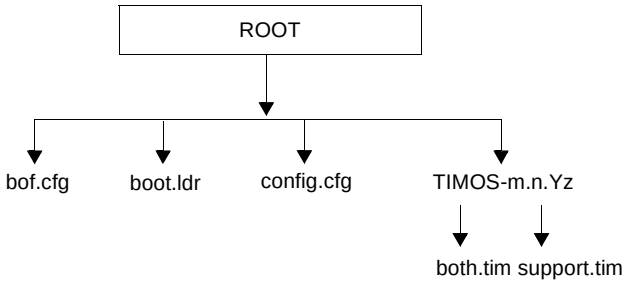


Figure 8: Files on the Compact Flash

Files on the compact flash are:

- bof.cfg — Boot option file
- boot.ldr — Bootstrap image
- config.cfg — Default configuration file
- TIMOS-m.n.Yz:

  m — Major release number

  n — Minor release number

  Y: A — Alpha release

  B — Beta release

  M — Maintenance release

  R — Released software

  z — Version number

  → both.tim — CPM and IOM image file

  → support.tim — required data for SR OS .tim files

Configuration and Image Loading

When the system executes the `boot.ldr` file, the initialization parameters from the BOF are processed. Three locations can be configured for the system to search for the files that contains the runtime image. The locations can be local or remote. The first location searched is the primary image location. If not found, the secondary image location is searched, and lastly, the tertiary image location is searched.

If the `BOF` cannot be found or loaded, then the system enters a console message dialog session prompting the user to enter alternate file locations and file names.

The **boot.ldr** can be interrupted during the boot sequence by pressing any key on the CPM console port. The operator must then type **sros** and press **ENTER** within 30 seconds or the **boot.ldr** will continue trying to boot the system. This key sequence ensures that noise or misconfiguration does not inadvertently interrupt the boot sequence. If the operator types **sros** and presses **ENTER** within 30 seconds, they are brought to a console message dialog session prompting the user to enter file locations and other boot information.

When the runtime image is successfully loaded, control is passed from the bootstrap loader to the image. The runtime image attempts to locate the configuration file as configured in the BOF. Like the runtime image, three locations can be configured for the system to search for the configuration file. The locations can be local or remote. The first location searched is the primary configuration location. If not found, the secondary configuration location is searched, and lastly, the tertiary configuration location is searched. The configuration file include chassis, IOM, MDA, and port configurations, as well as system, routing, and service configurations.

Figure 9 displays the boot sequence.

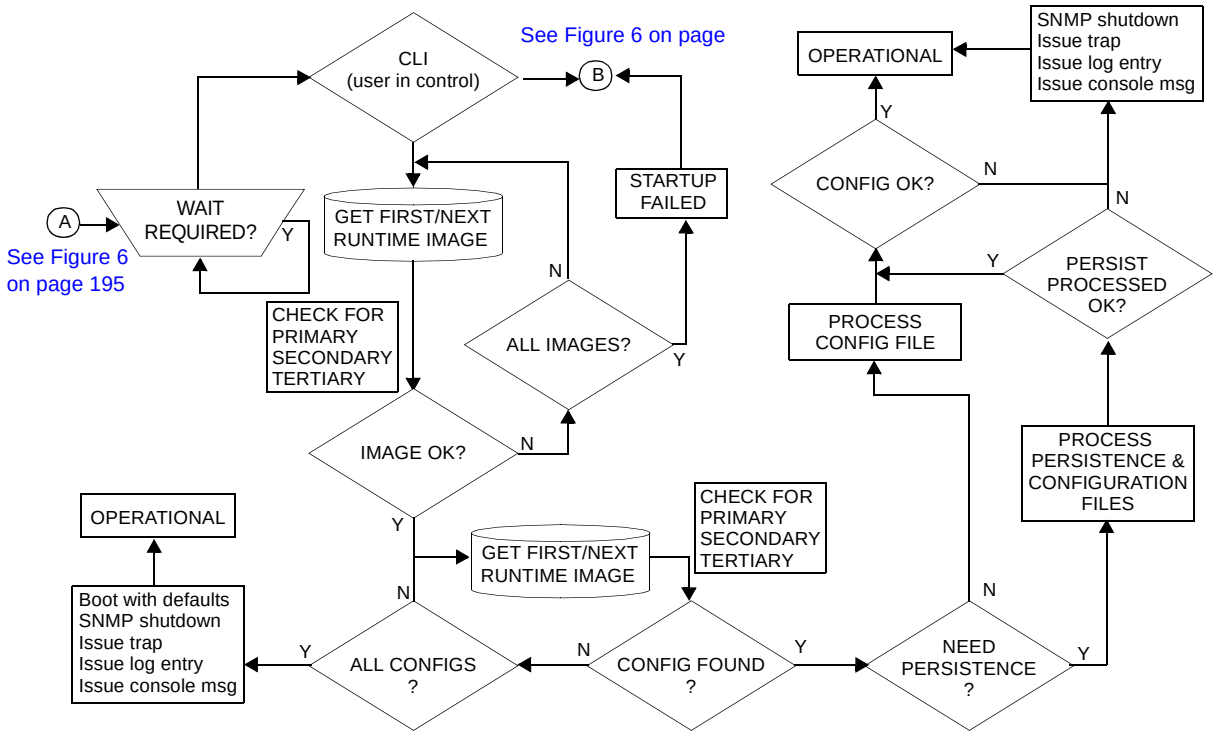


Figure 9: System Initialization - Part 2

The following displays an example of BOF output.

```
A:ALA-1>bof# show bof
===============================================================================
Memory BOF
===============================================================================
no autonegotiate
duplex            full
speed             100
address           10.10.xx.xx/20 active
wait              3
primary-image     cf3:\both.tim
primary-config    cf3:\test123.cfg
primary-dns       192.168.xx.xx
persist           on
dns-domain        test.alcatel.com
===============================================================================
A:ALA-1>bof#
```

Persistence

Optionally, the BOF `persist` parameter can specify whether the system should preserve system indexes when a **save** command is executed. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index, LSP IDs, path IDs, etc If persistence is not required and the configuration file is successfully processed, then the system becomes operational. If persist is required, then a matching `x.ndx` file must be located and successfully processed before the system can become operational. Matching files (configuration and index files) must have the same filename prefix such as `test123.cfg` and `test123.ndx` and are created at the same time when a **save** command is executed. Note that the persistence option must be enabled to deploy the Network Management System (NMS). The default is off.

Traps, logs, and console messages are generated if problems occur and SNMP shuts down for all SNMP gets and sets, however, traps are issued.

Lawful Intercept

Lawful Intercept (LI) describes a process to intercept telecommunications by which law enforcement authorities can un-obtrusively monitor voice and data communications to combat crime and terrorism with higher security standards of lawful intercept capabilities in accordance with local law and after following due process and receiving proper authorization from competent authorities. The interception capabilities are sought by various telecommunications providers.

As lawful interception is subject to national regulation, requirements vary from one country to another. Alcatel-Lucent's implementation satisfies most national standard's requirements. LI is configurable for all service types.

Initial System Startup Process Flow

Figure 10 displays the process start your system. Note that this example assumes that the boot loader and BOF image and configuration files are successfully located.

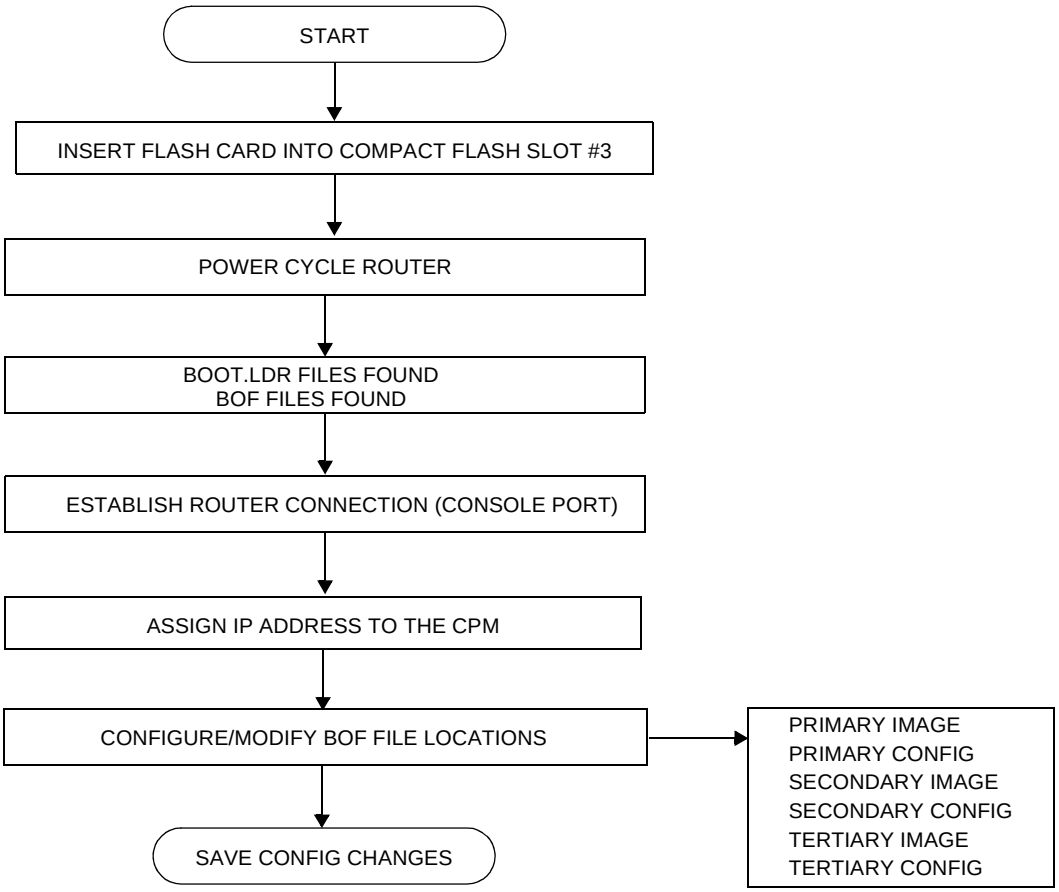


Figure 10: System Startup Flow

Configuration Notes

This section describes BOF configuration caveats.

- For router initialization, the compact flash card must be installed in the Compact Flash #3 slot.
- The loading sequence is based on the order in which it is placed in the configuration file. It is loaded as it is read in at boot time.

Configuring Boot File Options with CLI

This section provides information to configure BOF parameters with CLI.

Topics in this section include:

BOF Configuration Overview

Alcatel-Lucent 7750 SR-Series routers do not contain a boot EEPROM. The boot loader code is loaded from the boot.ldr file. The BOF file performs the following tasks:

1. Sets up the CPM/ Ethernet port (speed, duplex, auto).
2. Assigns the IP address for the CPM/Ethernet port.
3. Creates static routes for the CPM/ Ethernet port.
4. Sets the console port speed.
5. Configures the Domain Name System (DNS) name and DNS servers.
6. Configures the primary, secondary, tertiary configuration source.
7. Configures the primary, secondary, and tertiary image source.
8. Configures operational parameters.

Basic BOF Configuration

The parameters which specify location of the image filename that the router will try to boot from and the configuration file are in the BOF.

The most basic BOF configuration should have the following:

- Primary addressPrimary image location
- Primary configuration location

Following is a sample of a basic BOF configuration.

```
A:SR-45# show bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image    cf3:/4.0.R20
    primary-config   cf3:/ospf_default.cfg
    addres           138.120.189.53/24 active
    static-route     138.120.0.0/16 next-hop 138.120.189.1
    static-route     172.0.0.0/8 next-hop 138.120.189.1
    autonegotiate
    duplex           full
    speed            100
    wait             3
    persist          on
    console-speed    115200
===============================================================================
A:SR-45#
```

Common Configuration Tasks

The following sections are basic system tasks that must be performed.

For details about hardware installation and initial router connections, refer to the specific 7750 SR-Series hardware installation guide.

Searching for the BOF

The BOF should be on the same drive as the boot loader file. If the system cannot load or cannot find the BOF then the system checks whether the boot sequence was manually interrupted. The system prompts for a different image and configuration location.

The following example displays an example of the output when the boot sequence is interrupted.

```
...

Hit a key within 3 seconds to change boot parms...

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.

Press ENTER to begin, or 'flash' to enter firmware update...

Software Location
-----------------
   You must enter the URL of the TiMOS software.
   The location can be on a Compact Flash device,
   or on the network.

   Here are some examples
      cf3:/timos1.0R1
      ftp://user:passwd@192.168.xx.xxx/./timos1.0R1
      tftp://192.168.xx.xxx/./timos1.0R1

The existing Image URL is 'ftp://vxworks:vxw0rks@192.168.xx.xxx/./rel/0.0/xx'
Press ENTER to keep it.
Software Image URL:
Using: 'ftp://vxworks:vxw0rks@192.168.xx.xxx/./rel/0.0/xx'

Configuration File Location
---------------------------
   You must enter the location of configuration
   file to be used by TiMOS.  The file can be on
   a Compact Flash device, or on the network.

   Here are some examples
      cf1:/config.cfg
      ftp://user:passwd@192.168.xx.xxx/./config.cfg
      tftp://192.168.xx.xxx/./config.cfg

The existing Config URL is 'cf3:/config.cfg'
Press ENTER to keep it, or the word 'none' forno  Config URL.
Config File URL:
Using: 'cf3:/config.cfg'

Network Configuration
---------------------
   You specified a network location for either the
   software or the configuration file.  You need to
```

```
   assign an IP address for this system.

   The IP address should be entered in standard
   dotted decimal form with a network length.
       example:   192.168.xx.xxx/24
```

Displays on no n-Redundant Models l

```
The existing IP address is 192.168.xx.xxx/20. Press ENTER to keep it.
Enter IP Address:
Using: 192.168.xx.xxx/20
```

Display on Redundant models

```
The existing Active IP address is 192.168.xx.xxx/20. Press ENTER to keep it.
Enter Active IP Address:
Using: 192.168.xx.xxx/20

The existing Standby IP address is 192.168.xx.xxx/20. Press ENTER to keep it.
Enter Standby IP Address (Type 0 ifno ne desired):
Using: 192.168.xx.xxx/20



Would you like to add a static route? (yes/no) y

Static Routes
-------------
   You specified network locations which require
   static routes to reach. You will be asked to
   enter static routes until all the locations become
   reachable.

   Static routes should be entered in the following format:
   prefix/mask next-hop ip-address
       example:     192.168.xx.xxx/16 next-hop 192.168.xx.xxx

Enter route: 1.x.x.0/24 next-hop 192.168.xx.xxx
OK

Would you like to add another static route? (yes/no) n



New Settings
------------
    primary-image    ftp://vxworks:vxw0rks@192.168.xx.xx/./rel/0.0/xx
    primary-config   cf3:/config.cfg
    address          192.168.xx.xx/20 active
    primary-dns      192.168.xx.xx
    dns-domain       xxx.xxx.com
    static-route     1.x.x.0/24 next-hop 192.168.xx.xxx
    autonegotiate
    duplex           full
    speed            100
    wait             3
    persist          off


Do you want to overwrite cf3:/bof.cfg with the new settings? (yes/no): y
Successfully saved the new settings in cf3:/bof.cfg
```

Accessing the CLI

To access the CLI to configure the software for the first time, follow these steps:

- When the SF/CPM is installed and power to the chassis is turned on, the 7750 SR OS7750 SR OS MG software automatically begins the boot sequence.
- When the boot loader and BOF image and configuration files are successfully located, establish a router connection (console session).

Console Connection

To establish a console connection, you will need the following:

- An ASCII terminal or a PC running terminal emulation software set to the parameters shown in the table below.
- A standard serial cable with a male DB9.

Table 24: Console Configuration Parameter Values

Parameter	Value
Baud Rate	115,200
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

Figure 11 displays an example of the Console port on a 7750 SR-1 front panel.

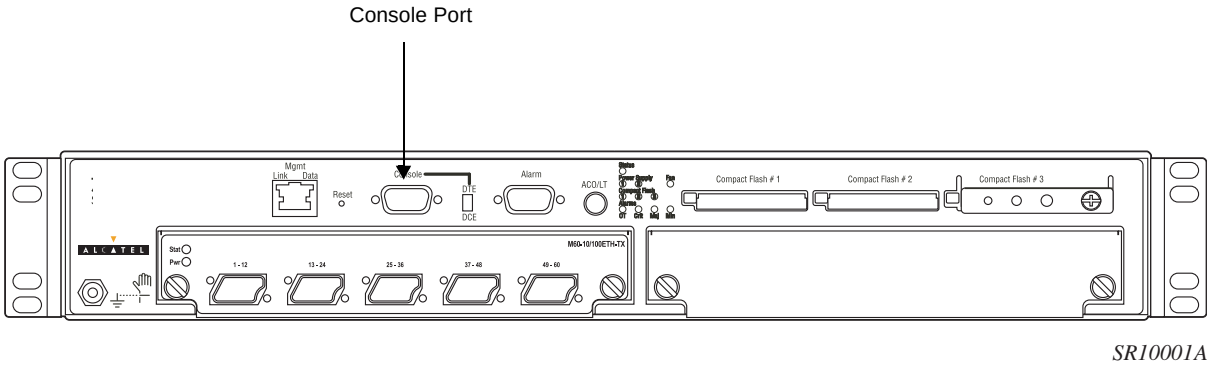


Figure 11: 7750 SR-1 Front Panel Console Port

To establish a console connection:

Step 1 Connect the terminal to the Console port on the front panel using the serial cable.

Step 2 Power on the terminal.

Step 3 Establish the connection by pressing the <Enter> key a few times on your terminal keyboard.

Step 4 At the router prompt, enter the login and password.

The default login is `admin`.
The default password is `admin`.

Configuring BOF Parameters

The following output displays a BOF configuration:

```
A:ALA-1>bof# show bof
===============================================================
Memory BOF
===============================================================
no autonegotiate
duplex      full
speed      100
address    10.10.xx.xx/20 active
wait    3
primary-image cf3:\both.tim
primary-config cf3:\test123.cfg
primary-dns 192.168.xx.xx
persist     on
dns-domain test.alcatel.com
===============================================================
A:ALA-1>bof#
```

Service Management Tasks

This section discusses the following service management tasks:

System Administration Commands

Use the following administrative commands to perform management tasks.

CLI Syntax:
```
A:ALA-1# admin
 display-config
 reboot [active|standby|upgrade] [hold] [now]
 save [file-url] [detail] [index]
```

Viewing the Current Configuration

Use one of the following CLI commands to display the current configuration. The *detail* option displays all default values. The *index* option displays only the persistent indices. The `info` command displays context-level information.

CLI Syntax:
```
admin# display-config [detail|index]
info detail
```

The following displays an example of a configuration file:

```
A:7750-3>admin# display-config
# TiMOS B-1.0.Ixxx - Copyright (c) 2000-2007 Alcatel, Inc.
# Built on Tues Jan 21 21:39:07 2007 by builder in /rel1.0/xx/panos/main

# Generated WED Jan 31 06:15:29 2007 UTC

exit all
configure
#------------------------------------------------
echo "System Configuration"
#------------------------------------------------
    system
        name "7750-3"
        contact "Fred Information Technology"
```

```
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
        ccm 1
        exit
        snmp
        exit
        login-control
            idle-timeout 1440
            motd text "7750-3"
        exit
        time
            sntp
                shutdown
            exit
            zone UTC
        exit
        thresholds
            rmon
            exit
        exit
    exit...
...
#------------------------------------------------
echo "Redundancy Configuration"
#------------------------------------------------
    redundancy
        synchronize boot-env
    exit
...exit all

# Finished FRI Nov 21 15:06:16 2008 UTC
A:7750#
```

Modifying and Saving a Configuration

If you modify a configuration file, the changes remain in effect only during the current power cycle unless a `save` command is executed. Changes are lost if the system is powered down or the router is rebooted without saving.

- Specify the file URL location to save the running configuration. If a destination is not specified, the files are saved to the location where the files were found for that boot sequence. The same configuration can be saved with different file names to the same location or to different locations.
- The **detail** option adds the default parameters to the saved configuration.
- The **index** option forces a save of the index file.
- Changing the active and standby addresses without reboot standby CPM may cause a boot-env sync to fail.

The following command saves a configuration:

CLI Syntax: `bof# save [`*`cflash-id`*`]`

Example:
```
A:ALA-1# bof
A:ALA-1>bof# save cf3:
A:ALA-1>bof#
```

The following command saves the system configuration:

CLI Syntax: `admin# save [`*`file-url`*`] [detail] [index]`

Example:
```
A:ALA-1# admin save cf3:\test123.cfg
Saving config.# Saved to cf3:\test123.cfg
... complete
A:ALA-1#
```

NOTE: If the `persist` option is enabled and the `admin save` *`file-url`* command is executed with an FTP path used as the *`file-url`* parameter, two FTP sessions simultaneously open to the FTP server. The FTP server must be configured to allow multiple sessions from the same login, otherwise, the configuration and index files will not be saved correctly.

Deleting BOF Parameters

You can delete specific BOF parameters. The **no** form of these commands removes the parameter from configuration. The changes remain in effect only during the current power cycle unless a `save` command is executed. Changes are lost if the system is powered down or the router is rebooted without saving.

Deleting a BOF address entry is not allowed from a Telnet session.

Use the following CLI syntax to save and remove BOF configuration parameters:

CLI Syntax: `bof# save [cflash-id]`

Example:
```
A:ALA-1# bof
A:ALA-1>bof# save cf3:
A:ALA-1>bof#
```

CLI Syntax:
```
bof#
 no address ip-address/mask [active | standby]
 no autonegotiate
 no console-speed
 no dns-domain
 no li-local-save
 no li-separate
 no primary-config
 no primary-dns
 no primary-image
 no secondary-config
 no secondary-dns
 no secondary-image
 no static-route ip-address/mask next-hop ip-address
 no tertiary-config
 no tertiary-dns
 no tertiary-image
```

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:

CLI Syntax: bof# save [*cflash-id*]

Example:
```
A:ALA-1# bof
A:ALA-1>bof# save cf3:
A:ALA-1>bof#
```

or

CLI Syntax: admin# save [*file-url*] [detail] [index]

Example:
```
A:ALA-1>admin# save cf3:\testABC.cfg
Saving config.# Saved to cf3:\testABC.cfg
... complete
A:ALA-1#
```

Rebooting

When an **admin>reboot** command is issued, routers with redundant CPM are rebooted as well as the IOMs. Changes are lost unless the configuration is saved. Use the **admin>save** *file-url* command to save the current configuration. If no command line options are specified, the user is prompted to confirm the reboot operation.

Use the following CLI syntax to reboot:

CLI Syntax: admin# reboot [active|standby|upgrade][hold][now]

Example:
```
A:ALA-1>admin# reboot
A:DutA>admin# reboot

Are you sure you want to reboot (y/n)? y

Resetting...OK

Alcatel 7xxx Boot ROM. Copyright 2000-2007 Alcatel-Lucent.

All rights reserved. All use is subject to applicable
license agreements.
....
```

BOF Command Reference

Command Hierarchies

Configuration Commands

bof
- — [**no**] **address***ip-prefix/ip-prefix-length* [**active** | **standby**]
- — [**no**] **autonegotiate**
- — **console-speed** *baud-rate*
- — **no console-speed**
- — **dns-domain** *dns-name*
- — **no dns-domain**
- — **duplex** {**full** | **half**}
- — [**no**] **li-local-save**
- — [**no**] **li-separate**
- — **persist** {**on** | **off**}
- — **primary-config** *file-url*
- — **no primary-config**
- — **primary-dns** *ip-address*
- — **no primary-dns**
- — **primary-image** *file-url*
- — **no primary-image**
- — **save** [*cflash-id*]
- — **secondary-config** *file-url*
- — **no secondary-config**
- — [**no**] **secondary-dns** *ip-address*
- — **secondary-image** *file-url*
- — **no secondary-image**
- — **speed** *speed*
- — [**no**] **static-route** *ip-prefix/ip-prefix-length* **next-hop** *ip-address*
- — **tertiary-config** *file-url*
- — **no tertiary-config**
- — [**no**] **tertiary-dns** *ip-address*
- — **tertiary-image** *file-url*
- — **no tertiary-image**
- — **wait** *seconds*

Show Commands

show
- **bof** [*cflash-id* | *booted*]
- **boot-messages**

Configuration Commands

File Management Commands

bof

Syntax **bof**

Context <ROOT>

Description This command creates or edits the boot option file (BOF) for the specified local storage device.

A BOF file specifies where the system searches for runtime images, configuration files, and other operational parameters during system initialization.

BOF parameters can be modified. Changes can be saved to a specified compact flash. The BOF must be located in the root directory of either an internal or external compact flash local to the system and have the mandatory filename of *bof.cfg*.

When modifications are made to in-memory parameters that are currently in use or operating, the changes are effective immediately. For example, if the IP address of the management port is changed, the change takes place immediately.

Only one entry of the BOF configuration command statement can be saved once the statement has been found to be syntactically correct.

When opening an existing BOF that is not the BOF used in the most recent boot, a message is issued notifying the user that the parameters will not affect the operation of the node.

No default boot option file exists. The router boots with the factory default boot sequence and options.

Default **none**

save

Syntax **save** [*cflash-id*]

Context bof

Description This command uses the boot option parameters currently in memory and writes them from the boot option file to the specified compact flash.

The BOF must be located in the root directory of the internal or external compact flash drives local to the system and have the mandatory filename of *bof.cfg*.

If a location is not specified, the BOF is saved to the default compact flash drive (cf3:) on the active CPM (typically the CPM in slot A, but the CPM in slot B could also be acting as the active CPM). The slot name is not case-sensitive. You can use upper or lowercase “A” or “B”.

Command usage:

- **bof save** — Saves the BOF to the default drive (cf3:) on the active CPM (either in slot A or B).
- **bof save cf3:** — Saves the BOF to cf3: on the active CPM (either in slot A or B).

To save the BOF to a compact flash drive on the standby CPM (for example, the redundant (standby) CPM is installed in slot B), specify -A or -B option.

Command usage:

- **bof save cf3-A:** — Saves the BOF to cf3: on CPM in in slot A whether it is active or standby.
- **bof save cf3-B:** — Saves the BOF to cf3: on CPM in in slot B whether it is active or standby.

The slot name is not case-sensitive. You can use upper or lowercase “A” or “B”.

The **bof save** and **show bof** commands allow you to save to or read from the compact flash of the standby CPM. Use the **show card** command to determine the active and standby CPM (A or B).

Default Saves must be explicitly executed. The BOF is saved to cf3: if a location is not specified.

Parameters *flash-id* — The compact flash ID where the *bof.cfg* is to be saved.

Values cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

Default cf3:

BOF Processing Control

wait

Syntax **wait** *seconds*

Context bof

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 boot option file (BOF).

Only one **wait** command can be defined in the BOF.

Default 3

Parameters *seconds* — The time to pause at the start of the boot process, in seconds.

Values 1 — 10

Console Port Configuration

console-speed

Syntax **console-speed** *baud-rate*
no console-speed

Context bof

Description This command configures the console port baud rate.

When this command is issued while editing the BOF file used for the most recent boot, both the BOF file and the active configuration are changed immediately.

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

Default **115200** — console configured for 115,200 bps operation

Parameters *baud-rate* — The console port baud rate, expressed as a decimal integer.

Values 9600, 19200, 38400, 57600, 115200

Image and Configuration Management

persist

Syntax **persist** {**on** | **off**}

Context bof

Description This command specifies whether the system will preserve system indexes when a **save** command is executed. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index, LSP IDs, path IDs, etc. This reduces resynchronizations of the Network Management System (NMS) with the affected network element.

In the event that persist is **on** and the reboot with the appropriate index file fails, SNMP is operationally shut down to prevent the management system from accessing and possibly synchronizing with a partially booted or incomplete network element. To enable SNMP access, enter the **config>system>snmp>no shutdown** command.

If **persist** is enabled and the **admin save** <*url*> command is executed with an FTP path used as the <*url*> parameter, two FTP sessions simultaneously open to the FTP server. The FTP server must be configured to allow multiple sessions from the same login, otherwise, the configuration and index files will not be saved correctly.

Notes:

- Persistency files (.ndx) are saved on the same disk as the configuration files and the image files.
- When an operator sets the location for the persistency file, the system will check to ensure that the disk has enough free space. If this there is not enough free space, the persistency will not become active and a trap will be generated. Then, it is up to the operator to free adequate disk space. In the meantime, the system will perform a space availability check every 30 seconds. As soon as the space is available the persistency will become active on the next (30 second) check.

Default **off**

Parameters *on* — Create when saving the configuration.

off — Disables the system index saves between reboots.

primary-config

Syntax **primary-config** *file-url*
no primary-config

Context bof

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 that if an error in the configuration file is encountered, the boot process aborts.

The **no** form of the command removes the **primary-config** configuration.

Default **none**

Parameters *file-url* — 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*/][*file-path*]
remote-url	[{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*]
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

primary-image

Syntax **primary-image** *file-url*
no primary image

Context bof

Description This command specifies the primary directory location for runtime image file loading.

The system attempts to load all runtime image files configured in the **primary-image** first. If this fails, the system attempts to load the runtime images from the location configured in the **secondary-image**. If the secondary image load fails, the tertiary image specified in **tertiary-image** is used.

All runtime image files (*.tim files) must be located in the same directory.

The **no** form of the command removes the **primary-image** configuration.

Default **none**

Parameters *file-url* — The *location-url* can be either local (this CPM) or a remote FTP server.

Values

file-url	[*local-url* | *remote-url*] (up to 180 characters)
local-url	[*cflash-id*/][*file-path*]
remote-url	[{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*]
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

secondary-config

Syntax **secondary-config** *file-url*
no secondary-config

Context bof

Description This command specifies the name and location of the secondary configuration file.

The system attempts to use the configuration as specified in **secondary-config** if the primary config cannot be located. If the **secondary-config** file cannot be located, the system attempts to obtain the configuration from the location specified in the **tertiary-config**.

Note that if an error in the configuration file is encountered, the boot process aborts.

The **no** form of the command removes the **secondary-config** configuration.

Default **none**

Parameters *file-url* — The secondary configuration file location, expressed as a file URL.

Values

file-url	[*local-url* | *remote-url*] (up to 180 characters)
local-url	[*cflash-id*/][*file-path*]
remote-url	[{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*]
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

secondary-image

Syntax **secondary-image** *file-url*
no secondary-image

Context bof

Description This command specifies the secondary directory location for runtime image file loading.

The system attempts to load all runtime image files configured in the **primary-image** first. If this fails, the system attempts to load the runtime images from the location configured in the **secondary-image**. If the secondary image load fails, the tertiary image specified in **tertiary-image** is used.

All runtime image files (*.tim files) must be located in the same directory.

The **no** form of the command removes the **secondary-image** configuration.

Default **none**

Parameters *file-url* — The *file-url* can be either local (this CPM) or a remote FTP server.

Values

file-url	[*local-url* | *remote-url*] (up to 180 characters)
local-url	[*cflash-id*/][*file-path*]
remote-url	[{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*]
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

tertiary-config

Syntax **tertiary-config** *file-url*
no tertiary-config

Context bof

Description This command specifies the name and location of the tertiary configuration file.

The system attempts to use the configuration specified in **tertiary-config** if both the primary and secondary config files cannot be located. If this file cannot be located, the system boots with the factory default configuration.

Note that if an error in the configuration file is encountered, the boot process aborts.

The **no** form of the command removes the **tertiary-config** configuration.

Default **none**

Parameters *file-url* — The tertiary configuration file location, expressed as a file URL.

Values

local-url	[*cflash-id*/][*file-path*]
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
remote-url	[{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*]

tertiary-image

Syntax **tertiary-image** *file-url*
no tertiary-image

Context bof

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.

All runtime image files (*.tim files) must be located in the same directory.

The **no** form of the command removes the **tertiary-image** configuration.

Default **none**

Parameters *file-url* — The location-url can be either local (this CPM) or a remote FTP server.

Values

file-url	[*local-url* | *remote-url*] (up to 180 characters)
local-url	[*cflash-id*/][*file-path*]
remote-url	[{ftp://|tftp://} *login:pswd@remote-locn*/][*file-path*]
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

Management Ethernet Configuration

address

Syntax [**no**] **address** *ip-prefix/ip-prefix-length* [**active** | **standby**]

Context bof

Description This command assigns an IP address to the management Ethernet port on the active CPM in the running configuration and the Boot Option File (BOF) or the standby CPM for systems using redundant CPMs. Deleting a BOF address entry is not allowed from a remote session.

Note that changing the active and standby addresses without reboot standby CPM may cause a boot-env sync to fail.

The **no** form of the command deletes the IP address from the CPM Ethernet port.

Default **no address** — There are no IP addresses assigned to Ethernet ports.

Parameters *ip-prefix/ip-prefix-length* — The destination address of the aggregate route in dotted decimal notation.

Values

ipv4-prefix	a.b.c.d (host bits must be 0)
ipv4-prefix-length	0 — 32
ipv6-prefix	x:x:x:x:x:x:x:x (eight 16-bit pieces) x:x:x:x:x:x:d.d.d.d x: [0 — FFFF]H d: [0 — 255]D
ipv6-prefix-length	0 — 128

active | **standby —** Specifies which CPM Ethernet address is being configured: the active CPM Ethernet or the standby CPM Ethernet.

Default active

autonegotiate

Syntax [**no**] **autonegotiate** [**limited**]

Context bof

Description This command enables speed and duplex autonegotiation on the management Ethernet port in the running configuration and the Boot Option File (BOF).
When autonegotiation is enabled, the link attempts to automatically negotiate the link speed and duplex parameters. If autonegotiation is enabled, then the configured duplex and speed parameters are ignored.

The **no** form of the command disables the autonegotiate feature on this port.

autonegotiate — Autonegotiation is enabled on the management Ethernet port.

Parameters **limited —** Specifies ethernet ports to be configurable to use link autonegotiation but with only a single speed/duplex combination advertised. This allows a specific speed/duplex to be guaranteed without having to turn off autonegotiation, which is not allowed for 1000BASE-T.

duplex

Syntax **duplex** {**full** | **half**}

Context bof

Description This command configures the duplex mode of the CPM management Ethernet port when autonegotiation is disabled in the running configuration and the Boot Option File (BOF).

This configuration command allows for the configuration of the duplex mode of the CPM Ethernet interface. If the port is configured to autonegotiate this parameter will be ignored.

Default **duplex full** — Full duplex operation.

Parameters **full —** Sets the link to full duplex mode.

half — Sets the link to half duplex mode.

li-local-save

Syntax [**no**] **li-local-save**

Context bof

Description This command enables the lawful intercept (LI) configuration to be saved locally.

li-separate

Syntax [**no**] **li-separate**

Context bof

Description This command enables separate access to lawful intercept (LI) information.

speed

Syntax **speed** *speed*

Context bof

Description This command configures the speed for theCPM management Ethernet port when autonegotiation is disabled in the running configuration and the Boot Option File (BOF).

If the port is configured to autonegotiate this parameter is ignored.

Default **speed 100** — 100 M/bps operation.

Parameters **10 —** Sets the link to 10 M/bps speed.

100 — Sets the link to 100 M/bps speed.

static-route

Syntax [**no**] **static-route** *ip-prefix/ip-prefix-length* **next-hop** *ip-address*

Context bof

Description This command creates a static route entry for the CPM management Ethernet port in the running configuration and the Boot Option File (BOF).

This command allows manual configuration of static routing table entries. These static routes are only used by traffic generated by the CPM Ethernet port. To reduce configuration, manual address aggregation should be applied where possible.

A static default (0.0.0.0/0 or ::/0) route cannot be configured on the CPM Ethernet port. A maximum of 10 static routes can be configured on the CPM port.

The **no** form of the command deletes the static route.

Default No default routes are configured.

Parameters *ip-prefix/ip-prefix-length* — The destination address of the static route in dotted decimal notation.

Values

ip-prefix/ip-prefix-length:	ipv4-prefix	a.b.c.d (host bits must be 0)
	ipv4-prefix-le	0 — 32
	ipv6-prefix	x:x:x:x:x:x:x:x (eight 16-bit pieces) x:x:x:x:x:x:d.d.d.d x: [0..FFFF]H d: [0..255]D
	ipv6-prefix-le	0 — 128
ip-address:	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

mask — The subnet mask, expressed as an integer or in dotted decimal notation.

Values 1 — 32 (mask length), 128.0.0.0 — 255.255.255.255 (dotted decimal)

next-hop *ip-address* **—** The next hop IP address used to reach the destination.

DNS Configuration Commands

dns-domain

Syntax **dns-domain** *dns-name*
no dns-domain

Context bof

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 the command removes the domain name from the configuration.

Default **no dns-domain** — No DNS domain name is configured.

Parameters *dns-name* — Specifies the DNS domain name up to 32 characters in length.

primary-dns

Syntax **primary-dns** *ip-address*
no primary-dns

Context bof

Description This command configures the primary DNS server used for DNS name resolution. DNS name resolution can be used when executing ping, traceroute, and service-ping, and also when defining file URLs. DNS name resolution is not supported when DNS names are embedded in configuration files.

The **no** form of the command removes the primary DNS server from the configuration.

Default **no primary-dns** — No primary DNS server is configured.

Parameters *ip-address* — The IPor IPv6 address of the primary DNS server.

Values

ipv4-address - a.b.c.d		
ipv6-address:	x:x:x:x:x:x:x:x[-interface]	
	x:x:x:x:x:x:d.d.d.d[-interface]	
	x: [0..FFFF]H	
	d: [0..255]D	
	interface - 32 chars max, for link local addresses	

secondary-dns

[**no**] **secondary-dns** *ip-address*

Context bof

Description This command configures the secondary DNS server for DNS name resolution. The secondary DNS server is used only if the primary DNS server does not respond.

DNS name resolution can be used when executing ping, traceroute, and service-ping, and also when defining file URLs. DNS name resolution is not supported when DNS names are embedded in configuration files.

The **no** form of the command removes the secondary DNS server from the configuration.

Default **no secondary-dns** — No secondary DNS server is configured.

Parameters *ip-address* — The IP or IPv6 address of the secondary DNS server.

Values
ipv4-address - a.b.c.d
ipv6-address: x:x:x:x:x:x:x:x[-interface]
x:x:x:x:x:x:d.d.d.d[-interface]
x: [0..FFFF]H
d: [0..255]D
interface - 32 chars max, for link local addresses

tertiary-dns

Syntax [**no**] **tertiary-dns** *ip-address*

Context bof

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 the command removes the tertiary DNS server from the configuration.

Default **no tertiary-dns** — No tertiary DNS server is configured.

Parameters *ip-address* — The IP or IPv6 address of the tertiary DNS server.

Values
ipv4-address - a.b.c.d
ipv6-address: x:x:x:x:x:x:x:x[-interface]
x:x:x:x:x:x:d.d.d.d[-interface]
x: [0..FFFF]H
d: [0..255]D
interface - 32 chars max, for link local addresses

Show Commands

bof

Syntax **bof** [*cflash-id* | **booted**]

Context show

Description This command displays the Boot Option File (BOF) executed on last system boot or on the specified device.

If no device is specified, the BOF used in the last system boot displays. If the BOF has been modified since the system boot, a message displays.

Parameters *cflash-id.* The cflash directory name. The slot name is not case-sensitive. Use upper or lowercase "A" or "B" for the slot name.

Values cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

booted — Displays the boot option file used to boot the system.

Output **Show BOF Fields —** The following table describes BOF output fields.

Table 25: Show BOF Output Fields

Label	Description
primary-image	The primary location of the directory that contains the runtime images of both CPM and IOM.
primary-config	The primary location of the file that contains the configuration.
primary-dns	The primary DNS server for resolution of host names to IP addresses.
secondary-image	The secondary location of the directory that contains the runtime images of both CPM and IOM.
secondary-config	The secondary location of the file that contains the configuration.
secondary-dns	The secondary DNS server for resolution of host names to IP addresses.
tertiary-image	The tertiary location of the directory that contains the runtime images of both CPM and IOM.
tertiary-config	The tertiary location of the file that contains the configuration.
address	The IP address and mask associated with the CPM Ethernet port or the secondary CPM port.
tertiary-dns	The tertiary DNS server for resolution of host names to IP addresses.
persist	on — Persistent indexes between system reboots is enabled. off — Persistent indexes between system reboots is disabled.

Table 25: Show BOF Output Fields (Continued)

Label	Description
wait	The time configured for the boot to pause while waiting for console input.
autonegotiate	No autonegotiate – Autonegotiate not enabled. autonegotiate – Autonegotiate is enabled.
duplex	half – Specifies that the system uses half duplex. full – Specifies that the system uses full duplex.
speed	The speed of the CPM Ethernet interface.
console speed	The console port baud rate.
dns domain	The domain name used when performing DNS address resolution.
uplinkA-address	Displays the Uplink-A IP address.
uplinkA-port	Displays the primary port to be used for auto-boot.
uplinkA-route	Displays the static route associated with Uplink-A.
uplinkA-vlan	Displays the VLAN ID to be used on Uplink-A.
uplinkB-address	Displays the Uplink-B IP address.
uplinkB-port	Displays the secondary port to be used for auto-boot.
uplinkB-route	Displays the static route associated with Uplink-B.
uplinkB-vlan	Displays the VLAN ID to be used on Uplink-B.
uplink-mode	This parameter displays the uplink mode of the device.
no-service-ports	Displays the ports on which service traffic is not processed.
use-expansion-card-type	Displays the expansion card type.

Sample Output

```
A:ALA-1# show bof cf3:
===============================================================================
BOF on cf3:
===============================================================================
autonegotiate
     primary-image    ftp://test:test@192.168.xx.xx/./both.tim
     primary-config   ftp://test:test@192.168.xx.xx/./1xx.cfg
     secondary-image  cf1:/i650/
     secondary-config cf1:/config.cfg
     address          192.168.xx.xxx/20 active
     address          192.168.xx.xxx/20 standby
     primary-dns      192.168.xx.xxx
```

```
    dns-domain       test.test.com
    autonegotiate
    duplex           full
    speed            100
    wait             2
    persist          off
    console-speed    115200
===============================================================================
A:ALA-1#
A:ALA-1# show bof booted
===============================================================================
System booted with BOF
===============================================================================
    primary-image    ftp://test:test@192.168.xx.xx/./both.tim
    primary-config   ftp://test:test@192.168.xx.xx/./103.cfg
    secondary-image  cf1:/i650/
    secondary-config cf1:/config.cfg
    address          192.168.xx.xxx/20 active
    address          192.168.xx.xxx/20 standby
    primary-dns      192.168.xx.xxx
    dns-domain       test.test.com
    autonegotiate
    duplex           full
    speed            100
    wait             2
    persist          off
    console-speed    115200
===============================================================================
A:ALA-1#
```

boot-messages

Syntax **boot-messages**

Context show

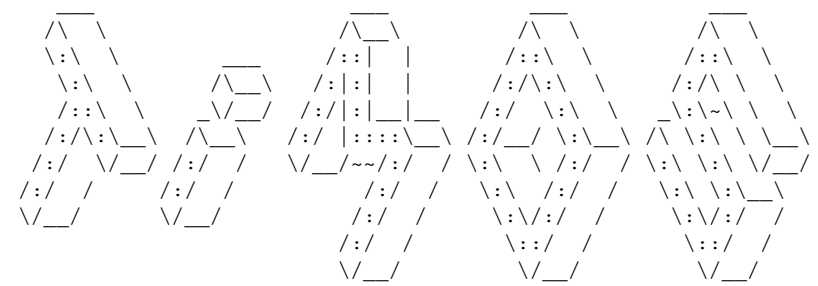
Description This command displays boot messages generated during the last system boot.

Output **Show Boot Messages Fields —** The following output shows boot message output fields.

Sample Output

```
ALA-## show boot-messages
Boot log started on CPU#0
  Build: X-1.2.B1-7 on Thurs Jan 13 14:49:23 201 by builder
  CPUCTL FPGA version: 2A
Forcing BDB controller to HwSlot 0
Performing Power on Diagnostics
>>>Testing mainboard FPGA chain...
JTAG chain length = 2
All requested FPGAs on chain programmed
>>>Validating SDRAM from 0x21f00000 to 0x22000000
>>>Testing SDRAM from 0x02200000 to 0x21f00000
>>>Testing Compact Flash 1... Slot Empty
>>>Testing Compact Flash 2... Slot Empty
>>>Testing Compact Flash 3... OK (TOSHIBA THNCF128MBA)
Wales peripheral FPGA version is 0x13
Hardware Slot 31
Card type in EEPROM is 0x6, 'england_r1'
MDA #1: HwType 0x02, 'denmark_r1', Serial Number 'de3-52'
MDA #2: HwType 0x16, 'hungary_ds3_e3_12_r1', Serial Number 'hun01-02'
Board Serial Number is 'eng02-15'
Chassis type 4 (sr1) found in BP 1 EEProm
Chassis Serial Number is '0203210096'
JTAG chain length = 2
All requested FPGAs on chain programmed
Searching for boot.ldr on local drives:
Searching cf3 for boot.ldr...
*******************************************************
    Loaded 0x001bc191 bytes from cf3 to 0x80400000
    Decompressing to address 0x0a000000
Starting code...

Total Memory: 512MB  Chassis Type: sr1  Card Type: england_r1
TiMOS-L-1.2.B1-7 boot/hops/T2.02  Copyright (c) 2000-2011 Alcatel, Inc.
Built on Thurs Jan 13 15:15:25 2003 by builder in /rel1.2/b1/B1-7/panos/main

TiMOS BOOT LOADER
Time from clock is Thurs Jan 13 08:39:03 2011 UTC
Error:  could not open boot messages file.
Boot messages will not be stored.

Looking for cf3:/bof.cfg ... OK, reading

Contents of Boot Options File on cf3:
    primary-image    ftp://vxworks:vxw0rks@192.168.15.1/./rel/0.0/I129
    primary-config   cf3:/config.cfg
```

```
    address          192.168.13.48/20 active
    primary-dns      192.168.1.254
    dns-domain       eng.timetra.com
    autonegotiate
    duplex           full
    speed            100
    wait             3
    persist          off

Hit a key within 1 second to change boot parms...

Primary image location: ftp://vxworks:vxw0rks@192.168.15.1/./rel/0.0/I129
Initializing management port tme0 using IP address 192.168.13.48.
Loading image ftp://vxworks:vxw0rks@192.168.15.1/./rel/0.0/I129/both.tim
Version B-0.0.I129, Thurs Jan 13 21:24:57  2011 by builder in /rel0.0/I129/panos/main
text:(8906865-->21711576) + data:(587508-->5418992)
Executing TiMOS image at 0x2800000

Total Memory: 512MB  Chassis Type: sr1  Card Type: england_r1
TiMOS-B-0.0.I129 both/hops/T2.02  Copyright (c) 2000-2011 Alcatel.
All rights reserved. All use subject to applicable license agreements.
Built on Thurs Jan 13 21:24:57 2011 by builder in /rel0.0/I129/panos/main
```



```
Time from clock is THU JAN 13 08:39:11 2011 UTC
Attempting to exec configuration file:
'cf3:/config.cfg' ...
System Configuration
Log Configuration
Card Configuration
Port Configuration
Router (Network Side) Configuration
Service Configuration
Router (Service Side) Configuration
Executed 232 lines in 0.0 seconds from file cf3:\config.cfg
ALA-1#
```

System Management

In This Chapter

This chapter provides information about configuring basic system management parameters.

Topics in this chapter include:

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 CLLI code as well as time zones, Network Time Protocol (NTP), Simple Network Time Protocol (SNTP) properties, CRON and synchronization properties.

It is possible to query the DNS server for IPv6 addresses. By default the DNS names are queried for A-records only (address-preference is IPv4-only). If the address-preference is set to IPv6 first, the DNS server will be queried for AAAA-records first, and if there is no successful reply, then A-records.

System Information

System information components include:

System Name

The system name is the MIB II (RFC 1907, *Management Information Base for Version 2 of the Simple Network Management Protocol* (*SNMPv2*)) sysName object. By convention, this text string is the node's fully-qualified domain name. The system name can be any ASCII printable text string of up to 32 characters.

System Contact

The system contact is the MIB II sysContact object. By convention, this text string is a textual identification of the contact person for this managed node, together with information on how to contact this person.The system contact can be any ASCII printable text string of up to 80 characters.

System Location

The system location is the MIB II sysLocation object which is a text string conventionally used to describe the node's physical location, for example, "Bldg MV-11, 1st Floor, Room 101". The system location can be any ASCII printable text string of up to 80 characters.

System Coordinates

The system coordinates is the Alcatel-Lucent Chassis MIB tmnxChassisCoordinates object. This text string indicates the Global Positioning System (GPS) coordinates of the location of the chassis.

Two-dimensional GPS positioning offers latitude and longitude information as a four dimensional vector:

$$\langle direction, hours, minutes, seconds \rangle$$

where *direction* is one of the four basic values: N, S, W, E, *hours* ranges from 0 to 180 (for latitude) and 0 to 90 for longitude, and minutes and seconds range from 0 to 60.

<W, 122, 56, 89> is an example of longitude and <N, 85, 66, 43> is an example of latitude.

System coordinates can be expressed in different notations, examples include:

- `N 45 58 23, W 34 56 12`
- `N37 37' 00 latitude, W122 22' 00 longitude`
- `N36*39.246'  W121*40.121`

The system coordinates can be any ASCII printable text string up to 80 characters.

Naming Objects

It is discouraged to configure named objects with a name that starts with "_tmnx_" and with "_" in general.

Common Language Location Identifier

A Common Language Location Identifier (CLLI) code string for the device is an 11-character standardized geographic identifier that uniquely identifies the geographic location of places and certain functional categories of equipment unique to the telecommunications industry. The CLLI code is stored in the Alcatel-Lucent Chassis MIB tmnxChassisCLLICode object.

The CLLI code can be any ASCII printable text string of up to 11 characters.

DNS Security Extensions

DNS Security (DNSSEC) Extensions are now implemented in SR OS, allowing operators to configure DNS behavior of the router to evaluate whether the Authenticated Data bit was set in the response received from the recursive name server and to trust the response, or ignore it.

System Time

7750 SR-Series routers are equipped with a real-time system clock for time keeping purposes. When set, the system clock always operates on Coordinated Universal Time (UTC), but the 7750 SR OS software has options for local time translation as well as system clock synchronization.

System time parameters include:

Time Zones

Setting a time zone in SR OS allows for times to be displayed in the local time rather than in UTC. The SR OS has both user-defined and system defined time zones.

A user-defined time zone has a user assigned name of up to four printable ASCII characters in length and unique from the system-defined time zones. For user-defined time zones, the offset from UTC is configured as well as any summer time adjustment for the time zone.

The SR OS system-defined time zones are listed in Table 26 which includes both time zones with and without summer time correction.

Table 26: System-defined Time Zones

Acronym	Time Zone Name	UTC Offset
Europe:		
GMT	Greenwich Mean Time	UTC
BST	British Summer Time	UTC +1
IST	Irish Summer Time	UTC +1*
WET	Western Europe Time	UTC
WEST	Western Europe Summer Time	UTC +1
CET	Central Europe Time	UTC +1
CEST	Central Europe Summer Time	UTC +2
EET	Eastern Europe Time	UTC +2
EEST	Eastern Europe Summer Time	UTC +3

Table 26: System-defined Time Zones (Continued)

Acronym	Time Zone Name	UTC Offset
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
MT	Mountain Time	Either as MST or MDT, depending on place and time of year
PST	Pacific Standard Time	UTC -8
PDT	Pacific Daylight Saving Time	UTC -7
PT	Pacific Time	Either as PST or PDT, depending on place and time of year
HST	Hawaiian Standard Time	UTC -10
AKST	Alaska Standard Time	UTC -9
AKDT	Alaska Standard Daylight Saving Time	UTC -8
Australia		
AWST	Western Standard Time (e.g., Perth)	UTC +8
ACST	Central Standard Time (e.g., Darwin)	UTC +9.5
AEST	Eastern Standard/Summer Time (e.g., Canberra)	UTC +10

Network Time Protocol (NTP)

NTP is the Network Time Protocol defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis* and RFC 5905, *Network Time Protocol Version 4: Protocol and Algorithms Specification*. It allows for the participating network nodes to keep time more accurately and more importantly they can maintain time in a more synchronized fashion between all participating network nodes.

NTP uses stratum levels to define the number of hops from a reference clock. The reference clock is considered to be a stratum-0 device that is assumed to be accurate with little or no delay. Stratum-0 servers cannot be used in a network. However, they can be directly connected to devices that operate as stratum-1 servers. A stratum-1 server is an NTP server with a directly-connected device that provides Coordinated Universal Time (UTC), such as a GPS or atomic clock.

The higher stratum levels are separated from the stratum-1 server over a network path, thus, a stratum-2 server receives its time over a network link from a stratum-1 server. A stratum-3 server receives its time over a network link from a stratum-2 server.

The SR OS will normally operate as a stratum 2 or higher device. It relies on an external stratum 1 server to source accurate time into the network. However, the SR OS also allows for the use of the local PTP recovered time to be a source into NTP. In this latter case, the local PTP source appears as a stratum 0 server and the SR OS advertises itself as a stratum 1 server. Activation of the PTP source into NTP may impact the network NTP 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. In this mode, the node will, by default, transmit NTP packets in NTP version 4 mode.
- Authentication keys — Increased security support in carrier and other network has been implemented. Both DES and MD5 authentication are supported as well as multiple keys.
- Operation in symmetric active mode — This capability requires that NTP be synchronized with a specific node that is considered more trustworthy or accurate than other nodes carrying NTP in the system. This mode requires that a specific peer is set.
- Server and peer addressing using IPv6 — Both external servers and external peers may be defined using IPv6 or IPv4 addresses. Other features (such as multicast, broadcast) use IPv4 addressing only.
- Broadcast or multicast modes — When operating in these modes, the node will receive or send using either a multicast (default 224.0.1.1) or a broadcast address. Multicast is supported on the MGMT port.
- Alert when NTP server is not available — When none of the configured servers are reachable on the node, the system reverts to manual timekeeping and issues a critical alarm. When a server becomes available, a trap is issued indicating that standard operation

has resumed.

- NTP and SNTP — If both NTP and SNTP are enabled on the node, then SNTP transitions to an operationally down state. If NTP is removed from the configuration or shut down, then SNTP resumes an operationally up state.
- Gradual clock adjustment — As several applications (such as Service Assurance Agent (SAA)) can use the clock, and if determined that a major (128 ms or more) adjustment needs to be performed, the adjustment is performed by programmatically stepping the clock. If a minor (less than 128 ms) adjustment must be performed, then the adjustment is performed by either speeding up or slowing down the clock.
- In order to avoid the generation of too many events/trap the NTP module will rate limit the generation of events/traps to three per second. At that point a single trap will be generated that indicates that event/trap squashing is taking place.

SNTP Time Synchronization

For synchronizing the system clock with outside time sources, the SR OS includes a Simple Network Time Protocol (SNTP) client. As defined in RFC 2030, SNTP Version 4 is an adaptation of the Network Time Protocol (NTP). SNTP typically provides time accuracy within 100 milliseconds of the time source. SNTP can only receive the time from NTP servers; it cannot be used to provide time services to other systems. SNTP is a compact, client-only version of NTP. SNTP does not authenticate traffic.

SNTP can be configured in both unicast client modes (point-to-point) and broadcast client modes (point-to-multipoint). SNTP should be used only at the extremities of the synchronization subnet. SNTP clients should operate only at the highest stratum (leaves) of the subnet and in configurations where no NTP or SNTP client is dependent on another SNTP client for synchronization. SNTP time servers should operate only at the root (stratum 1) of the subnet and then only in configurations where no other source of synchronization other than a reliable radio clock is available. External servers may only be specified using IPv4 addresses.

In the SR OS, the SNTP client can be configured for either broadcast or unicast client mode.

CRON

The CRON feature supports the Service Assurance Agent (SAA) functions as well as 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 (one-shot), 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 features are saved to the configuration file on both primary and backup control modules. If a control module switchover occurs, CRON events are restored when the new configuration is loaded. If a control module switchover occurs during the execution of a cron script, the failover behavior will be determined by the contents of the script.

CRON features run serially with at least 255 separate schedules and scripts. Each instance can support a schedule where the event is executed any number of times.

The following CRON elements are supported:

- Action — 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 which contains information on 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 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.

High Availability

This section discusses the high availability (HA) routing options and features available to service providers that help diminish vulnerability at the network or service provider edge and alleviate the effect of a lengthy outage on IP networks.

High availability is an important feature in service provider routing systems. High availability is gaining momentum due to the unprecedented growth of IP services and applications in service provider networks driven by the demand from the enterprise and residential communities. Downtime can be very costly, and, in addition to lost revenue, customer information and business-critical communications can be lost. High availability is the combination of continuous uptime over long periods (Mean Time Between Failures (MTBF)) and the speed at which failover or recovery occurs (Mean Time To Repair (MTTR).

The popularity of high availability routing is evident at the network or service provider edge where thousands of connections are hosted and rerouting options around a failed piece of equipment can often be limiting. Or, a single access link exists to a customer because of additional costs for redundant links. As service providers converge business-critical services such as real-time voice (VoIP), video, and VPN applications over their IP networks, high availability becomes much more stringent compared to the requirements for best-effort data. Network and service availability become critical aspects when offering advanced IP services which dictates that IP routers that are used to construct the foundations of these networks be resilient to component and software outages.

For high availability configuration information, refer to Synchronization and Redundancy on page 259.

HA Features

As more and more critical commercial applications move onto the IP/MPLS networks, providing high availability services becomes increasingly important. This section describes high availability features for routers. Most of these features only apply to routers with two Control Processor Modules (CPM), currently the 7750 SR-7, SR-12, and SR-c12 s.

Redundancy

The redundancy features enable the duplication of data elements and software functionality to maintain service continuation in case of outages or component failure.

Refer to the 7750 SR-Series OS Integrated Services Adapter Guide for information about redundancy for the Integrated Service Adapter (ISA).

Software Redundancy

Software outages are challenging even when baseline hardware redundancy is in place. There should be a balance to provide high availability routing otherwise router problems typically propagate not only throughout the service provider network, but also externally to other connected networks possibly belonging to other service providers. This could affect customers on a broad scale. Presently, there are several software availability features that contribute to the percentage of time that a router is available to process and forward traffic.

To fully appreciate high availability you should realize that all routing protocols specify minimum time intervals in which the peer device must receive an acknowledgement before it disconnects the session.

- OSPF default session timeout is approximately 40 seconds. The timeout intervals are configurable.
- BGP default session timeout is approximately 120 seconds. The timeout intervals are configurable.

Therefore, router software has to recover faster than the specified time interval to maintain up time.

Configuration Redundancy

Features configured on the active device CPM are saved on the standby CPM as well. When the active device CPM fails, these features are brought up on the standby device CPM that takes over the mastership.

Even with modern modular and stable software, the failure of route processor hardware or software can cause the router to reboot or cause other service impacting events. In the best circumstances, failure leads to the initialization of a redundant route processor, which hosts the standby software configuration, to become the active processor. The following options are available.

- Warm standby — The router image and configuration is already loaded on the standby route processor. However, the standby could still take a few minutes to become effective since it must first re-initialize connections by bringing up Layer 2 connections and Layer 3 routing protocols and then rebuild routing tables.
- Hot standby — The router image, configuration, and network state is already loaded on the standby and it receives continual updates from the active route processor and the swapover is immediate. However, hot standby affects conventional router performance as more frequent synchronization increases consumption of system resources. Newer generation service routers, like the SR OS routers, address this issue because they already have extra processing built into the system.

Component Redundancy

7750 SR-Series component redundancy is critical to reduce MTTR for the system and primarily consists of the following router features:

- Dual route processor modules — For a highly available architecture, redundant route processors (RPs) or Control Processor Modules(CPM) are essential. The route processor calculates the most efficient route to an Internet destination and communicates the best

path information to peer routers. Rapid information synchronization between the primary and secondary route processor is crucial to minimize recovery time.

- Dual switch fabric — Failover to the backup switch fabric within a minimum time interval, preferably with no loss of traffic.
- Redundant line cards — Failover to the backup within a minimum time interval, preferably with no loss of traffic.
- Redundant power supply — A power module can be removed without impact on traffic.
- Redundant fan — Failure of a fan module without impacting traffic.
- Hot swap — Components in a live system can be replaced or become active without taking the system down or affecting traffic flow to/from other modules.

Router hardware architecture plays a key role in the availability of the system. The principle router architecture styles are centralized and distributed. In these architectures, both active and standby route processors, I/O modules (IOMs) (also called line cards), fans, and power supplies maintain a low MTTR for the routing system.

However, in a centralized architecture, packet processing and forwarding is performed in a central shared route processor and the individual line cards are relatively simple. The cards rely solely on the route processor for routing and forwarding intelligence and, should the centralized route processor fail, there is greater impact to the system overall, as all routing and packet forwarding will stop.

In a distributed system, the packet forwarding functionality is situated on each line card. Distributing the forwarding engines off the central route processor and positioning one on each line card lowers the impact of route processor failure as the line cards can continue to forward traffic during an outage.

The distributed system is better suited to enable the convergence of business critical services such as real-time voice (VoIP), Video, and VPN applications over IP networks with superior performance and scalability. The centralized architecture can be prone to performance bottleneck issues and limits service offerings through poor scalability which may lead to customer and service SLA violations.

Service Redundancy

All service-related statistics are kept during a switchover. Services, SDPs, and SAPs will remain up with a minimum loss of forwarded traffic during a CPM switchover.

Accounting Configuration Redundancy

When there is a switchover and the standby CPM becomes active, the accounting servers will be checked and if they are administratively up and capable of coming online (media present, etc.), the

standby will be brought online and new accounting files will be created at that point. Users must manually copy the accounting records from the failed CPM.

Nonstop Forwarding

In a control plane failure or a forced switchover event, the router continues to forward packets using the existing stale forwarding information. Nonstop forwarding requires clean control plane and data plane separation. Usually the forwarding information is distributed to the IOMs.

Nonstop forwarding is used to notify peer routers to continue forwarding and receiving packets, even if the route processor (control plane) is not working or is in a switch-over state. Nonstop forwarding requires clean control plane and data plane separation and usually the forwarding information is distributed to the line cards. This method of availability has both advantages and disadvantages. Nonstop forwarding continues to forward packets using the existing stale forwarding information during a failure. This may cause routing loops and black holes, and also requires that surrounding routers adhere to separate extension standards for each protocol. Every router vendor must support protocol extensions for interoperability.

Nonstop Routing (NSR)

With NSR on the 7750 SR-Series routers devices, routing neighbors are unaware of a routing process fault. If a fault occurs, a reliable and deterministic activity switch to the inactive control complex occurs such that routing topology and reachability are not affected, even in the presence of routing updates. NSR achieves high availability through parallelization by maintaining up to date routing state information, at all times, on the standby route processor. This capability is achieved independently of protocols or protocol extensions, providing a more robust solution than graceful restart protocols between network routers.

The NSR implementation on the 7750 SR-Series routers supports all routing protocols. NSR makes it possible to keep the existing sessions (BGP, LDP, OSPF, etc.) during a CPM switchover, including support for MPLS signaling protocols. Peers will not see any change.

Protocol extensions are not required. There are no interoperability issues and there is no need to define protocol extensions for every protocol. Unlike nonstop forwarding and graceful restart, the forwarding information in NSR is always up to date, which eliminates possible blackholes or forwarding loops.

Traditionally, addressing high availability issues have been patched through non-stop forwarding solutions. With the implementation of NSR, these limitations are overcome by delivering an intelligent hitless failover solution. This enables a carrier-class foundation for transparent networks, required to support business IP services backed by stringent SLAs. This level of high availability poses a major issue for conventional routers whose architectural design limits or prevents them from implementing NSR.

CPM Switchover

During a switchover, system control and routing protocol execution are transferred from the active to the standby CPM.

An automatic switchover may occur under the following conditions:

- A fault condition that causes the active CPM to crash or reboot.
- The active CPM is declared down (not responding).
- Online removal of the active CPM.

A manual switchover can occur under the following conditions:

- To force a switchover from an active CPM to a standby, use the `admin redundancy force-switchover` command. You can configure a batch file that executes after failover by using the **config system switchover-exec** and **admin redundancy force-switchover now** CLI commands.

Synchronization

Synchronization between the CPMs includes the following:

- Configuration and boot-env Synchronization on page 258
- State Database Synchronization on page 258

Configuration and boot-env Synchronization

Configuration and boot-env synchronization are supported in **admin>redundancy> synchronize and config>redundancy>synchronize** contexts.

State Database Synchronization

If a new standby CPM is inserted into the system, it synchronizes with the active CPM upon a successful boot process.

If the standby CPM is rebooted, it synchronizes with the active CPM upon a successful boot process.

When configuration or state changes occur, an incremental synchronization is conducted from the active CPM to the standby CPM.

If the synchronization fails, the standby does not reboot automatically. The **show redundancy synchronization** command displays synchronization output information.

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the **admin reboot standby** command on the active or the standby CPM.

Synchronization and Redundancy

7750 SR-Series routers supporting redundancy use a 1:1 redundancy scheme. Redundancy methods facilitate system synchronization between the active and standby Control Processor Modules (CPMs) so they maintain identical operational parameters to prevent inconsistencies in the event of a CPM failure.

When automatic system synchronization is enabled for an entity, any save or delete file operations configured on the primary, secondary or tertiary choices on the active CPM file system are mirrored in the standby CPM file system.

Although software configurations and images can be copied or downloaded from remote locations, synchronization can only occur locally between compact flash drives (cf1:, cf2:, and cf3:).

Synchronization can occur either:

- Automatically — Automatic synchronization is disabled by default. To enable automatic synchronization, the **config>redundancy>synchronization** command must be specified with either the **boot-env** parameter or the `config` parameter.

  When the **boot-env** parameter is specified, the BOF, boot.ldr, config, and image files are automatically synchronized. When the `config` parameter is specified, only the config files are automatically synchronized.

  Automatic synchronization also occurs whenever the BOF is modified and when an `admin>save` command is entered with no filename specified.

- Manually — To execute synchronization manually, the **admin>redundancy>synchronization** command must be entered with the **boot-env** parameter or the **config** parameter.

  When the **boot-env** parameter is specified, the BOF, boot.ldr, config, and image files are synchronized. When the **config** parameter is specified, only the config files are synchronized.

  The following shows the output displayed during a manual synchronization of configuration files.

```
A:ALA-12>admin>redundancy# synchronize config
Syncing configuration......

Syncing configuration.....Completed.
A:ALA-12#
```

Active and Standby Designations

Typically, the first Switch Fabric (SF)/CPM card installed in a redundant 7750 SR-Series chassis assumes the role as active, regardless of being inserted in Slot A or B. The next CPM installed in the same chassis then assumes the role as the standby CPM. If two CPM are inserted simultaneously (or almost simultaneously) and are booting at the same time, then preference is given to the CPM installed in Slot A.

If only one CPM is installed in a redundant router device, then it becomes the active CPM regardless of the slot it is installed in.

To visually determine the active and standby designations, the Status LED on the faceplate is lit green (steady) to indicate the active designation. The Status LED on the second CPM faceplate is lit amber to indicate the standby designation.

The following output shows that the CPM installed in Slot A is acting as the active CPM and the CPM installed in Slot B is acting as the standby.

```
ALA-12# show card
===============================================================================
Card Summary
===============================================================================
slot card             card             card             admin     operational
     allowed          provisioned      equipped         state     state
-------------------------------------------------------------------------------
2    all supported    iom-20g          iom-20g          up        up
A    all supported    sfm-400g         sfm-400g         up        up/active
B    all supported    sfm-400g         sfm-400g         up        up/standby
===============================================================================
ALA-12#
```

The following console message displays when a CPM boots, sees an active CPM, and becomes the standby CPM.

```
...
Slot A contains the Active CPM

This CPM (Slot B) is the Standby CPM
```

When the Active CPM Goes Offline

When an active CPM goes offline (due to reboot, removal, or failure), the standby CPM takes control without rebooting or initializing itself. It is assumed that the CPMs are synchronized, therefore, there is no delay in operability. When the CPM that went offline boots and then comes back online, it becomes the standby CPM.

When the standby CPM comes online, the following output displays:

```
Active CPM in Slot A has stopped
Slot B is now active CPM


Attempting to exec configuration file:
'cf3:/config.cfg' ...

...

Executed 49,588 lines in 8.0 seconds from file cf3:\config.cfg
```

Persistence

The persistence feature allows information learned through DHCP snooping across reboots to be kept. This information can include data such as the IP address, MAC binding information, lease length information, and ingress sap information (required for VPLS snooping to identify the ingress interface). This information is referred to as the DHCP lease-state information.

When a DHCP message is snooped, there are steps that make the data persistent in a system with dual CPMs. In systems with only one CPM, only Step 1 applies. In systems with dual CPMs, all steps apply.

1. When a DHCP ACK is received from a DHCP server, the entry information is written to the active CPM Compact Flash. If writing was successful, the ACK is forwarded to the DHCP client. If persistency fails completely (bad cflash), a trap is generated indicating that persistency can no longer be guaranteed. If the complete persistency system fails the DHCP ACKs are still forwarded to the DHCP clients. Only during small persistency interruptions or in overload conditions of the Compact Flash, DHCP ACKs may get dropped and not forwarded to the DHCP clients.
2. DHCP message information is sent to the standby CPM and also there the DHCP information is logged on the Compact Flash. If persistency fails on the standby also, a trap is generated.

Network Synchronization

This section describes network synchronization capabilities available on SR OS platforms. These capabilities involve multiple approaches to network timing; namely SDH/SONET, Synchronous Ethernet, and Adaptive clocking and a Precision Time Protocol (PTP) IEEE 1588v2.These features address barriers to entry by:

- Providing synchronization quality required by the mobile space; such as radio operations and circuit emulation services (CES) transport.
- Augmenting and potentially replacing the existing (SONET/SDH) timing infrastructure and delivering high quality network timing for time sensitive applications in the wireline space.

Network synchronization is commonly distributed in a hierarchical master-slave topology at the physical layer as shown in Figure 12.

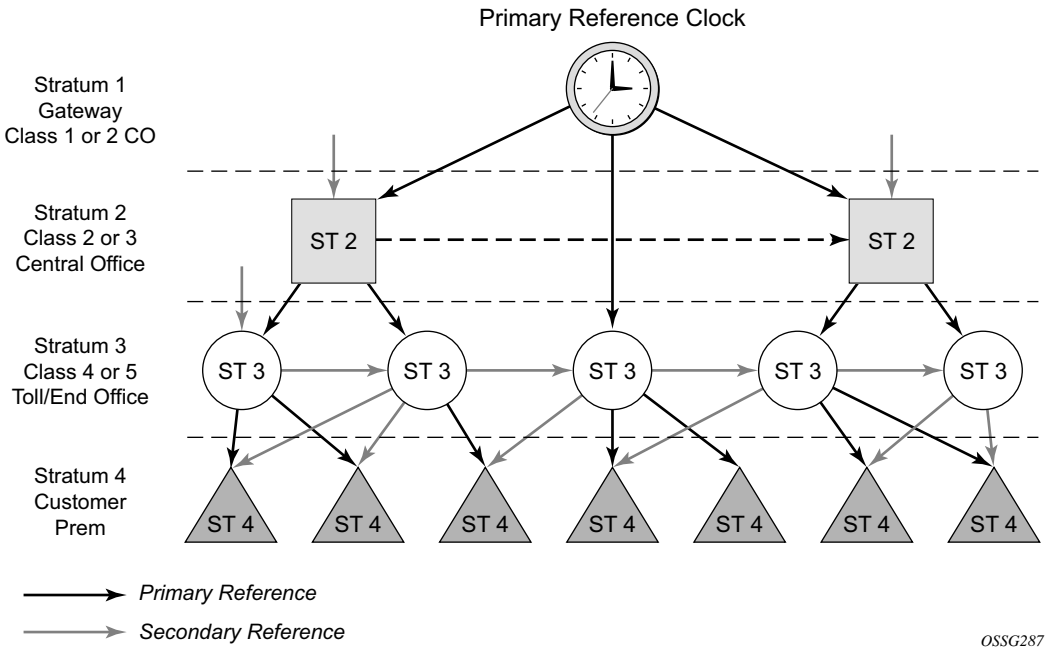


Figure 12: Conventional Network Timing Architecture (North American Nomenclature)

The architecture shown in Figure 12 provides the following benefits:

- Limits the need for high quality clocks at each network element and only requires that they reliably replicate input to remain traceable to its reference.
- Uses reliable physical media to provide transport of the timing signal; it doesn't consume any bandwidth and requires limited additional processing.

The synchronization network is designed so a clock always receives timing from a clock of equal or higher stratum or quality level. This ensures that if an upstream clock has a fault condition (for example, loses its reference and enters a holdover or free-run state) and begins to drift in frequency, the downstream clock 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 or loop timing. In addition, some TDM channels can use adaptive timing.

Transmission of a reference clock through a chain of Ethernet equipment requires that all equipment supports Synchronous Ethernet. A single piece of equipment that is not capable of performing Synchronous Ethernet breaks the chain. Ethernet frames will still get through but downstream devices should not use the recovered line timing as it will not be traceable to an acceptable stratum source.

Central Synchronization Sub-System

The timing subsystem for the platforms has a central clock located on the CPM (motherboard). The timing subsystem performs many of the duties of the network element clock as defined by Telcordia (GR-1244-CORE) and ITU-T G.781.

The system can select from up to four timing inputs to train the local oscillator. The priority order of these references must be specified. This is a simple ordered list of inputs: {bits, ref1, ref2, ptp}. The CPM clock output shall have the ability to drive the clocking for all line cards in the system. The routers support selection of the node reference using Quality Level (QL) indications. See Figure 13 for a description of synchronization reference selection.

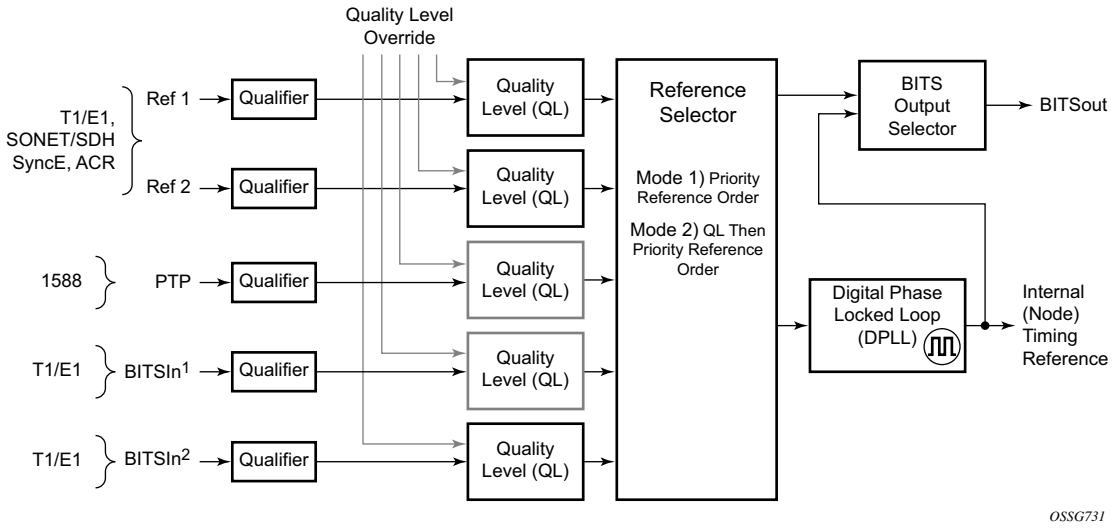


Figure 13: Synchronization Reference Selection

The recovered clock will be able to derive its timing from any of the following:

- OC3/STM1, OC12/STM4, OC48/STM16, OC192/STM64 ports
- T1/E1 CES channel (adaptive clocking)
- Synchronous Ethernet ports
- T1/E1 port
- BITS port on a Channelized OC3/STM1 CES CMA (7710 SR-c4, 7710 SR-c12, and the 7750 SR-c12)
- BITS port on the CPM or CFM module
- IEEE 1588v2 slave port (PTP)

All settings of the signal characteristics for the BITS input applies to both ports. When the active CPM considers the BITS input as a possible reference, it will consider first the BITS input port on the active CPM followed the BITS input port on the standby CPM in that relative priority order. This relative priority order is in addition to the user definable ref-order. For example, a ref-order of ‘bits-ref1-ref2’ would actually be BITS in (active CPM) followed by BITS in (standby CPM) followed by ref1 followed by ref2. When ql-selection is enabled, then the QL of each BITS input port shall be viewed independently. The higher QL source shall be chosen.

The 7750 SR-c4 platform has a CFM, there are two BITS input ports and two BITS output ports on this one module. These two ports are provided for BITS redundancy for the chassis. All settings of the signal characteristics for the BITS input applies to both ports. This includes the ql-override setting. When the CFM considers the BITS input as a possible reference, it will consider first the

BITS input port “bits1” followed the BITS input port “bits2” in that relative priority order. This relative priority order is in addition to the user definable ref-order. For example, a ref-order of ‘bits-ref1-ref2’ would actually be “bits1” followed by “bits2” followed by ref1 followed by ref2. When ql-selection is enabled, then the QL of each BITS input port shall be viewed independently. The higher QL source shall be chosen.

The BITS output ports can be configured to provided either the unfiltered recovered line clock from a SR/ESS port or the output of the central clock of the 7750 SR. The first case would be used if the port was connected to deliver an input reference directly to dedicated timing device in the facility (BITS or SASE device). The second case would be used to test the quality of the clocking used by the 7750 SR.

When QL selection mode is disabled, then the reversion setting controls when the central clock can re-select a previously failed reference.

The Table 27 shows the selection followed for two reference in both revertive and non-revertive modes:

Table 27: 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

Synchronization Status Messages (SSM)

SSM provides a mechanism to allow the synchronization distribution network to both determine the quality level of the clock sourcing a given synchronisation trail and to allow a network element to select the best of multiple input synchronization trails. Synchronization Status messages have been defined for various transport protocols including SONET/SDH, T1/E1, and Synchronous Ethernet, for interaction with office clocks, such as BITS or SSUs and embedded network element clocks.

SSM allows equipment to autonomously provision and reconfigure (by reference switching) their synchronization references, while helping to avoid the creation of timing loops. These messages are particularly useful to allow synchronization reconfigurations when timing is distributed in both directions around a ring.

DS1 Signals

DS1 signals can carry an indication of the quality level of the source generating the timing information using the SSM transported within the 1544 Kbit/s signal's Extended Super Frame (ESF) Data Link (DL) as specified in Recommendation G.704. No such provision is extended to SF formatted DS1 signals.

The format of the data link messages in ESF frame format is "0xxx xxx0 1111 1111", transmitted rightmost bit first. The six bits denoted "xxx xxx" contain the actual message; some of these messages are reserved for synchronization messaging. It takes 32 frames (such as 4 ms) to transmit all 16 bits of a complete DL.

E1 Signals

E1 signals can carry an indication of the quality level of the source generating the timing information using the SSM as specified in Recommendation G.704.

One of the Sa4 to Sa8 bits, (the actual Sa bit is for operator selection), is allocated for Synchronization Status Messages. To prevent ambiguities in pattern recognition, it is necessary to align the first bit (San1) with frame 1 of a G.704 E1 multiframe.

The numbering of the San (n = 4, 5, 6, 7, 8) bits. A San bit is organized as a 4-bit nibble San1 to San4. San1 is the most significant bit; San4 is the least significant bit.

The message set in San1 to San4 is a copy of the set defined in SDH bits 5 to 8 of byte S1.

SONET/SDH Signals

The SSM of SDH and SONET interfaces is carried in the S1 byte of the frame overhead. Each frame contains the four bit value of the QL.

DS3/E3

These signals are not required to be synchronous. However, it is acceptable for their clocking to be generated from a sychronization source. The SR/ESS permits E3/DS3 physical ports to be specified as a central clock input reference.

DS3/E3 signals do not support an SSM channel. QL-override should be used for these ports if ql-selection is enabled

Synchronous Ethernet

Traditionally, Ethernet-based networks employ the physical layer transmitter clock to be derived from an inexpensive +/-100ppm crystal oscillator and the receiver locks onto it. There is no need for long term frequency stability because the data is packetized and can be buffered. For the same reason there is no need for consistency between the frequencies of different links. However, you can derive the physical layer transmitter clock from a high quality frequency reference by replacing the crystal with a frequency source traceable to a primary reference clock. This would not effect the operation of any of the Ethernet layers, for which this change would be transparent. The receiver at the far end of the link would lock onto the physical layer clock of the received signal, and thus itself gain access to a highly accurate and stable frequency reference. Then, in a manner analogous to conventional hierarchical master-slave network synchronization, this receiver could lock the transmission clock of its other ports to this frequency reference and a fully time synchronous network could be established.

The advantage of using Synchronous Ethernet, compared with methods that rely on sending timing information in packets over an unclocked physical layer, is that it is not influenced by impairments introduced by the higher levels of the networking technology (packet loss, packet delay variation). Hence, the frequency accuracy and stability may be expected to exceed those of networks with unsynchronized physical layers.

Synchronous Ethernet allows operators to gracefully integrate existing systems and future deployments into conventional industry-standard synchronization hierarchy. The concept behind synchronous Ethernet is analogous to SONET/SDH system timing capabilities. It allows the operator to select any (optical) Ethernet port as a candidate timing reference. The recovered timing from this port will then be used to time the system (for example, the CPM will lock to this provisioned reference selection). The operator then could ensure that any of system output would be locked to a stable traceable frequency source.

If the port is a fixed copper Ethernet port and in 1000BASE-T mode of operation, there is a dependency on the 802.3 link timing for the Synchronous Ethernet functionality (refer to ITU-T G.8262). The 802.3 link Master-Slave timing states must align with the desired direction of Synchronous Ethernet timing flow. When a fixed copper Ethernet port is specified as an input reference for the node or when it is removed as an input reference for the node, an 802.3 link auto-negotiation is triggered to ensure the link timing aligns properly.

The SSM of Synchronous Ethernet uses an Ethernet OAM PDU that uses the slow protocol subtype. For a complete description of the format and processing see ITU-T G.8264

Clock Source Quality Level Definitions

The following clock source quality levels have been identified for the purpose of tracking network timing flow. These levels make up all of the defined network deployment options given in Recommendation G.803 and G.781. The Option I network is a network developed on the original European SDH model; whereas, the Option II network is a network developed on the North American SONET model.

In addition to the QL values received over SSM of an interface, the standards also define additional codes for internal use. These include the following:

- QL INVx is generated internally by the system if and when an unallocated SSM value is received, where x represents the binary value of this SSM. Within the SR/ESS all these independent values are assigned as the singled value of QL-INVALID.
- QL FAILED is generated internally by the system if and when the terminated network synchronization distribution trail is in the signal fail state.

Within the SR/ESS, there is also an internal quality level of QL-UNKNOWN. This is used to differentiate from a received QL-STU code but is equivalent for the purposes of QL selection.

Table 28: Synchronization Message Coding and Source Priorities

SSM value received on port				
SDH interface SyncE interafce in SDH mode	**SONET Interface SyncE interface in SONET mode**	**E1 interface**	**T1 interface (ESF)**	**Internal Relative Quality Level**
0010 (prc)	0001 (prs)	0010 (prc)	00000100 11111111 (prs)	1. Best quality
	0000 (stu)		00001000 11111111 (stu)	2.
	0111 (st2)		00001100 11111111 (ST2)	3.
0100 (ssua)	0100 (tnc)	0100 (ssua)	01111000 11111111 (TNC)	4.
	1101 (st3e)		01111100 11111111 (ST3E)	5.
1000 (ssub)		1000 (ssub)		6.
	1010 (st3/eec2)		00010000 11111111 (ST3)	7.

Table 28: Synchronization Message Coding and Source Priorities (Continued)

1011 (sec/eec1)		1011 (sec)		8. Lowest quality qualified in QL-enabled mode
	1100 (smc)		00100010 11111111 (smc)	9.
			00101000 11111111 (st4)	10.
	1110 (pno)		01000000 11111111 (pno)	11.
1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)	12.
Any other	Any other	Any other	N/A	13. QL_INVALID
				14. QL-FAILED
				15. QL-UNC

Table 29: Synchronization Message Coding and Source Priorities

	SSM values to be transmitted by interface of type			
Internal Relative Quality Level	**SDH interface SyncE interafce in SDH mode**	**SONET Interface SyncE interface in SONET mode**	**E1 interface**	**T1 interface (ESF)**
1. Best quality	0010 (prc)	0001 (PRS)	0010 (prc)	00000100 11111111 (PRS)
2.	0100 (ssua)	0000 (stu)	0100 (ssua)	00001000 11111111 (stu)
3.	0100 (ssua)	0111 (st2)	0100 (ssua)	00001100 11111111 (st2)
4.	0100 (ssua)	0100 (tnc)	0100 (ssua)	01111000 11111111 (tnc)
5.	1000 (ssub)	1101 (st3e)	1000 (ssub)	01111100 11111111 (st3e)
6.	1000 (ssub)	1010 (st3/eec2)	1000 (ssub)	00010000 11111111 (st3)
7.	1011 (sec/eec1)	1010 (st3/eec2)	1011 (sec)	00010000 11111111 (st3)
8. Lowest quality qualified in QL-enabled mode	1011 (sec/ eec1)	1100 (smc)	1011 (sec)	00100010 11111111 (smc)

Table 29: Synchronization Message Coding and Source Priorities (Continued)

9.	1111 (dnu)	1100 (smc)	1111 (dnu)	00100010 11111111 (smc)
10.	1111 (dnu)	1111 (dus)	1111 dnu	00101000 11111111 (st4)
11.	1111 (dnu)	1110 (pno)	1111 (dnu)	01000000 11111111 (pno)
12.	1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)
13. QL_INVALID	1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)
14. QL-FAILED	1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)
15. QL-UNC	1011 (sec/eec1)	1010 (st3/eec2)	1011 (sec)	00010000 11111111 (st3)

Note: When the internal Quality level is in the range of 9 through 14, the output codes shown in Table 29, will only appear if QL selection is disabled. If ql-selection is enabled, then all of these internal states are changed to internal state 15 (Holdover) and the ssm value generated will reflect the holdover quality of the internal clock.

IEEE 1588v2 PTP

Precision Time Protocol (PTP) is a timing-over-packet protocol defined in the IEEE 1588v2 standard 1588 PTP 2008.

PTP may be deployed as an alternative timing-over-packet option to ACR. PTP provides the capability to synchronize network elements to a Stratum-1 clock or primary reference clock (PRC) traceable 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 PTP functionality has dependencies on hardware components in the 7750 SR. Refer to the relevant release notes for details.

The 7750 SR supports the ordinary clock in slave or master mode or the boundary clock.When configured as an ordinary clock master, the 7750 SR can only provide frequency distribution using IEEE 1588v2. The boundary clock and ordinary clock slave can be used for both frequency and time distribution.

The 7750 SR communicates with peer IEEE 1588v2 clocks; see Figure 14. These peers can be ordinary clock masters, ordinary clock slaves, or boundary clocks. Each peer is identified by the IPv4 address to be used for communications between the two clocks.

There are two types of peers: configured and discovered. The 7750 SR operating as an ordinary clock slave or as a boundary clock should have configured peers for each PTP neighbor clock from which it might accept synchronization information. The 7750 SR initiates unicast sessions with all configured peers. A 7750 SR operating as an ordinary clock master or boundary clock will accept unicast session requests from external peers. If the peer is not a configured peer, then it is considered a discovered peer. The 7750 SR can deliver synchronization information toward discovered peers.

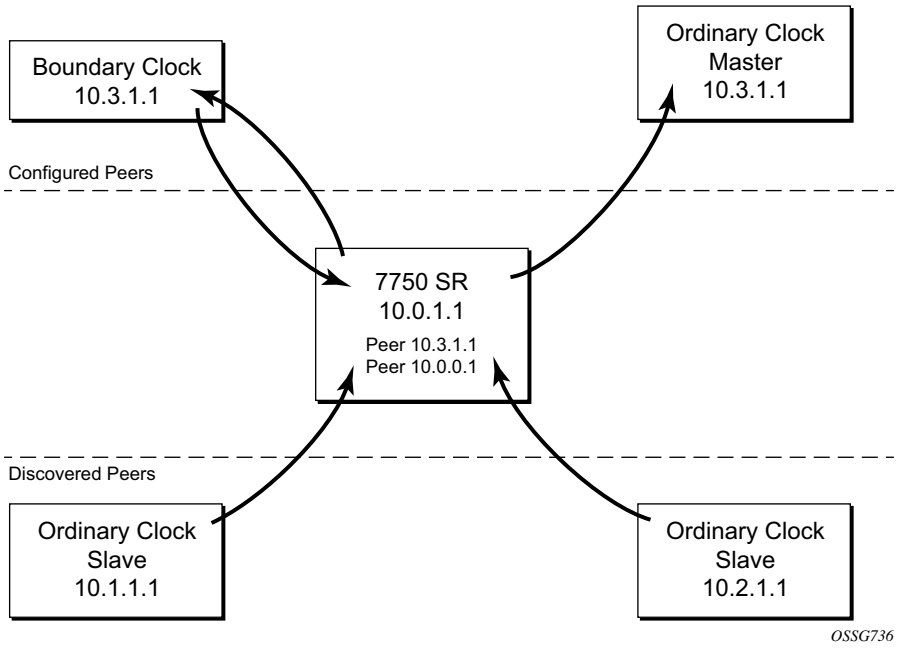


Figure 14: Peer Clocks

The IEEE 1588v2 standard includes the concept of PTP profiles. These profiles are defined by industry groups or standards bodies that define how IEEE 1588v2 is to be used for a particular application.

7750 SRcurrently supports two profiles:

- IEEE 1588v2 default profile
- ITU-T Telecom profile (G.8265.1)

In both cases, communications between clocks utilize the Unicast communication procedures of the IEEE standard. The transport layer uses UDP/IPv4 encapsulation.

When a 7750 SR receives *Announce* messages from one or moreconfiguredpeers, it executes a Best Master Clock Algorithm (BMCA) to determine the state of communication between itself and the peers. The system uses the BMCA to create a hierarchical topology allowing the flow of synchronization information from the best source (the Grandmaster clock) out through the network to all boundary and slave clocks. Each profile has a dedicated BMCA.

If the **profile** setting for the clock is **ieee1588-2008**, the precedence order for the best master selection algorithm is as follows:

- priority1
- clock class
- clock accuracy
- PTP variance (offsetScaledLogVariance)
- priority2
- clock identity
- steps removed from the grandmaster

The 7750 SR sets its local parameters as follows:

Table 30: Local Clock Parameters When Profile is set to ieee1588-2008

Parameter	Value
clockIdentity	Chassis MAC address following the guidelines of 7.5.2.2.2 of IEEE 1588
clockClass	13 – router configured as ordinary clock master and is locked to an external reference 14 – router configured as ordinary clock master and in holdover after having been locked to an external source 248 – router configured as ordinary clock master and is in free run or the router is configured as a boundary clock 255 – router configured as ordinary clock slave
clockAccuracy	FE - Unknown
offsetScaledLogVariance	FFFF – not computed

If the **profile** setting for the clock is g8265dot1-2010, the precedence order for the best master selection algorithm is:

- clock class
- priority

The 7750 SR sets its local parameters as follows:

Table 31: 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 7750 SR as per Table 1/G.8265.1 255 – the 7750 SR is configured as ordinary clock slave

The ITU-T profile is for use in an environment with only ordinary clock masters and slaves for frequency distribution. The default profile should be used for all other cases.

There is a limit on the number of external PTP clocks to which the 7750 BC/Slaves will request unicast service (# configured peers) and also a limit to the number of external PTP clocks to which the 7750 GM/BC will grant unicast service (# discovered peers). An association where the 7750 BC has a symmetric relationship with another 7750 BC (i.e. they both have the other as a configured peer) will consume a request and a grant unicast service in each 7750 BC.

In addition, there are limits to the maximum transmitted and received event message rates supported in the node. Each unicast service established will consume a portion of the limit. Once either limit is reached, additional unicast service requests will be refused by sending a grant response with zero in the duration field.

Please refer to the scaling guide for the appropriate release for the specific limits related to PTP.

Figure 15 shows the unicast negotiation procedure performed between a slave and a peer clock that is selected to be the master clock. The slave clock will request Announce messages from all peer clocks but only request Sync and Delay_Resp messages from the clock selected to be the master clock.

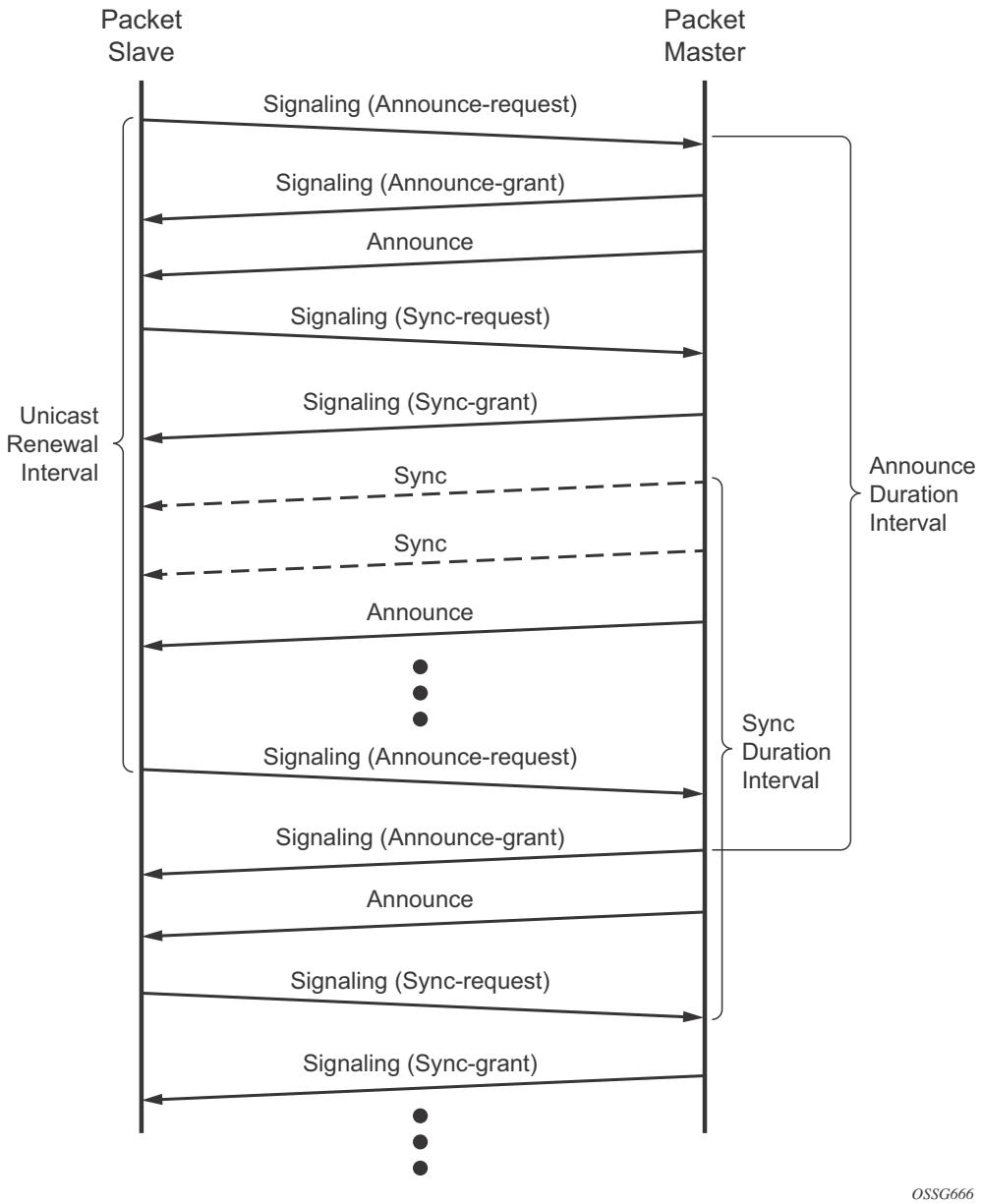


Figure 15: Messaging Sequence Between the PTP Slave Clock and PTP Master Clock

PTP Clock Synchronization

The IEEE 1588v2 standard allows for synchronization of the frequency and time from a master clock to one or more slave clocks over a packet stream. This packet-based synchronization can be over UDP/IP or Ethernet and can be multicast or unicast. Only IPv4 unicast mode with unicast negotiation is supported on the 7750 SR.

As part of the basic synchronization timing computation, a number of event messages are defined for synchronization messaging between the PTP slave clock and PTP master clock. A one-step or two-step synchronization operation can be used, with the two-step operation requiring a follow-up message after each synchronization message. A 7750 SR configured as an ordinary master clock operates in one-step mode. A 7750 SR configured as an ordinary slave clock can communicate with both one-step and two-step master clocks.

The IEEE 1588v2 standard includes a mechanism to control the topology for synchronization distribution. The Best Master Clock Algorithm (BMCA) defines the states for the PTP ports on a clock. One port will be set into slave state and the other ports will be set to master (or passive) states. Ports in slave state recovered synchronization delivered by from an external PTP clock and ports in master state transmit synchronization to toward external PTP clocks.

The basic synchronization timing computation between the PTP slave and PTP master is shown in Figure 16. This figure illustrates the offset of the slave clock referenced to the best master signal during startup.

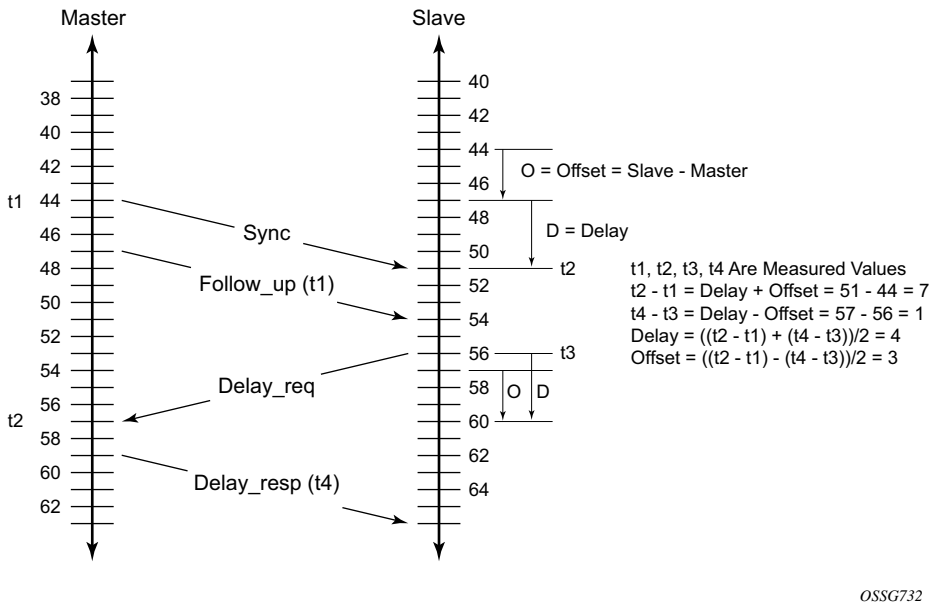


Figure 16: PTP Slave and Master Time Synchronization Computation

When using IEEE 1588v2 for distribution of a frequency reference, the slave calculates a message delay from the master to the slave based on the timestamps exchanged. A sequence of these calculated delays will contain information of the relative frequencies of the master clock and slave clock but will have noise component related to the packet delay variation (PDV) experienced across the network. The slave must filter the PDV effects so as to extract the relative frequency data and then adjust the slave frequency to align with the master frequency.

When using IEEE 1588v2 for distribution of time, the 7750 SR uses the four timestamps exchanged using the IEEE 1588v2 messages to determine the offset between the 7750 SR time base and the external master clock time base. The 7750 SR determines the offset adjustment and then in between these adjustments, the 7750 SR maintains the progression of time using the frequency from the central clock of the node. This allows time to be maintained using a BITS input source or a Synchronous Ethernet input source even if the IEEE 1588v2 communications fail. When using IEEE 1588v2 for time distribution, the central clock should at a minimum have a system timing input reference enabled.

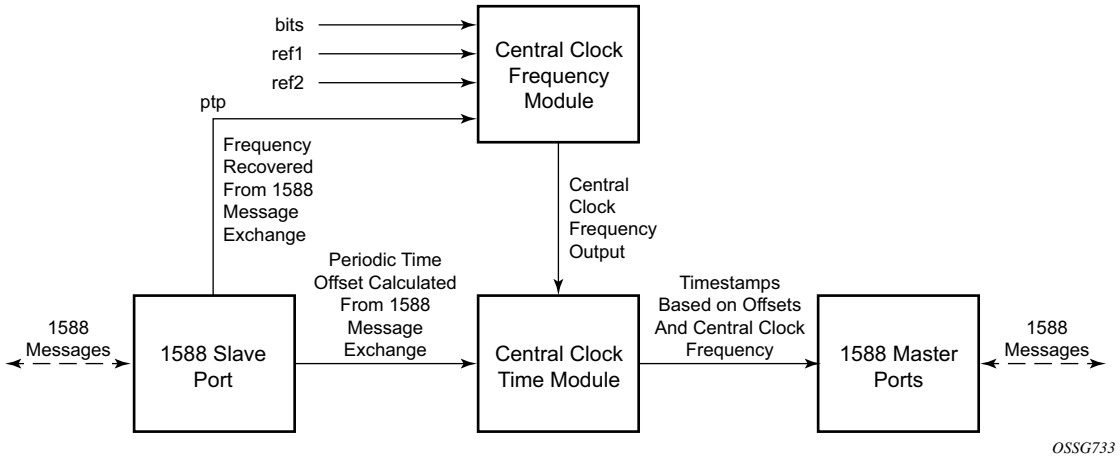


Figure 17: Using IEEE 1588v2 For Time Distribution

Performance Considerations

Although IEEE 1588v2 can be used on a network that is not PTP-aware, the use of PTP-aware network elements (boundary clocks) within the packet switched network improves synchronization performance by reducing the impact of PDV between the grand master clock and the slave clock. In particular, when IEEE 1588v2 is used to distribute high accuracy time, such as for mobile base station phase requirements, then the network architecture requires the deployment of PTP awareness in every device between the Grandmaster and the mobile base station slave.

In addition, performance is also improved by the removal of any PDV caused by internal queuing within the boundary clock or slave clock. This is accomplished with hardware that is capable of detecting and time stamping the IEEE 1588v2 packets at the Ethernet interface. This capability is referred to as port-based time stamping.

Port Based Timestamping of PTP Messages

For ultimate performance, the 1588 packets should be time-stamped at the ingress and egress of the 7750 SR. This then avoids any possible PDV that might be introduced between the port and the CPM. This capability to timestamp in the interface hardware is provided on a subset of the IMM and MDA assemblies of the 7750 SR. Refer to the release notes for the complete list.

In order for this to operate, the CPM, IOM, IMM, and MDAs must be running the firmware that supports the capability. The CPM firmware upgrade occurs automatically when the CPM card software is updated. Since upgrading of IOM, IMM, and MDA firmware is service impacting, this upgrade is not performed automatically on a soft reset of the MDA. The IOM/IMM firmware is upgraded when the IOM/IMM card is hard reset. The MDA firmware is programmed during system initialization, when the MDA is inserted, or when the MDA is hard reset via a **clear mda** or **clear card** command. However, when an MDA is soft reset via either a **clear card soft** command or during a major ISSU, the MDA firmware is not updated.

PTP Capabilities

For each PTP message type to be exchanged between the 7750 SR and an external 1588 clock, a Unicast Session must be established using the Unicast Negotiation procedures. The 7750 SR allows configuration of the message rate to be requested from external 1588 clocks. The 7750 SR also supports a range of message rates that it will grant to requests received from the external 1588 clocks.

Table 32 describes the ranges for both the rates that the 7750 SR can request and grant.

Table 32: Message Rates Ranges and Defaults

Message Type	Rates Requested by the 7X50		Rates Granted by the 7X50	
	Min	Max	Min	Max
Announce	1 packet every 16 seconds	8 packets/second	packet every 16 seconds	8 packets/second

Table 32: Message Rates Ranges and Defaults

Message Type	Rates Requested by the 7X50		Rates Granted by the 7X50	
	Min	Max	Min	Max
Sync	1 packet/second	64 packet/second	1 packet/second	128 packet/second
Delay_Resp	1 packet/second	64 packets/second	1 packet/second	128 packets/second
(Duration)	300	300	1	1000

State and statistics data for each PTP peer are available to assist in the detection of failures or unusual situations.

PTP Ordinary Slave Clock For Frequency

Traditionally, only clock frequency is required to ensure smooth transmission in a synchronous network. The PTP ordinary clock with slave capability on the 7750 SR provides another option to reference a Stratum-1 traceable clock across a packet switched network. The recovered clock can be referenced by the internal SSU and distributed to all slots and ports.Figure 18 shows a PTP ordinary slave clock network configuration.

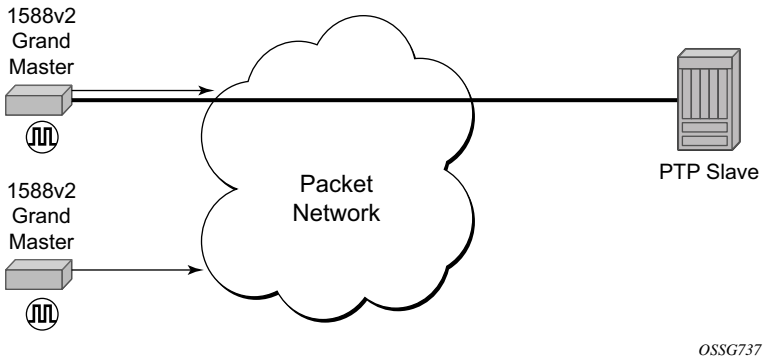


Figure 18: Slave Clock

The PTP slave capability is implemented on the CPM, version 3 or later. The IEEE 1588v2 messages can ingress and egress the node on any line interface. Figure 19 shows the operation of an ordinary PTP clock in slave mode.

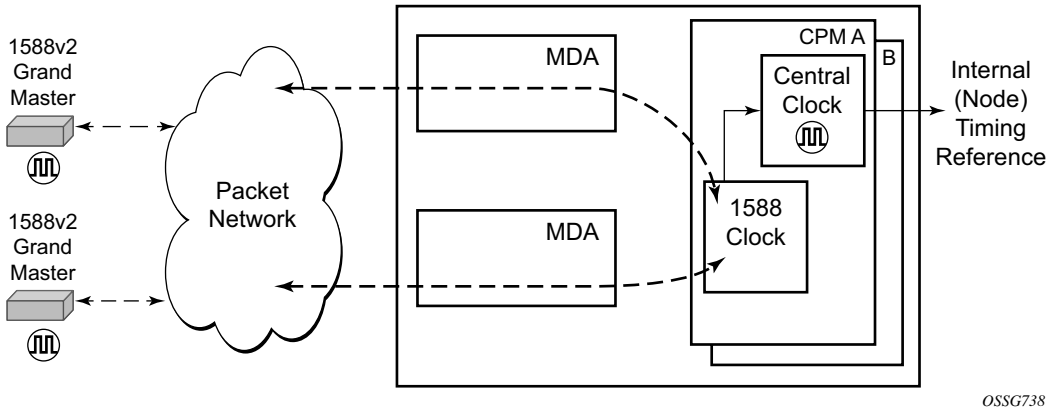


Figure 19: Ordinary Slave Clock Operation

PTP Ordinary Master Clock For Frequency

The 7750 SR supports the PTP ordinary clock in master mode. Normally, a IEEE 1588v2 grand master is used to support many slaves and boundary clocks in the network. In cases where only a small number of slaves and boundary clocks exist and only frequency is required, a PTP integrated master clock can greatly reduce hardware and management costs to implement PTP across the network. It also provides an opportunity to achieve better performance by placing a master clock closer to the edge of the network, as close to the slave clocks as possible. Figure 20 shows a PTP master clock network configuration.

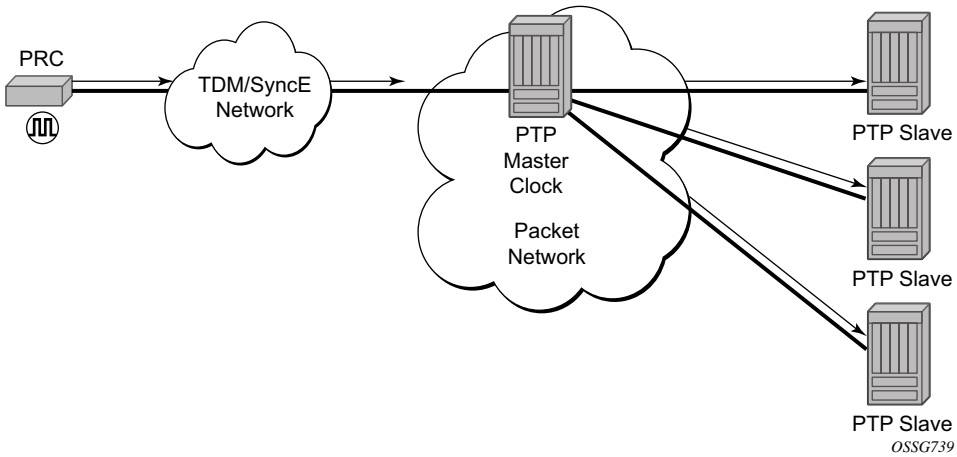


Figure 20: PTP Master Clock

All packets are routed to their destination via the best route as determined in the route table; see Figure 21. It does not matter which ports are used to ingress and egress these packets (unless port based time stamping is enabled for higher performance).

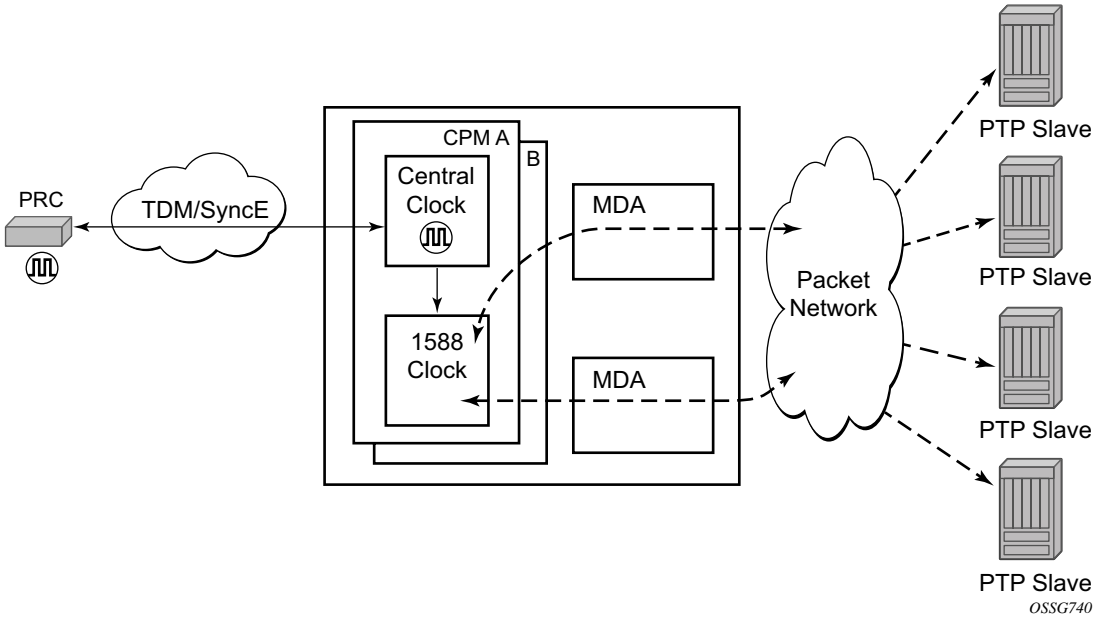


Figure 21: Ordinary Master Clock Operation

PTP Boundary Clock for Frequency and Time

The 7750 SR supports boundary clock PTP devices in both master and slave states. IEEE 1588v2 can function across a packet network that is not PTP-aware; however, the performance may be unsatisfactory and unpredictable. PDV across the packet network varies with the number of hops, link speeds, utilization rates, and the inherent behavior of the routers. By using routers with boundary clock functionality in the path between the grand master clock and the slave clock, one long path over many hops is split into multiple shorter segments, allowing better PDV control and improved slave performance. This allows PTP to function as a valid timing option in more network deployments and allows for better scalability and increased robustness in certain topologies, such as rings. Boundary clocks can simultaneously function as a PTP slave of an upstream grand master (ordinary clock) or boundary clock, and as a PTP master of downstream slaves (ordinary clock) and/or boundary clocks.

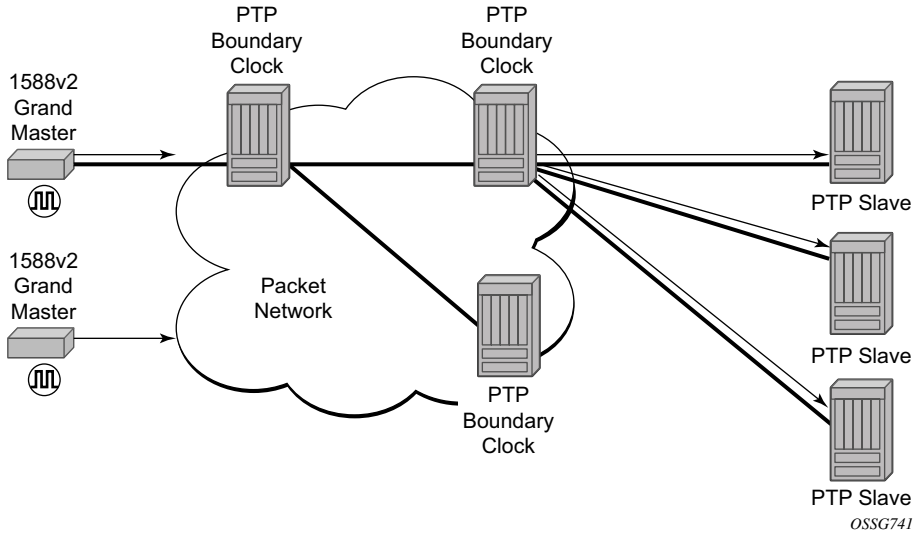


Figure 22: Boundary Clock

In addition, the use of port based timestamping in every network element between the grandmaster and the end slave application is highly recommended for delivering time to meet one microsecond accuracies required of mobile applications.

The 7750 SR always uses the frequency output of the central clock to maintain the timebase within the node. The PTP reference into the central clock should always be enabled as an option if the 7750 is operating in 1588 Boundary Clock mode. This avoids the situation of the node entering holdover while propagating time with 1588.

PTP Clock Redundancy

The PTP module in the router exists on the CPM. The PTP module on the standby CPM is kept synchronized to the PTP module on the active CPM. All sessions with external ptp peers are maintained over a CPM switchover.

PTP Time for System Time and OAM Time

PTP has the potential to provide much more accurate time into the SR OS than can be obtained with NTP. This PTP recovered time can be made available for system time and OAM packet time stamping to improve the accuracies of logged events and OAM delay measurements. The mechanism to activate PTP as the source for these internal time bases is to allocate PTP as a local

server into NTP. This permits the NTP time recovery to use PTP as a source for time and then distribute it within the node to system time and the OAM process. This activation also affects the operation of the NTP server within the SR OS. The PTP server appears as NTP stratum 0 server and therefore the SR OS will advertise itself as an NTP Stratum 1 server to external peers and clients. This activation may impact the NTP topology.

PTP within Routing Instances

In addition to based routing and IES services, PTP messaging is supported within VPRN services. PTP messaging is not supported through the management router instance. Only one PTP clock exists within the node and it is shared by all routing instances that have access. Only one routing instance may have configured peers and only this routing context can receive the time or frequency reference into the 7750 SR /7450 ESS (contain a PTP port in Slave state). The dynamic peers are shared across all routing instances; if it is desired to control the number of dynamic peers that can be consumed by a given routing instance then this must be configured for that routing instance.

System-Wide ATM Parameters

The atm-ping OAM loopback feature can be enabled on an ATM SAP for a period of time configured through the interval and the send-count parameters. When the ATM SAP terminates on IES or VPRN services, a failure of the loopback state machine does not bring down the Layer 3 interface. Only receiving AIS/RDI OAM cells or entering the AIS/RDI state brings down the Layer 3 interface.

The atm-ping OAM loopback feature can be also be enabled on a continuous basis on an ATM SAP terminating on IES or VPRN services. When the loopback state machine fails, the Layer 3 interface is brought down.

The ATM OAM loopback parameters must be first enabled and configured in the **config>system> atm>oam** context and then enabled in the IES or VPRN service interface SAP **atm oam** context.

Refer to the IES and VPRN sections of the *7750 OS Services Guide* for further information.

Link Layer Discovery Protocol (LLDP)

The IEEE 802.1ab Link Layer Discovery Protocol (LLDP) is a uni-directional protocol that uses the MAC layer to transmit specific information related to the capabilities and status of the local device. Separately from the transmit direction, the LLDP agent can also receive the same kind of information for a remote device which is stored in the related MIBs.

LLDP itself does not contain a mechanism for soliciting specific information from other LLDP agents, nor does it provide a specific means of confirming the receipt of information. LLDP allows the transmitter and the receiver to be separately enabled, making it possible to configure an implementation so the local LLDP agent can either transmit only or receive only, or can transmit and receive LLDP information.

The information fields in each LLDP frame are contained in a LLDP Data Unit (LLDPDU) as a sequence of variable length information elements, that each include type, length, and value fields (known as TLVs), where:

- Type identifies what kind of information is being sent.
- Length indicates the length of the information string in octets.
- Value is the actual information that needs to be sent (for example, a binary bit map or an alphanumeric string that can contain one or more fields).

Each LLDPDU contains four mandatory TLVs and can contain optional TLVs as selected by network management:

- Chassis ID TLV
- Port ID TLV
- Time To Live TLV
- Zero or more optional TLVs, as allowed by the maximum size of the LLDPDU
- End Of LLDPDU TLV

The chassis ID and the port ID values are concatenated to form a logical identifier that is used by the recipient to identify the sending LLDP agent/port. Both the chassis ID and port ID values can be defined in a number of convenient forms. Once selected however, the chassis ID/port ID value combination remains the same as long as the particular port remains operable.

A non-zero value in the TTL field of the time-to-live TLV tells the receiving LLDP agent how long all information pertaining to this LLDPDU’s identifier will be valid so that all the associated information can later be automatically discarded by the receiving LLDP agent if the sender fails to update it in a timely manner. A zero value indicates that any information pertaining to this LLDPDU’s identifier is to be discarded immediately.

Note that a TTL value of zero can be used, for example, to signal that the sending port has initiated a port shutdown procedure.

The end of a LLDPDU TLV marks the end of the LLDPDU.

The IEEE 802.1ab standard defines a protocol that:

- Advertises connectivity and management information about the local station to adjacent stations on the same IEEE 802 LAN.
- Receives network management information from adjacent stations on the same IEEE 802 LAN.
- Operates with all IEEE 802 access protocols and network media.
- Establishes a network management information schema and object definitions that are suitable for storing connection information about adjacent stations.
- Provides compatibility with a number of MIBs as depicted in Figure 23.

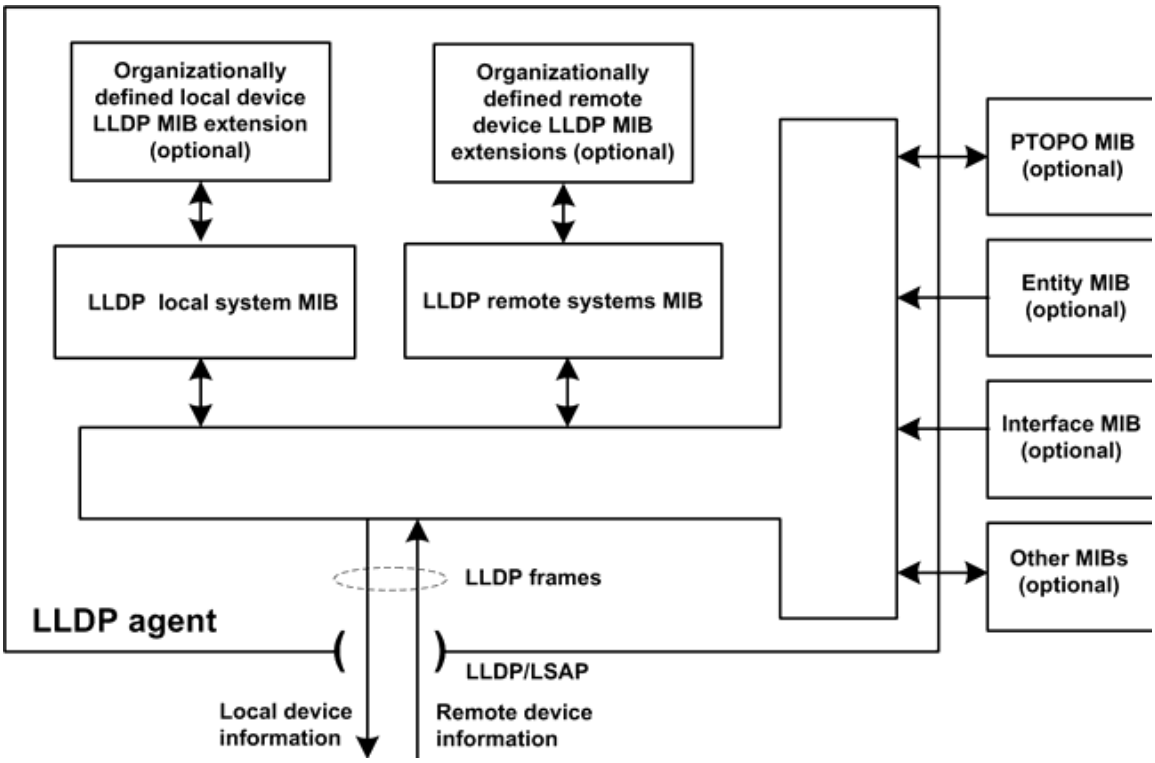


Figure 23: LLDP Internal Architecture for a Network Node

Network operators must be able to discover the topology information in order to detect and address network problems and inconsistencies in the configuration. Moreover, standard-based tools can address the complex network scenarios where multiple devices from different vendors are interconnected using Ethernet interfaces.

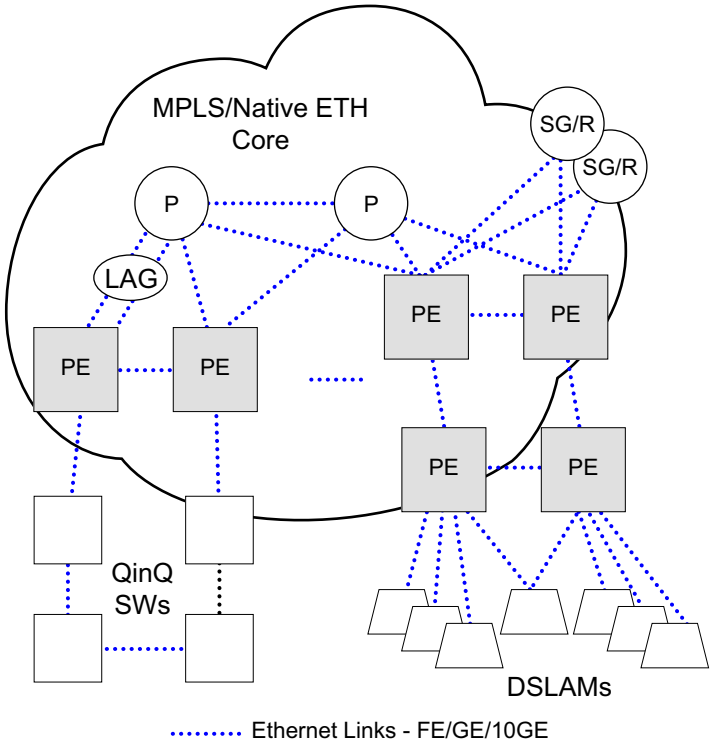


Figure 24: Customer Use Example For LLDP

The example displayed in Figure 24 depicts a MPLS network that uses Ethernet interfaces in the core or as an access/handoff interfaces to connect to different kind of Ethernet enabled devices such as service gateway/routers, QinQ switches, DSLAMs or customer equipment.

IEEE 802.1ab LLDP running on each Ethernet interfaces in between all the above network elements may be used to discover the topology information.

Administrative Tasks

This section contains information to perform administrative tasks.

Configuring the Chassis Mode

Depending on the chassis type and IOM type, the following modes can be configured:

NOTE: Chassis modes are not available on the 7750 SR-c12 router.

a: This mode corresponds to scaling and feature set associated with iom-20g.

b: This mode corresponds to scaling and feature set associated with iom-20g-b.

c: This mode corresponds to scaling and feature set associated with iom2-20g.

d: This mode corresponds to scaling and feature set associated with iom3-xp.

If the chassis mode is not explicitly provisioned in the configuration file, the chassis will come up in chassis mode a by default. The behavior for the IOMs is described in the following table:

Table 33: Provisioned IOM Card Behavior

IOM	Behavior
iom-20g-b	Comes online if provisioned as iom-20g or iom-20g-b.
iom2-20g	Comes online if provisioned as iom-20g, iom-20g-b or iom2-20g.
iom3-xp	Comes online if provisioned as iom3-xp.

To support a particular chassis-mode, all provisioned IOMs must meet the corresponding IOM level.

The chassis Mode corresponds to scaling and feature sets associated with a given card. The base mode is chassis mode A which supports all IOM card types.

IOM cards that are not compatible with more recent chassis modes will be put into an operationally failed state if the configuration chassis mode “force” option is used.

- Chassis mode A corresponds to iom-20g, chassis mode backwards compatible for iom-20g-b, iom2-20g, iom3-xp
- Chassis mode B corresponds to iom-20g-b, chassis mode backwards compatible for iom2-20g, iom3-xp
- Chassis mode C corresponds to iom2-20g, chassis mode backwards compatible for iom3-xp
- Chassis mode D corresponds to iom3-xp

NOTE: The iom-20g is not supported from 5.0R and later but chassis mode A is described for backwards compatibility purposes.

The **force** keyword forces an upgrade either from mode **a** to mode **b** or **d** with cards provisioned as iom-20g or from mode **b** to mode **c** with cards provisioned as iom-20g-b.

The ASAP MDA can only be configured if the IOM2-20g and IOM3-XP is provisioned.

Note that, if you are in chassis-mode **d** and configure an IOM type as iom2-20g and then downgrade to chassis-mode **a** or **b** (must specify **force** keyword), a warning appears about the IOM downgrade. In this case, the IOM`s provisioned type will downgrade to iom-20g-b. Once this is done, the ASAP MDA cannot be configured. The following message appears:

```
*A:138.120.214.68>config>system# chassis-mode b
MINOR: CHMGR #1009 Mode change requires force - card-type iom2-20g in slot 1 would
       change to iom-20g-b *A:138.120.214.68>config>system# chassis-mode b force
MINOR: CHMGR #1010 Can not change mode - mda m1-choc12-as-sfp in 10/1 not supported
       when card changes to iom-20g-b
```

If this is the desired behavior, for example, chassis-mode **d** is configured and IPv6 is running, you can then downgrade to chassis-mode **a** or **b** if you want to disable IPv6.

```
*A:ALA-48# show chassis
===============================================================================
Chassis Information
===============================================================================
    Name                          : ALA-48
    Type                          : 7750 SR-12
    Location                      : exit
    Coordinates                   : N 45 58 23, W 34 56 12
    CLLI code                     : abcdefg1234
    Number of slots               : 12
    Number of ports               : 246
    Critical LED state            : Off
    Major LED state               : Off
    Minor LED state               : Off
    Over Temperature state        : OK
    Base MAC address              : 14:30:ff:00:00:00
    Admin chassis mode            : d
```

```
    Oper chassis mode             : d

Hardware Data
    Part number                   : Sim Part#
    CLEI code                     : Sim CLEI
    Serial number                 : sim48
    Manufacture date              : 01012003
    Manufacturing string          : Sim MfgString sim48
    Manufacturing deviations      : Sim MfgDeviation sim48
    Time of last boot             : 2007/09/24 08:15:17
    Current alarm state           : alarm cleared
-------------------------------------------------------------------------------
Environment Information
...
===============================================================================
*A:ALA-48#
```

Saving Configurations

Whenever configuration changes are made, the modified configuration must be saved so they will not be lost when the system is rebooted.

Configuration files are saved by executing explicit command syntax which includes the file URL location to save the configuration file as well as options to save both default and non-default configuration parameters. Boot option file (BOF) parameters specify where the system should search for configuration and image files as well as other operational parameters during system initialization.

For more information about boot option files, refer to the *Boot Option Files* section of this manual.

Specifying Post-Boot Configuration Files

Two post-boot configuration extension files are supported and are triggered when either a successful or failed boot configuration file is processed. The **boot-bad-exec** and **boot-good-exec** commands specify URLs for the CLI scripts to be run following the completion of the boot-up configuration. A URL must be specified or no action is taken.

For example, after a configuration file is successfully loaded, the specified URL can contain a nearly identical configuration file with certain commands enabled or disabled, or particular parameters specified and according to the script which loads that file.

Network Timing

In Time Domain Multiplexed (TDM)-based networks (for example, SONET or SDH circuit-switched networks), the concept of network timing is used to prevent over-run or under-run issues where circuits are groomed (rebundled) and switched. Hardware exists in each node that takes a common clock derived from an internal oscillator, a specific receive interface or special BITS interface and provides it to each synchronous interface in the system. Usually, each synchronous interface is allowed to choose between using the chassis-provided clock or the clocking recovered from the received signal on the interface. The clocking is used to drive the transmit side of the interface. The appropriate configuration at each node which defines how interface clocking is handled must be considered when designing a network that has a centralized timing source so each interface is operating in a synchronous manner.

The effect of timing on a network is dependent on the nature of the type of traffic carried on the network. With bit-wise synchronous traffic (traditional circuit-based voice or video), non-synchronous transmissions cause a loss of information in the streams affecting performance. With packet-based traffic, the applications expect and handle jitter and latency inherent to packet-based networks. When a packet-based network is used to carry voice or video traffic, the applications use data compression and elasticity buffering to compensate for jitter and latency. The network itself relies on appropriate Quality of Service (QoS) definitions and network provisioning to further minimize the jitter and latency the application may experience.

Power Supplies

SR OS upports a **power-supply** command to configure the type and number of power supplies present in the chassis. The operational status of a power source is always displayed by the LEDs on the Control Processor/Switch Fabric Module (CP/SFM) front panel, but the power supply information must be explicitly configured in order for a power supply alarm to be generated if a power source becomes operationally disabled.

Automatic Synchronization

Use the CLI syntax displayed below to configure synchronization components relating to active-to-standby CPM switchover. In redundant systems, synchronization ensures that the active and standby CPMs have identical operational parameters, including the active configuration, CPM, and IOM images in the event of a failure or reset of the active CPM.
The **force-switchover** command forces a switchover to the standby CPM card.

To enable automatic synchronization, either the **boot-env** parameter or the **config** parameter must be specified. The synchronization occurs when the **admin save** or **bof save** commands are executed.

When the **boot-env** parameter of the **synchronize** command is specified, the bof.cfg, primary/secondary/tertiary configuration files (.cfg and .ndx), li, and ssh files are automatically synchronized. When the **config** parameter is specified, only the configuration files are automatically synchronized.

Synchronization also occurs whenever the BOF is modified and when an **admin>save** command is entered with no filename specified.

Boot-Env Option

The **boot-env** option enables a synchronization of all the files used in system initialization.

When configuring the system to perform this synchronization, the following occurs:

1. The BOF used during system initialization is copied to the same compact flash on the standby CPM (in redundant systems).
   Note: The synchronization parameters on the standby CPM are preserved.
2. The primary, secondary, and tertiary images, (provided they are locally stored on the active CPM) are copied to the same compact flash on the standby CPM.
3. The primary, secondary, and tertiary configuration files, (provided they are locally stored on the active CPM) are copied to the same compact flash on the standby CPM.

Config Option

The **config** option synchronizes configuration files by copying the files specified in the active CPM BOF file to the same compact flash on the standby CPM.

Manual Synchronization

The **admin redundancy synchronize** command performs manual CPM synchronizations. The **boot-env** parameter synchronizes the BOF, image, and configuration files in redundant systems. The **config** parameter synchronizes only the configuration files in redundant systems.

Forcing a Switchover

The **force-switchover now** command forces an immediate switchover to the standby CPM card.

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the **admin reboot standby** command on the active or the standby CPM.

System Configuration Process Overview

Figure 25 displays the process to provision basic system parameters.

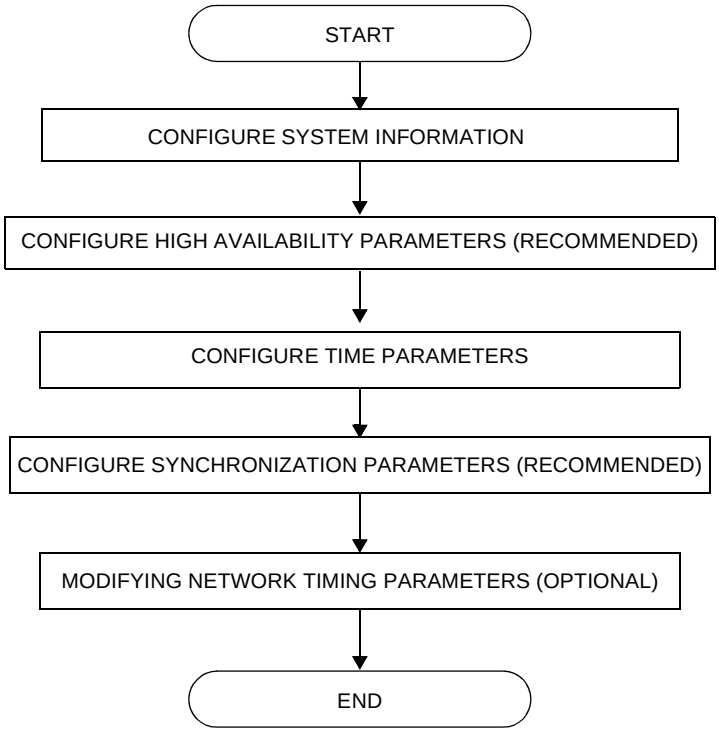


Figure 25: System Configuration and Implementation Flow

Configuration Notes

This section describes system configuration caveats.

General

The system must be properly initialized and the boot loader and BOF files successfully executed in order to access the CLI.

Configuring System Management with CLI

This section provides information about configuring system management features with CLI.

Topics in this chapter include:

- Configuring System Monitoring Thresholds on page 354
- Configuring LLDP on page 357

System Management

Saving Configurations

Whenever configuration changes are made, the modified configuration must be saved so the changes will not be lost when the system is rebooted. The system uses the configuration and image files, as well as other operational parameters necessary for system initialization, according to the locations specified in the boot option file (BOF) parameters. For more information about boot option files, refer to the *Boot Option Files* section of this manual.

Configuration files are saved by executing *implicit* or *explicit* command syntax.

- An *explicit* save writes the configuration to the location specified in the `save` command syntax (the *file-url* option).
- An *implicit* save writes the configuration to the file specified in the primary configuration location.

  If the *file-url* option is not specified in the `save` command syntax, the system attempts to save the current configuration to the current BOF primary configuration source. If the primary configuration source (path and/or filename) changed since the last boot, the new configuration source is used.

The **`save`** command includes an option to save both default and non-default configuration parameters (the *detail* option).

The *index* option specifies that the system preserves system indexes when a save command is executed, regardless of the persistent status in the BOF file. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index, LSP IDs, path IDs, etc. 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.

Basic System Configuration

This section provides information to configure system parameters and provides configuration examples of common configuration tasks. The minimal system parameters that should be configured are:

- System Information Parameters on page 307
- System Time Elements on page 310

The following example displays a basic system configuration:

```
A:ALA-12>config>system# info
#------------------------------------------
echo "System Configuration "
#------------------------------------------
        name "ALA-12"
        coordinates "Unknown"
        snmp
        exit
        security
            snmp
                community "private" rwa version both
            exit
        exit
        time
            ntp
                server 192.168.15.221
                no shutdown
            exit
            sntp
                shutdown
            exit
            zone GMT
        exit
------------------------------------------------
A:ALA-12>config>system#
```

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.

System Information

This section covers the basic system information parameters to configure the physical location of the SR-Series, contact information, location information such as the place the router is located such as an address, floor, room number, etc., global positioning system (GPS) coordinates, and system name.

Use the CLI syntax displayed below to configure the following system components:

General system parameters include:

System Information Parameters

Name

Use the system command to configure a name for the device. The name is used in the prompt string. Only one system name can be configured, if multiple system names are configured the last one encountered overwrites the previous entry. Use the following CLI syntax to configure the system name:

CLI Syntax: config>system
name *system-name*

Example: alcatel>config>system# name ALA-12

The following example displays the system name:

```
sysName@domain>config>system# info
#------------------------------------------
echo "System Configuration "
#------------------------------------------
        name "ALA-12"
. . .
        exit
-------------------------------------------------
sysName@domain>config>system#
```

Contact

Use the contact command to specify the name of a system administrator, IT staff member, or other administrative entity.

CLI Syntax: config>system
contact *contact-name*

Example: config>system# contact “Fred Information Technology”

Location

Use the `location` command to specify the system location of the device. For example, enter the city, building address, floor, room number, etc., where the router is located.

Use the following CLI syntax to configure the location:

CLI Syntax: `config>system`
`location` *`location`*

Example: `config>system# location "Bldg.1-floor 2-Room 201"`

CLLI Code

The Common Language Location Code (CLLI code) is an 11-character standardized geographic identifier that is used to uniquely identify the geographic location of a 7750 SR-Series router.

Use the following CLI command syntax to define the CLLI code:

CLI Syntax: `config>system`
`clli-code` *`clli-code`*

Example: `config>system# clli-code abcdefg1234`

Coordinates

Use the optional `coordinates` command to specify the GPS location of the device. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

Use the following CLI syntax to configure the location:

CLI Syntax: `config>system`
`coordinates` *`coordinates`*

Example: `config>system# coordinates "N 45 58 23, W 34 56 12"`

The following example displays the configuration output of the general system commands:

```
sysName@domain>config>system# info
#------------------------------------------
echo "System Configuration "
#------------------------------------------
       name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"

. . .
        exit
-------------------------------------------------
A:ALA-12>config>system#
```

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.

Time elements include:

Zone

The `zone` command sets the time zone and/or time zone offset for the router. The router supports system-defined and user-defined time zones. The system-defined time zones are listed in Table 34.

CLI Syntax: `config>system>time`
`zone` *`std-zone-name`*|*`non-std-zone-name`* [*`hh`* [`:`*`mm`*]]

Example: `config>system>time#`
`config>system>time# zone GMT`

The following example displays the zone output:

```
A:ALA-12>config>system>time# info
----------------------------------------------
         ntp
               server 192.168.15.221
               no shutdown
         exit
         sntp
               shutdown
         exit
         zone UTC
----------------------------------------------
A:ALA-12>config>system>time#
```

Table 34: System-defined Time Zones

Acronym	Time Zone Name	UTC Offset
Europe:		
GMT	Greenwich Mean Time	UTC
WET	Western Europe Time	UTC
WEST	Western Europe Summer Time	UTC +1 hour
CET	Central Europe Time	UTC +1 hour
CEST	Central Europe Summer Time	UTC +2 hours
EET	Eastern Europe Time	UTC +2 hours
EEST	Eastern Europe Summer Time	UTC +3 hours
MSK	Moscow Time	UTC +3 hours
MSD	Moscow Summer Time	UTC +4 hours
US and Canada:		
AST	Atlantic Standard Time	UTC -4 hours
ADT	Atlantic Daylight Time	UTC -3 hours
EST	Eastern Standard Time	UTC -5 hours
EDT	Eastern Daylight Saving Time	UTC -4 hours
CST	Central Standard Time	UTC -6 hours
CDT	Central Daylight Saving Time	UTC -5 hours
MST	Mountain Standard Time	UTC -7 hours
MDT	Mountain Daylight Saving Time	UTC -6 hours
PST	Pacific Standard Time	UTC -8 hours
PDT	Pacific Daylight Saving Time	UTC -7 hours
HST	Hawaiian Standard Time	UTC -10 hours
AKST	Alaska Standard Time	UTC -9 hours
AKDT	Alaska Standard Daylight Saving Time	UTC -8 hours
Australia and New Zealand:		
AWST	Western Standard Time (e.g., Perth)	UTC +8 hours
ACST	Central Standard Time (e.g., Darwin)	UTC +9.5 hours
AEST	Eastern Standard/Summer Time (e.g., Canberra)	UTC +10 hours
NZT	New Zealand Standard Time	UTC +12 hours
NZDT	New Zealand Daylight Saving Time	UTC +13 hours

Summer Time 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 will be adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

CLI Syntax:
```
config>system>time
 dst-zone zone-name
    end {end-week} {end-day} {end-month} [hours-minutes]
    offset offset
    start {start-week} {start-day} {start-month} [hours-min-
    utes]
```

Example:
```
config>system# time
config>system>time# dst-zone pt
config>system>time>dst-zone# start second sunday april 02:00
end first sunday october 02:00
config>system>time>dst-zone# offset 0
```

If the time zone configured is listed in Table 34, then the starting and ending parameters and offset do not need to be configured with this command unless there is a need to override the system defaults. The command will return an error if the start and ending dates and times are not available either in Table 34 or entered as optional parameters in this command.

The following example displays the configured parameters.

```
A:ALA-48>config>system>time>dst-zone# info
----------------------------------------------
                start second sunday april 02:00
                end first sunday october 02:00
                offset 0
----------------------------------------------
A:ALA-48>config>system>time>dst-zone# offset 0
```

NTP

Network Time Protocol (NTP) is defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis* and RFC 5905, *Network Time Protocol Version 4: Protocol and Algorithms Specification*. It allows for participating network nodes to keep time more accurately and maintain time in a synchronized manner between all participating network nodes.

NTP time elements include:

Authentication-check

NTP supports an authentication mechanism to provide some security and access control to servers and clients. The default behavior when any authentication keys are configured is to reject all NTP protocol PDUs that have a mismatch in either the authentication key-id, type, or key. The authentication-check command provides for the options to skip or maintain this rejection of NTP PDUs that do not match the authentication requirements.

When authentication-check is configured, NTP PDUs are authenticated on receipt. However, mismatches cause a counter to be increased, one counter for key-id, one for type, and one for key value mismatches.

CLI Syntax:
```
config>system>time>ntp
        authentication-check
```

Example:
```
config>system>time>ntp#
config>system>time>ntp# authentication-check
config>system>time>ntp# no shutdown
```

Authentication-key

This command configures an authentication key-id, key type, and key used to authenticate NTP PDUs sent to and received from other network elements participating in the NTP protocol. For authentication to work, the authentication key-id, authentication type and authentication key value must match.

CLI Syntax: config>system>time>ntp
authentication-key *key-id* {key *key*} [hash | hash2] type {des|message-digest}

Example: config>system>time>ntp#
config>system>time>ntp# authentication-key 1 key A type des
config>system>time>ntp# no shutdown

The following example shows NTP disabled with the authentication-key parameter enabled.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
               shutdown
               authentication-key 1 key "OAwgNUlbzgI" hash2 type des
----------------------------------------------
A:sim1>config>system>time>ntp#
```

Broadcast

The broadcast command is used to transmit broadcast packets on a given interface. Interfaces in the base routing context or the management interface may be specified. Due the relative ease of spoofing of broadcast messages, it is strongly recommended to use authentication with broadcast mode. The messages are transmitted using a destination address that is the NTP Broadcast address.

CLI Syntax: config>system>time>ntp
broadcast [router *router-name*] {interface *ip-int-name*}[key-id *key-id*] [version *version*] [ttl *ttl*]

Example: config>system>time>ntp#
config>system>time>ntp# broadcast interface int11 version 4 ttl 127
config>system>time>ntp# no shutdown

The following example in the system>time context shows NTP enabled with the broadcast command configured.

```
A:sim1>config>system>time# info detail
----------------------------------------------
           ntp
               no shutdown
```

```
                authentication-check
                ntp-server
                broadcast interface int11 version 4 ttl 127
            exit
A:sim1>config>system>time#
```

Broadcastclient

The `broadcastclient` command enables listening to NTP broadcast messages on the specified interface. Interfaces in the base routing context or the management interface may be specified. Due the relative ease of spoofing of broadcast messages, it is strongly recommended to use authentication with broadcast mode. The messages must have a destination address of the NTP Broadcast address.

CLI Syntax: `config>system>time>ntp`
`broadcastclient[router` *`router-name`*`] {interface` *`ip-int-name`*`} [authenticate]`

Example: `config>system>time>ntp#`
`config>system>time>ntp# broadcastclient interface int11`
`config>system>time>ntp# no shutdown`

The following example shows NTP enabled with the `broadcastclient` parameter enabled.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            ntp
                broadcastclient interface int11
                no shutdown
            exit
----------------------------------------------
A:ALA-12>config>system>time#
```

Multicast

When configuring NTP the node can be configured to transmit or receive multicast packets on the CPM MGMT port. Broadcast & Multicast messages can easily be spoofed, therefore, authentication is strongly recommended. Multicast is used to configure the transmission of NTP multicast messages. The no construct of this command removes the transmission of multicast packets on the management port.

When transmitting multicast NTP messages the default address of 224.0.1.1 is used.

CLI Syntax: `config>system>time>ntp`
`multicast[version` *`version`*`] [key-id` *`key-id`*`]`

Example:
```
config>system>time>ntp#
config>system>time>ntp# multicast
config>system>time>ntp# no shutdown
```

The following example shows NTP enabled with the `multicast` command configured.

```
A:ALA-12>config>system>time# info
----------------------------------------------
             server 192.168.15.221
             multicast
             no shutdown
----------------------------------------------
A:ALA-12>config>system>time#
```

Multicastclient

This command is used to configure an address to receive multicast NTP messages on the CPM MGMT port. Broadcast & Multicast messages can easily be spoofed, therefore, authentication is strongly recommended. The no construct of this command removes the multicast client. If multicastclient is not configured, all NTP multicast traffic will be ignored.

CLI Syntax: `config>system>time>ntp`
`multicastclient [authenticate]`

Example:
```
config>system>time>ntp#
config>system>time>ntp# multicastclient authenticate
config>system>time>ntp# no shutdown
```

The following example shows NTP enabled with the `multicastclient` command configured.

```
A:ALA-12>config>system>time# info
----------------------------------------------
             server 192.168.15.221
             multicastclient
             no shutdown
```

```
-------------------------------------------
A:ALA-12>config>system>time##
```

NTP-Server

This command configures the node to assume the role of an NTP server. Unless the server command is used this node will function as an NTP client only and will not distribute the time to downstream network elements. If authentication is specified in this command, the NTP server requires client packets to be authenticated based on the key received in the client request.

CLI Syntax: `config>system>time>ntp`
`ntp-server [transmit key-id]`

Example:
```
config>system>time>ntp#
config>system>time>ntp# ntp-server
config>system>time>ntp# no shutdown
```

The following example shows NTP enabled with the `ntp-server` command configured.

```
A:sim1>config>system>time>ntp# info
-------------------------------------------
        no shutdown
        ntp-server
-------------------------------------------
A:sim1>config>system>time>ntp#
```

Peer

Configuration of an NTP peer configures symmetric active mode for the configured peer. Although any system can be configured to peer with any other NTP node, it is recommended to configure authentication and to configure known time servers as their peers. Use the **no** form of the command to remove the configured peer.

CLI Syntax: `config>system>time>ntp`
`peer ip-address [version version] [key-id key-id] [prefer]`

Example:
```
config>system>time>ntp#
config>system>time>ntp# peer 192.168.1.1 key-id 1
config>system>time>ntp# no shutdown
```

The following example shows NTP enabled with the `peer` command configured.

```
A:sim1>config>system>time>ntp# info
-------------------------------------------
            no shutdown
            peer 192.168.1.1 key-id 1
-------------------------------------------
A:sim1>config>system>time>ntp#
```

Server

The Server command is used when the node should operate in client mode with the NTP server specified in the address field. Use the **no** form of this command to remove the server with the specified address from the configuration.

Up to ten NTP servers can be configured.

CLI Syntax: `config>system>time>ntp`
`server` *`ip-address`* `[key-id` *`key-id`*`] [version` *`version`*`]`
`[prefer]`

Example: `config>system>time>ntp#`
`config>system>time>ntp# server 192.168.1.1 key-id 1`
`config>system>time>ntp# no shutdown`

The following example shows NTP enabled with the `server` command configured.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
            no shutdown
            server 192.168.1.1 key 1
----------------------------------------------
A:sim1>config>system>time>ntp#
```

SNTP

SNTP is a compact, client-only version of the NTP. SNTP can only receive the time from SNTP/NTP servers; it cannot be used to provide time services to other systems. SNTP can be configured in either broadcast or unicast client mode.

SNTP time elements include:

- Broadcast-client on page 319
- Server-address on page 320

CLI Syntax:
```
config>system
 time
    sntp
       broadcast-client
       server-address ip-address [version version-number]
          [normal|preferred] [interval seconds]
       no shutdown
```

Broadcast-client

The **broadcast-client** command enables listening at the global device level to SNTP broadcast messages on interfaces with broadcast client enabled.

CLI Syntax:
```
config>system>time>sntp
                  broadcast-client
```

Example:
```
config>system>time>sntp#
config>system>time>sntp# broadcast-client
config>system>time>sntp# no shutdown
```

The following example shows SNTP enabled with the **broadcast-client** command enabled.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            sntp
                broadcast-client
                no shutdown
            exit
            dst-zone PT
                start second sunday april 02:00
                end first sunday october 02:00
                offset 0
            exit
            zone GMT
----------------------------------------------
A:ALA-12>config>system>time#
```

Server-address

The **server-address** command configures an SNTP server for SNTP unicast client mode.

CLI Syntax: config>system>time>sntp#
config>system>time>sntp# server-address *ip-address* version *version-number*] [normal|preferred] [interval *seconds*]

Example: config>system>time>sntp#
config>system>time# server-address 10.10.0.94 version 1 preferred interval 100

The following example shows SNTP enabled with the **server-address** command configured.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            sntp
                server-address 10.10.0.94 version 1 preferred interval 100
                no shutdown
            exit
            dst-zone PT start-date 2006/04/04 12:00 end-date 2006/10/25 12:00
            zone GMT
----------------------------------------------
A:ALA-12>config>system>time#
```

CRON

The CRON command supports the Service Assurance Agent (SAA) functions as well as the ability to schedule turning on and off policies to meet “Time of Day” requirements. CRON functionality includes the ability to specify the commands that need to be run, when they will be scheduled, including one-time only functionality (oneshot), interval and calendar functions, as well as where to store the output of the results. In addition, CRON can specify the relationship between input, output and schedule. Scheduled reboots, peer turn ups, service assurance agent tests and more can all be scheduled with Cron, as well as OAM events, such as connectivity checks, or troubleshooting runs.

CRON elements include:

- Action
- Schedule
- Script
- Time Range
- Time of Day

Action

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.

CLI Syntax:

```
config>cron
        action action-name [owner action-owner]
           expire-time {seconds|forever}
           lifetime {seconds|forever}
           max-completed unsigned
           results file-url
           script script-name [owner script-owner]
           shutdown
```

Example:

```
config>cron# action test
config>cron>action# results ftp://172.22.184.249/./sim1/test-
results
config>cron>action# no shut
```

The following example shows a script named “test” receiving an action to store its results in a file called “test-results”:

```
A:sim1>config>cron# info
----------------------------------------------
        script "test"
```

```
            location "ftp://172.22.184.249/./sim1/test.cfg"
            no shutdown
        exit
        action "test"
            results "ftp://172.22.184.249/./sim1/test-results"
            no shutdown
        exit
-------------------------------------------
A:sim1>config>cron# script
```

Schedule

The schedule function configures the type of schedule to run, including one-time only (oneshot), periodic or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds). If end-time and interval are both configured, whichever condition is reached first is applied.

CLI Syntax:

```
config>cron
      schedule schedule-name [owner schedule-owner]
         action action-name [owner owner-name]
         count number
         day-of-month {day-number [..day-number]|all}
         description description-string
         end-time [date|day-name] time
         hour {hour-number [..hour-number] | all}
         interval seconds
         minute {minute-number [..minute-number]|all}
         month {month-number [..month-number]|month-name
            [..month-name]|all}
         no shutdown
         type {periodic|calendar|oneshot}
         weekday {weekday-number [..weekday-number]|day-name
            [..day-name]|all}
         shutdown
```

Example:

```
config>cron# schedule test2
config>cron>sched# day-of-month 17
config>cron>sched# end-time 2007/07/17 12:00
config>cron>sched# minute 0 15 30 45
config>cron>sched# weekday friday
config>cron>sched# shut
```

The following example schedules a script named “test2” to run every 15 minutes on the 17th of each month and every Friday until noon on July 17, 2007:

```
*A:SR-3>config>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>cron#
```

Script

The script command opens a new nodal context which contains information on a script.

CLI Syntax: config>cron
script *script-name* [owner *script-owner*]
description *description-string*
location *file-url*
shutdown

Example: config>cron# script test
config>cron>script#

The following example names a script “test”:

```
A:sim1>config>cron# info
-----------------------------------------------
        script "test"
            location "ftp://172.22.184.249/./sim1/test.cfg"
            no shutdown
        exit
-----------------------------------------------
A:sim1>config>cron#
```

Time Range

7750 SR 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 and will be used as a match criteria.

Time range elements include:

Create

Use this command to enable the time-range context.

The following example creates a time-range called test1.

CLI Syntax:
```
config>cron>
    time-range name create
```

Example:
```
config>cron# time-range test1 create
config>cron>time-range$
```

Absolute

The absolute command configures a start and end time that will not repeat.

CLI Syntax:
```
config>cron>time-range$
    absolute absolute-time end absolute-time
```

Example:
```
config>cron>time-range$ absolute start 2006/05/05,11:00 end
2006/05/06,11:01
config>cron>time-range$
```

The following example shows an absolute time range beginning on May 5, 2006 at 11:00 and ending May 6, 2006 at 11:01:

```
A:sim1>config>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : test1
Triggers    : 0
Status      : Inactive
Absolute    : start 2006/05/05,11:00 end 2006/05/06,11:01
===============================================================================
A:sim1>config>cron>time-range#
```

Daily

The daily command configures the start and end of a periodic schedule for every day of the week (Sunday through Saturday).

CLI Syntax: `config>cron>time-range$`
`daily start` *`time-of-day`* `end` *`time-of-day`*

Example: `config>cron>time-range$ daily start 11:00 end 12:00`
`config>cron>time-range$`

The following example shows a daily time range beginning at 11:00 and ending at 12:00.

```
A:sim1>config>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>cron>time-range#
```

Weekdays

The weekdays command configures the start and end of a periodic schedule for weekdays (Monday through Friday).

CLI Syntax: `config>cron>time-range$`
`weekdays start` *`time-of-day`* `end` *`time-of-day`*

Example: `config>cron>time-range$ weekdays start 11:00 end 12:00`
`config>cron>time-range$`

The following command shows a time range beginning at 11:00 and ending at 12:00. This schedule runs all weekdays during this time period.

```
A:sim1>config>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>cron>time-range#
```

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.

CLI Syntax: `config>cron>time-range$`
`weekend start` *`time-of-day`* `end` *`time-of-day`*

Example: `config>cron>time-range$ weekend start 11:00 end 12:00`
`config>cron>time-range$`

The following command shows 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 oneshot or periodic events in the `config>cron>` context.

```
A:sim1>config>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
```

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.

CLI Syntax: `config>cron>time-range$`
`weekly start` *`time-in-week`* `end` *`time-in-week`*

Example: `config>cron>time-range$ start fri,01:01 end fri,01:02`
`config>cron>time-range$`

The following command shows a weekly time range beginning on Friday at 1:01am ending Friday at 1:02am.

```
A:sim1>config>cron>time-range$ info
----------------------------------------------
        weekly start fri,01:01 end fri,01:02
----------------------------------------------
A:sim1>config>cron>time-range$
```

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.

SAPs

- If a TOD Suite is assigned to a SAP, statistics collection are not collected for that SAP and scheduler overrides cannot be collected on the SAP. If the SAP has an egress aggregate rate limit configured, an egress scheduler policy assignment cannot be applied
- When an item is configured both on SAP level and in the TOD suite assigned to the SAP, the TOD-suite defined value takes precedence. If a SAP belongs to an IES Interface, TOD Suites are allowed only with generic interfaces (no subscriber, group, redundant, etc.).
- A policy or filter assignment configured directly on a SAP has a lower priority than any assignment in a TOD Suite. Hence, it is possible that a new direct configuration has no immediate effect. If the configuration is made by CLI, a warning is given.

Multiservice Site

When applying a TOD Suite to a multi-service-site, only the scheduler policy assignment is active. If the multi-service-site has an egress aggregate rate limit configured, any egress scheduler policy assignment cannot be applied. While a TOD Suite is assigned to a multi-service-site, it is not possible to configure a scheduler to override it.

ANCP (Access Node Control Protocol)

Static ANCP string mapping and TOD suites must be configured on separate SAPs or multiservice sites.

Time of day elements include:

- Egress on page 329
- Ingress on page 332

Egress

This command is an enhancement for specific egress policies including filter lists, schedulers and QoS. Use this command to create time-range based associations of previously created filter lists, QoS and scheduler policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

Egress Aggregate Rate Limit

Having an egress aggregate rate limit is incompatible with having a scheduler policy. If a SAP or multi-service-site has a configured egress aggregate rate limit, and the TOD suite assigns a scheduler policy to it, that assignment cannot be applied: the configured aggregate rate limit takes precedence over the TOD suite's scheduler policy assignment.

Egress Multicast Group

SAPs may not have a TOD suite while belonging to an egress multicast group (EMG). Since all SAPs that belong to the same EMG must have the same egress filter, it is imperative to ensure that the TOD Suite does not modify the egress filter assignment.

Filters

In a TOD suite, filters that have entries with time-ranges may not be selected. Similarly, filter entries with a time-range may not be created while a TOD suite refers to that filter. QoS policies and filters referred to by a TOD suite must have scope “template” (default).
The following syntax is used to configure TOD-suite egress parameters.

CLI Syntax:
```
config
 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]
          qos policy-id [time-range time-range-name] [priori-
             ty priority]
          scheduler-policy scheduler-policy-name [time-range
             time-range-name]
```

Example:
```
config>cron>tod-suite$ egress filter ip 100
config>cron>tod-suite$
```

The following command shows 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>cron>tod-suite# egress filter ip 100
A:sim1>config>cron>tod-suite# info detail
----------------------------------------------
            no description
            egress
                filter ip 100
            exit
----------------------------------------------
A:sim1>config>cron>tod-suite#
```

Example:
```
config>cron>tod-suite$ egress qos 101
    config>cron>tod-suite$
```

The following command shows an association with egress QoS-SAP policy 101.

```
A:sim1>config>qos# sap-egress 101 create
...
A:sim1>config>cron>tod-suite# egress qos 101
A:sim1>config>cron>tod-suite# info detail
----------------------------------------------
            no description
            egress
                qos 101
            exit
----------------------------------------------
A:sim1>config>cron>tod-suite#
```

Example: `config>cron>tod-suite$ egress scheduler-policy test1`
`config>cron>tod-suite$`

The following command shows an association with an egress scheduler-policy called test1.

```
A:sim1>config# qos scheduler-policy test1 create
A:sim1>config>qos>scheduler-policy#
...
A:sim1# configure cron tod-suite test1 create
A:sim1>config>cron>tod-suite# egress scheduler-policy test1
A:sim1>config>cron>tod-suite# info detail
----------------------------------------------
            no description
            egress
                scheduler-policy test1
            exit
----------------------------------------------
A:sim1>config>cron>tod-suite$
```

Ingress

This command is an enhancement for specific ingress policies including filter lists, schedulers and QoS policies. Use this command to create time-range based associations of previously created filter lists QoS and scheduler policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range. To configure a daily time-range across midnight, use a combination of two entries. An entry that starts at hour zero will take over from an entry that ends at hour 24.

CLI Syntax:
```
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] [priority priority]
          filter mac mac-filter-id[time-range time-range-
             name] [priority priority]
          qos policy-id [time-range time-range-name] [priori-
             ty priority]
          scheduler-policy scheduler-policy-name [time-range
             time-range-name]
```

Example:
```
config>cron>tod-suite$ ingress filter ip 100
config>cron>tod-suite$
```

The following command shows an ingress IP filter association with filter ID 100.

```
sim1>config>filter# ip-filter 100 create
A:sim1>config>filter>ip-filter$ entry 10 create
A:sim1>config>filter>ip-filter>entry$
...
A:sim1>config>cron>tod-suite# ingress filter ip 100
A:sim1>config>cron>tod-suite# info detail
----------------------------------------------
            no description
            ingress
                filter ip 100
            exit
----------------------------------------------
A:sim1>config>cron>tod-suite#
```

Example:
```
config>cron>tod-suite$ ingress qos 101
config>cron>tod-suite$
```

The following command shows an association with ingress QoS-SAP policy 101.

```
A:sim1>config>qos# sap-egress 101 create
...
A:sim1>config>cron>tod-suite# ingress qos 101
A:sim1>config>cron>tod-suite# info detail
----------------------------------------------
            no description
            ingress
                qos 101
            exit
----------------------------------------------
A:sim1>config>cron>tod-suite#
```

Example: `config>cron>tod-suite$ ingress scheduler-policy test1`
`config>cron>tod-suite$`

The following command shows an association with an ingress scheduler-policy named test1.

```
A:sim1>config# qos scheduler-policy test1 create
A:sim1>config>qos>scheduler-policy#
...
A:sim1# configure cron tod-suite test1 create
A:sim1>config>cron>tod-suite#ingress scheduler-policy test1
A:sim1>config>cron>tod-suite# info detail
----------------------------------------------
            no description
            ingress
                scheduler-policy test1
            exit
----------------------------------------------
A:sim1>config>cron>tod-suite#
```

ANCP Enhancements

Persistency is available for subscriber's ANCP attributes and is stored on the on-board compact flash card. ANCP data will stay persistence during an ISSU as well as nodal reboots. During recovery, ANCP attributes are first restored fully from the persistence file, and incoming ANCP sessions are temporarily on hold. Afterwards, new ANCP data can overwrite any existing values. This new data is then stored into the compact flash in preparation for the next event.

Configuring Synchronization and Redundancy

Configuring Persistence

The following example displays subscriber management system persistence command usage:

Example:
```
config>system# persistence
config>system>persistence# subscriber-mgmt
config>system>persistence>sub-mgmt# description "cf3:SubMgmt-
Test"
config>system>persistence>sub-mgmt# location cf3:
config>system>persistence>sub-mgmt# exit

A:ALA-12>config>system>persistence# info
----------------------------------------------
            subscriber-mgmt
                description "cf3:SubMgmt-Test"
                location cf1:
            exit
----------------------------------------------
A:ALA-12>config>system>persistence#
```

Configuring Synchronization

The **switchover-exec** command specifies the location and name of the CLI script file executed following a redundancy switchover from the previously active CPM card.

CLI Syntax:
```
admin>redundancy
    synchronize {boot-env|config}
```

CLI Syntax:
```
config>system
    switchover-exec file-url
```

Configuring Manual Synchronization

Note that automatic synchronization can be configured in the **config>system> synchronization** context.

CLI Syntax:
```
admin
    redundancy
        synchronize {boot-env|config}
```

Example:
```
admin>redundancy# synchronize config
```

The following shows the output which displays during a manual synchronization:

```
A:ALA-12>admin# synchronize config

Syncing configuration......

Syncing configuration.....Completed.
A:ALA-12#
```

Forcing a Switchover

The **force-switchover now** command forces an immediate switchover to the standby CPM card.

CLI Syntax:
```
admin>redundancy
    force-switchover [now]
```

Example:
```
admin>redundancy# force-switchover now
```

```
A:ALA-12# admin redundancy force-switchover now
A:ALA-12#
Resetting...
?
```

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the **admin reboot standby** command on the active or the standby CPM.

Configuring Synchronization Options

Network operators can specify the type of synchronization operation to perform between the primary and secondary CPMs after a change has been made to the configuration files or the boot environment information contained in the boot options file (BOF).

Use the following CLI to configure the boot-env option:

CLI Syntax: `config>system`
`synchronize {boot-env|config}`

Example: `config>system# synchronize boot-env`

The following displays the configuration:

```
A:ALA-12>config>system# synchronize boot-env
A:ALA-12>config>system# show system synchronization
===============================================
Synchronization Information
===============================================
Synchronize Mode        : Boot Environment
Synchronize Status      : No synchronization
Last Config Sync Time   : 2006/06/27 06:19:47
Last Boot Env Sync Time : 2006/06/27 06:19:47
===============================================
A:ALA-12>config>system#
```

Use the following CLI to configure the config option:

CLI Syntax: `config>system`
`synchronize {boot-env|config}`

Example: `config>system# synchronize config`

The following example displays the configuration.

```
A:ALA-12>config>system# synchronize config
A:ALA-12>config>system# show system synchronization
===============================================
Synchronization Information
===============================================
Synchronize Mode        : Configuration
Synchronize Status      : No synchronization
Last Config Sync Time   : 2006/06/27 09:17:15
Last Boot Env Sync Time : 2006/06/24 07:16:37
===============================================
A:ALA-12>config>system#
```

Configuring Multi-Chassis Redundancy

Note: When configuring associated LAG ID parameters, the LAG must be in access mode and LACP must be enabled.

Use the CLI syntax displayed below to configure multi-chassis redundancy features.

CLI Syntax:

```
admin>redundancy
    multi-chassis
        peer ip-address
            authentication-key [authentication-key | hash-key]
                [hash | hash2]
            description description-string
            mc-lag
                hold-on-neighbor-failure duration
                keep-alive-interval interval
                lag lag-id lacp-key admin-key system-id system-id [remote-
                    lag lag-id] system-priority system-priority
                no shutdown
            no shutdown
            source-address ip-address
            sync
                igmp
                igmp-snooping
                port [port-id | lag-id] [sync-tag]
                    range encap-range sync-tag
                no shutdown
                srrp
                sub-mgmt
```

Example:

```
admin>redundancy#
          config>redundancy# multi-chassis
          config>redundancy>multi-chassis# peer 10.10.10.2 create
          config>redundancy>multi-chassis>peer# description "Mc-Lag peer
10.10.10.2"
          config>redundancy>multi-chassis>peer# mc-lag
          config>redundancy>mc>peer>mc-lag# lag 1 lacp-key 32666 system-
id 00:00:00:33:33:33 system-priority 32888
          config>redundancy>mc>peer>mc-lag# no shutdown
          config>redundancy>mc>peer>mc-lag# exit
          config>redundancy>multi-chassis>peer# no shutdown
          config>redundancy>multi-chassis>peer# exit
          config>redundancy>multi-chassis# exit
          config>redundancy#
```

The following displays the configuration:

```
A:ALA-48>config>redundancy# info
----------------------------------------------
```

```
        multi-chassis
            peer 10.10.10.2 create
                description "Mc-Lag peer 10.10.10.2"
                mc-lag
                    no shutdown
                exit
                no shutdown
            exit
        exit
-------------------------------------------
A:ALA-48>config>redundancy#
```

Configuring Mixed Mode

The 7450 mixed mode feature allows a 7450 ESS-7 or ESS-12 chassis to utilize 7750 IOM3-XPs, MDAs, and IMMs to enable 7750 SR capabilities on the associated slots. This allows features such as multicast routing, VPRN and IPv6 support as well as others to be enabled on existing 7450 systems.

The following are mixed-mode requirements:

- SR capabilities (for example, IP-VPNs, IPv6 routing and multicast routing) can only be associated with interfaces on 7750 IOM3-XPs, MDAs, and IMMs
- Network interface ports must be located 7750 IOM3-XPs or IMMs
- Only 7750 IOM3-XPs, 7750 MDAs, or 7750 IMMs can be used in 7450 slots with SR capabilities enabled.

Notes:

- The 7x50 SR supports mixed mode, specifically to run IPv6 services in a router that also contains IOM-20G-Bs (chassis mode A).
- ESM for IPv6 must run on IOM-3 or IMM hardware only, not on IOM or IOM-2, because the IOM and IOM2 data planes are not capable of routing incoming traffic to the IPv6 ESM hosts.
- The scaling limits are still defined by the chassis mode. That means only 16k IPv6 ESM subscribers (limited by the ARP scale of chassis mode A).

Enabling Mixed Mode on a 7450 System

To configure mixed mode support, 7750 IOM3-XPs, 7750 MDAs, or 7750 IMMs must be installed in a 7450 ESS-7 or ESS-12 router that is running OS 8.0 or later. All network interfaces must be migrated to ports on the 7750 cards.

The mixed mode state is then enabled by using the **mixed-mode-upgrade** command:

CLI Syntax: `mixed-mode-upgrade` *`slot-list`*

This tool will take a list of slots that should have 7750 cards installed. The command then checks to ensure that all network interfaces are located on ports on these slots and that they are all 7750 cards. It then enables the **mixed-mode** state at the system level and changes the **capability** setting for the specified slots to **sr**.

At this point the 7450 system is operating in a mixed mode state and supported features and services can now be configured on the slots with SR capabilities enabled.

Once in mixed mode use the **capability** command to configure slots for SR capabilities:

CLI Syntax: `config>card>capability sr|ess`

Slots using 7750-capable cards will have to have SR capability enabled on all slots with 7750 IOM3s and IMMs, as well as **mixed-mode** at the system level.

See Table 35 for a description of mixed-mode support.

Table 35: Mixed-Mode Support

Feature	7450 Standard Mode	7450 Mixed Mode (Limited to 7750 IOM3/IMM)
Full IES Support	Limited IES support	Yes
Full VPRN Support	No	Yes
BGP for routing (all address families)	No	Yes
IPv6 routing: IPv6 routing (Unicast and Multicast) 6PE 6VPE (IPv6 VPRN)	No	Yes
IP Multicast routing and forwarding Protocols: PIM, MSDP and IGMP mVPN P2MP LSP support	No	Yes
Spoke termination on L3 (IES/VPRN) interfaces	No	Yes
TPSDA IPv4 & v6 Routed subscriber management support PPPoE support SRRP Routed subscriber management for wholesale	No	Yes
IP Mirroring	No	Yes

Configuring Power Supply Parameters

By default, 7750 SR-Series

```
A:ALA-12>config>system# info
----------------------------------------------------------------------
..
        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"
        power-supply 1 dc
        power-supply 2 dc
        lacp-system-priority 1
        sync-if-timing
            begin
            ref-order ref1 ref2 bits
            ref1
                shutdown
            exit
            ref2
                shutdown
            exit
            bits
                shutdown
                interface-type ds1 esf
            exit
            commit
        exit
..
----------------------------------------------------------------------
```

Configuring ATM System Parameters

The ATM context configures system-wide ATM parameters.

CLI Syntax:
```
config>system#
 atm
    atm-location-id location-id
    oam
       loopback-period period
       retry-down retries
       retry-up retries
```

Example:
```
config>system# atm
config>system>atm# atm-location-id
03:00:00:00:00:00:00:00:00:00: 00:00:00:00:00:00
config>system>atm# oam
config>system>atm>oam# loopback-period 30
config>system>atm>oam# retry-down 5
config>system>atm>oam# retry-up 3
config>system>atm>oam# exit
```

The following example shows the ATM configuration.

```
A:ALA-12>config>system>atm# info
----------------------------------------------
            atm-location-id 03:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
            oam
                retry-up 3
                retry-down 5
                loopback-period 30
            exit
----------------------------------------------
A:ALA-12>config>system>atm#
```

Configuring Backup Copies

The `config-backup` command allows you to specify the maximum number of backup versions of configuration and index files kept in the primary location.

For example, assume the **config-backup** *count* is set to **5** and the configuration file is called *xyz.cfg*. When a **save** command is executed, the file *xyz.cfg* is saved with a .1 extension. Each subsequent **config-backup** command increments the numeric extension until the maximum count is reached. The oldest file (**5**) is deleted as more recent files are saved.

xyz.cfg
xyz.cfg.1
xyz.cfg.2
xyz.cfg.3
xyz.cfg.4
xyz.cfg.**5**
xyz.ndx

Each persistent index file is updated at the same time as the associated configuration file. When the index file is updated, then the save is performed to *xyz .cfg* and the index file is created as *xyz.ndx*. Synchronization between the active and standby SF/CPM is performed for all configurations and their associated persistent index files.

CLI Syntax: `config>system`
`config-backup` *count*

Example: `config>system#`
`config>system# config-backup 7`

The following example shows the `config-backup` configuration.

```
A:ALA-12>config>system>time# info
#------------------------------------------
echo "System Configuration"
#------------------------------------------
        name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
        config-backup 7
...
-------------------------------------------------
A:ALA-12>config>system>time#
```

Post-Boot Configuration Extension Files

Two post-boot configuration extension files are supported and are triggered when either a successful or failed boot configuration file is processed. The commands specify URLs for the CLI scripts to be run following the completion of the boot-up configuration. A URL must be specified or no action is taken. The commands are persistent between router (re)boots and are included in the configuration saves (`admin>save`).

CLI Syntax:
```
config>system
            boot-bad-exec file-url
            boot-good-exec file-url
```

Example:
```
config>system# boot-bad-exec ftp://test:test@192.168.xx.xxx/./
fail.cfg
config>system# boot-good-exec ftp://test:test@192.168.xx.xxx/./
ok.cfg
```

The following example displays the command output:

```
A:ALA-12>config>system# info
#------------------------------------------
echo "System Configuration"
#------------------------------------------
        name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
        config-backup 7
        boot-good-exec "ftp://test:test@192.168.xx.xxx/./ok.cfg"
        boot-bad-exec "ftp://test:test@192.168.xx.xxx/./fail.cfg"
        power-supply 1 dc
        power-supply 2 dc
        lacp-system-priority 1
        sync-if-timing
            begin
            ref-order ref1 ref2 bits
..
------------------------------------------------
A:ALA-12>config>system#
```

Show Command Output and Console Messages

The show>system>information command displays the current value of the bad/good exec URLs and indicates whether a post-boot configuration extension file was executed when the system was booted. If an extension file was executed, the show>system>information command also indicates if it completed successfully or not.

```
ALA-12>config>system#  show system information
===============================================================================
System Information
===============================================================================
System Name            : ALA-12
System Contact         : Fred Information Technology
System Location        : Bldg.1-floor 2-Room 201
System Coordinates     : N 45 58 23, W 34 56 12
System Up Time         : 1 days, 04:59:33.56 (hr:min:sec)

SNMP Port              : 161
SNMP Engine ID         : 0000197f000000000467ff00
SNMP Max Message Size  : 1500
SNMP Admin State       : Disabled
SNMP Oper State        : Disabled
SNMP Index Boot Status : Not Persistent

BOF Source             : cf1:
Image Source           : primary
Config Source          : primary
Last Booted Config File: ftp://test:test@192.168.xx.xxx/./12.cfg
Last Boot Cfg Version  : THU MAR 04 22:39:03 2004 UTC
Last Boot Config Header: # TiMOS B-0.0.I323 - Copyright (c) 2000-2004 Alcatel.
                         # All rights reserved. All use subject to applicable l
                         icense agreements. # Built on Sun Feb 29 21:43:13 PST
                         2004 by builder in /rel0.0/I323/panos/main # Generated
                          THU MAR 04 22:39:03 2004 UTC
Last Boot Index Version: N/A
Last Boot Index Header : N/A
Last Saved Config      : N/A
Time Last Saved        : N/A
Changes Since Last Save: Yes
Time Last Modified     : 2004/03/06 03:30:45
Max Cfg/BOF Backup Rev : 7
Cfg-OK Script          : ftp://test:test@192.168.xx.xxx/./ok.cfg
Cfg-OK Script Status   : not used
Cfg-Fail Script        : ftp://test:test@192.168.xx.xxx/./fail.cfg
Cfg-Fail Script Status : not used

Management IP Addr     : 192.168.xx.xxx/20
DNS Server             : 192.168.1.254
DNS Domain             : eng.timetra.com
BOF Static Routes      :
  To                   Next Hop
  172.22.184.0/22      192.168.1.251
ATM Location ID        : 01:00:00:00:00:11:00:00:00:00:00:00:00:00:00:00
===============================================================================
ALA-12>config>system#
```

When executing a post-boot configuration extension file, status messages are output to the CONSOLE screen prior to the “Login” prompt.

Following is an example of a failed 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 ALCATEL SR 7750 Copyright (c) 2000-2009 Alcatel-Lucent.
All rights reserved. All use subject to applicable license agreements.
Built on Thu Nov 207 19:19:11 PST 2008 by builder in /rel5x.0/b1/Rx/panos/main


Login:
```

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 by the central clock.

Note: In the current release the derived timing is distributed only through other Ethernet ports.

```
CLI Syntax:
     config>system>sync-if-timing
               abort
               begin
               commit
               ref-order ref1 ref2
               ref1
                    source-port port-id
                    no shutdown
               ref2
                    source-port port-id
                    no shutdown
               no revert
```

In the event that network timing is required for the synchronous interfaces in the router, a timing subsystem is utilized to provide a clock to all synchronous interfaces within the system.

This section describes the commands used to configure and control the timing subsystem.

Use the CLI syntax displayed below to:

- Edit Mode on page 349
- Configuring Timing References on page 350
- Using the Revert Command on page 351
- Other Editing Commands on page 352
- Forcing a Specific Reference on page 353

Edit Mode

To enter the mode to edit timing references, you must enter the **begin** keyword at the **config>system>sync-if-timing#** prompt.

Use the following CLI syntax to enter the edit mode:

CLI Syntax:
```
config>system>sync-if-timing
  begin
```

The following error message displays when the you try to modify **sync-if-timing** parameters without entering the keyword **begin**.

```
A:ALA-12>config>system>sync-if-timing>ref1# source-port 2/1/1
MINOR: CLI The sync-if-timing must be in edit mode by calling begin before any changes can
be made.
MINOR: CLI Unable to set source port for ref1 to 2/1/1
A:ALA-12>config>system>sync-if-timing>ref1#
```

Configuring Timing References

Use the following CLI syntax to configure timing reference parameters. Note that the source port specified for **ref1** and **ref2** is dependent on the 7750 SR-Series model type and chassis slot.

Note: For the SR-c12 and SR-c4, the ref1 and ref2 cannot both be from the same slot.

7750 Model	Ref1/Slots	Ref2/Slots
SR-1	Not enabled	Not enabled
SR-7	1 — 2	3 — 5
SR-12	1 — 5	6 — 10
SR-12e	1 — 5	6 — 9
SR-c12	No restriction	No restriction
SR-c4	No restriction	No restriction

Note that the SR-c12 and SRc-4, ref1 and ref2 cannot be from the same slot.

The following displays a timing reference configuration example:

```
ALA-12>config>system>sync-if-timing# info
----------------------------------------------
            ref-order ref2 ref1 bits
            ref1
                source-port 3/1/1
                no shutdown
            exit
            ref2
                source-port 6/1/2
                no shutdown
            exit
            bits
                interface-type ds1 esf
                no shutdown
            exit
----------------------------------------------
ALA-12>config>system>sync-if-timing#
```

Using the Revert Command

The **revert** command allows the clock to revert to a higher priority reference if the current reference goes offline or becomes unstable. When the failed reference becomes operational, it is eligible for selection.

When mode is non-revertive, a failed clock source is not selected again. If a node would enter holdover due to the references being in previous failed state, then the node will select one of the previously failed references rather than going into holdover.

CLI Syntax: `config>system>sync-if-timing`
`revert`

If the current reference goes offline or becomes unstable the revert command allows the clock to **revert** to a higher-priority reference.

When revert is switching enabled a valid timing reference of the highest priority is used. If a reference with a higher priority becomes valid, a reference switch over to that reference is initiated. If a failure on the current reference occurs, the next highest reference takes over.

If non-revertive switching is enabled, the valid active reference always remains selected even if a higher priority reference becomes available. If the active reference becomes invalid, a reference switch over to a valid reference with the highest priority is initiated. The failed reference is eligible for selection once it becomes operational.

```
CLI Syntax: config>system>sync-if-timing
          no revert
```

Other Editing Commands

Other editing commands include:

- `commit` — This command saves changes made to the timing references during a session. Modifications are not persistent across system boots unless this command is entered.
- `abort` — This command discards changes that have been made to the timing references during a session.

CLI Syntax:
```
config>system>sync-if-timing
 abort
 commit
```

Forcing a Specific Reference

Note: The debug sync-if-timing force-reference command should only be used to test and debug problems. Network synchronization problems may appear if network elements are left with this manual override setting. Once the system timing reference input has been forced, it may be cleared using the no force-reference command.

You can force the CPM clock to use a specific input reference using the force-reference command.

When the command is executed, the CPM clock on the active CPM immediately switches its input reference to that specified by the command. If the specified input is not available (shutdown), or in a disqualified state, the CPM clock shall use the next qualified input reference based on the selection rules.

This command also affects the BITS output port. If the BITS output port selection is set to line-reference and the reference being forced is not the BITS input port, then the system uses the forced reference to generate the signal out the BITS output port. If the BITS output port selection is set to internal-clock, then the system uses the output of the CPM clock to generate the signal for the BITS output port.

On a CPM activity switch, the force command is cleared and normal reference selection is determined.

Debug configurations are not saved between reboots.

CLI Syntax: `debug>sync-if-timing`
`force-reference {ref1 | ref2 | bits}`

Example: `debug>sync-if-timing# force-reference`

The 7750 SR-c4 has two BITS input ports on the CFM. The force reference command on this system allows the selection of the specific port.

CLI Syntax: `debug>sync-if-timing`
`force-reference {ref1 | ref2 | bits1 | bits2}`

Configuring System Monitoring Thresholds

Creating Events

The **event** command controls the generation and notification of threshold crossing events configured with the **alarm** command. When a threshold crossing event is triggered, the **rmon event** configuration optionally specifies whether an entry in the RMON-MIB log table be created to record the occurrence of the event. It can also specify whether an SNMP notification (trap) be generated for the event. There are two notifications for threshold crossing events, a rising alarm and a falling alarm.ping-address

Creating an event entry in the RMON-MIB log table does not create a corresponding entry in the event logs. However, when the event is set to trap the generation of a rising alarm or falling alarm notification creates an entry in the event logs and that is distributed to whatever log destinations are configured: console, session, memory, file, syslog, or SNMP trap destination. The logger message includes a rising or falling threshold crossing event indicator, the sample type (absolute or delta), the sampled value, the threshold value, the *rmon-alarm-id*, the associated *rmon-event-id* and the sampled SNMP object identifier.

The **alarm** command configures an entry in the RMON-MIB alarm table. The **alarm** command controls the monitoring and triggering of threshold crossing events. In order for notification or logging of a threshold crossing event to occur there must be at least one associated **rmon event** configured.

The agent periodically takes statistical sample values from the MIB variable specified for monitoring and compares them to thresholds that have been configured with the **alarm** command. The **alarm** command configures the MIB variable to be monitored, the polling period (interval), sampling type (absolute or delta value), and rising and falling threshold parameters. If a sample has crossed a threshold value, the associated ‘event’ is generated.

Preconfigured CLI threshold commands are available. Preconfigured commands hide some of the complexities of configuring RMON alarm and event commands and perform the same function. In particular, the preconfigured commands do not require the user to know the SNMP object identifier to be sampled. The preconfigured threshold configurations include memory warnings and alarms and compact flash usage warnings and alarms.

To create events, use the following CLI:

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

Example: config>system>thresh>rmon# event 5 both description "alarm testing" owner "Timos CLI"

The following example displays the 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#
```

System Alarm Contact Inputs

The hardware supports alarm contact inputs that allow an operator to monitor and report changes in the external environmental conditions. In a remote or outdoor deployment, alarm contact inputs allow an operator to detect conditions, for example, air conditioner fault, open door.

An operator can configure generation of events when alarm contact inputs transition between the open and close states. For each generated event, the operator can specify the:

- Action associated with each state transition.
- Severity associated with each state transition.
- Log message associated with each state transition.

Configuring LLDP

The following output displays LLDP defaults:

```
A:testSr1>config>system>lldp# info detail
----------------------------------------------
             no tx-interval
             no tx-hold-multiplier
             no reinit-delay
             no notification-interval
             no tx-credit-max
             no message-fast-tx
             no message-fast-tx-init
             no shutdown
----------------------------------------------
A:testSr1>config>system>lldp#
```

The following example shows an LLDP port configuration.

```
*A:ALA-48>config>port>ethernet>lldp# info
----------------------------------------------
                dest-mac nearest-bridge
                    admin-status tx-rx
                    tx-tlvs port-desc sys-cap
                    tx-mgmt-address system
                exit
----------------------------------------------
*A:ALA-48>config>port>ethernet>lldp#
```

The following example shows a global system LLDP configuration.

```
A:ALA-48>config>system>lldp# info
----------------------------------------------
            tx-interval 10
            tx-hold-multiplier 2
            reinit-delay 5
            notification-interval 10
----------------------------------------------
A:ALA-48>config>system>lldp#
```

System Command Reference

Command Hierarchies

Configuration Commands

System Information Commands

```
config
    — system
        — atm
            — atm-location-id
            — oam
                — loopback-period period
                — retry-down retries
                — retry-up retries
        — boot-bad-exec file-url
        — no boot-bad-exec
        — boot-bad-execfile-url
        — no boot-bad-exec
        — chassis-mode {chassis-mode} [force]
        — clli-code clli-code
        — no clli-code
        — config-backup count
        — no config-backup
        — contact contact-name
```

- **no contact**
- **coordinates** *coordinates*
- **no coordinates**
- **dns**
  - **address-pref** {**ipv4-only** | **ipv6-first**}
  - **no address-pref**
  - **dnssec**
    - **ad-validation** *fall-through*|*drop*
- [**no**] **ad-validation**
- **lsr-load-balancing** *hashing-algorithm*
- **no lsr-load-balancing**
- **lacp-system-priority** *lacp-system-priority*
- **no lacp-system-priority**
- [**no**] **l4-load-balancing**
- [**no**] **mc-enh-load-balancing**
- **location** *location*
- **no location**
- **name** *system-name*
- **no name**
- **no system-ip-load-balancing**

System Alarm Commands

config
- **system**
  - **thresholds**
    - **cflash-cap-alarm** *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm*-type]
    - **no cflash-cap-alarm** *cflash-id*
    - **cflash-cap-warn** *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm*-type]
    - **no cflash-cap-warn** *cflash-id*
    - **kb-memory-use-alarm** **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
    - **no kb-memory-use-alarm**
    - **kb-memory-use-warn** **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
    - **no kb-memory-use-warn**
    - **memory-use-alarm** **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm*-type]
    - **no memory-use-alarm**
    - **memory-use-warn** **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm*-type]
    - **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*

Persistence Commands

```
config
    — system
        — persistence
            — ancp
                — description description-string
                — no description
                — location cflash-id
                — no location
            — application-assurance
                — description description-string
                — no description
                — location cflash-id
                — no location
            — dhcp-server
                — description description-string
                — no description
                — location cflash-id
                — no location
            — nat-port-forwarding
                — description description-string
                — no description
                — location cflash-id
                — no location
            — python-policy-cache
                — description description-string
                — no description
                — location cflash-id
                — no location
            — subscriber-mgmt
                — description description-string
                — no description
                — location cflash-id
                — no location
```

PTP Commands

```
config
    — system
        — ptp
            — anno-rx-timeout count
            — clock-type {{ordinary [master | slave]} | boundary}
            — [no] domain domain
            — log-anno-interval log-interval
            — network-type {sdh | sonet}
            — peer-limit limit
            — no peer-limit
            — [no] peer ip-address
                — [no] log-sync-interval log-interval
                — [no] priority local-priority
                — [no] shutdown
            — [no] priority1 priority
            — [no] priority2 priority
```

— **profile** *profile*
— [**no**] **shutdown**

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**] **broadcast** [**router** *router-name*] {**interface** *ip-int-name*} [**key-id** *key-id*] [**version** *version*] [**ttl** *ttl*]
      - **broadcastclient** [**router** *router-name*] {**interface** *ip-int-name*} [**authenticate**]
      - [**no**] **multicast** [**version** *version*] [**key-id** *key-id*]
      - [**no**] **multicastclient** [**authenticate**]
      - [**no**] **ntp-server** [**authenticate**]
      - [**no**] **peer** {*ip-address* | *ipv6-address}* [**version** *version*] [**key-id** *key-id*] [**prefer**]
      - [**no**] **server** {*ip-address* | *ipv6-address* | *ptp}* [**key-id** *key-id*] [**version** *version*] [**prefer**]
      - [**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**

Cron Commands

config
- [**no**] **cron**
  - [**no**] **action** *action-name* [**owner** *owner-name*]
    - **expire-time** {**seconds** | **forever**}
    - **lifetime** {**seconds** | **forever**}
    - **max-completed** *unsigned*
    - [**no**] **results** *file-url*
    - [**no**] **script** *script-name* [**owner** *owner-name*]
    - [**no**] **shutdown**
  - [**no**] **schedule** ***schedule-name*** [**owner** *owner-name*]
    - [**no**] **action** ***action-name*** **[owner** ***owner-name*****]**
    - [**no**] **day-of-month** {*day-number* [*..day-number*] **all**}
    - **count** *number*
    - [**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**] **shutdown**
    - **type** {*schedule-type*}
    - [**no**] **weekday** {*weekday-number* [*..weekday-number*]|*day-name* [*..day-name*]|**all**}
  - [**no**] **script** ***script-name*** [**owner** *owner-name*]
    - [**no**] **description** *description-string*
    - [**no**] **Specifies the script namea.loction** ***file-url***
    - [**no**] **shutdown**
  - [**no**] **time-range** *name*
    - **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*
    - **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**
    - **egress**
      - **filter ip** *ip-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]
      - **filter ipv6** *ipv6-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]
      - **filter mac** *mac-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]
      - **no filter ip** *ip-filter-id* [**time-range** *time-range-name*]
      - **no filter ipv6** *ipv6-filter-id* [**time-range** *time-range-name*]
      - **no filtermac** *mac-filter-id* [**time-range** *time-range-name*
      - **qos** *policy-id* [**time-range** *time-range-name*] [**priority** *priority*]
      - **no qos** *policy-id* [**time-range** *time-range-name*]
      - **scheduler-policy** *scheduler-policy-name* [**time-range** *time-range-name*] [**priority** *priority*]
      - **no scheduler-policy** *scheduler-policy-name* [**time-range** *time-range-name*]
    - **ingress**
      - **filter ip** *ip-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]
      - **filter ipv6** *ipv6-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]

- **filter mac** *mac-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]
- **no filter ip** *ip-filter-id* [**time-range** *time-range-name*]
- **no filter ipv6** *ipv6-filter-id* [**time-range** *time-range-name*]
- **no filtermac** *mac-filter-id* [**time-range** *time-range-name*
- **qos** *policy-id* [**time-range** *time-range-name*] [**priority** *priority*]
- **no qos** *policy-id* [**time-range** *time-range-name*]
- **scheduler-policy** *scheduler-policy-name* [**time-range** *time-range-name*] [**priority** *priority*]
- **no scheduler-policy** *scheduler-policy-name* [**time-range** *time-range-name*]

System Administration (Admin) Commands

root
- — **admin**
  - — **application-assurance**
    - — **upgrade**
  - — **clear-policy-lock**
  - — **debug-save** *file-url*
  - — **disconnect** {**address** *ip-address* | **username** *user-name* | **console** | **telnet** | **ftp** | **ssh**}
  - — **display-config** [**detail** | **index**]
  - — [**no**] **enable-tech**
  - — **radius-discovery**
  - — **force-discover** [**svc-id** *service-id*]
  - — **reboot** [**active** | **standby** | **upgrade**] [**hold**] [**now**]
  - — **redundancy**
    - — [**no**] **cert-sync**
  - — **synchronize** {**boot-env**|**config**}
  - — **no synchronize**
  - — **save** [*file-url*] [**detail**] [**index**]
  - — **synchronize** [**boot-env** | **config**]
  - — **tech-support** [*file-url*]

System Synchronization Commands

```
config
    — system
        — sync-if-timing
            — abort
            — begin
            — bits
                — input
                    — [no] shutdown
                — interface-type {ds1 [{esf | sf}] | e1 [{pcm30crc | pcm31crc}]}
                — no interface-type
                — output
                    — line-length {110, 220, 330, 440, 550, 660}
                    — [no] shutdown
                    — source {line-ref|internal-clock}
                — ql-override {prs | stu | st2 | tnc | st3e | st3 | eec1 | sec | prc | ssu-a | ssu-b | eec2}
                — no ql-override
                — ssm-bit sa-bit
            — commit
            — ref-order first second [third [fourth]]
            — no ref-order
            — ptp
                — ql-override {prs | stu | st2 | tnc | st3e | st3 | eec1 | sec | prc | ssu-a | ssu-b | eec2}
                — no ql-override
                — [no] shutdown
            — ref1
                — ql-override {prs | stu | st2 | tnc | st3e | st3 | eec1 | sec | prc | ssu-a | ssu-b | eec2}
                — no ql-override
                — [no] shutdown
                — source-port port-id
                — no source-port
            — ref2
                — ql-override {prs | stu | st2 | tnc | st3e | st3 | eec1 | sec | prc | ssu-a | ssu-b | eec2}
                — no ql-override
                — [no] shutdown
                — source-port port-id
                — no source-port
            — [no] ql-selection
            — [no] revert
```

The following commands apply to the 7750 SR-c12 model.

```
config
    — system
        — sync-if-timing
            — abort
            — begin
            — commit
            — ref-order first second [third]
            — no ref-order
            — ref1
                — bits-interface-type {ds1 [{esf | sf}] | e1 [{pcm30crc | pcm31crc}]}
                — no bits-interface-type
```

- **ql-override** {**prs** | **stu** | **st2** | **tnc** | **st3e** | **st3** | **eec1** | **sec** | **prc** | **ssu-a** | **ssu-b** | **eec2**}
- **no ql-override**
- [**no**] **shutdown**
- **source-bits** *slot/mda*
- **no source-bits**
- **source-port** *port-id*
- **no source-port**
- **ssm-bit** ***sa-bit***

— **ref2**

- **bits-interface-type** {**ds1** [{**esf** | **sf**}] | **e1** [{**pcm30crc** | **pcm31crc**}]}
- **no bits-interface-type**
- **ql-override** **{prs** | **stu** | **st2** | **tnc** | **st3e** | **st3** | **eec1** | **sec** | **prc** | **ssu-a** | **ssu-b** | **eec2}**
- **no ql-override**
- [**no**] **shutdown**
- **source-bits** *slot/mda*
- **no source-bits**
- **source-port** *port-id*
- **no source-port**
- **ssm-bit** ***sa-bit***

— [**no**] **ql-selection**
— [**no**] **revert**

High Availability (Redundancy) Commands

root
- **admin**
  - **redundancy**
  - **display-config** [**detail** |**index**]
  - **redundancy**
    - **force-switchover** [**now**] [**force-switchover]**
    - **rollback-sync**
    - **synchronize** {**boot-env** | **config**}
  - **rollback**
    - **redundancy** [**to** *source 1*]
    - **delete** {**latest-rb** | *checkpoint-id* | **rescue**}
    - **revert** [**latest-rb**] | *checkpoint-id* | **rescue** [**now**]
    - **revert**
    - **save (rollback)** [**rescue**] [**comment** *comment-string*]
    - **view** [**latest-rb** | *checkpoint-id* | **rescue**]
  - **view** {**latest-cfg** | **active-cfg** | **latest-rb** | *checkpoint-id*}

config
- **system**
  - **rollback**
    - [**no**] **rollback-location** *file-url*
    - [**no**] **rescue-location** *file-url*
    - [**no**] **local-max-checkpoints** *<1...50>*
    - [**no**] **remote-max-checkpoints** *<1...50>*
  - **switchover-exec** *file-url*
  - **no switchover-exec**
- **redundancy**
  - **multi-chassis**
    - [**no**] **peer** *ip-address*
      - **authentication-key** [*authentication-key* | *hash-key*] [**hash** | **hash2**]
      - **no authentication-key**
      - **description** *description-string*
      - **no description**
      - [**no**] **mc-endpoint**
        - [**no**] **bfd-enable**
        - **boot-timer** *interval*
        - **no boot-timer**
        - **hold-on-neighbor-failure** *multiplier*
        - **no hold-on-neighbor-failure**
        - **keep-alive-interval** *interval*
        - **no keep-alive-interval**
        - [**no**] **passive-mode**
        - [**no**] **shutdown**
        - **system-priority** *value*
        - **no system-priority**
      - [**no**] **mc-lag**
        - **hold-on-neighbor-failure** *multiplier*
        - **no hold-on-neighbor-failure**
        - **keep-alive-interval** *interval*
        - **no keep-alive-interval**
        - **lag** *lag-id* **lacp-key** *admin-key* **system-id** *system-id* [**remote-lag** *remote-lag-id*] **system-priority** *system-priority* **source-bmac-lsb** *use-lacp-key*

- — **lag** *lag-id* **lacp-key** *admin-key* **system-id** *system-id* [**remote-lag** *remote-lag-id*] **system-priority** *system-priority* **source-bmac-lsb** *MAC-Lsb*
- — **lag** *lag-id* **lacp-key** *admin-key* **system-id** *system-id* [**remote-lag** *remote-lag-id*] **system-priority** *system-priority*
- — **lag** *lag-id* [**remote-lag** *remote-lag-id*]
- — **no lag** *lag-id*
- — [**no**] **shutdown**

— [**no**] **mc-mobile**

- — **bfd-enable** [**service** *service-id*] **interface** *interface-name*
- — **no bfd-enable**
- — **hold-on-neighbor-failure** *multiplier*
- — **no hold-on-neighbor-failure**
- — **keep-alive-interval** *interval*
- — **no keep-alive-interval**
- — **ring** *sync-tag* [**create**]
- — **no ring** *sync-tag*
  - — **in-band-control-path**
    - — **dst-ip** *ip-address*
    - — **no dst-ip**
    - — **interface** *ip-int-name*
    - — **no interface**
    - — **service-id** *service-id*
    - — **no service-id**
  - — [**no**] **path-b**
    - — [**no**] **range** *vlan-range*
  - — [**no**] **path-excl**
    - — [**no**] **range** *vlan-range*
  - — **ring-node** *ring-node-name* [**create**]
  - — **no ring-node** *ring-node-name*
    - — **connectivity-verify**
      - — **dst-ip** *ip-address*
      - — **no dst-ip**
      - — **interval** *interval*
      - — **no interval**
      - — **service-id** *service-id*
      - — **no service-id**
      - — [**no**] **shutdown**
      - — **src-ip** *ip-address*
      - — **no src-ip**
      - — **src-mac** *ieee-address*
      - — **no src-mac**
      - — **vlan** [**0..4094**]
      - — **no vlan**
  - — [**no**] **shutdown**
- — **peer-name** *name*
- — **no peer-name**
- — [**no**] **shutdown**
- — **source-address** *ip-address*
- — **no source-address**
- — [**no**] **sync**
  - — [**no**] **igmp**
  - — [**no**] **igmp-snooping**
  - — [**no**] **local-dhcp-server**
  - — [**no**] **mc-ring**

```
                                    — [no] mld-snooping
                                    — port [port-id | lag-id] [sync-tag sync-tag]
                                    — no port [port-id | lag-id]
                                        — range encap-range [sync-tag sync-tag]
                                        — no range encap-range
                                    — [no] python
                                    — [no] shutdown
                                    — [no] srrp
                                    — [no] sub-host-trk
                                    — [no] sub-mgmt
                                — warm-standby
— bgp-multi-homing
        — boot-timer seconds
        — no boot-timer
        — site-activation-timer seconds
        — no site-activation-timer
— [no] cert-sync
— [no] rollback-sync
— synchronize {boot-env | config}
```

LLDP System Commands

```
configure
    — system
        — lldp
            — message-fast-tx time
            — no message-fast-tx
            — message-fast-tx-init count
            — no message-fast-tx-init
            — notification-interval time
            — no notification-interval
            — reinit-delay time
            — no reinit-delay
            — [no] shutdown
            — tx-credit-max count
            — no tx-credit-max
            — tx-hold-multiplier multiplier
            — no tx-hold-multiplier
            — tx-interval interval
            — no tx-interval
```

LLDP Ethernet Port Commands

```
configure
    — port port-id
        — ethernet
            — lldp
                — dest-mac {nearest-bridge | nearest-non-tpmr | nearest-customer}
                — admin-status {rx | tx | tx-rx | disabled}
                — [no] notification
                — tx-mgmt-address [system]
                — no tx-mgmt-address
                — tx-tlvs [port-desc] [sys-name] [sys-desc] [sys-cap]
                — no tx-tlvs
```

Show Commands

show
- **cron**
  - **action**
  - **schedule**
  - **script**
  - **tod-suite** *tod-suite-name* [**detail**]
  - **tod-suite** *tod-suite-name***associations**
  - **tod-suite** *tod-suite-name***failed-associations**
  - **time-range** *name* **associations** [**detail**]
- **redundancy**
  - **multi-chassis**
    - **all** [**detail**]
    - **mc-endpoint statistics**
    - **mc-endpoint peer** *[ip-address*] **statistics**
    - **mc-endpoint endpoint** [*mcep-id*] **statistics**
    - **mc-endpoint peer** [*ip-address*]
    - **mc-mobile peer** [*ip-address* | *ipv6-address*]
    - **mc-lag** [**lag** *lag-id*]
      - **peer** [**peer** *ip-address* [**lag** *lag-id*]] **mc-lag**
      - **statistics**
    - **mc-ring peer** *ip-address* **statistics**
    - **mc-ring peer** *ip-address* [**ring** *sync-tag* [**detail** | **statistics**]]
    - **mc-ring peer** *ip-address* **ring** *sync-tag* **ring-node** [*ring-node-name* [**detail** | **statistics**]]
    - **mc-ring global-statistics**
    - **sync** [**port** *port-id* | *lag-id*]
      - **peer** [**port** *port-id*]
      - **detail**
  - **synchronization**
- **time**
- **system**
  - **connections** [**address** *ip-address* [**interface** *interface-name*]] [**port** *port-number*] [**detail**]
  - **cpu** [**sample-period** *seconds*]
  - **information**
  - **lldp neighbor**
  - **load-balancing-alg** [**detail**]
  - **memory-pools**
  - **ntp**
  - **ptp** [**peer** *ip-address* [**router** *router-instance*] [**detail**] | **peers** [**router** *router-instance*] [**detail**] | **unicast** [**router** *router-instance*] | **statistics** | **standby**]
  - **rollback**
  - **sntp**
  - **switch-fabric**
  - **sync-if-timing**
  - **thresholds**
  - **time**
- **uptime**

Clear Commands

clear
- — **application-assurance**
  - — **group** *isa-aa-group-id* **statistics**
  - — **group** *isa-aa-group-id* **status**
- — **redundancy**
  - — **multi-chassis**
    - — **mc-endpoint** **endpoint** [*mcep-id*] **statistics**
    - — **mc-endpoint** **statistics**
    - — **mc-endpoint** **peer** [*ip-address*] **statistics**
    - — **mc-mobile** **statistics peer** {**ip-address** | **ipv6-address**}
    - — **mc-lag** [**peer** *ip-address* [**lag** *lag-id*]]
    - — **mc-ring**
      - — **debounce** **peer** *ip-address* **ring** *sync-tag*
      - — **ring-nodes** **peer** *ip-address* **ring** *sync-tag*
      - — **statistics**
        - — **global**
        - — **peer** *ip-address*
        - — **ring** **peer** *ip-address* **ring** *sync-tag*
        - — **ring-node** **peer** *ip-address* **ring** *sync-tag* **node** *ring-node-name*
    - — **sync-database** **peer** *ip-address* **all application** *application*
    - — **sync-database** **peer** *ip-address* {**port** *port-id* | *lag-id* | **sync-tag** *sync-tag*} **application** *application*
    - — **sync-database** **peer** *ip-address* **port** *port-id* | *lag-id* **sync-tag** *sync-tag* **application** *application*
- — **screen** *action-name* [**owner** *owner-name*]
- — **system** **sync-if-timing** {**ref1** | **ref2** | **bits**}
- — **trace** **log**

Debug Commands

debug
- — **sync-if-timing**
  - — **force-reference** {**ref1** | **ref2** | **bits**}
  - — **no force-reference**
- — [**no**] **system**
  - — **http-connections** [*host-ip-address/mask*]
  - — **no http-connections**
  - — **ntp** [**router** *router-name*] [**interface** *ip-int-name*]
  - — **persistence**

Tools Commands

tools
- **dump**
  - **redundancy**
    - **multi-chassis**
      - **mc-endpoint peer** *ip-address*
      - **mc-ring**
      - **mc-ring peer** *ip-address* [ring *sync-tag*]
      - **sync-database** [**instance** *instance-id*] [**peer** *ip-address*]
      - **sync-database** [**peer** *ip-address*] [**port** *port-id* | *lag-id*] [**sync-tag** *sync-tag*] [**application** *application*] [**detail**] [**type** *type*]
- **perform**
  - **set-fabric-speed** *speed*

System Command Reference

Generic Commands

shutdown

Syntax [**no**] **shutdown**

Context config>cron>action
config>cron>sched
config>cron>script
config>system>time>ntp
config>system>time>sntp
config>system>sync-if-timing>ref1
config>system>sync-if-timing>ref2
config>system>sync-if-timing>ptp
config>system>sync-if-timing>bits>input
config>system>sync-if-timing>bits>output
config>system>persistence>app-assure
config>system>persistence>dhcp-server
config>system>persistence>nat-port-forward
config>system>persistence>python-policy-cache
config>system>persistence>subscriber-mgmt
config>redundancy>multi-chassis>peer
config>redundancy>multi-chassis>peer>mc-lag
config>redundancy>multi-chassis>peer>sync
config>redundancy>mc>peer>mcr>node>cv
config>system>lldp
config>redundancy>multi-chassis>peer>mc-ep

Description This command administratively disables the entity. When disabled, an entity does not change, reset, or remove any configuration settings or statistics.

The operational state of the entity is disabled as well as the operational state of any entities contained within. Many objects must be shut down before they may be deleted.

The **no** form of this command places the entity into an administratively enabled state.

Default **no shutdown**

description

Syntax **description** *description-string*
no description

Context config>cron>sched
config>system>persistence>ancp
config>system>persistence>app-assure
config>system>persistence>dhcp-server
config>system>persistence>nat-fwd
config>system>persistence>sub-mgmt
config>system>persistence>dhcp-server
config>redundancy>multi-chassis>peer

Description This command creates a text description stored in the configuration file for a configuration context.

The **description** command associates a text string with a configuration context to help identify the content in the configuration file.

The **no** form of this command removes the string from the configuration.

Default No description associated with the configuration context.

Parameters *string* — The description character string. Allowed values are any string up to 80 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

System Information Commands

atm

Syntax **atm**

Context config>system

Description This command enables the context to configure system-wide ATM parameters.

atm-location-id

Syntax **atm-location-id** *location-id*

Context config>system

Description This command indicates the location ID for ATM OAM.

Refer to the *7750 SR OS Services Guide* for information about ATM QoS policies and ATM-related service parameters.

Default no atm-location-id

Parameters *location-id* — Specify the 16 octets that identifies the system loopback location ID as required by the ATM OAM Loopback capability. This textual convention is defined in ITU-T standard I.610.

Invalid values include a location ID where the first octet is : 00, FF, 6A
Acceptable *location-ids* include values where the first octet is: 01, 03
Other values are not accepted.

Values 01:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

oam

Syntax **oam**

Context config>system>atm

Description This command configures system-wide ATM parameters.

loopback-period

Syntax **loopback-period** *period*
no loopback-period

Context config>system>atm>oam

Description This command specifies the number of seconds between periodic loopback attempts on an ATM endpoint that has periodic loopback enabled.

Parameters *period* — Specify the time, in seconds, between periodic loopback attempts.

Values 1 — 40

Default 10

retry-down

Syntax **retry-down** *retries*
no retry-down

Context config>system>atm>oam

Description Specifies the number of OAM loopback attempts that must fail after the periodic attempt before the endpoint will transition to AIS-LOC state.

The retry values are configured on a system wide basis and are affective on the next period cycle of any ATM VC SAP using **periodic-loopback**, if changed. The timeout for receiving a loopback response from the remote peer and declaring the loopack failed is 1 second and is not configurable.

Parameters *retries* — Specify the number of failed loopback attempts before an ATM VC goes down.

Values 0 — 10 (A zero value means that the endpoint will transition to AIS-LOC state immediately if the periodic loopback attempt fails.)

Default 4

retry-up

Syntax **retry-up** *retries*
no retry-up

Context config>system>atm>oam

Description This command specifies the number of consecutive OAM loopback attempts that must succeed after the periodic attempt before the endpoint will transition the state to up.

Parameters *retries* — Specify the number of successful loopback replies before an ATM VC goes up.

Values 0 — 10 (A zero value means that the endpoint will transition to the up state immediately if the periodic loopback attempt succeeds.)

Default 2

boot-bad-exec

Syntax **boot-bad-exec** *file-url*
no boot-bad-exec

Context config>system

Description Use this command to configure 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 (re)boots and are included in the configuration saves (**admin>save**).

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*/][*file-path*]	
remote-url:	[{ftp://} 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..FFFF]H
		d - [0..255]D
		interface - 32 chars max, for link local addressescflash-
id:	cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:	

Related Commands **exec command on page 77 —** This command executes the contents of a text file as if they were CLI commands entered at the console.

boot-good-exec

Syntax **boot-good-exec** *file-url*
no boot-good-exec

Context config>system

Description Use this command to configure a URL for a CLI script to exec following the success of a boot-up configuration.

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.

Values

file url:	local-url | remote-url: 255 chars max	
local-url:	[*cflash-id*/][*file-path*]	
remote-url:	[{ftp://} login:pswd@remote-locn/][file-path]	
	remote-locn [*hostname* | *ipv4-address* | [*ipv6- address*]	
	ipv6-address -	x:x:x:x:x:x:x:x[-interface]
		x:x:x:x:x:x:d.d.d.d[-interface]
		x - [0..FFFF]H
		d - [0..255]D
		interface - 32 chars max, for link local addresses
cflash-id:	cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:	

Related Commands **exec command on page 77 —** This command executes the contents of a text file as if they were CLI commands entered at the console.

chassis-mode

Syntax **chassis-mode** [*chassis-mode*] [**force**]

Context config>system

Description This command configures the chassis scaling and feature set.

Note that, if you are in chassis-mode **d** and configure an IOM type as iom2-20g and then downgrade to chassis-mode **a** or **b** (must specify **force** keyword), a warning appears about the IOM downgrade. In this case, the IOM`s provisioned type will downgrade to iom-20g-b. Once this is done, the ASAP MDA cannot be configured.

The ASAP MDA can only be configured if the iom2-20g IOM type is provisioned and equipped and the chassis mode is configured as **a** or **b**.

If this is the desired behavior, for example, chassis-mode **d** is configured and IPv6 is running, you can then downgrade to chassis-mode **a** or **b** if you want to disable IPv6.

For chassis mode **d**, the default must be changed from the default mode **a** which assumes the least available features. Mode **d** enables the new feature sets available with newer generations of IOMs. Chassis mode **d** supports the P2/Q2/T2-based IOMs products and the extensive queuing/policing/bandwidth. Mode **d** assumes that the **iom3-xp** is installed.

Default a

Parameters *chassis-mode* — Specify the one of the following chassis modes:

a: This mode corresponds to scaling and feature set associated with iom-20g.

b: This mode corresponds to scaling and feature set associated with iom-20g-b.

c: This mode corresponds to scaling and feature set associated with iom2-20g.

d: This mode corresponds to scaling and feature set associated with iom3-xp.

If the chassis mode is not explicitly provisioned in the configuration file, the chassis will come up in chassis mode a by default. The behavior for the IOMs is described in the following table:

Table 36: Chassis Mode Behavior

IOM	Behavior
iom-20g-b	Comes online if provisioned as iom-20g or iom-20g-b.
iom2-20g	Comes online if provisioned as iom-20g, iom-20g-b or iom2-20g.
iom-10g	Comes online if provisioned as iom-10g.
iom3-xp	Comes online if provisioned as iom3-xp.

force — Forces an upgrade from mode **a** to mode **b** or **d**, or an upgrade from mode **b** to mode **d**.

clli-code

Syntax **clli-code** *clli-code*
no clli-code

Context config>system

Description This command creates a Common Language Location Identifier (CLLI) code string for the 7750 SR-Series router. A CLLI code is an 11-character standardized geographic identifier that uniquely identifies geographic locations and certain functional categories of equipment unique to the telecommunications industry.

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 the command removes the CLLI code.

Default none — No CLLI codes are configured.

Parameters *clli-code* — 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, etc.), the entire string must be enclosed within double quotes. If more than 11 characters are entered, the string is truncated. If less than 11 characters are entered the string is padded with spaces.

config-backup

Syntax **config-backup** *count*
no config-backup

Context config>system

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 CPM is performed for all configurations and their associated persistent index files.

The **no** form of the command returns the configuration to the default value.

Default 5

Parameters *count* — The maximum number of backup revisions.

Values 1 — 9

contact

Syntax **contact** *contact-name*
no contact

Context config>system

Description This command creates a text string that identifies the contact name for the device.

Only one contact can be configured, if multiple contacts are configured the last one entered will overwrite the previous entry.

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

Default none — No contact name is configured.

Parameters *contact-name* — The contact name character string. The string can be up to 80 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

coordinates

Syntax **coordinates** *coordinates*
no coordinates

Context config>system

Description This command creates a text string that identifies the system coordinates for the device location. For example, the command **coordinates** "*37.390 -122.0550*" is read as latitude 37.390 north and longitude 122.0550 west.

Only one set of coordinates can be configured. If multiple coordinates are configured, the last one entered overwrites the previous entry.

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

Default none — No coordinates are configured.

Parameters *coordinates* — The coordinates describing the device location character string. The string may be up to 80 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), 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.

dns

Syntax **dns**

Context config>system

Description This command configures DNS settings.

address-pref

Syntax **address-pref** {**ipv4-only | ipv6-first**
no address-pref

Context config>system>dns

Description This command configures the DNS address resolving order preference. By default DNS names are queried for A-records only (address-preference is IPv4-only).

If the address-preference is set to IPv6-first, the DNS server will be queried for AAAA-records (IPv6) first and if a successful replied is not received, then the DNS server is queried for A-records.

ad-validation

Syntax **ad-validation** *fall-through*|*drop*
no ad-validation

Context config>system>dns>dnssec

Description This command enables validation of the presence of the AD-bit in responses from the DNS servers, and reports a warning to the SECURITY log if DNSSEC validation was not possible.

This command requires either the fall-through or drop parameters be configured. When the fall-through parameter is supplied, the system will allow DNS responses that do not pass DNSSEC validation to be accepted and logged. When the drop parameter is specified, the system will reject and log DNS responses that do not pass DNSSEC validation and the resolution will appear to fail.

Default disabled

Parameters *fall-through* — Specifies that the DNSSEC validator should allow non-DNSSEC responses to fall-through to permit resolution in case of validation failure.

drop — Specifies that the DNSSEC validator should drop non-DNSSEC responses in case of validation failure.

enable-icmp-vse

Syntax [**no**] **enable-icmp-vse**

Context config>system

Description This command enables vendor specific extensions to ICMP.

l4-load-balancing

Syntax [**no**] **l4-load-balancing**

Context config>system

Description This command configures system-wide Layer 4 load balancing. The configuration at system level can enable or disable load balancing based on Layer 4 fields. If enabled, Layer 4 source and destination port fields will be included in hashing calculation for TCP/UDP packets.

The hashing algorithm addresses finer spraying granularity where many hosts are connected to the network.

To address more efficient traffic distribution between network links (forming a LAG group), a hashing algorithm extension takes into account L4 information (i.e., src/dst L4-protocol port).

The hashing index can be calculated according to the following algorithm:

```
If [(TCP or UDP traffic) & enabled]
        hash (<TCP/UDP ports>, <IP addresses>)
else if (IP traffic)
        hash (<IP addresses>)
```

```
else
        hash (<MAC addresses>)
endif
```

This algorithm will be used in all cases where IP information in per-packet hashing is included (see LAG and ECMP Hashing in the Interfaces Guide). However the Layer 4 information (TCP/UDP ports) will not be used in the following cases:

- Fragmented packets

Default no l4-load-balancing

lsr-load-balancing

Syntax **lsr-load-balancing** *hashing-algorithm*
no lsr-load-balancing

Context config>router>if

Description This command specifies whether the IP header is used in the LAG and ECMP LSR hashing algorithm. This is the per interface setting.

Default no lsr-load-balancing

Parameters **lbl-only —** Only the label is used in the hashing algorithm.

lbl-ip — The IP header is included in the hashing algorithm.

ip-only — the IP header is used exclusively in the hashing algorithm

eth-encap-ip — The hash algorithm parses down the label stack (up to 3 labels supported) and once it hits the bottom, the stack assumes Ethernet II non-tagged header follows. At the expected Ethertype offset location, algorithm checks whether the value present is IPv4/v6 (0x0800 or 0x86DD). If the check passes, the hash algorithm checks the first nibble at the expected IP header location for IPv4/IPv6 (0x0100/0x0110). If the secondary check passes, the hash is performed using IP SA/DA fields in the expected IP header; otherwise (any of the check failed) label-stack hash is performed.

mc-enh-load-balancing

Syntax [**no**] **mc-enh-load-balancing**

Context config>system

Description This command enables enhanced egress multicast load balancing behavior for Layer 3 multicast. When enabled, the router will spray the multicast traffic using as hash inputs from the packet based on lsr-load-balancing, l4-load-balancing and system-ip-load-balancing configurations, namely an ingress LER or IP PE will spray traffic based on IP hash criteria: SA/DA + optional L4 port + optional system IP egress LER or LSR - will spray traffic based on label or IP hash criteria outlined above or both based on configuration of lsr-load-balancing, l4-load-balancing and system-ip-load-balancing.

The **no** form preserves the default behavior for per flow hashing of multicast traffic.

lacp-system-priority

Syntax **lacp-system-priority** *lacp-system-priority*
no lacp-system-priority

Context config>system

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 — 65535

location

Syntax **location** *location*
no location

Context config>system

Description This command creates a text string that identifies the system location for the device.

Only one location can be configured. If multiple locations are configured, the last one entered overwrites the previous entry.

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

Default **none** — No system location is configured.

Parameters *location* — Enter the location as a character string. The string may be up to 80 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

name

Syntax **name** *system-name*
no name

Context config>system

Description This command creates a system name string for the device.

For example, system-name parameter ALA-1 for the **name** command configures the device name as ALA-1.

```
ABC>config>system# name "ALA-1"
ALA-1>config>system#
```

Only one system name can be configured. If multiple system names are configured, the last one encountered overwrites the previous entry.

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

Default The default system name is set to the chassis serial number which is read from the backplane EEPROM.

Parameters *system-name* — Enter the system name as a character string. The string may be up to 32 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

system-ip-load-balancing

Syntax **system-ip-load-balancing**
no system-ip-load-balancing

Context config>system

Description This command enables the use of the system IP address in the ECMP hash algorithm to add a per system variable. This can help guard against cases where multiple routers, in series, will end up hashing traffic to the same ECMP/LAG path.

This command is set at a system wide basis, however if certain IOMs do not support the new load-balancing algorithm, they will continue to use the default algorithm. By default, the IPv4 system IP address is used in the hash algorithm. When no IPv4 system IP address is configured, the IPv6 system IP address, when configured, is used in the hash algorithm.

The **no** form of the command resets the system wide algorithm to default.

Default no system-ip-load-balancing

switchover-exec

Syntax **switchover-exec** *file-url*
no switchover-exec

Context config>system

Description This command specifies the location and name of the CLI script file executed following a redundancy switchover from the previously active CPM card. A switchover can happen because of a fatal failure or by manual action.

The CLI script file can contain commands for environment settings, debug (excluding mirroring settings), and other commands not maintained by the configuration redundancy.

The following commands are not supported in the switchover-exec file: clear, configure, candidate, oam, tools, oam, ping, traceroute, mstat, mtrace and mrinfo.

When the *file-url* parameter is not specified, no CLI script file is executed.

Default none

Parameters *file-url* — Specifies the location and name of the CLI script file.

Values

file url:	local-url | remote-url: 255 chars max
local-url:	[*cflash-id*/][*file-path*]
remote-url:	[{ftp://|tftp://} login:pswd@remote-locn/][file-path]
cflash-id:	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

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

Description The alarm command configures an entry in the RMON-MIB alarmTable. The alarm command controls the monitoring and triggering of threshold crossing events. In order for notification or logging of a threshold crossing event to occur there must be at least one associated rmon>event configured.

The agent periodically takes statistical sample values from the MIB variable specified for monitoring and compares them to thresholds that have been configured with the alarm command. The alarm command configures the MIB variable to be monitored, the polling period (interval), sampling type (absolute or delta value), and rising and falling threshold parameters. If a sample has crossed a threshold value, the associated event is generated.

Use the **no** form of this command to remove an rmon-alarm-id from the configuration.

Parameters *rmon-alarm-id* — The rmon-alarm-id is a numerical identifier for the alarm being configured. The number of alarms that can be created is limited to 1200.

Default **None**

Values 1 — 65535

variable-oid *oid-string* **—** The oid-string is 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

Default **None**

interval *seconds* **—** The interval in seconds specifies the polling period over which the data is sampled and compared with the rising and falling thresholds. When setting this interval value, care should be taken in the case of 'delta' type sampling - the interval should be set short enough that the sampled variable is very unlikely to increase or decrease by more than 2147483647 - 1 during a single sampling interval. Care should also be taken not to set the interval value too low to avoid creating unnecessary processing overhead.

Default **None**

Values 1 — 2147483647

sample-type — Specifies the method of sampling the selected variable and calculating the value to be compared against the thresholds.

Default **Absolute**

Values **absolute** — Specifies that the value of the selected variable will be compared directly with the thresholds at the end of the sampling interval.
delta — Specifies that the value of the selected variable at the last sample will be subtracted from the current value, and the difference compared with the thresholds.

startup-alarm *alarm-type* **—** Specifies the alarm that may be sent when this alarm is first created.
If the first sample is greater than or equal to the rising threshold value and 'startup-alarm' is equal to 'rising' or 'either', then a single rising threshold crossing event is generated.
If the first sample is less than or equal to the falling threshold value and 'startup-alarm' is equal to 'falling' or 'either', a single falling threshold crossing event is generated.

Default **either**

Values **rising**, **falling**, **either**

rising-event *rmon-event-id* **—** The identifier of the the **rmon>event** that specifies the action to be taken when a rising threshold crossing event occurs.
If there is no corresponding 'event' configured for the specified rmon-event-id, then no association exists and no action is taken.
If the 'rising-event rmon-event-id' has a value of zero (0), no associated event exists.

If a 'rising event rmon-event' is configured, the CLI requires a 'rising-threshold' to also be configured.

Default 0

Values 0 — 65535

rising-threshold *threshold* **—** Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the 'falling-threshold' value.

Default 0

Values -2147483648 — 2147483647

falling-event *rmon-event-id* **—** The identifier of the **rmon>event** that specifies the action to be taken when a falling threshold crossing event occurs. If there is no corresponding event configured for the specified rmon-event-id, then no association exists and no action is taken. If the falling-event has a value of zero (0), no associated event exists.

If a 'falling event' is configured, the CLI requires a 'falling-threshold to also be configured.

Default 0

Values 0 — 65535

falling-threshold *threshold* **—** Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than

this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated 'startup-alarm' is equal to 'falling' or 'either'.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

Default 0

Values -2147483648 — 2147483647

owner *owner* **—** The owner identifies the creator of this alarm. It defaults to "TiMOS CLI". This parameter is defined primarily to allow entries that have been created in the RMON-MIB alarmTable by remote SNMP managers to be saved and reloaded in a CLI configuration file. The owner will not normally be configured by CLI users and can be a maximum of 80 characters long.

Default TiMOS CLI

Configuration example:

```
alarm 3 variable-oid ifInOctets.184582144 interval 20 sample-type delta start-alarm either
rising-event 5 rising-threshold 10000 falling-event 5 falling-threshold 9000 owner "TiMOS
CLI"
```

cflash-cap-alarm

Syntax **cflash-cap-alarm** *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
no cflash-cap-alarm *cflash-id*

Context config>system>thresholds

Description This command enables capacity monitoring of the compact flash specified in this command. The severity level is alarm. Both a rising and falling threshold can be specified.

The **no** form of this command removes the configured compact flash threshold alarm.

Parameters *cflash-id* — The cflash-id specifies the name of the cflash device to be monitored.

Values cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:

rising-threshold *threshold* **—** Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated 'startup-alarm' is equal to 'rising' or 'either'.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the 'falling-threshold' value.

Default 0

Values -2147483648 — 2147483647

falling-threshold *threshold* **—** Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than

this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

Default 0

Values -2147483648 — 2147483647

interval *seconds* **—** Specifies the polling period, in seconds, over which the data is sampled and compared with the rising and falling thresholds.

Values 1 — 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session , memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default **both**

startup-alarm *alarm-type* **—** Specifies the alarm that may be sent when this alarm is first created.

If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated.

If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

Default either

Values rising, falling, either

Configuration example:

cflash-cap-alarm cf1-A: rising-threshold 50000000 falling-threshold 49999900 interval 120 rmon-event-type both start-alarm rising.

cflash-cap-warn

Syntax **cflash-cap-warn** *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
no cflash-cap-warn *cflash-id*

Context config>system>thresholds

Description This command enables capacity monitoring of the compact flash specified in this command. The severity level is warning. Both a rising and falling threshold can be specified. The no form of this command removes the configured compact flash threshold warning.

Parameters *cflash-id* — The cflash-id specifies the name of the cflash device to be monitored.

Values cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:

rising-threshold *threshold* **—** Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

Default 0

Values -2147483648 — 2147483647

falling-threshold *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

Default 0

Values -2147483648 — 2147483647

interval *seconds* **—** Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 — 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values log — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the show>system>thresholds CLI command.

trap — In the case of 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 — In the case of both, both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — In the case of 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

Configuration example:

cflash-cap-warn cf1-B: rising-threshold 2000000 falling-threshold 1999900 interval 240 rmon-event-type trap start-alarm either

kb-memory-use-alarm

Syntax **kb-memory-use-alarm rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
no kb-memory-use-warn

Context config>system>thresholds

Description This command configures memory use, in kilobytes, alarm thresholds.

The **no** form of the command removes the parameters from the configuration.

Default none

Parameters **rising-threshold** *threshold* **—** Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

Default 0

Values -2147483648 — 2147483647

falling-threshold *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

Default 0

Values -2147483648 — 2147483647

interval *seconds* **—** Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 — 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values log — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the show>system>thresholds CLI command.

trap — In the case of 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 — In the case of both, both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — In the case of none, no action is taken.

Default both

startup-alarm *alarm-type* **—** Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

Values rising, falling, either

Default either

kb-memory-use-warn

Syntax **kb-memory-use-warn rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
no kb-memory-use-warn

Context config>system>thresholds

Description This command configures memory usage, in kilobytes, for warning thresholds

Default none

Parameters **rising-threshold** *threshold* **—** Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event

will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

Default 0

Values -2147483648 — 2147483647

falling-threshold ***threshold*** **—** Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

Default 0

Values -2147483648 — 2147483647

interval *seconds* **—** Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 — 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values log — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the show>system>thresholds CLI command.

trap — In the case of 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 — In the case of both, both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — In the case of 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

event

Syntax **event** *rmon-event-id* [*event-type*] [**description** *description-string*] [**owner** *owner-string*]
no event *rmon-event-id*

Context config>system>thresholds>rmon

Description The event command configures an entry in the RMON-MIB event table. The event command controls the generation and notification of threshold crossing events configured with the alarm command. When a threshold crossing event is triggered, the **rmon>event** configuration optionally specifies if an entry in the RMON-MIB log table should be created to record the occurrence of the event. It may also specify that an SNMP notification (trap) should be generated for the event. The RMON-MIB defines two notifications for threshold crossing events: Rising Alarm and Falling Alarm.

Creating an event entry in the RMON-MIB log table does not create a corresponding entry in the 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.

Use the **no** form of this command to remove an rmon-event-id from the configuration.

Parameters **rmon-event-type —** The rmon-event-type specifies the type of notification action to be taken when this event occurs.

Values log — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence.

This does **not** create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — In the case of 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 — In the case of both, both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — In the case of none, no action is taken.

Default both

description — The description is a user configurable string that can be used to identify the purpose of this event. This is an optional parameter and can be 80 characters long. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

Default An empty string.

owner *owner* **—** The owner identifies the creator of this alarm. It defaults to "TiMOS CLI". This parameter is defined primarily to allow entries that have been created in the RMON-MIB alarmTable by

remote SNMP managers to be saved and reloaded in a CLI configuration file. The owner will not normally be configured by CLI users and can be a maximum of 80 characters long.

Default TiMOS CLI

Configuration example:

Default event 5 rmon-event-type both description "alarm testing" owner "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

Description The memory thresholds are based on monitoring the TIMETRA-SYSTEM-MIB sgiMemoryUsed object. This object contains the amount of memory currently used by the system. The severity level is Alarm. The absolute sample type method is used.

The **no** form of this command removes the configured memory threshold warning.

Parameters **rising-threshold** *threshold* **—** Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

Default 0

Values -2147483648 — 2147483647

falling-threshold *threshold* **—** Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

Default 0

Values -2147483648 — 2147483647

interval *seconds* **—** Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 — 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values log — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence. This does not create an OS logger entry. The RMON-MIB log table entries can be viewed using the CLI command.

trap — In the case of 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 — In the case of both, both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — In the case of 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

Configuration example:

memory-use-alarm rising-threshold 50000000 falling-threshold 45999999 interval 500 rmon-event-type both start-alarm either

memory-use-warn

Syntax **memory-use-warn rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
no memory-use-warn

Context config>system>thresholds

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* **—** The rising-threshold specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

Default 0

Values -2147483648 — 2147483647

falling-threshold *threshold* **—** The falling-threshold specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

Default 0

Values -2147483648 — 2147483647

interval *seconds* **—** The interval in seconds specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 — 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values log — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence.

This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — In the case of 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 — In the case of both, both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — In the case of none, no action is taken.

Default both

Values log, trap, both, none

startup-alarm *alarm-type* **—** Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

Default either

Values rising, falling, either

Configuration example:

```
memory-use-warn rising-threshold 500000 falling-threshold 400000 interval 800 rmon-event-
type log start-alarm falling
```

rmon

Syntax **rmon**

Context config>system>thresholds

Description This command creates the context to configure generic RMON alarms and events.

Generic RMON alarms can be created on any SNMP object-ID that is valid for RMON monitoring (for example, an integer-based datatype).

The configuration of an event controls the generation and notification of threshold crossing events configured with the alarm command.

thresholds

Syntax **thresholds**

Context config>system

Description This command enables the context to configure monitoring thresholds.

Date and Time Commands

set-time

Syntax **set-time** [*date*] [*time*]

Context admin

Description This command sets the local system time.

The time entered should be accurate for the time zone configured for the system. The system will convert the local time to UTC before saving to the system clock which is always set to UTC. This command does not take into account any daylight saving offset if defined.

If SNTP or NTP is enabled (no shutdown) then this command cannot be used.

Parameters *date* — 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 — The time (accurate to the second) in the *hh*:*mm*[*:ss*] format. If no seconds value is entered, the seconds are reset to :00.

Default 0

Values *hh* is the two-digit hour in 24 hour format (00=midnight, 12=noon)
mm is the two-digit minute

time

Syntax **time**

Context config>system

Description This command enables the context to configure the system time zone and time synchronization parameters.

Network Time Protocol Commands

ntp

Syntax [**no**] **ntp**

Context config>system>time

Description This command enables the context to configure Network Time Protocol (NTP) and its operation. This protocol defines a method to accurately distribute and maintain time for network elements. Furthermore this capability allows for the synchronization of clocks between the various network elements. Use the no form of the command to stop the execution of NTP and remove its configuration.

Default none

authentication-check

Syntax [**no**] **authentication-check**

Context config>system>time>ntp

Description This command provides the option to skip the rejection of NTP PDUs that do not match the authentication key-id, type or key requirements. The default behavior when authentication is configured is to reject all NTP protocol PDUs that have a mismatch in either the authentication key-id, type or key.

When **authentication-check** is enabled, NTP PDUs are authenticated on receipt. However, mismatches cause a counter to be increased, one counter for type and one for key-id, one for type, value mismatches. These counters are visible in a show command.

The **no** form of this command allows authentication mismatches to be accepted; the counters however are maintained.

Default authentication-check — Rejects authentication mismatches.

authentication-key

Syntax **authentication-key** *key-id* {**key** *key*} [**hash** | **hash2**] **type** {**des** | **message-digest**}
no authentication-key *key-id*

Context config>system>time>ntp

Description This command sets the authentication key-id, type and key used to authenticate NTP PDUs sent to or received by other network elements participating in the NTP protocol. For authentication to work, the authentication key-id, type and key value must match.

The **no** form of the command removes the authentication key.

Default none

Parameters *key-id* — Configure the authentication key-id that will be used by the node when transmitting or receiving Network Time Protocol packets.

Entering the authentication-key command with a key-id value that matches an existing configuration key will result in overriding the existing entry.

Recipients of the NTP packets must have the same authentication key-id, type, and key value in order to use the data transmitted by this node. This is an optional parameter.

Default None

Values 1 — 255

key — The authentication key associated with the configured key-id, the value configured in this parameter is the actual value used by other network elements to authenticate the NTP packet.

The key can be any combination of ASCII characters up to 32 characters in length for message-digest (md5) or 8 characters in length for des (length limits are unencrypted lengths). If spaces are used in the string, enclose the entire string in quotation marks (“ ”).

hash — Specifies the key is entered in an encrypted form. If the hash or hash2 parameter is not used, the key is assumed to be in 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.

hash2 — Specifies the key is entered in a more complex encrypted form that involves more variables then the key value alone, this means that hash2 encrypted variable can’t be copied and pasted. If the hash or hash2 parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the hash or hash2 parameter specified.

type — This parameter determines if DES or message-digest authentication is used.

This is a required parameter; either DES or message-digest must be configured.

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.

broadcast

Syntax **broadcast** [**router** *router-name*] {**interface** *ip-int-name*} [**key-id** *key-id*] [**version** *version*] [**ttl** *ttl*]
no broadcast [**router** *router-name*] {**interface** *ip-int-name*}

Context config>system>time>ntp

Description This command configures the node to transmit NTP packets on a given interface. Broadcast and multicast messages can easily be spoofed, thus, authentication is strongly recommended.

The **no** form of this command removes the address from the configuration.

Parameters *router*Specifies the router name used to transmit NTP packets. Base is the default. Select management to use the management port (Ethernet port on the CPM).

Default Base, managementBase

ip-int-name — Specifies the local interface on which to transmit NTP broadcast packets. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

Values 32 character maximum

key-id *key-id* **—** Identifies the configured authentication key and authentication type used by this node to receive and transmit NTP packets to and from an NTP server and peers. If an NTP packet is received by this node both authentication key and authentication type must be valid otherwise the packet will be rejected and an event/trap generated.

Values 1 — 255

Default none

version *version* **—** Specifies the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode in which case all versions will be accepted.

Values 1 — 4

Default 4

ttl *ttl* **—** Specifies the IP Time To Live (TTL) value.

Values 1 — 255

Default none

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

Description When configuring NTP, the node can be configured to receive broadcast packets on a given subnet. Broadcast and multicast messages can easily be spoofed, thus, authentication is strongly recommended. If broadcast is not configured then received NTP broadcast traffic will be ignored. Use the **show** command to view the state of the configuration.

The **no** form of this command removes the address from the configuration.

Parameters **router** *router-name* — Specifies the router name used to receive NTP packets.

Default Base, managementBase

interface *ip-int-name* — Specifies the local interface on which to receive NTP broadcast packets. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

Values 32 character maximum

authenticate — Specifies whether or not to require authentication of NTP PDUs. When enabled, NTP PDUs are authenticated upon receipt.

multicast

Syntax **multicast** [**version** *version*] [**key-id** *key-id*]
no multicast

Context config>system>time>ntp

Description This command configures NTP the node to transmit multicast packets on the CPMCCM MGMT port. Broadcast and multicast messages can easily be spoofed; authentication is strongly recommended.

The **no** form of this command removes the multicast address from the configuration.

Parameters **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 versions are accepted.

Values 2 — 4

Default 4

key-id *key-id* **—** Specifies the configured authentication key and authentication type used by this version to transmit NTP packets. If this command is omitted from the configuration, packets are sent un-encrypted.

Values 1 — 255

Default None

multicastclient

Syntax **multicastclient** [**authenticate**]
no multicastclient

Context config>system>time>ntp

Description This command configures the node to receive multicast NTP messages on the CPM MGMT port. If multicastclient is not configured, received NTP multicast traffic will be ignored. Use the **show** command to view the state of the configuration.

The **no** construct of this message removes the multicast client for the specified interface from the configuration.

Parameters **authenticate —** This optional parameter makes authentication a requirement. If authentication is required, the authentication key-id received must have been configured in the “authentication-key” command, and that key-id’s type and key value must also match.

ntp-server

Syntax **ntp-server** [**authenticate**]
no ntp-server

Context config>system>time>ntp

Description This command configures the node to assume the role of an NTP server. Unless the server command is used, this node will function as an NTP client only and will not distribute the time to downstream network elements.

Default no ntp-server

Parameters **authenticate** — If specified, makes authentication a requirement. If authentication is required, the authentication key-id received in a message must have been configured in the "authentication-key" command, and that key-id's type and key value must also match

peer

Syntax **peer** {*ip-address* | *ipv6-address*} [**key-id** *key-id*] [**version** *version*] [**prefer**]
no peer *ip-address*

Context config>system>time>ntp

Description Configuration of an NTP peer configures symmetric active mode for the configured peer. Although any system can be configured to peer with any other NTP node it is recommended to configure authentication and to configure known time servers as their peers.

The **no** form of the command removes the configured peer.

Parameters *ipv6-address* — ipv6-address - Configure the IPv6 address of the peer that requires a peering relationship to be set up.

Default None

Values 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

ip-address — Configure the IP address of the peer that requires a peering relationship to be set up. This is a required parameter.

Default None

Values Any valid IP-address

key-id *key-id* **—** Successful authentication requires that both peers must have configured the same authentication key-id, type and key value.

Specify the *key-id* that identifies the configured authentication key and authentication type used by this node to transmit NTP packets to an NTP peer. If an NTP packet is received by this node, the authentication key-id, type, and key value must be valid otherwise the packet will be rejected and an event/trap generated.

Default None

Values 1 — 255

version *version* **—** Specify the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode in which case all three nodes are accepted.

Default 4

Values 2 — 4

prefer — When configuring more than one peer, one remote system can be configured as the preferred peer. When a second peer is configured as preferred, then the new entry overrides the old entry.

server

Syntax **server** {*ip address* | *ipv6-address* | **ptp** }[**key-id** *key-id*] [**version** *version*] [**prefer**]
no server *ip address*

Context config>system>time>ntp

Description This command is used when the node should operate in client mode with the ntp server specified in the address field of this command. The no construct of this command removes the server with the specified address from the configuration.

If the internal PTP process is to be used as a source of time for System Time and OAM time then it must be specified as a server for NTP. If PTP is specified then the prefer parameter must also be specified. Once PTP has established a UTC traceable time from an external grandmaster then it shall always be the source for time into NTP even if PTP goes into time holdover.

Note: Use of the internal PTP time source for NTP will promote the internal NTP server to stratum 1 level. This may impact the NTP network topology.

Parameters *ipv6-address* — Configure the IPv6 address of the node that acts as an NTP server to this network element.

Default None

Values 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

ip-address — Configures the IP address of a node that acts as an NTP server to this network element. This is a required parameter.

Values Any valid IP address

ptp — Configures the internal PTP process as a time server into the NTP process. The prefer parameter is mandatory with this server option.

key-id *key-id* **—** Enters the key-id that identifies the configured authentication key and authentication type used by this node to transmit NTP packets to an NTP server. If an NTP packet is received by this node, the authentication key-id, type, and key value must be valid otherwise the packet will be rejected and an event/trap generated. This is an optional parameter.

Values 1 — 255

version *version* **—** Configures the NTP version number that is expected by this node. This is an optional parameter

Default 4

Values 2 — 4

prefer — When configuring more than one peer, one remote system can be configured as the preferred peer. When a second peer is configured as preferred, then the new entry overrides the old entry.

SNTP Commands

sntp

Syntax [**no**] **sntp**

Context config>system>time

Description This command creates the context to edit the Simple Network Time Protocol (SNTP).

SNTP can be configured in either broadcast or unicast client mode. SNTP is a compact, client-only version of the NTP. SNTP can only receive the time from SNTP/NTP servers. It cannot be used to provide time services to other systems.

The system clock is automatically adjusted at system initialization time or when the protocol first starts up.

When the time differential between the SNTP/NTP server and the system is more than 2.5 seconds, the time on the system is gradually adjusted.

SNTP is created in an administratively enabled state (**no shutdown**).

The **no** form of the command removes the SNTP instance and configuration. SNTP does not need to be administratively disabled when removing the SNTP instance and configuration.

Default no sntp

broadcast-client

Syntax [**no**] **broadcast-client**

Context config>system>time>sntp

Description This command enables listening to SNTP/NTP broadcast messages on interfaces with broadcast client enabled at global device level.

When this global parameter is configured then the **ntp-broadcast** parameter must be configured on selected interfaces on which NTP broadcasts are transmitted.

SNTP must be shutdown prior to changing either to or from broadcast mode.

The **no** form of the command disables broadcast client mode.

Default **no broadcast-client**

server-address

Syntax **server-address** *ip-address* [**version** *version-number*] [**normal** | **preferred**]
[interval *seconds*]
no server-address

Context config>system>time>sntp

Description This command creates an SNTP server for unicast client mode.

Parameters *ip-address* — Specifies the IP address of the SNTP server.

version *version-number* **—** Specifies the SNTP version supported by this server.

Values 1 — 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 — 1024

Default 64

CRON Commands

cron

Syntax **cron**

Context config

Description This command creates the context to create scripts, script parameters and schedules which support the Service Assurance Agent (SAA) functions.

CRON features are saved to the configuration file on both primary and backup control modules. If a control module switchover occurs, CRON events are restored when the new configuration is loaded. If a control module switchover occurs during the execution of a cron script, the failover behavior will be determined by the contents of the script.

action

Syntax **[no] action *action-name* [owner *action-owner*]**

Context config>cron
config>cron>sched

Description This command configures action parameters for a script.

Default none

Parameters **action** *action-name* **—** Specifies the action name.

Values Maximum 32 characters.

owner *action-owner* **—** Specifies the owner name.

Default TiMOS CLI

expire-time

Syntax **expire-time** {**seconds** | **forever**}

Context config>cron>action

Description This command configures the maximum amount of time to keep the results from a script run.

Parameters **seconds —** Specifies the maximum amount of time to keep the results from a script run.

Values 1 — 21474836

Default 3600 (1 hour)

forever — Specifies to keep the results from a script run forever.

lifetime

Syntax **lifetime** {**seconds** | **forever**}

Context config>cron>action

Description This command configures the maximum amount of time the script may run.

Parameters **seconds —** Specifies the maximum amount of time to keep the results from a script run.

Values 1 — 21474836

Default 3600 (1 hour)

forever — Specifies to keep the results from a script run forever.

max-completed

Syntax **max-completed** *unsigned*

Context config>cron>action

Description This command specifies the maximum number of completed sessions to keep in the event execution log. If a new event execution record exceeds the number of records specified this command, the oldest record is deleted.

The **no** form of this command resets the value to the default.

Parameters *unsigned* — Specifies the maximum number of completed sessions to keep in the event execution log.

Values 0 — 255

Default 1

results

Syntax **[no] results *file-url***

Context config>cron>action

Description This command specifies the location where the system writes the output of an event script's execution.

The **no** form of this command removes the file location from the configuration.

Parameters *file-url* — Specifies the location where the system writes the output of an event script's execution.

Values

file url:	local-url | remote-url: 255 chars max	
local-url:	[*cflash-id*/][*file-path*]	
remote-url:	[{ftp://} login:pswd@remote-locn/][file-path]	
	remote-locn [*hostname* | *ipv4-address* | [*ipv6- address*]	
	ipv6-address -	x:x:x:x:x:x:x:x[-interface]
		x:x:x:x:x:x:d.d.d.d[-interface]
		x - [0..FFFF]H

d - [0..255]D
interface - 32 chars max, for link local addressescflash-
id: cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:

script

Syntax **[no] script *script-name* [owner *owner-name*]**

Context config>cron>action

Description This command creates action 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.

The **no** form of this command removes the script parameters from the configuration.

Default none — No server-address is configured.

Parameters **script** *script-name* **—** The script command in the action context connects and event to the script which will run when the event is triggered.

owner *owner-name* **—** Owner name of the schedule.

Default TiMOS CLI

The **no** form of this command removes the script entry from the action context.

schedule

Syntax [**no**] **schedule** *schedule-name* [**owner** *owner-name*]

Context config>cron

Description This command configures the type of schedule to run, including one-time only (oneshot), periodic or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds).

The **no** form of the command removes the context from the configuration.

Default none

Parameters *schedule-name* — Name of the schedule.

owner *owner-name* **—** Owner name of the schedule.

count

Syntax **count** *number*

Context config>cron>sched

Description This command configures the total number of times a CRON "interval" schedule is run. For example, if the interval is set to 600 and the count is set to 4, the schedule runs 4 times at 600 second intervals.

Parameters *number* — The number of times the schedule is run.

Values 1 — 65535

Default 65535

day-of-month

Syntax **[no] day-of-month {*day-number* [*..day-number*] all}**

Context config>cron>sched

Description This command specifies which days of the month that the schedule will occur. Multiple days of the month can be specified. When multiple days are configured, each of them will cause the schedule to trigger. If a day-of-month is configured without configuring month, weekday, hour and minute, the event will not execute.

Using the **weekday** command as well as the **day-of-month** command will cause the script to run twice. For example, consider that "today" is Monday January 1. If "Tuesday January 5" is configured, the script will run on Tuesday (tomorrow) as well as January 5 (Friday).

The **no** form of this command removes the specified day-of-month from the list.

Parameters *day-number* — The positive integers specify the day of the month counting from the first of the month. The negative integers specify the day of the month counting from the last day of the month. For example, configuring **day-of-month -5, 5** in a month that has 31 days will specify the schedule to occur on the 27th and 5th of that month.

Integer values must map to a valid day for the month in question. For example, February 30 is not a valid date.

Values 1 — 31, -31 — -1 (maximum 62 day-numbers)

all — Specifies all days of the month.

end-time

Syntax **[no] end-time [*date* | *day-name*] *time***

Context config>cron>sched

Description This command is used concurrently with type **periodic** or **calendar**. Using the type of **periodic**, end-time determines at which interval the schedule will end. Using the type of **calendar**, end-time determines on which date the schedule will end.

When **no end-time** is specified, the schedule runs forever.

Parameters *date* — Specifies the date to schedule a command.

Values YYYY:MM:DD in year:month:day number format

day-name — Specifies the day of the week to schedule a command.

Values sunday|monday|tuesday|wednesday|thursday|friday|saturday

time — Specifies the time of day to schedule a command.

Values hh:mm in hour:minute format

hour

Syntax **[no] hour {..*hour-number* [..*hour-number*]| all}**

Context config>cron>sched

Description This command specifies which hour to schedule a command. Multiple hours of the day can be specified. When multiple hours are configured, each of them will cause the schedule to trigger. Day-of-month or weekday must also be specified. All days of the month or weekdays can be specified. If an hour is configured without configuring month, weekday, day-of-month, and minute, the event will not execute.

The **no** form of this command removes the specified hour from the configuration.

Parameters *hour-number* — Specifies the hour to schedule a command.

Values 0 — 23 (maximum 24 hour-numbers)

all — Specifies all hours.

interval

Syntax [**no**] **interval** *seconds*

Context config>cron>sched

Description This command specifies the interval between runs of an event.

Parameters *seconds* — The interval, in seconds, between runs of an event.

Values 30 — 4,294,967,295

minute

Syntax **[no] minute {*minute-number* [*..minute-number*]| all}**

Context config>cron>sched

Description This command specifies the minute to schedule a command. Multiple minutes of the hour can be specified. When multiple minutes are configured, each of them will cause the schedule to occur. If a minute is configured, but no hour or day is configured, the event will not execute. If a minute is configured without configuring month, weekday, day-of-month, and hour, the event will not execute.

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 — 59 (maximum 60 minute-numbers)

all — Specifies all minutes.

month

Syntax **[no] month {*month-number* [*..month-number*]|*month-name* [*..month-name*]| all}**

Context config>cron>sched

Description This command specifies the month when the event should be executed. Multiple months can be specified. When multiple months are configured, each of them will cause the schedule to trigger. If a month is configured without configuring weekday, day-of-month, hour and minute, the event will not execute.

The **no** form of this command removes the specified month from the configuration.

Parameters **month-number —** Specifies a month number.

Values 1 —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>cron>sched

Description This command specifies how the system should interpret the commands contained within the schedule node.

Parameters *schedule-type* — Specify the type of schedule for the system to interpret the commands contained within the schedule node.

Values **periodic** — Specifies a schedule which runs at a given interval. interval must be specified for this feature to run successfully.
calendar — Specifies a schedule which runs based on a calendar. weekday, month, day-of-month, hour and minute must be specified for this feature to run successfully.
oneshot — Specifies a schedule which runs one time only. As soon as the first event specified in these parameters takes place and the associated event occurs, the schedule enters a shutdown state. month, weekday, day-of-month, hour and minute must be specified for this feature to run successfully.

Default periodic

weekday

Syntax **[no] weekday {*weekday-number* [*..weekday-number*]|*day-name* [*..day-name*]| all}**

Context config>cron>sched

Description This command specifies which days of the week that the schedule will fire on. Multiple days of the week can be specified. When multiple days are configured, each of them will cause the schedule to occur. If a weekday is configured without configuring month, day-of-month, hour and minute, the event will not execute.

Using the **weekday** command as well as the **day-of month** command will cause the script to run twice. For example, consider that “today” is Monday January 1. If “Tuesday January 5” is configured, the script will run on Tuesday (tomorrow) as well as January 5 (Friday).

The **no** form of this command removes the specified weekday from the configuration.

Parameters **day-number —** Specifies a weekday number.

Values 1 —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.

script

Syntax **[no] script *script-name* [owner *owner-name*]**

Context **config>cron>script**

Description This command configures the name associated with this script.

Parameters *script-name* — Specifies the script name.location

Syntax **[no] location *file-url***

Context **config>cron>script**

Description This command configures the location of script to be scheduled.

Parameters *file-url* — Specifies the location where the system writes the output of an event script's execution.

Values

file url:	local-url | remote-url: 255 chars max	
local-url:	[*cflash-id/*][*file-path*]	
remote-url:	[{ftp://} login:pswd@remote-locn/][file-path]	
	remote-locn [*hostname* | *ipv4-address* | [*ipv6- address*]	
	ipv6-address -	x:x:x:x:x:x:x:x[-interface]
		x:x:x:x:x:x:d.d.d.d[-interface]
		x - [0..FFFF]H
		d - [0..255]D
		interface - 32 chars max, for link local addressescflash-
id:	cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:	

Time Range Commands

time-range

Syntax [**no**] **time-range** *name*

Context config>cron

Description This command configures a time range.

The **no** form of the command removes the *name* from the configuration.

Default none

Parameters *name* — Configures a name for the time range up to 32 characters in length.

absolute

Syntax **absolute start** *start-absolute-time* **end** *end-absolute-time*
no absolute start *absolute-time*

Context config>cron>time-range

Description This command configures an absolute time interval that will not repeat.

The **no** form of the command removes the absolute time range from the configuration.

Parameters **start** *absolute-time* **—** Specifies starting parameters for the absolute time-range.

Values

absolute-time:	year/month/day,hh:mm
year:	2005 — 2099
month:	1 — 12
day:	1 — 31
hh:	0 — 23
mm: [	0 — 59

end *absolute-time* **—** Specifies end parameters for the absolute time-range.

Values

absolute-time:	year/month/day,hh:mm
year:	2005 — 2099
month:	1 — 12
day:	1 — 31
hh:	0 — 23
mm: [	0 — 59

daily

Syntax **daily start** *start-time-of-day* **end** *end-time-of-day*
no daily start *start-time-of-day*

Context config>cron>time-range

Description This command configures the start and end of a schedule for every day of the week. To configure a daily time-range across midnight, use a combination of two entries. An entry that starts at hour zero will take over from an entry that ends at hour 24.

The **no** form of the command removes the daily time parameters from the configuration.

Parameters *start-time-of-day* — Specifies the starting time for the time range.

Values Syntax: hh:mm
hh 0 — 23
mm 0 — 59

end-time-of-day — Specifies the ending time for the time range.

Values Syntax: hh:mm
hh 0 — 24
mm 0 — 59

weekdays

Syntax **weekdays start** *start-time-of-day* **end** *end-time-of-day*
no weekdays start *start-time-of-day*

Context config>cron>time-range

Description This command configures the start and end of a weekday schedule.

The **no** form of the command removes the weekday parameters from the configuration.

Parameters *start-time-of-day* — Specifies the starting time for the time range.

Values Syntax: hh:mm
hh 0 — 23
mm 0 — 59

end-time-of-day — Specifies the ending time for the time range.

Values Syntax: hh:mm
hh 0 — 24
mm 0 — 59

weekend

Syntax **weekend start** *start-time-of-day* **end** *end-time-of-day*
no weekend start *start-time-of-day*

Context config>cron>time-range

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 the command removes the weekend parameters from the configuration.

Parameters *start-time-of-day* — Specifies the starting time for the time range.

Values Syntax: hh:mm
hh 0 — 23
mm 0 — 59

end-time-of-day — Specifies the ending time for the time range.

Values Syntax: hh:mm
hh 0 — 24
mm 0 — 59

weekly

Syntax **weekly start** *start-time-in-week* **end** *end-time-in-week*
no weekly start *start-time-in-week*

Context config>cron>time-range

Description This command configures a weekly periodic interval in the time range.

The **no** form of the command removes the weekly parameters from the configuration.

Parameters *start-time-in-week* — Specifies the start day and time of the week.

Values Syntax: day,hh:mm

day sun, mon, tue, wed, thu, fri, sat
sunday, monday, tuesday, wednesday, thursday, friday, saturday
hh 0 — 23
mm 0 — 59

end-time-in-week — Specifies the end day and time of the week.

Values Syntax: day,hh:mm

Values day sun, mon, tue, wed, thu, fri, sat
sunday, monday, tuesday, wednesday, thursday, friday, saturday

hh	0 — 24
mm	0 — 59

weekly start *time-in-week* **end** *time-in-week* **—** This parameter 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.

Values 00 — 23, 00 — 59

Default no time-range

Time of Day Commands

tod-suite

Syntax [**no**] **tod-suite** *tod-suite name* **create**

Context config>cron

Description This command creates the tod-suite context.

Default no tod-suite

egress

Syntax **egress**

Context config>cron>tod-suite

Description This command enables the TOD suite egress parameters.

ingress

Syntax **ingress**

Context config>cron>tod-suite

Description This command enables the TOD suite ingress parameters.

filter

Syntax **filter ip** *ip-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]
filter ipv6 *ipv6-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]
filter mac *mac-filter-id* [**time-range** *time-range-name*] [**priority** *priority*]
no ip *ip-filter-id* [**time-range** *time-range-name*]
no filter ipv6 *ipv6-filter-id* [**time-range** *time-range-name*]
no filter mac *mac-filter-id* [**time-range** *time-range-name*]

Context config>cron>tod-suite>egress
config>cron>tod-suite>ingress

Description This command creates time-range based associations of previously created filter policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

Parameters **ip-filter** *ip-filter-id* **—** Specifies an IP filter for this tod-suite.

Values 1 — 65535

ipv6-filter *ipv6-filter-id* **—** Specifies an IPv6 filter for this tod-suite.

Values 1 — 65535

time-range *time-range-name* **—** Name for the specified time-range. If the time-range is not populated the system will assume the assignment to mean “all times”. Only one entry without a time-range is allowed for every type of policy. The system does not allow the user to specify more than one policy with the same time-range and priority.

Values Up to 32 characters

priority *priority* **—** Priority of the time-range. Only one time-range assignment of the same type and priority is allowed.

Values 1 — 10

mac *mac-filter-id* **—** Specifies a MAC filter for this tod-suite.

Values 1 — 65535

qos

Syntax **qos** *policy-id* [**time-range** *time-range-name*] [**priority** *priority*]
no qos *policy-id* [**time-range** *time-range-name*] [

Context config>cron>tod-suite>egress
config>cron>tod-suite>ingress

Description This command creates time-range based associations of previously created QoS policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

The no form of the command reverts to the

Parameters **policy-id —** Specifies an egress QoS policy for this tod-suite.

Values 1 — 65535

time-range *time-range-name* **—** Name for the specified time-range. If the time-range is not populated the system will assume the assignment to mean “all times”. Only one entry without a time-range is allowed for every type of policy. The system does not allow the user to specify more than one policy with the same time-range and priority.

Values Up to 32 characters

Default "NO-TIME-RANGE" policy

priority *priority* **—** Priority of the time-range. Only one time-range assignment of the same type and priority is allowed.

Values 1 — 10

Default 5

scheduler-policy

Syntax [**no**] **scheduler-policy** *scheduler-policy-name* [**time-range** *time-range-name*] [**priority** *priority*]

Context config>cron>tod-suite>egress
config>cron>tod-suite>ingress

Description This command creates time-range based associations of previously created scheduler policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

Parameters *scheduler-policy-name* — Specifies a scheduler policy for this tod-suite.

Values Up to 32 characters

time-range *time-range-name* **—** Specifies the name for a time-range. If the time-range is not populated the system will assume the assignment to mean “all times”. Only one entry without a time-range is allowed for every type of policy. The system does not allow the user to specify more than one policy and the same time-range and priority.

Values Up to 32 characters

priority *priority* **—** Specifies the time-range priority. Only one time-range assignment of the same type and priority is allowed.

Values 1 — 10

System Time Commands

dst-zone

Syntax [**no**] **dst-zone** [*std-zone-name* | *non-std-zone-name*]

Context config>system>time

Description This command configures the start and end dates and offset for summer time or daylight savings time to override system defaults or for user defined time zones.

When configured, the time is adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

If the time zone configured is listed in Table 26, System-defined Time Zones, on page 246, 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 26 on or entered as optional parameters in this command.

Up to five summer time zones may be configured, for example, for five successive years or for five different time zones. Configuring a sixth entry will return an error message. If no summer (daylight savings) time is supplied, it is assumed no summer time adjustment is required.

The **no** form of the command removes a configured summer (daylight savings) time entry.

Default none — No summer time is configured.

Parameters *std-zone-name* — The standard time zone name. The standard name must be a system-defined zone in Table 26. 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

non-std-zone-name — The non-standard time zone name. Create a user-defined name created using the **zone** command on page 431

Values 5 characters maximum

end

Syntax **end** {*end-week*} {*end-day*} {*end-month*} [*hours-minutes*]

Context config>system>time>dst-zone

Description This command configures start of summer time settings.

Parameters *end-week* — Specifies the starting week of the month when the summer time will end.

Values first, second, third, fourth, last

Default first

end-day — Specifies the starting day of the week when the summer time will end.

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday

Default sunday

end-month — The starting month of the year when the summer time will take effect.

Values january, february, march, april, may, june, july, august, september, october, november, december}

Default january

hours — Specifies the hour at which the summer time will end.

Values 0 — 24

Default 0

minutes — Specifies the number of minutes, after the hours defined by the *hours* parameter, when the summer time will end.

Values 0 — 59

Default 0

offset

Syntax **offset** *offset*

Context config>system>time>dst-zone

Description This command specifies the number of minutes that will be added to the time when summer time takes effect. The same number of minutes will be subtracted from the time when the summer time ends.

Parameters *offset* — The number of minutes added to the time at the beginning of summer time and subtracted at the end of summer time, expressed as an integer.

Default 60

Values 0 — 60

start

Syntax **start** {*start-week*} {*start-day*} {*start-month*} [*hours-minutes*]

Context config>system>time>dst-zone

Description This command configures start of summer time settings.

Parameters **start-week —** Specifies the starting week of the month when the summer time will take effect.

Values first, second, third, fourth, last

Default first

start-day — Specifies the starting day of the week when the summer time will take effect.

Default sunday

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday

start-month — The starting month of the year when the summer time will take effect.

Values january, february, march, april, may, june, july, august, september, october, november, december

Default january

hours — Specifies the hour at which the summer time will take effect.

Default 0

minutes — Specifies the number of minutes, after the hours defined by the *hours* parameter, when the summer time will take effect.

Default 0

zone

Syntax **zone** [*std-zone-name* | *non-std-zone-name*] [*hh* [:*mm*]]
no zone

Context config>system>time

Description This command sets the time zone and/or time zone offset for the device.

7750 SR OS supports system-defined and user-defined time zones. The system-defined time zones are listed in Table 26, System-defined Time Zones, on page 246.

For user-defined time zones, the zone and the UTC offset must be specified.

The **no** form of the command reverts to the default of Coordinated Universal Time (UTC). If the time zone in use was a user-defined time zone, the time zone will be deleted. If a **dst-zone** command has been configured that references the zone, the summer commands must be deleted before the zone can be reset to UTC.

Default **zone utc** - The time zone is set for Coordinated Universal Time (UTC).

Parameters *std-zone-name* — The standard time zone name. The standard name must be a system-defined zone in Table 26. 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.

A user-defined time zone name is case-sensitive and can be up to 5 characters in length.

Values A user-defined value can be up to 4 characters or one of the following 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 — The non-standard time zone name.

Values Up to 5 characters maximum.

hh [**:mm**] — The hours and minutes offset from UTC time, expressed as integers. Some time zones do not have an offset that is an integral number of hours. In these instances, the *minutes-offset* must be specified. For example, the time zone in Pirlanngimpi, Australia UTC + 9.5 hours.

Default hours: 0
minutes: 0

Values hours: -11 — 11
minutes: 0 — 59

System Synchronization Configuration Commands

sync-if-timing

Syntax **sync-if-timing**

Context **config>system**

Description This command creates or edits the context to create or modify timing reference parameters.
This command is not enabled in the 7750 SR-1.

Default Disabled

abort

Syntax **abort**

Context config>system>sync-if-timing

Description This command is required to discard changes that have been made to the synchronous interface timing configuration during a session.

Default No default

begin

Syntax **begin**

Context config>system>sync-if-timing

Description This command is required in order to enter the mode to create or edit the system synchronous interface timing configuration.

Default No default

bits

Syntax **bits**

Context config>system>sync-if-timing

Description This command enables the context to configure parameters for the Building Integrated Timing Supply (BITS). The settings specified under this context apply to both the BITS input and BITS output ports and to both the bits1 and bits2 ports on the 7750 SR-c4.

The **bits** command subtree is only available on the7750 SR-7, 7750 SR-12, 7750 Sr-12e, and 7750 SR-c4.

Default disabled

commit

Syntax **commit**

Context config>system>sync-if-timing

Description This command saves changes made to the system synchronous interface timing configuration.

Default No default

interface-type

Syntax **interface-type** {**ds1** [{**esf** | **sf**}] | **e1** [{**pcm30crc** | **pcm31crc**}]}
no interface-type

Context config>system>sync-if-timing>bits

Description This command configures the Building Integrated Timing Source (BITS) timing reference. This command is not supported on the 7450 ESS-6, 7450 ESS-6v, 7450 ESS-1.

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

Default ds1 esf

Parameters **ds1 esf —** Specifies Extended Super Frame (ESF). This is a framing type used on DS1 circuits that consists of 24 192-bit frames, The 193rd bit provides timing and other functions.

ds1 sf — Specifies Super Frame (SF), also called D4 framing. This is a common framing type used on DS1 circuits. SF consists of 12 192-bit frames. The 193rd bit provides error checking and other functions. ESF supersedes SF.

e1 pcm30crc — Specifies the pulse code modulation (PCM) type. PCM30CRC uses PCM to separate the signal into 30 user channels with CRC protection.

e1 pcm31crc — Specifies the pulse code modulation (PCM) type. PCM31CRC uses PCM to separate the signal into 31 user channels with CRC protection.

bits-interface-type

Syntax **bits-interface-type {ds1 [{esf | sf}] | e1 [{pcm30crc | pcm31crc}]}**
[no] bits-interface-type

Context config>system>sync-if-timing>ref1
config>system>sync-if-timing>ref2

Description This command configures the interface type of the BITS timing reference.

This command is only supported on the 7750 SR-c12 (and 7710 SR-c12).

The **no** form of the command reverts to the default configuration

In addition, copy the Default and Parameters blocks from the interface-type command just above They apply to this command as well.

input

Syntax **input**

Context config>system>sync-if-timing>bits

Description This command provides a context to enable or disable the external BITS timing reference inputs to the SR/ESS router. In redundant systems with BITS ports, there are two possible BITS-in interfaces, one for each CPM. In the 7750 SR-c4 system, there are two bits ports on the CFM. They are configured together, but they are displayed separately in the show command.

Default shutdown

output

Syntax **output**

Context config>system>sync-if-timing>bits

Description This command provides a context to configure and enable or disable the external BITS timing reference output to the SR/ESS router. On redundant systems, there are two possible BITS-out interfaces, one for each CPM. On the 7750 SR-c4 system, there are two possible BITS-out interfaces on the chassis front panel. They are configured together, but they are displayed separately in the show command.

Default shutdown

line-length

Syntax **line-length** {110,220,330,440,550,660}

Context config>system>sync-if-timing>bits

Description This command configures the line-length parameter of the BITS output, This is the distance in feet between the network element and the office clock (BITS/SSU). There are two possible BITS-out interfaces, one for each CPM. They are configured together, but they are displayed separately in the show command. This command is only applicable when the interface-type is DS1.

Default 110

Parameters *110* — Distance is from 0 to 110 feet

220 — Distance is from 110 to 220 feet

330 — Distance is from 220 to 330 feet

440 — Distance is from 330 to 440 feet

550 — Distance is from 440 to 550 feet

660 — Distance is from 550 to 660 feet

source

Syntax **source** {**line-ref** | **internal-clock**}

Context config>system>sync-if-timing>bits>output

Description This command configures the values used to identity the source of the BITS (Building Integrated Timing Supply) output. This is either the signal recovered directly from ref1, ref2 or ptp or it is the output of the node's central clock. The directly recovered signal would be used when the BITS output signal is feeding into an external stand alone timing distribution device (BITS/SASE). The specific directly recovered signal used is the best of the available signals based of the QL and/or the ref-order. The central clock output would be used when no BITS/SASE device is present and the BITS output signal is used to monitor the quality of the recovered clock within the system.

Default line-ref

Parameters **line-ref —** Specifies that the BITS output timing is selected from one of the input references, without any filtering.

internal-clock — Specifies that the BITS output timing is driven from the system timing.

ssm-bit

Syntax **ssm-bit** *sa-bit*

Context config>system>sync-if-timing>bits
config>system>sync-if-timing>ref1
config>system>sync-if-timing>ref2

Description This command configures which sa-bit to use for conveying SSM information when the interface-type is E1.

Default 8

Parameters *sa-bit* — Specifies the sa-bit value.

Values 4–8

ql-override

Syntax **ql-override** {**prs**|**stu**|**st2**|**tnc**|**st3e**|**st3**|**eec1**|**sec**|**prc**|**ssu-a**|**ssu-b**|**eec2**}
no ql-override

Context config>system>sync-if-timing>bits
config>system>sync-if-timing>ptp
config>system>sync-if-timing>ref1
config>system>sync-if-timing>ref2

Description This command configures the QL value to be used for the reference for SETS input selection and BITS output. This value overrides any value received by that reference's SSM process.

Default no ql-overide

Parameters **prs** — SONET Primary Reference Source Traceable

stu — SONET Synchronous Traceability Unknown

st2 — SONET Stratum 2 Traceable

tnc — SONET Transit Node Clock Traceable

st3e — SONET Stratum 3E Traceable

st3 — SONET Stratum 3 Traceable

eec1 — Ethernet Equipment Clock Option 1 Traceable (sdh)

eec2 — Ethernet Equipment Clock Option 2 Traceable (sonet)

prc — SDH Primary Reference Clock Traceable

ssu-a — SDH Primary Level Synchronization Supply Unit Traceable

ssu-b — SDH Second Level Synchronization Supply Unit Traceable

sec — SDH Synchronous Equipment Clock Traceable

ql-selection

Syntax [**no**] **ql-selection**

Context config>system>sync-if-timing

Description When enabled the selection of system timing reference and BITS output timing reference takes into account quality level. This command turns -on or turns-off SSM encoding as a means of timing reference selection.

Default no ql-selection

ptp

Syntax **ptp**

Context config>system>sync-if-timing

Description This command enables the context to configure parameters for system timing via IEEE 1588-2008, Precision Time Protocol.

This command is only available on the systems supporting the 1588-2008 frequency recovery engine.

ref-order

Syntax **ref-order** *first second* [*third* [f*ourth*]]
no ref-order

Context **config>system>sync-if-timing**

Description The synchronous equipment timing subsystem can lock to different timing reference inputs, those specified in the **ref1, ref2**, **bits** 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.

Note that if a **sync-if-timing** reference is linked to a source port that is operationally down, the port is no longer qualified as a valid reference.

For systems with two SF/CPM modules, the system distinguishes between the BITS inputs on the active and standby CPMs. The active CPM will use its BITS input port providing that port is qualified. If the local port is not qualified, then the active CPM will use the BITS input port from the standby CPM as the next priority reference. For example, the normal ref-order of “bits ref1 ref2” will actually be bits (active CPM), followed by bits (standby CPM), followed by ref1, followed by ref2.

For 7750 SR-c4 systems, the system distinguishes between the two BITS inputs on the CFM. The CFM will use its BITS input port “bits1” providing that port is qualified. If port “bits1” is not qualified, then the CFM will use the BITS input port “bits2” as the next priority reference. For example, the normal ref-order of “bits ref1 ref2” will actually be bits1 followed by bits2, followed by ref1, followed by ref2.

The **no** form of the command resets the reference order to the default values.

The **bits** option is not supported on the 7750 SR-c12 chassis.

Default **bitsref1 ref2 ptp**

first — Specifies the first timing reference to use in the reference order sequence.

Values ref1, ref2, bits, ptp

second — Specifies the second timing reference to use in the reference order sequence.

Values ref1, ref2, bits, ptp

third — Specifies the third timing reference to use in the reference order sequence.

Values ref1, ref2, bits, ptp

ref1

Syntax **ref1**

Context **config>system>sync-if-timing**

Description This command enables the context to configure parameters for the first timing reference. Note that source ports for ref1 and ref2 must be on different slots.

The timing reference for **ref1** must be specified for the following chassis slots:

7750 Model	Ref1/Slots
SR-1	Not enabled
SR-7	1 — 2
SR-12	1 — 5
SR-c12	No restriction
SR-c4	No restriction

Note: ref1 and ref2 cannot be configured on the same MDA/CMA for the SR-c12 nor the SR-c4.

ref2

Syntax **ref2**

Context **config>system>sync-if-timing**

Description This command enables the context to configure parameters for the second timing reference. Note that source ports for ref1 and ref2 must be on different slots.

The timing reference for **ref2** must be specified for the following chassis slots.

Note: For the SR-c12 and SR-c4, the ref1 and ref2 cannot both be from the same slot.

7750 Model	Ref2/Slots
SR-1	Not enabled
SR-7	3 — 5
SR-12	6 — 10
SR-c12	No restriction
SR-c4	No restriction

Note: ref1 and ref2 cannot be configured on the same MDA/CMA for the SR-c12 nor the SR-c4.

revert

Syntax [**no**] **revert**

Context config>system>sync-if-timing

Description This command allows the clock to revert to a higher priority reference if the current reference goes offline or becomes unstable. When the failed reference becomes operational, it is eligible for selection. When the mode is non-revertive, a failed clock source is not selected again.

Default no revert

source-bits

Syntax **source-bits** *slot/mda*
no source-bits

Context config>system>sync-if-timing>ref1

config>system>sync-if-timing>ref2

Description This comand configures the source bits for the first (ref1) or second (ref2) timing reference. Note that this command is only applicable to the 7750 SR-c12 chassis.

Parameters *slot/mda* — Specifies the chassis slot and MDA containing the BITS port to be used as one of the two timing reference sources in the system timing subsystem.

Values slot: 1
mda: 1 — 12

source-port

Syntax **source-port** *port-id*
no source-port

Context **config>system>sync-if-timing>ref1**
config>system>sync-if-timing>ref2

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.

In addition to physical port, T1 or E1 channels on a Channelized OC3/OC12/STM1/STM4 Circuit Emulation Service port can be specified if they are using adaptive timing.

The timing reference for **ref1** and **ref2** must be specified for ports in the following chassis slots:

7750 Model	Ref1/Slots	Ref2/Slots
SR-1	Not enabled	Not enabled
SR-7	1 — 2	3 — 5
SR-12	1 — 5	6 — 10
SR-c12	No restriction	No restriction
SR-c4	No restriction	No restriction

Note that ref1 and ref2 cannot be configured on the same MDA/CMA for the SR-c12 nor the SR-c4.

Parameters *port-id* — Identify the physical port in the *slot/mda/port* format.

System Administration Commands

admin

Syntax **admin**

Context <ROOT>

Description The context to configure administrative system commands. Only authorized users can execute the commands in the **admin** context.

Default none

application-assurance

Syntax **application-assurance**

Context admin

Description This command enables the context to perform application-assurance operations.

upgrade

Syntax **upgrade**

Context admin>app-assure

Description This command loads a new protocol list from the isa-aa.tim file into the CPM.

Note that an ISA-AA reboot is required.

clear-policy-lock

Syntax **clear-policy-lock**

Context admin>

Description This command allows an authorized administrator to clear an exclusive policy lock. This will reset the lock flag and end the policy editing session in progress, aborting any policy edits.

debug-save

Syntax **debug-save** *file-url*

Context admin

Description This command saves existing debug configuration (configuration done under the debug branch of CLI). Debug configurations are not preserved in configuration saves. SR OS automatically looks for and loads the saved debug config during startup.

Default none

Parameters *file-url* — The file URL location to save the debug configuration.

Values

file url:	local-url | remote-url: 255 chars max	
local-url:	[*cflash-id*/][*file-path*], 200 chars max, including the cflash-id directory length, 99 chars max each	
remote-url:	[{ftp://} 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..FFFF]H
		d - [0..255]D
		interface - 32 chars max, for link local addresses255 chars max, directory length 99 chars max each
cflash-id:	cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:	

disconnect

Syntax **disconnect** [**address** *ip-address* **\| username** *user-name* **\| console \| telnet \| ftp \| ssh \| netconf**]

Context admin

Description This command disconnects a user from a session.

Disconnect without any parameters will disconnect the session in which the command was executed.

If any of the session type options (for example, console, telnet, FTP, SSH) are specified, then only the respective sessions are affected.

If no session type options are specified, then all sessions from the IP address or from the specified user are disconnected.

Any task that the user is executing is terminated. FTP files accessed by the user will not be removed.

A major severity security log event is created specifying what was terminated and by whom.

Default none — No disconnect options are configured.

Parameters **address** *ip-address* **—** The IP address to disconnect, specified in dotted decimal notation.

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**username** *user-name* **—** The name of the user.	

console — Disconnects the console session.

telnet — Disconnects the Telnet session.

ftp — Disconnects the FTP session.

ssh — Disconnects the SSH session.

netconf — Disconnects the NETCONF session.

display-config

Syntax **display-config** [**detail | index**]

Context admin

Description This command displays the system's running configuration.

By default, only non-default settings are displayed.

Specifying the **detail** option displays all default and non-default configuration parameters.

Parameters **detail —** Displays default and non-default configuration parameters.

index — Displays only persistent-indices.

reboot

Syntax **reboot** [**active** | **standby** | **upgrade**] [**hold**] [**now**]

Context admin

Description This command reboots the router or one CPM and can also be used to force an upgrade of the system boot ROMs.

If no options are specified, the user is prompted to confirm the reboot operation. Answering yes ('y') will result in both CPMs and all IOMs rebooting.

```
ALA-1>admin# reboot
Are you sure you want to reboot (y/n)?
```

Parameters **active —** Keyword to reboot the active CPM.

Default active

standby — Keyword to reboot the standby CPM.

Default active

upgrade — Forces card firmware to be upgraded during chassis reboot. Normally, the 7750 SR OS automatically performs firmware upgrades on CPMs and IOM cards without the need for the "upgrade" keyword.

When the **upgrade** keyword is specified, a chassis flag is set for the BOOT Loader (boot.ldr) and on the subsequent boot of the 7750 SR OS on the chassis, firmware images on CPMs or IOMs will be upgraded automatically.

Any CPMs that are installed in the chassis will be upgraded automatically. For example, if a card is inserted with down revision firmware as a result of a card hot swap with the latest OS version running, the firmware on the card will be automatically upgraded before the card is brought online.

If the card firmware is upgraded automatically, a chassis cardUpgraded (event 2032) log event is generated. The corresponding SNMP trap for this log event is tmnxEqCardFirmwareUpgraded.

During any firmware upgrade, automatic or manual, it is imperative that during the upgrade procedure:

- Power must NOT be switched off or interrupted.
- The system must NOT be reset.
- No cards are inserted or removed.

Any of the above conditions may render cards inoperable requiring a return of the card for resolution.

The time required to upgrade the firmware on the cards in the chassis depends on the number of cards to be upgraded. The progress of a firmware upgrade can be monitored at the console.

hold — Administratively hold a rebooted standby CPM from coming back online. This may be useful for troubleshooting purposes (e.g. standby SF/CPM is suspected of causing some system problems). The CPM should not be left offline as the system does not have control redundancy while one CPM is offline. The CPM must be rebooted again (without the 'hold' keyword) to return it to service.

now — Forces a reboot of the router immediately without an interactive confirmation.

save

Syntax **save** [*file-url*] [**detail**] [**index**]

Context admin

Description This command saves the running configuration to a configuration file. For example:

```
A:ALA-1>admin# save ftp://test:test@192.168.x.xx/./100.cfg
Saving configuration .........Completed.
```

By default, the running configuration is saved to the primary configuration file.

Parameters *file-url* — The file URL location to save the configuration file.

Default The primary configuration file location.

Values

file url:	local-url | remote-url: 255 chars max	
local-url:	[*cflash-id*/][*file-path*], 200 chars max, including the cflash-id directory length, 99 chars max each	
remote-url:	[{ftp://} 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..FFFF]H
d - [0..255]D
interface - 32 chars max, for link local addresses
255 chars max, directory length 99 chars max each

cflash-id: cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:

detail — Saves both default and non-default configuration parameters.

index — Forces a save of the persistent index file regardless of the persistent status in the BOF file. The index option can also be used to avoid an additional boot required while changing your system to use the persistence indices.

enable-tech

Syntax [**no**] **enable-tech**

Context admin

Description This command enables the shell and kernel commands.

NOTE: This command should only be used with authorized direction from the Alcatel-Lucent Technical Assistance Center (TAC).

radius-discovery

Syntax **radius-discovery**

Context admin

Description This command performs RADIUS discovery operations.

force-discover

Syntax **force-discover** [**svc-id** *service-id*]

Context admin>radius-discovery

Description When enabled, the server is immediately contacted to attempt discovery.

Parameters **svc-id** *service-id* **—** Specifies an existing service ID.

Values 1 — 2147483648 | *svc-name*, up to 64 char max

tech-support

Syntax **tech-support [***file-url***]**

Context admin

Description This command creates a system core dump. If the file-url is omitted, and a ts-location is defined, then the tech support file will have an automatic SR OS generated file name based on the system name and the date and time and will be saved to the directory indicated by the configured ts-location.

The format of the auto-generated filename is ts-XXXXX.YYYYMMDD.HHMMUTC.dat where:

- XXXXX: system name with special characters expanded to avoid problems with file systems (for example, a '.' is expanded to %2E.)
- YYYYMMDD: Date with leading zeroes on year, month and day

- HHMM: Hours and Minutes in UTC time (24hr format, always 4 chars, with leading zeroes on hours and minutes)

NOTE: This command should only be used with authorized direction from the Alcatel-Lucent Technical Assistance Center (TAC).

Parameters *file-url* — The file URL location to save the binary file.

Values

file url: local-url | remote-url: 255 chars max	
local-url:	[*cflash-id*/][*file-path*], 200 chars max, including the cflash-id directory length, 99 chars max each
remote-url:	[{ftp://} 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..FFFF]H
	d - [0..255]D
	interface - 32 chars max, for link local addresses
	255 chars max, directory length 99 chars max each
cflash-id:	cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:

ts-location

Syntax

ts-location *file-url*
no ts-location

Context config>system>security

Description The **ts-location** command is used (along with an automatic system generated file name) when no *file-url* parameter is provided for the **admin tech-support** command. If **no ts-location** is defined then the operator must provide a file-url with the **admin tech-support** command itself.

The directory specified for the ts-location is not auto-created by SR OS. The operator must ensure that it exists.

Please see the 'admin tech-support' command for more details about the system generated file name.

Parameters *file-url* — Specifies the destination directory for auto-named tech-support files (when no file-url is specified with the 'admin tech-support' command). The *file-url* for the **ts-location** must be a directory (no filename or extension). The root directory (for example, cf1:\) is blocked for local compact flash destinations. A sub-directory (for example, cf2:\tech-support) must be used if local cf is the location.

Values

<file-url>	<local-url>|<remote-url>
local-url	[<cflash-id>/][<file-path>] 200 chars max, including cflash-id directory length 99 chars max each
remote-url	[{ftp://|tftp://}<login>:<pswd>@ <remote-locn>/][<file-path>] 255 chars max directory length 99 chars max each

remote-locn	[<hostname> | <ipv4-address> |<ipv6-address>]
ipv4-address	a.b.c.d
ipv6-address	x:x:x:x:x:x:x:x[-interface] x:x:x:x:x:x:d.d.d.d[-interface] x - [0..FFFF]H d - [0..255]D interface - 32 chars max, for link local addresses
cflash-id	cf1:|cf1-A:|cf1-B:|cf2:|cf2-A:|cf2-B:|cf3:|cf3-A:|cf3-B:

view

Syntax **view** {**bootup-cfg|active-cfg|candidate-cfg|latest-rb|** *checkpoint-id***|rescue**}

Context <ROOT>

Description The context to configure administrative system viewing parameters. Only authorized users can execute the commands in the **admin** context.

Default none

Parameters **bootup-cfg —** Specifies the bootup configuration.

active-cfg — Specifies current running configuration.

candidate-cfg — Specifies candidate configuration.

latest-rb — Specifies the latest configuration.

***checkpoint-id* —** Specifies a specific checkpoint file configuration.

Values 1 — 9

rescue — Specifies a rescue checkpoint configuration.

Persistence Commands

persistence

Syntax [**no**] **persistence**

Context config>system

Description This command enables the context to configure persistence parameters on the system.

The persistence feature enables state on information learned through DHCP snooping across reboots to be retained. This information includes data such as the IP address and MAC binding information, lease-length information, and ingress sap information (required for VPLS snooping to identify the ingress interface).

If persistence is enabled when there are no DHCP relay or snooping commands enabled, it will simply create an empty file.

Default no persistence

ancp

Syntax **ancp**

Context **config>system>persistence**

Description This command configures ANCP persistence parameters.

application-assurance

Syntax **application-assurance**

Context **config>system>persistence**

Description This command configures application assurance persistence parameters.

dhcp-server

Syntax **dhcp-server**

Context config>system>persistence

Description This command configures DHCP server persistence parameters.

nat-port-forwarding

Syntax **nat-port-forwarding**

Context **config>system>persistence**

Description This command configures NAT port forwarding persistence parameters.

python-policy-cache

Syntax **python-policy-cache**

Context config>system>persistence

Description This command configures Python policy cache persistency parameters.

subscriber-mgmt

Syntax **subscriber-mgmt**

Context config>system>persistence

Description This command configures subscriber management persistence parameters.

location

Syntax **location** [**cf1:** | **cf2:** | **cf3:**]
no location

Context config>system>persistence>ancp
config>system>persistence>sub-mgmt
config>system>persistence>dhcp-server

Description This command instructs the system where to write the file. The name of the file is: dhcp-persistence.db. On boot the system scans the file systems looking for dhcp-persistence.db, if it finds it starts to load it.

In the subscriber management context, the location specifies the flash device on a CPM card where the data for handling subscriber management persistency is stored.

The **no** form of this command returns the system to the default. If there is a change in file location while persistence is running, a new file will be written on the new flash, and then the old file will be removed.

Default no location

PTP Commands

ptp

Syntax **ptp**

Context config>system

Description This command enables the context to configure parameters for IEEE 1588-2008, Precision Time Protocol.

This command is only available on the control assemblies that support 1588.

shutdown

Syntax [**no**] **shutdown**

Context config>system>ptp

Description This command disables or enables the PTP protocol. If PTP is disabled, the router will not transmit any PTP packets, and will ignore all received PTP packets. If the user attempts execute a **no shutdown** command on hardware that does not support PTP, an alarm will be raised to indicate limited capabilities.

When PTP is shutdown, the PTP slave port is not operational. It shall not be considered as a source for system timing.

On assemblies supporting a 1 PPS output interface, this command controls the presentation of a signal on that interface. When PTP is enabled, the 1 PPS port is enabled, and it generates a pulse whose rising edge represented the second rollover of the internal PTP time scale (that is, whenever the fractional second of the time is exactly zero). When PTP is disabled, no signal is presented on the 1 PPS interface.

Default shutdown

anno-rx-timeout

Syntax **anno-rx-timeout count**

Context config>system>ptp

Description This command configures the announceReceiptTimeout value for all peer associations. This defines the number of Announce message intervals that must expire with no received Announce messages before declaring an ANNOUNCE_RECIPT_TIMEOUT event.

The announce-rx-timeout cannot be changed unless ptp is shutdown.

Default 3

Parameters **count —** The announce packet interval, in log form.

Values 2— 10

clock-type

Syntax **clock-type** {**ordinary** {**master** | **slave**} | **boundary**}

Context config>system>ptp

Description This command configures the type of clock. The clock-type can only be changed when PTP is shutdown.

The clock-type cannot be changed to ordinary master if the PTP reference is no shutdown. In addition, the clock-type cannot be changed to ordinary master if there are peers configured.

Default ordinary slave

Parameters **boundary —** The system is a boundary clock, which may be anywhere in the master-slave clock hierarchy. It can obtain timing from a master clock, and provide timing to multiple slave clocks concurrently.

ordinary master — The system is a grandmaster clock in the master-slave hierarchy. The system provides timing to multiple slave clocks in the network.

ordinary slave — The system is always a slave clock in the master-slave hierarchy. The system derives its timing from one or more master clocks in the network.

domain

Syntax [**no**] **domain** *domain*

Context config>system>ptp

Description This command configures the PTP domain.

The **no** form of the command reverts to the default configuration. Note some profiles may require a domain number in a restricted range. It is up to the operator to ensure the value aligns with what is expected within the profile.

Domain cannot be changed unless PTP is shutdown. If the PTP profile is changed, the domain is changed to the default domain for the new PTP profile.

Default 0 for ieee1588-2008 or 4 for g.8265.1-2010

Parameters *domain* — The PTP domain.

Values 0 — 255

log-anno-interval

Syntax **log-anno-interval** ***log-interval***

Context config>system>ptp

Description This command configures the announce message interval used for both unicast and multicast messages.

For unicast messages, it defines the announce message interval that is requested during unicast negotiation to any peer. This controls the announce message rate sent from remote peers to the local node. It does not

affect the announce message rate that may be sent from the local node to remote peers. Remote peers may request an announce message rate anywhere within the acceptable grant range.

For multicast messages, used on PTP Ethernet ports, this configures the message interval used for Announce messages transmitted by the local node.

This value also defines the interval between executions of the BMCA within the node.

The announce-interval cannot be changed unless the ptp is shutdown.

Note: In order to minimize BMCA driven reconfigurations, the IEEE recommends that the announce-interval should be consistent across the entire 1588 network.

Default 1 (1 packet every 2 seconds)

Parameters *log-interval* — The announce packet interval, in log form..

Values -3 .. 4

network-type

Syntax **network-type** {**sdh** | **sonet**}

Context config>system>ptp

Description This command configures the codeset to be used for the encoding of QL values into PTP clockClass values when the profile is configured for G.8265.1. The codeset is defined in Table 1/G.8265.1. This setting only applies to the range of values observed in the clockClass values transmitted out of the node in Announce messages. The 7750 will support the reception of any valid value in Table 1/G.8265.1

Default 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

priority1

Syntax [**no**] **priority1** *priority*

Context config>system>ptp

This command configures the priority1 value of the local clock. This parameter is only used when the profile is set to ieee1588-2008. This value is used by the Best Master Clock Algorithm to determine which clock should provide timing for the network.

Note: This value is used for the value to advertise in the Announce messages and for the local clock value in data set comparisons.

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

Default 128

Parameters *priority* — Specifies the value of the priority1 field.

Values 0 — 255

priority2

Syntax [**no**] **priority2** *priority*

Context config>system>ptp

This command configures the priority2 value of the local clock. This parameter is only used when the profile is set to ieee1588-2008. This value is used by the Best Master Clock algorithm to determine which clock should provide timing for the network.

Note: This value is used for the value to advertise in the Announce messages and for local clock value in data set comparisons..

The no form of the command reverts to the default configuration.

Default 128

Parameters *priority* — Specifies the value of the priority2 field.

Values 0 — 255

profile

Syntax **profile** {**g8265dot1-2010** | **ieee1588-2008**}

Context config>system>ptp

Description This command configures the profile to be used for the internal PTP clock. It defines the Best Master Clock Algorithm (BMCA) behavior.

The profile cannot be changed unless PTP is shutdown.

When you change the profile, the domain changes to the default value for the new profile.

Default ieee1588-2008

Parameters ieee1588-2008 — Conform to the default BMCA of the 2008 version of the IEEE1588 standard.

g8265dot1-2010 — Conform to the BMCA specified in the ITU-T G.8265.1 specification.

peer-limit

Syntax **peer-limit** *limit*
no peer-limit

Context configure>system>ptp

Description This command specifies an upper limit to the number of discovered peers permitted within the routing instance. This can be used to ensure that a routing instance does not consume all the possible discovered peers and blocking discovered peers in other routing instances.

If it is desired to reserve a fixed number of discovered peers per router instance, then all router instances supporting PTP should have values specified with this command and the sum of all the peer-limit values must not exceed the maximum number of discovered peers supported by the system.

If the user attempts to specify a peer-limit, and there are already more discovered peers in the routing instance than the new limit being specified, the configuration will not be accepted.

Default no limit

Parameters *limit* — Specifies the maximum number of discovered peers allowed in the routing instance.

Values 0 — 50

Default 1 (The maximum number of discovered peers supported by the system.)

peer

Syntax **peer ip-address**

Context config>system>ptp

Description This command configures a remote PTP peer. It provides the context to configure parameters for the remote PTP peer.

Up to 20 remote PTP peers may be configured.

The **no** form of the command deletes the specified peer.

If the clock-type is ordinary slave or boundary, and PTP is no shutdown, the last peer cannot be deleted. This prevents the user from having PTP enabled without any peer configured and enabled.

Peers are created within the routing instance associated with the context of this command. All configured PTP peers must use the same routing instance.

Default none

Parameters *ip-address* — The IP address of the remote peer.

Values ipv4-address a.b.c.d

log-sync-interval

Syntax **log-sync-interval** *log-interval*

Context configure>service>vprn>ptp>peer
configure>system>ptp>peer

Description This command configures the Sync message interval used for unicast messages. For unicast messages, it defines the Sync message interval that is requested during unicast negotiation to the specific peer. This

controls the Sync message rate sent from remote peers to the local node. It does not affect the Sync packet rate that may be sent from the local node to remote peers. Remote peers may request a Sync packet rate anywhere within the acceptable grant range.

The sync-interval cannot be changed unless the peer is shutdown.

Default -6 (64 packets per second)

Parameters *log-interval* — Specifies the sync message interval, in log form.

Values [-6..0]

priority

Syntax **priority local_priority**

Context configure>system>ptp>peer

This command configures the local priority used to choose between PTP masters in the best master clock algorithm (BMCA). This setting is only relevant when the g.8265.1-2010 profile is selected. The parameter is ignored when the ieee1588-2008 profile is selected. The value 1 is the highest priority and 255 is the lowest priority. The priority of a peer cannot be configured if the PTP profile is ieee1588-2008.

Default 128

Parameters *local_priority* — Specifies the value of the local priority.

Values 1-255

shutdown

Syntax [**no**] **shutdown**

Context configure>system>ptp>peer

This command disables or enables a specific PTP peer. Shutting down a peer sends cancel unicast negotiation messages on any established unicast sessions. When shutdown, all received packets from the peer are ignored.

If the clock-type is ordinary slave or boundary, and PTP is no shutdown, the last enabled peer cannot be shutdown. This prevents the user from having PTP enabled without any peer configured & enabled

Default no shutdown

Redundancy Commands

redundancy

Syntax **redundancy**

Context admin
config

Description This command enters the context to allow the user to perform redundancy operations.

cert-sync

Syntax [**no**] **cert-sync**

Context admin>redundancy

Description This command automatically synchronizes the certificate/CRL/key when importing or generating (for the key). Also if a new CF card is inserted into slot3 into the backup CPM, the system will sync the whole system-pki directory from the active CPM.

Default enabled

warm-standby

Syntax **warm-standby**

Context configure>redundancy>multi-chassis>peer

Description This command enables Oversubscribed Multi-Chassis Redundancy (OMCR). Subscriber hosts are synchronized between two chassis only in the control plane and are kept there (as part of the Multi-Chassis Synchronization (MCS) state) until the switchover occurs. Link or nodal failure will trigger the switchover at which point the subscriber hosts are being fully instantiated in the control and the forwarding plane. This approach allows oversubscription of the resources in the central standby (or protecting) node that is backing-up a number of other active nodes. The total number of protected subscribers in the OMCR cluster exceeds the forwarding capacity of the protecting node. This is achievable by not fully occupying the resources for the subscriber hosts until the failure occurs.

The restoration times depend on the amount of the subscriber hosts that are affected by the switchover and it is related to the time needed for the full instantiation of the subscribers in the forwarding plane.

Although this command is configured on a peer level, the warm-standby property is a nodal characteristic. In other words, mixing of N:1 and 1:1 (hot standby) mode in the central standby node is not supported. Consequently all peers on the central standby node must be configured for warm-standby (N:1), or all peers must be configured for hot-standby (1:1) by omitting the warm-standby keyword from the configuration.

The peer of the central-backup node is not aware of the redundancy model supported. In in other words, the peer of the central-backup node does not know whether it peers with a warm-standby peer or host-standby-peer. All nodes participating in this protection model must run SR OS R12.0 or higher.

Default no warm-standby

rollback-sync

Syntax **no rollback-sync**

Context admin>redundancy

Description This command copies the entire set of rollback checkpoint files from the active CPM CF to the inactive CPM CF.

Default None.

synchronize

Syntax **synchronize** {**boot-env**|**config**}
no synchronize

Context admin>redundancy

Description This command performs a synrchonization of the standby CPM's images and/or configuration files to the active CPM. Either the **boot-env** or **config** parameter must be specified.

In the **admin>redundancy** context, this command performs a manually triggered standby CPM synchronization. When the standby CPM takes over operation following a failure or reset of the active CPM, it is important to ensure that the active and standby CPM have identical operational parameters. This includes the saved configuration, CPM and IOM images.

The active CPM ensures that the active configuration is maintained on the standby CPM. However, to ensure smooth operation under all circumstances, runtime images and system initialization configurations must also be automatically synchronized between the active and standby CPM. If synchronization fails, alarms and log messages that indicate the type of error that caused the failure of the synchronization operation are generated. When the error condition ceases to exist, the alarm is cleared.

Only files stored on the router are synchronized. If a configuration file or image is stored in a location other than on a local compact flash, the file is not synchronized (for example, storing a configuration file on an FTP server).

The **no** form of the command removes the parameter from the configuration.

Default none

Parameters **boot-env —** Synchronizes all files required for the boot process (loader, BOF, images, and config).

config — Synchronizes only the primary, secondary, and tertiary configuration files.

force-switchover

Syntax **force-switchover** [**now**] [**ignore-status**]

Context admin>redundancy

Description This command forces a switchover to the standby CPM card. The primary CPM reloads its software image and becomes the secondary CPM.

Parameters **now —** Forces the switchover to the redundant CPM card immediately.

ignore-status — Forces a switchover despite any diagnostics or conditions on the standby.

bgp-multi-homing

Syntax **bgp-multi-homing**

Context config>redundancy

Description This command configures BGP multi-homing parameters.

boot-timer

Syntax **boot-timer** *seconds*
no boot-timer

Context config>redundancy>bgp-multi-homing

Description This command configures the time the service manger waits after a node reboot before running the DF election algorithm. The boot-timer value should be configured to allow for the BGP sessions to come up and for the NLRI information to be refreshed/exchanged.

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

Default no boot-timer

Parameters *seconds* — Specifies the BGP multi-homing boot-timer in seconds.

Values 1 — 100

site-activation-timer

Syntax **site-activation-timer** *seconds*
no site-activation-timer

Context config>redundancy>bgp-multi-homing

Description This command defines the amount of time the service manager will keep the local sites in standby status, waiting for BGP updates from remote PEs before running the DF election algorithm to decide whether the

site should be unblocked. The timer is started when one of the following events occurs if the site is operationally up:

- Manual site activation using the **no shutdown** command at site-id level or at member object(s) level (SAP(s) or PW(s))
- Site activation after a failure

Default no site-activation-timer

Parameters *seconds* — Specifies the standby status in seconds.

Values 1 — 100

Default 2

synchronize

Syntax **synchronize** {**boot-env** | **config**}

Context config>redundancy

Description This command performs a synrchonization of the standby CPM's images and/or config files to the active CPM. Either the **boot-env** or **config** parameter must be specified.
In the **config>redundancy** context, this command performs an automatically triggered standby CPM synchronization. When the standby CPM takes over operation following a failure or reset of the active CPM, it is important to ensure that the active and standby CPMs have identical operational parameters. This includes the saved configuration, CPM and IOM images.
The active CPM ensures that the active configuration is maintained on the standby CPM. However, to ensure smooth operation under all circumstances, runtime images and system initialization configurations must also be automatically synchronized between the active and standby CPM.

If synchronization fails, alarms and log messages that indicate the type of error that caused the failure of the synchronization operation are generated. When the error condition ceases to exist, the alarm is cleared.

Only files stored on the router are synchronized. If a configuration file or image is stored in a location other than on a local compact flash, the file is not synchronized (for example, storing a configuration file on an FTP server).

Default enabled

Parameters **boot-env —** Synchronizes all files required for the boot process (loader, BOF, images, and config).

config — Synchronize only the primary, secondary, and tertiary configuration files.

Default **config**

synchronize

Syntax **synchronize** {**boot-env** | **config**}

Context admin>redundancy

Description This command performs a synrchonization of the standby CPM's images and/or config files to the active CPM. Either the **boot-env** or **config** parameter must be specified.

In the **admin**>**redundancy** context, this command performs a manually triggered standby CPM synchronization. When the standby CPM takes over operation following a failure or reset of the active CPM, it is important to ensure that the active and standby CPM have identical operational parameters. This includes the saved configuration, CPM and IOM images.

The active CPM ensures that the active configuration is maintained on the standby CPM. However, to ensure smooth operation under all circumstances, runtime images and system initialization configurations must also be automatically synchronized between the active and standby CPM.

If synchronization fails, alarms and log messages that indicate the type of error that caused the failure of the synchronization operation are generated. When the error condition ceases to exist, the alarm is cleared.

Only files stored on the router are synchronized. If a configuration file or image is stored in a location other than on a local compact flash, the file is not synchronized (for example, storing a configuration file on an FTP server).

Default none

Parameters **boot-env —** Synchronizes all files required for the boot process (loader, BOF, images, and configuration files.

config — Synchronize only the primary, secondary, and tertiary configuration files.

multi-chassis

Syntax **multi-chassis**

Context config>redundancy

Description This command enables the context to configure multi-chassis parameters.

peer-name

Syntax **peer-name** *name*
no peer-name

Context config>redundancy>multi-chassis>peer

Description This command specifies a peer name.

Parameters *name* — The string may be up to 32 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

rollback-sync

Syntax [**no**] **rollback-sync**

Context config>redundancy

Description The operator can enable automatic synchronization of rollback checkpoint files between the active CPM and inactive CPM. When this automatic synchronization is enabled, a rollback save will cause the new checkpoint file to be saved on both the active and standby CPMs. The suffixes of the old checkpoint files on both active and standby CPMs are incremented. Note that automatic sync only causes the ONE new checkpoint file to be copied to both CFs (the other 9 checkpoints are not automatically copied from active to standby but that can be done manually with "admin red rollback-sync").

Automatic synchronization of rollback checkpoint files across CPMs is only performed if the rollback-location is configured as a local file-url (for example, "cf3:/rollback-files/rollback). Synchronization is not done if the rollback-location is remote.

Note that “config red sync {boot-env|config}” and “admin red sync {boot-env|config}” do not apply to rollback checkpoint files. These commands do not manually or automatically sync rollback checkpoint files. The dedicated rollback-sync commands must be used to sync rollback checkpoint files.

source-address

Syntax **source-address** *ip-address*
no source-address

Context config>redundancy>multi-chassis>peer

Description This command specifies the source address used to communicate with the multi-chassis peer.

Parameters *ip-address* — Specifies the source address used to communicate with the multi-chassis peer.

sync

Syntax [**no**] **sync**

Context config>redundancy>multi-chassis>peer

Description This command enables the context to configure synchronization parameters.

igmp

Syntax [**no**] **igmp**

Context config>redundancy>multi-chassis>peer>sync

Description This command specifies whether IGMP protocol information should be synchronized with the multi-chassis peer.

Default no igmp

igmp-snooping

Syntax [**no**] **igmp-snooping**

Context config>redundancy>multi-chassis>peer>sync

Description This command specifies whether IGMP snooping information should be synchronized with the multi-chassis peer.

Default no igmp-snooping

local-dhcp-server

Syntax [**no**] **local-dhcp-server**

Context config>redundancy>multi-chassis>peer>sync

Description This command synchronizes DHCP server information.

mld-snooping

Syntax [**no**] **mld-snooping**

Context config>redundancy>multi-chassis>peer>sync

Description MCS synchronization of MLD snooping is not supported. This command is not blocked for backwards compatibility reasons but has no effect on the system if configured.

port

Syntax **port** [*port-id* | *lag-id*] [**sync-tag** *sync-tag*]
no port [*port-id* | *lag-id*]

Context config>redundancy>multi-chassis>peer>sync

Description This command specifies the port to be synchronized with the multi-chassis peer and a synchronization tag to be used while synchronizing this port with the multi-chassis peer.

Parameters *port-id* — Specifies the port to be synchronized with the multi-chassis peer.

lag-id — Specifies the LAG ID to be synchronized with the multi-chassis peer.

sync-tag *sync-tag* — Specifies a synchronization tag to be used while synchronizing this port with the multi-chassis peer.

python

Syntax **python**

Context config>redundancy>multi-chassis>peer>sync

Description This command enables syncing of python-policy cached entries to the peer.

Use the **mcs-peer** command in the python-policy to enable syncing for a specific python-policy.

Default no python

range

Syntax **range** *encap-range* **sync-tag** *sync-tag*
no range *encap-range*

Context config>redundancy>multi-chassis>peer>sync>port

Description This command configures a range of encapsulation values.

Parameters *encap-range* — Specifies a range of encapsulation values on a port to be synchronized with a multi-chassis peer.

Values		
	Dot1Q	*start-vlan-end-vlan*
	QinQ	Q1.*start-vlan*-Q1.*end-vlan*

sync-tag *sync-tag* **—** Specifies a synchronization tag up to 32 characters in length to be used while synchronizing this encapsulation value range with the multi-chassis peer.

srrp

Syntax [**no**] **srrp**

Context config>redundancy>multi-chassis>peer>sync

Description This command specifies whether subscriber routed redundancy protocol (SRRP) information should be synchronized with the multi-chassis peer.

Default no srrp

sub-mgmt

Syntax [**no**] **sub-mgmt**

Context config>redundancy>multi-chassis>peer>sync

Description This command specifies whether subscriber management information should be synchronized with the multi-chassis peer.

Default no sub-mgmt

sub-host-trk

Syntax [**no**] **sub-host-trk**

Context config>redundancy>multi-chassis>peer>sync

Description This command specifies whether subscriber host tracking information should be synchronized with the multi-chassis peer.

Default no sub-mgmt

Peer Commands

peer

Syntax **[no] peer *ip-address***

Context config>redundancy>multi-chassis

Description This command configures a multi-chassis redundancy peer.

Parameters *ip-address* — Specifies a peer IP address. Multicast address are not allowed.

authentication-key

Syntax **authentication-key** [*authentication-key* | *hash-key*] [**hash** | **hash2**]
no authentication-key

Context config>redundancy>multi-chassis>peer

Description This command configures the authentication key used between this node and the multi-chassis peer. The authentication key can be any combination of letters or numbers.

Parameters *authentication-key* — Specifies the authentication key. Allowed values are any string up to 20 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

hash-key — The hash key. The key can be any combination of ASCII characters up to 33 (hash1-key) or 55 (hash2-key) characters in length (encrypted). If spaces are used in the string, enclose the entire string in quotation marks (“ ”).

hash — Specifies the key is entered in an encrypted form. If the hash or hash2 parameter is not used, the key is assumed to be in 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.

hash2 — Specifies the key is entered in a more complex encrypted form that involves more variables then the key value alone, this means that hash2 encrypted variable cannot be copied and pasted. If the hash or hash2 parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the hash or hash2 parameter specified.

MC Endpoint Commands

mc-endpoint

Syntax [**no**] **mc-endpoint**

Context config>redundancy>multi-chassis>peer

Description This command specifies that the endpoint is multi-chassis. This value should be the same on both MC-EP peers for the pseudowires that must be part of the same group.

The **no** form of this command removes the endpoint from the MC-EP. Single chassis behavior applies.

bfd-enable

Syntax [**no**] **bfd-enable**

Context config>redundancy>multi-chassis>peer>mc-ep
config>router>rsvp
config>router>bgp
config>router>bgp>group
config>router>bgp>group>neighbor
config>redundancy>multi-chassis>peer>mc-ep

Description This command enables the use of bi-directional forwarding (BFD) to control the state of the associated protocol interface. By enabling BFD on a given protocol interface, the state of the protocol interface is tied to the state of the BFD session between the local node and the remote node. The parameters used for the BFD are set via the BFD command under the IP interface.

The **no** form of this command disables BFD.

Default no bfd-enable

boot-timer

Syntax **boot-timer** *interval*
no boot-timer

Context config>redundancy>multi-chassis>peer>mc-ep

Description This command configures the boot timer interval. This command applies only when the node reboots. It specifies the time the MC-EP protocol keeps trying to establish a connection before assuming a failure of the remote peer. This is different from the keep-alives mechanism which is used just after the peer-peer communication was established. After this time interval passed all the mc-endpoints configured under services will revert to single chassis behavior, activating the best local PW.

The **no** form of this command sets the interval to default.

Default 300

Parameters *interval* — Specifies the boot timer interval.

Values 1 — 600

hold-on-neighbor-failure

Syntax **hold-on-neighbor-failure** *multiplier*
no hold-on-neighbor-failure

Context config>redundancy>multi-chassis>peer>mc-ep

Description This command specifies the number of keep-alive intervals that the local node will wait for packets from the MC-EP peer before assuming failure. After this time interval passed the all the mc-endpoints configured under services will revert to single chassis behavior, activating the best local pseudowire.

The **no** form of this command sets the multiplier to default value

Default 3

Parameters *multiplier* — Specifies the hold time applied on neighbor failure.

Values 2 — 25

keep-alive-interval

Syntax **keep-alive-interval** *interval*
no keep-alive-interval

Context config>redundancy>multi-chassis>peer>mc-ep

Description This command sets the interval at which keep-alive messages are exchanged between two systems participating in MC-EP when bfd is not enabled or is down. These fast keep-alive messages are used to determine remote-node failure and the interval is set in deci-seconds.

The **no** form of this command sets the interval to default value

Default 5 (0.5s)

Parameters *interval* — The time interval expressed in deci-seconds.

Values 5 — 500 (tenths of a second)

passive-mode

Syntax [**no**] **passive-mode**

Context config>redundancy>multi-chassis>peer>mc-ep

Description This command configures the passive mode behavior for the MC-EP protocol. When in passive mode the MC-EP pair will be dormant until two of the pseudowires in a MC-EP will be signaled as active by the remote PEs, being assumed that the remote pair is configured with regular MC-EP. As soon as more than one pseudowire is active, dormant MC-EP pair will activate. It will use the regular exchange to select the best pseudowire between the active ones and it will block the Rx and Tx directions of the other pseudowires.

The **no** form of this command will disable the passive mode behavior.

Default no passive-mode

system-priority

Syntax **system-priority** *value*
no system-priority

Context config>redundancy>multi-chassis>peer>mc-ep

Description This command allows the operator to set the system priority. The peer configured with the lowest value is chosen to be the master. If system-priority are equal then the one with the highest system-id (chassis MAC address) is chosen as the master.

The **no** form of this command sets the system priority to default

Default no system-priority

Parameters *value* — Specifies the priority assigned to the local MC-EP peer.

Values 1 — 255

MC-LAG Commands

mc-lag

Syntax [**no**] **mc-lag**

Context config>redundancy>multi-chassis>peer>mc-lag

Description This command enables the context to configure multi-chassis LAG operations and related parameters.

The **no** form of this command administratively disables multi-chassis LAG. MC-LAG can only be issued only when mc-lag is shutdown.

hold-on-neighbor-failure

Syntax **hold-on-neighbor-failure** *multiplier*
no hold-on-neighbor-failure

Context config>redundancy>multi-chassis>peer>mc-lag

Description This command specifies the interval that the standby node will wait for packets from the active node before assuming a redundant-neighbor node failure. This delay in switch-over operation is required to accommodate different factors influencing node failure detection rate, such as IGP convergence, or HA switch-over times and to prevent the standby node to take action prematurely.

The **no** form of this command sets this parameter to default value.

Default 3

Parameters *multiplier* — The time interval that the standby node will wait for packets from the active node before assuming a redundant-neighbor node failure.

Values 2 — 25

keep-alive-interval

Syntax **keep-alive-interval** *interval*
no keep-alive-interval

Context config>redundancy>multi-chassis>peer>mc-lag

Description This command sets the interval at which keep-alive messages are exchanged between two systems participating in MC-LAG. These keep-alive messages are used to determine remote-node failure and the interval is set in deci-seconds.

The **no** form of this command sets the interval to default value

Default 1s (10 hundreds of milliseconds means interval value of 10)

Parameters *interval* — The time interval expressed in deci-seconds

Values 5 — 500

lag

Syntax **lag** *lag-id* **lacp-key** *admin-key* **system-id** *system-id* [**remote-lag** *remote-lag-id*] **system-priority** *system-priority* **source-bmac-lsb** *use-lacp-key*
lag *lag-id* **lacp-key** *admin-key* **system-id** *system-id* [**remote-lag** *remote-lag-id*] **system-priority** *system-priority* **source-bmac-lsb** *MAC-Lsb*
lag *lag-id* **lacp-key** *admin-key* **system-id** *system-id* [**remote-lag** *remote-lag-id*] **system-priority** *system-priority*
lag *lag-id* [**remote-lag** *remote-lag-id*]
no lag *lag-id*

Context config>redundancy>multi-chassis>peer>mc-lag

Description This command defines a LAG which is forming a redundant-pair for MC-LAG with a LAG configured on the given peer. The same LAG group can be defined only in the scope of 1 peer.
The same **lacp-key**, **system-id**, and **system-priority** must be configured on both nodes of the redundant pair in order to MC-LAG to become operational. In order MC-LAG to become operational, all parameters (**lacp-key**, **system-id**, **system-priority**) must be configured the same on both nodes of the same redundant pair.

The partner system (the system connected to all links forming MC-LAG) will consider all ports using the same **lacp-key**, **system-id**, **system-priority** as the part of the same LAG. In order to achieve this in MC operation, both redundant-pair nodes have to be configured with the same values. In case of the mismatch, MC-LAG is kept operationally down.

Default none

Parameters *lag-id* — The LAG identifier, expressed as a decimal integer. Specifying the *lag-id* allows the mismatch between lag-id on redundant-pair. If no **lag-id** is specified it is assumed that neighbor system uses the same *lag-id* as a part of the given MC-LAG. If no matching MC-LAG group can be found between neighbor systems, the individual LAGs will operate as usual (no MC-LAG operation is established.).

Values 1 — 20064

lacp-key *admin-key* **—** Specifies a 16 bit key that needs to be configured in the same manner on both sides of the MC-LAG in order for the MC-LAG to come up.

Values 1 — 65535

system-id *system-id* **—** Specifies a 6 byte value expressed in the same notation as MAC address

Values xx:xx:xx:xx:xx:xx - xx [00..FF]

remote-lag *lag-id* **—** Specifies the LAG ID on the remote system.

Values 1 — 20064

system-priority *system-priority* **—** Specifies the system priority to be used in the context of the MC-LAG. The partner system will consider all ports using the same **lacp-key**, **system-id**, and **system-priority** as part of the same LAG.

Values 1 — 65535

Multi-Chassis Mobile Commands

mc-mobile

Syntax **mc-mobile**

Context config>redundancy>mc>peer

Description This command enables to the context to configure mc-mobile parameters.

Default no mc-mobile

bfd-enable

Syntax **bfd-enable** [**service** *service-id*] **interface** *interface-name*
no bfd-enable

Context config>redundancy>multi-chassis>peer>mc-mobile

Description This command enables the use of Bi-directional Forwarding Detection (BFD) to be associated with the peer. The mc-mobile redundancy protocol will use the BFD state to determine liveliness of its peer. The parameters for the BFD session are set via the BFD command under the IP interface configuration.

Default no bfd-enable

Parameters *service-id* — Specifies the service identifier string, maximum of 64 characters.

Values 1—2147483648

interface-name — Specifies the interface name, maximum of 32 characters.

hold-on-neighbor-failure

Syntax **hold-on-neighbor-failure** *multiplier*
no hold-on-neighbor-failure

Context config>redundancy>multi-chassis>peer>mc-mobile

Description This command specifies the number of keep-alive-intervals that may expire before the local node decides that the peer has failed. A peer failure will be declared if no keep-alive responses are received after hold-on-neighbor-failure x keep-alive-interval.

Default 3

Parameters *multiplier* — Specifies the multiplier.

Values 2—25

keep-alive-interval

Syntax **keep-alive-interval** *interval*
no keep-alive-interval

Context config>redundancy>multi-chassis>peer>mc-mobile

Description This command sets the interval at which keep-alive messages are sent to the peer when bfd is not enabled or is down.

Default 10 (1 second)

Parameters *interval* — The time interval expressed in deci-seconds.

Values 5—500 (tenths of a second)

Multi-Chassis Ring Commands

mc-ring

Syntax **mc-ring**

Context config>redundancy>mc>peer
config>redundancy>multi-chassis>peer>sync

Description This command enables the context to configure the multi-chassis ring parameters.

ring

Syntax **ring** *sync-tag*
no ring *sync-tag*

Context config>redundancy>mc>peer>mcr

Description This command configures a multi-chassis ring.

Parameters *sync-tag* — Specifies a synchronization tag to be used while synchronizing this port with the multi-chassis peer.

in-band-control-path

Syntax **in-band-control-path**

Context config>redundancy>mc>peer>mcr>ring

Description This command enables the context to configure multi-chassis ring inband control path parameters.

dst-ip

Syntax **dst-ip** *ip-address*
no dst-ip

Context config>redundancy>mc>peer>mcr>ring>in-band-control-path

Description This command specifies the destination IP address used in the inband control connection. If the address is not configured, the ring cannot become operational.

Parameters *ip-address* — Specifies the destination IP address.

interface

Syntax **interface** *ip-int-name*
no interface

Context config>redundancy>mc>peer>mcr>ring>in-band-control-path

Description This command specifies the name of the IP interface used for the inband control connection.If the name is not configured, the ring cannot become operational.

service-id

Syntax **service-id** *service-id*
no service-id

Context config>redundancy>mc>peer>mcr>ring>ibc

Description This command specifies the service ID if the interface used for the inband control connection belongs to a VPRN service. If not specified, the *service-id* is zero and the interface must belong to the Base router.

The **no** form of the command removes the service-id from the IBC configuration.

Parameters *service-id* — Specifies the service ID if the interface.

path-b

Syntax [**no**] **path-b**

Context config>redundancy>mc>peer>mcr>ring

Description This command specifies the set of upper-VLAN IDs associated with the SAPs that belong to path B with respect to load-sharing. All other SAPs belong to path A.

Default If not specified, the default is an empty set.

range

Syntax **[no] range *vlan-range***

Context config>redundancy>mc>peer>mcr>ring>path-b
config>redundancy>mc>peer>mcr>ring>path-excl

Description This command configures a MCR b-path VLAN range.

Parameters *vla-range* — Specifies the VLAN range.

Values 1 to 4094 — 1 to 4094

path-excl

Syntax [**no**] **path-excl**

Context config>redundancy>mc>peer>mcr>ring

Description This command specifies the set of upper-VLAN IDs associated with the SAPs that are to be excluded from control by the multi-chassis ring.

Default If not specified, the default is an empty set.

ring-node

Syntax **ring-node** *ring-node-name* [**create**]
no ring-node *ring-node-name*

Context config>redundancy>mc>peer>mcr>ring

Description This command specifies the unique name of a multi-chassis ring access node.

Parameters *ring-node-name* — Specifies the unique name of a multi-chassis ring access node.

create — Keyword used to create the ring node instance. The **create** keyword requirement can be enabled/disabled in the **environment>create** context.

connectivity-verify

Syntax **connectivity-verify**

Context config>redundancy>mc>peer>mcr>ring>ring-node

Description This command enables the context to configure node connectivity check parameters.

dst-ip

Syntax **dst-ip** *ip-address*
no dst-ip

Context config>redundancy>mc>peer>mcr>ring>ring-node>connectivity-verify

Description This command configures the node cc destination IP address.

Default no dst-ip

Parameters *ip-address* — Specifies the destination IP address used in the inband control connection.

interval

Syntax **interval** *interval*
no interval

Context config>redundancy>mc>peer>mcr>ring>ring-node>connectivity-verify

Description This command specifies the polling interval of the ring-node connectivity verification of this ring node.

Default 5

Parameters *interval* — Specifies the polling interval, in minutes.

Values 1 — 6000

service-id

Syntax **service-id** *service-id*
no service-id

Context config>redundancy>mc>peer>mcr>ring>ring-node>connectivity-verify

Description This command specifies the service ID of the SAP used for the ring-node connectivity verification of this ring node.

Default no service-id

Parameters *service-id* — Specifies the service ID of the SAP.

Values 1 — 2147483647

src-ip

Syntax **src-ip** *ip-address*
no src-ip

Context config>redundancy>mc>peer>mcr>ring>ring-node>connectivity-verify

This command specifies the source IP address used in the ring-node connectivity verification of this ring node.

Default no src-ip

Parameters *ip-address* — Specifies the address of the multi-chassis peer.

src-mac

Syntax **src-mac** *ieee-address*
no src-mac

Context config>redundancy>mc>peer>mcr>node>cv

Description This command specifies the source MAC address used for the Ring-Node Connectivity Verification of this ring node.

A value of all zeroes (000000000000 H (0:0:0:0:0:0)) specifies that the MAC address of the system management processor (CPM) is used.

Default no src-mac

Parameters *ieee-address* — Specifies the source MAC address.

vlan

Syntax **vlan** [**0..4094**]
no vlan

Context config>redundancy>mc>peer>mcr>node>cv

Description This command specifies the VLAN tag of the SAP used for the ring-node connectivity verification of this ring node. It is only meaningful if the value of service ID is not zero. A zero value means that no VLAN tag is configured.

Default no vlan

Parameters [**0..4094**] — Specifies the set of VLAN IDs associated with the SAPs that are to be controlled by the slave peer.

Rollback Commands

compare

Syntax **compare** [**to** *source2*]
compare *source1* **to** *source2*

Context admin
admin>rollback

Description This command displays the differences between rollback checkpoints and the active operational configuration, with source1 as the base/first file to which source2 is compared.

Parameters *source1, source2* — Specifies comparison information.

Values **active-cfg** — The currently operational configuration that is active in the node.

latest-rb — The most recent rollback checkpoint (the checkpoint file at the configured rollback-location with "*.rb" as the suffix).

rescue— The rescue configuration (at the configured rescue-location).

checkpoint-id — An id from [1 ..max] indicating a specific rollback checkpoint (where max is the highest checkpoint allowed/configured). A checkpoint-id of 1 indicates the rollback checkpoint file (at the configured rollback-location) with "*.rb.1" as the suffix, 2 for file "*.rb.2", etc.

Default The defaults for source1 and source2 are context aware and differ based on the branch in which the command is executed. In general, the default for source1 matches the context from which the command is issued.

- In the admin node: No defaults. source1 and source2 must be specified.
- In the admin>rollback node:

  source1 default = active-cfg, source2 default = lastest-rb

  compare: Equivalent to "compare active-cfg to lastest-rb"

  compare to source2:Equivalent to "compare active-cfg to source2"

delete

Syntax **delete** {**latest-rb**| *checkpoint-id* | **rescue**}

Context admin>rollback

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

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

It is not advised to manually delete a rollback checkpoint (for example, using a "file delete" command). If a rollback checkpoint file is manually deleted without using the "admin rollback delete" command then the suffixes of the checkpoint files are NOT shuffled, nor is the equivalent checkpoint file deleted from the standby CF. This manual deletion creates a "hole" in the checkpoint file list until enough new checkpoints have been created to roll the "hole" off the end of the list.

Default none

Parameters **latest-rb —** Specifies the most recently created rollback checkpoint (corresponds to the file-url.rb rollback checkpoint file).

checkpoint-id — An id from [1 ..max] indicating a specific rollback checkpoint (where max is the highest checkpoint allowed/configured). A checkpoint-id of 1 indicates the rollback checkpoint file (at the configured rollback-location) with "*.rb.1" as the suffix, 2 for file "*.rb.2", etc.

rescue — Deletes the rescue checkpoint. No checkpoint suffix numbers are changed.

rescue-location

Syntax **no rescue-location** *file-url*

Context config>system>rollback

Description The location and filename of the rescue configuration is configurable to be local (on compact flash) or remote. The suffix ".rc" will be automatically appended to the filename when a rescue configuration file is saved. Trivial FTP (tftp) is not supported for remote locations.

Default None. A valid rescue-location must be configured before a rescue configuration is saved.

Parameters *file-url* — Specifies the URL.

Values

<file-url>		
	<local-url>|<remote-url>	
	local-url	[<cflash-id>/][<file-path>] 200 chars max, including cflash-id directory length 99 chars max each
	remote-url	[{ftp://}<login>:<pswd>@ <remote-locn>/][<file-path>] 255 chars max directory length 99 chars max each
	remote-locn	[<hostname> | <ipv4-address> | <ipv6-address>]
	ipv4-address	a.b.c.d
	ipv6-address	x:x:x:x:x:x:x:x[-interface] x:x:x:x:x:x:d.d.d.d[-interface] x - [0..FFFF]H d - [0..255]D interface - 32 chars max, for link local addresses
	cflash-id	cf1:|cf1-A:|cf1-B:|cf2:|cf2-A:|cf2-B:| cf3:|cf3-A:|cf3-B:
<rescue filename>		suffixed with .rc during rescue file creation

rollback-location

Syntax **rollback-location** *file-url/***rollback** *filename*

Context config>system>rollback

Description The location and name of the rollback checkpoint files is configurable to be local (on compact flash) or remote. The file-url must not contain a suffix (just a path/directory + filename). The suffixes for rollback checkpoint files are “.rb”, ".rb.1", ..., ".rb.9" and are automatically appended to rollback checkpoint files.

Default None. A valid rollback-location must be configured before a rollback save is executed.

Values

<file-url>
<local-url>|<remote-url>

local-url	[<cflash-id>/][<file-path>] 200 chars max, including cflash-id directory length 99 chars max each
remote-url	[{ftp://}<login>:<pswd>@ <remote-locn>/][<file-path>] 255 chars max directory length 99 chars max each
remote-locn	[<hostname> | <ipv4-address> | <ipv6-address>]
ipv4-address	a.b.c.d
ipv6-address	x:x:x:x:x:x:x:x[-interface] x:x:x:x:x:x:d.d.d.d[-interface] x - [0..FFFF]H d - [0..255]D interface - 32 chars max, for link local addresses
cflash-id	cf1:|cf1-A:|cf1-B:|cf2:|cf2-A:|cf2-B:| cf3:|cf3-A:|cf3-B:

<rollback filename> suffixed with .rb, .rb.1 up to .9 during rollback checkpoint creation

remote-max-checkpoints

Syntax **remote-max-checkpoints** *<1..200>*

Context config>system>rollback

Description Configures the maximum number of rollback checkpoint files when the rollback-location is remote (e.g. ftp).

Default 10

local-max-checkpoints

Syntax **local-max-checkpoints** *<1..50>*

Context config>system>rollback

Description Configures the maximum number of rollback checkpoint files when the rollback-location is on local compact flash.

Default 10

save (rollback)

Syntax **save** [**rescue**] [**comment** *comment-string*]

Context admin>rollback

Description If the optional “rescue” keyword is not used, this command saves a rollback checkpoint at the location and with the filename specified by the rollback-location with a suffix of ".rb". The previously saved checkpoints will have their suffixes incremented by one (.rb.1 becomes .rb.2, etc). If there are already as many checkpoint files as the maximum number supported, then the last checkpoint file is deleted.

If the “rescue” keyword is used, then this command saves the current operational configuration as a rescue configuration at the location and with the filename specified by the rescue-location. The filename will have the suffix “.rc” appended.

Default none

Parameters *comment-string* — A comment of up to 255 characters in length that is associated with the checkpoint.

rescue — Save the rescue checkpoint instead of a normal rollback checkpoint.

revert

Syntax **revert** [**latest-rb**| *checkpoint-id* | **rescue**] [**now**]

Context admin>rollback

Description This command initiates a configuration rollback revert operation that will return the configuration state of the node to a previously saved checkpoint. The rollback revert minimizes impacts to running services. There are no impacts in areas of configuration that did not change since the checkpoint. Configuration parameters that changed (or items on which changed configuration have dependencies) are first removed (revert to default) and the previous values are then restored (can be briefly service impacting in changed areas).

Parameters **latest-rb —** Specifies the most recently created rollback checkpoint (corresponds to the file-url.rb rollback checkpoint file).

checkpoint-id — >Indicates the configuration to return to (which rollback checkpoint file to use). Checkpoint-id of “1” corresponds to the file-url.rb.1 rollback checkpoint file. The higher the id, the older the checkpoint. Max is the highest rollback checkpoint supported or configured.

Values 1—max, where max is the number of configured checkpoints minus 1 (since, for example, the 10th checkpoint has an id of 9)

rescue — Revert to the rescue checkpoint.

now — Forces a rollback revert without any interactive confirmations (assumes ‘y’ for any confirmations that would have occurred).

view

Syntax **view** [**latest-rb** | *checkpoint-id* | **rescue**]

Context admin>rollback

Description This command displays checkpoint..

Default none

Parameters **latest-rb —** Specifies the most recently created rollback checkpoint (corresponds to the file-url.rb rollback checkpoint file).

checkpoint-id — >Indicates rollback checkpoint file to be viewed. Checkpoint-id of “1” corresponds to the file-url.rb.1 rollback checkpoint file. The higher the id, the older the checkpoint. Max is the highest rollback checkpoint supported or configured.

Values 1..max

rescue — View the rescue configuration.

LLDP System Commands

lldp

Syntax **lldp**

Context config>system

Description This command enables the context to configure system-wide Link Layer Discovery Protocol parameters.

message-fast-tx

Syntax **message-fast-tx** *time*
no message-fast-tx

Context config>system>lldp

Description This command configures the duration of the fast transmission period.

Parameters *time* — Specifies the fast transmission period in seconds.

Values 1 — 3600

Default 1

message-fast-tx-init

Syntax **message-fast-tx-init** *count*
no message-fast-tx-init

Context config>system>lldp

Description This command configures the number of LLDPDUs to send during the fast transmission period.

Parameters *count* — Specifies the number of LLDPDUs to send during the fast transmission period.

Values 1 — 8

Default 4

notification-interval

Syntax **notification-interval** *time*
no notification-interval

Context config>system>lldp

Description This command configures the minimum time between change notifications.

Parameters *time* — Specifies the minimum time, in seconds, between change notifications.

Values 5 — 3600

Default 5

reinit-delay

Syntax **reinit-delay** *time*
no reinit-delay

Context config>system>lldp

Description This command configures the time before re-initializing LLDP on a port.

Parameters *time* — Specifies the time, in seconds, before re-initializing LLDP on a port.

Values 1 — 10

Default 2

tx-credit-max

Syntax **tx-credit-max** *count*
no tx-credit-max

Context config>system>lldp

Description This command configures the maximum consecutive LLDPDUs transmitted.

Parameters *count* — Specifies the maximum consecutive LLDPDUs transmitted.

Values 1 — 100

Default 5

tx-hold-multiplier

Syntax **tx-hold-multiplier** *multiplier*
no tx-hold-multiplier

Context config>system>lldp

Description This command configures the multiplier of the tx-interval.

Parameters *multiplier* — Specifies the multiplier of the tx-interval.

Values 2 — 10

Default 4

tx-interval

Syntax **tx-interval** *interval*
no tx-interval

Context config>system>lldp

Description This command configures the LLDP transmit interval time.

Parameters *interval* — Specifies the LLDP transmit interval time.

Values 1 — 100

Default 5

LLDP Ethernet Port Commands

lldp

Syntax **lldp**

Context config>port>ethernet

Description This command enables the context to configure Link Layer Discovery Protocol (LLDP) parameters on the specified port.

dest-mac

Syntax **dest-mac** {*bridge-mac*}

Context config>port>ethernet>lldp

Description This command configures destination MAC address parameters.

Parameters **bridge-mac —** Specifies destination bridge MAC type to use by LLDP.

Values **nearest-bridge** — Specifies to use the nearest bridge.
nearest-non-tpmr — Specifies to use the nearest non-Two-Port MAC Relay (TPMR) .
nearest-customer — Specifies to use the nearest customer.

admin-status

Syntax **admin-status** {**rx** | **tx** | **tx-rx** | **disabled**}

Context config>port>ethernet>lldp>dstmac

Description This command specifies the administratively desired status of the local LLDP agent.

Parameters **rx —** Specifies the LLDP agent will receive, but will not transmit LLDP frames on this port.

tx — Specifies that the LLDP agent will transmit LLDP frames on this port and will not store any information about the remote systems connected.

tx-rx — Specifies that the LLDP agent will transmit and receive LLDP frames on this port.

disabled — Specifies that the LLDP agent will not transmit or receive LLDP frames on this port. If there is remote systems information which is received on this port and stored in other tables, before the port's admin status becomes disabled, then the information will naturally age out.

notification

Syntax [**no**] **notification**

Context config>port>ethernet>lldp>dstmac

Description This command enables LLDP notifications.

The **no** form of the command disables LLDP notifications.

tx-mgmt-address

Syntax **tx-mgmt-address** [**system**]
no tx-mgmt-address

Context config>port>ethernet>lldp>dstmac

Description This command specifies which management address to transmit.

The no form of the command resets value to the default.

Default no tx-mgmt-address

Parameters **system —** Specifies to use the system IP address. Note that the system address will only be transmitted once 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

Description This command specifies which LLDP TLVs to transmit.

The **no** form of the command resets the value to the default.

Default no tx-tlvs

Parameters **port-desc —** Indicates that the LLDP agent should transmit port description TLVs.

sys-name — Indicates that the LLDP agent should transmit system name TLVs.

sys-desc — Indicates that the LLDP agent should transmit system description TLVs.

sys-cap — Indicates that the LLDP agent should transmit system capabilities TLVs.

Show Commands

SYSTEM COMMANDS

connections

Syntax **connections** [**address** *ip-address*] [**port** *port-number*] [**detail**]

Context show>system

Description This command displays UDP and TCP connection information.
If no command line options are specified, a summary of the TCP and UDP connections displays.

Parameters *ip-address* — Displays only the connection information for the specified IP address.

Values

ipv4-address:	a.b.c.d (host bits must be 0)
ipv6-address:	x:x:x:x:x:x:x:x[-interface]
	x:x:x:x:x:x:d.d.d.d[-interface]
	x: [0 — FFFF]H
	d: [0 — 255]D
	interface: 32 characters maximum, mandatory for link local addresses

port-number — Displays only the connection information for the specified port number.

Values 0 — 65535

detail — Appends TCP statistics to the display output.

Output **Standard Connection Output —** The following table describes the system connections output fields.

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.

Label	Description (Continued)
	vRtrID – The virtual router identifier. • vRtrID 0 — listens for connections in all routing instances including the Base and Management VRFs. • vRtrID 1 — Base routing instance • vRtrID 4095 — Management routing instance MSS – The TCP maximum segment size.

Sample Output

```
A:ALA-12# show system connections

===============================================================================
Connections
===============================================================================
Prot RecvQ   TxmtQ   Local Address                                      State
               MSS  Remote Address                                        vRtrID
-------------------------------------------------------------------------------
TCP        0       0 0.0.0.0.21                                        LISTEN
              1024  0.0.0.0.0                                                0
TCP        0       0 0.0.0.0.22                                        LISTEN
              1024  0.0.0.0.0                                                0
TCP        0       0 0.0.0.0.23                                        LISTEN
              1024  0.0.0.0.0                                                0
TCP        0       0 0.0.0.0.830                                       LISTEN
              1024  0.0.0.0.0                                                0
TCP        0       0 0.0.0.0.6068                                      LISTEN
              1024  0.0.0.0.0                                                0
TCP        0       0 0.0.0.0.47806                                     LISTEN
              1024  0.0.0.0.0                                                0
TCP        0       0 ::.21                                             LISTEN
              1024  ::.0                                                     0
TCP        0       0 ::.22                                             LISTEN
              1024  ::.0                                                     0
TCP        0       0 ::.830                                            LISTEN
              1024  ::.0                                                     0
TCP        0       0 ::.47806                                          LISTEN
              1024  ::.0                                                     0
TCP        0       0 127.1.0.11.21                                     LISTEN
              1024  0.0.0.0.0                                              4095
TCP        0       0 127.1.0.11.21059                                  LISTEN
              1024  0.0.0.0.0                                              4095
TCP        0       0 135.121.129.98.22                                 LISTEN
              1024  0.0.0.0.0                                              4095
TCP        0       0 135.121.129.98.23                                 ESTABLISH
              1024  138.120.140.149.59042                                  4095
TCP        0    1149 135.121.129.98.23                                 ESTABLISH
              1024  138.120.140.244.58579                                  4095
TCP        0       0 135.121.129.98.830                                LISTEN
              1024  0.0.0.0.0                                              4095
TCP        0       0 3000::8779:8163.22                                LISTEN
              1024  ::.0                                                   4095
TCP        0       0 3000::8779:8163.830                               LISTEN
```

```
               1024  ::.0                                                  4095
UDP        0       0 0.0.0.0.67                                    ---
                     0.0.0.0.0                                             0
UDP        0       0 0.0.0.0.68                                    ---
                     0.0.0.0.0                                             0
UDP        0       0 0.0.0.0.123                                   ---
                     0.0.0.0.0                                             0
UDP        0       0 0.0.0.0.319                                   ---
                     0.0.0.0.0                                             0
UDP        0       0 0.0.0.0.320                                   ---
                     0.0.0.0.0                                             0
UDP        0       0 0.0.0.0.514                                   ---
                     0.0.0.0.0                                             0
UDP        0       0 0.0.0.0.50055                                 ---
                     0.0.0.0.0                                             0
UDP        0       0 ::.123                                        ---
                     ::.0                                                  0
UDP        0       0 ::.50056                                      ---
                     ::.0                                                  0
UDP        0       0 0.0.0.0.1025                                  ---
                     0.0.0.0.0                                             1
UDP        0       0 0.0.0.0.123                                   ---
                     0.0.0.0.0                                          4095
UDP        0       0 0.0.0.0.49152
-------------------------------------------------------------------------------
No. of Connections: 18
===============================================================================
A:ALA-12#
```

Sample Detailed Output

```
A:ALA-12# show system connections detail
-------------------------------------------------------------------------------
 TCP Statistics
-------------------------------------------------------------------------------
packets sent                                : 659635
data packets                                : 338982 (7435146 bytes)
data packet retransmitted                   : 73 (1368 bytes)
ack-only packets                            : 320548 (140960 delayed)
URG only packet                             : 0
window probe packet                         : 0
window update packet                        : 0
control packets                             : 32
packets received                            : 658893
acks                                        : 338738 for (7435123 bytes)
duplicate acks                              : 23
ack for 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
connections dropped by bad md5 digest       : 0
connections dropped by enhanced auth        : 0
path mtu discovery backoff                  : 0
===============================================================================
A:ALA-12#
```

cpu

Syntax **cpu** [**sample-period** *seconds*]

Context show>system

Description This command displays CPU utilization per task over a sample period.

Parameters **sample-period** *seconds* **—** The number of seconds over which to sample CPU task utilization.

Default 1

Values 1 — 5

Output **System CPU Output —** The following table describes the system CPU output fields.

Label	Description
CPU Utilization	The total amount of CPU time.
Name	The process or protocol name.
CPU Time (uSec)	The CPU time each process or protocol has used in the specified time.
CPU Usage	The sum of CPU usage of all the processes and protocols.
Capacity Usage	Displays the level the specified service is being utilized. When this number hits 100%, this part of the system is busied out. There may be extra CPU cycles still left for other processes, but this service is running at capacity. This column does not reflect the true CPU utilization value; that data is still available in the **CPU Usage** column. This column is the **busiest** task in each group, where **busiest** is defined as either actually running or blocked attempting to acquire a lock.

Sample Output

```
*A:cses-E11# show system cpu sample-period 2
===============================================================================
CPU Utilization (Sample period: 2 seconds)
===============================================================================
Name                                    CPU Time       CPU Usage        Capacity
                                          (uSec)                           Usage
-------------------------------------------------------------------------------
BFD                                           10          ~0.00%          ~0.00%
BGP                                            0           0.00%           0.00%
CFLOWD                                        61          ~0.00%          ~0.00%
Cards & Ports                              8,332           0.41%           0.08%
DHCP Server                                   79          ~0.00%          ~0.00%
ICC                                          408           0.02%           0.01%
IGMP/MLD                                   1,768           0.08%           0.08%
IOM                                       17,197           0.85%           0.31%
IP Stack                                   4,080           0.20%           0.09%
IS-IS                                      1,213           0.06%           0.06%
ISA                                        2,496           0.12%           0.07%
LDP                                            0           0.00%           0.00%
Logging                                       32          ~0.00%          ~0.00%
MPLS/RSVP                                  2,380           0.11%           0.08%
MSDP                                           0           0.00%           0.00%
Management                                 5,969           0.29%           0.15%
OAM                                          907           0.04%           0.02%
OSPF                                          25          ~0.00%          ~0.00%
PIM                                        5,600           0.27%           0.27%
RIP                                            0           0.00%           0.00%
RTM/Policies                                   0           0.00%           0.00%
Redundancy                                 3,635           0.18%           0.13%
SIM                                        1,462           0.07%           0.04%
SNMP Daemon                                    0           0.00%           0.00%
Services                                   2,241           0.11%           0.05%
Stats                                          0           0.00%           0.00%
Subscriber Mgmt                            2,129           0.10%           0.04%
System                                     8,802           0.43%           0.17%
Traffic Eng                                    0           0.00%           0.00%
VRRP                                         697           0.03%           0.02%
WEB Redirect                                 125          ~0.00%          ~0.00%
-------------------------------------------------------------------------------
Total                                  2,014,761         100.00%
   Idle                                1,945,113          96.54%
   Usage                                  69,648           3.45%
Busiest Core Utilization                  69,648           3.45%
===============================================================================
*A:cses-E11#
```

cron

Syntax **cron**

Context show>cron

Description This command enters the show CRON context.

action

Syntax **action** [*action-name*] [**owner** *action-owner*] **run-history** *run-state*

Context show>cron#

Description This command displays cron action parameters.

Parameters **action** *action-name* **—** Specifies the action name.

Values maximum 32 characters

owner *action-owner* **—** Specifies the owner name.

Default TiMOS CLI

run-history *run-state* **—** Specifies the state of the test to be run.

Values executing, initializing, terminated

Output The following table describes the show cron action output fields.

Label	Description
Action	Displays the name of the action.
Action owner	The name of the action owner.
Administrative status	Enabled — Administrative status is enabled
	Disabled — Administrative status is disabled
Script	The name of the script
Script owner	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 run history saved	Displays the maximum amount of time to keep the results from a script run.

Label	Description (Continued)
Last change	Displays the system time a change was made to the configuration.

Sample Output

```
*A:Redundancy# show cron action run-history terminated
===============================================================================
CRON Action Run History
===============================================================================
Action "test"
Owner "TiMOS CLI"
-------------------------------------------------------------------------------
Script Run #17
-------------------------------------------------------------------------------
Start time    : 2006/11/06 20:30:09     End time      : 2006/11/06 20:35:24
Elapsed time  : 0d 00:05:15             Lifetime      : 0d 00:00:00
State         : terminated              Run exit code : noError
Result time   : 2006/11/06 20:35:24     Keep history  : 0d 00:49:57
Error time    : never
Results file  : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-203008.
                out
Run exit      : Success
-------------------------------------------------------------------------------
Script Run #18
-------------------------------------------------------------------------------
Start time    : 2006/11/06 20:35:24     End time      : 2006/11/06 20:40:40
Elapsed time  : 0d 00:05:16             Lifetime      : 0d 00:00:00
State         : terminated              Run exit code : noError
Result time   : 2006/11/06 20:40:40     Keep history  : 0d 00:55:13
Error time    : never
Results file  : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-203523.
                out
Run exit      : Success
-------------------------------------------------------------------------------
*A:Redundancy#


*A:Redundancy# show cron action run-history executing
===============================================================================
CRON Action Run History
===============================================================================
Action "test"
Owner "TiMOS CLI"
-------------------------------------------------------------------------------
Script Run #20
-------------------------------------------------------------------------------
Start time    : 2006/11/06 20:46:00     End time      : never
Elapsed time  : 0d 00:00:56             Lifetime      : 0d 00:59:04
State         : executing               Run exit code : noError
Result time   : never                   Keep history  : 0d 01:00:00
Error time    : never
Results file  : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-204559.
                out
===============================================================================
*A:Redundancy#
```

```
*A:Redundancy# show cron action run-history initializing
===============================================================================
CRON Action Run History
===============================================================================
Action "test"
Owner "TiMOS CLI"
-------------------------------------------------------------------------------
Script Run #21
-------------------------------------------------------------------------------
Start time    : never                   End time      : never
Elapsed time  : 0d 00:00:00             Lifetime      : 0d 01:00:00
State         : initializing            Run exit code : noError
Result time   : never                   Keep history  : 0d 01:00:00
Error time    : never
Results file  : none
-------------------------------------------------------------------------------
Script Run #22
-------------------------------------------------------------------------------
Start time    : never                   End time      : never
Elapsed time  : 0d 00:00:00             Lifetime      : 0d 01:00:00
State         : initializing            Run exit code : noError
Result time   : never                   Keep history  : 0d 01:00:00
Error time    : never
Results file  : none
-------------------------------------------------------------------------------
Script Run #23
-------------------------------------------------------------------------------
Start time    : never                   End time      : never
Elapsed time  : 0d 00:00:00             Lifetime      : 0d 01:00:00
State         : initializing            Run exit code : noError
Result time   : never                   Keep history  : 0d 01:00:00
Error time    : never
Results file  : none
===============================================================================
*A:Redundancy#
```

schedule

Syntax **schedule** [*schedule-name*] [**owner** *schedule-owner*]

Context show>cron#

Description This command displays cron schedule parameters.

Parameters *schedule-name* — Displays information for the specified scheduler name.

owner *schedule-owner* **—** Displays information for the specified scheduler owner.

Output The following table describes the show cron schedule output fields.

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.
Action	Displays the action name
Action owner	Displays the name of action owner.
Script	Displays the name of the script.
Script owner	Displays the name of the script.
Script owner	Displays the name of the of script owner.
Script source location	Displays the location of scheduled script.
Script results location	Displays the location where the script results have been sent.
Schedule type	Periodic — Displays a schedule which ran at a given interval.
	Calendar — Displays a schedule which ran based on a calendar.
	Oneshot — Displays a schedule which ran one time only.
Interval	Displays the interval between runs of an event.
Next scheduled run	Displays the time for the next scheduled run.
Weekday	Displays the configured weekday.
Month	Displays the configured month.
Day of Month	Displays the configured day of month.
Hour	Displays the configured hour.
Minute	Displays the configured minute.
Number of scheduled runs	Displays the number of scheduled sessions.
Last scheduled run	Displays the last scheduled session.

Label	Description (Continued)
Number of scheduled failures	Displays the number of scheduled sessions that failed to execute.
Last scheduled failure	Displays the last scheduled session that failed to execute.
Last failure time	Displays the system time of the last failure.

```
A:sim1>show>cron schedule test
===============================================================================
CRON Schedule Information
===============================================================================
Schedule                      : test
Schedule owner                : TiMOS CLI
Description                   : none
Administrative status         : enabled
Operational status            : enabled
Action                        : test
Action owner                  : TiMOS CLI
Script                        : test
Script Owner                  : TiMOS CLI
Script source location        : ftp://*****:******@192.168.15.1/home/testlab_bgp
                                /cron/test1.cfg
Script results location       : ftp://*****:******@192.168.15.1/home/testlab_bgp
                                /cron/res
Schedule type                 : periodic
Interval                      : 0d 00:01:00 (60 seconds)
Next scheduled run            : 0d 00:00:42
Weekday                       : tuesday
Month                         : none
Day of month                  : none
Hour                          : none
Minute                        : none
Number of schedule runs       : 10
Last schedule run             : 2008/01/01 17:20:52
Number of schedule failures   : 0
Last schedule failure         : no error
Last failure time             : never
===============================================================================
A:sim1>show>cron
```

script

Syntax **script** [*script-name*] [**owner** *script-owner*]

Context show>cron#

Description This command displays cron script parameters.

Parameters *schedule-name* — Displays information for the specified script.

owner *schedule-owner* — Displays information for the specified script owner.

Output The following table describes the show cron script output fields.

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.

Sample Output

```
A:sim1>show>cron# script
===============================================================================
CRON Script Information
===============================================================================
Script                       : test
Owner name                   : TiMOS CLI
Description                  : asd
Administrative status        : enabled
Operational status           : enabled
Script source location       : ftp://*****:******@192.168.15.1/home/testlab_bgp
                               /cron/test1.cfg
Last script error            : none
Last change                  : 2006/11/07 17:10:03
===============================================================================
A:sim1>show>cron#
```

information

Syntax **information**

Context show>system

Description This command displays general system information including basic system, SNMP server, last boot and DNS client information.

Output **System Information Output —** The following table describes the system information output fields.

Label	Description
System Name	The configured system name.
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 file was loaded from the secondary source. Tertiary — Indicates that the directory location for runtime image file was loaded from the tertiary source.
Config Source	Primary — Indicates that the directory location for configuration file was loaded from the primary source. Secondary — Indicates that the directory location for configuration file was loaded from the secondary source. Tertiary — Indicates that the directory location for configuration file was loaded from the tertiary source.

Label	Description (Continued)
DNS Resolve Preference	ipv4-only – Dns-names are queried for A-records only. ipv6-first – Dns-server will be queried for AAAA-records first and a successful reply is not received, the dns-server is queried for A-records.
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 this card was last rebooted.
Last Boot Index Header	The header of the persistence index file read when this card was last rebooted.
Last Saved Config	The location and filename of the last saved configuration file.
Time Last Saved	The date and time of the last time configuration file was saved.
Changes Since Last Save	Yes – There are unsaved configuration file changes. No – There are no unsaved configuration file changes.
Time Last Modified	The date and time of the last modification.
Max Cfg/BOF Backup Rev	The maximum number of backup revisions maintained for a configuration file. This value also applies to the number of revisions maintained for the BOF file.
Cfg-OK Script	URL – The location and name of the CLI script file executed following successful completion of the boot-up configuration file execution.
Cfg-OK Script Status	Successful/Failed – The results from the execution of the CLI script file specified in the Cfg-OK Script location. Not used – No CLI script file was executed.
Cfg-Fail Script	URL – The location and name of the CLI script file executed following a failed boot-up configuration file execution. Not used – No CLI script file was executed.
Cfg-Fail Script Status	Successful/Failed – The results from the execution of the CLI script file specified in the Cfg-Fail Script location. Not used – No CLI script file was executed.
Management IP Addr	The management IP address and mask.
DNS Server	The IP address of the DNS server.
DNS Domain	The DNS domain name of the node.

Label	Description (Continued)
BOF Static Routes	To — The static route destination. Next Hop — The next hop IP address used to reach the destination. Metric — Displays the priority of this static route versus other static routes. None — No static routes are configured.

Sample Output

```
A:Dut-F>show system information
...
Primary DNS Server     : 138.120.252.56
Secondary DNS Server   : 138.120.252.48
Tertiary DNS Server    : 138.120.252.49
DNS Domain             : labs.ca.alcatel-lucent.com
DNS Resolve Preference : ipv4-only
DNSSEC                 AD Validated    : False
DNSSEC Response Control: drop
BOF Static Routes      :

A:Dut-F# show system information
===============================================================================
System Information
===============================================================================
System Name            : Dut-F
System Type            : 7750 SR-7 7450 ESS-7
System Version         : B-6.0.B1-6
System Contact         :
System Location        :
System Coordinates     :
System Active Slot     : A
System Up Time         : 0 days, 03:42:01.29 (hr:min:sec)

SNMP Port              : 161
SNMP Engine ID         : 0000197f00008c6cff000000
SNMP Max Message Size  : 1500
SNMP Admin State       : Enabled
SNMP Oper State        : Enabled
SNMP Index Boot Status : Not Persistent
SNMP Sync State        : OK

Tel/Tel6/SSH/FTP Admin : Enabled/Disabled/Enabled/Enabled
Tel/Tel6/SSH/FTP Oper  : Up/Down/Up/Up

BOF Source             : ftp://test:test@xxx.xxx.xx.xxx/./images
Image Source           : primary
Config Source          : primary
Last Booted Config File: ftp://*:*@xxx.xxx.xx.xxx/./images/dut-f.cfg
Last Boot Cfg Version  : N/A
Last Boot Index Version: N/A
Last Saved Config      : N/A
Time Last Saved        : N/A
Changes Since Last Save: No
Max Cfg/BOF Backup Rev : 5
```

```
Cfg-OK Script          : ftp://*:*@[3000::8acb:466d]/./images/env.cfg
Cfg-OK Script Status   : failed
Cfg-Fail Script        : N/A
Cfg-Fail Script Status : not used
Management IP Addr     : xxx.xxx.xx.xxx/23
Primary DNS Server     : xxx.xxx.xx.xxx
Secondary DNS Server   : xxx.xxx.xx.xxx
Tertiary DNS Server    : N/A
DNS Domain             : sh.bel.alcatel.be
DNS Resolve Preference : ipv4-only
BOF Static Routes      :
  To                   Next Hop
  138.203.0.0/16       xxx.xxx.xx.xxx
  172.0.0.0/8          xxx.xxx.xx.xxx
ATM Location ID        : 01:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
ATM OAM Retry Up       : 2
ATM OAM Retry Down     : 4
ATM OAM Loopback Period: 10
===============================================================================
A:Dut-F#
```

lldp

Syntax **lldp neighbor**

Context show>system

Description This command displays neighbor information for all configured ports without having to specify each individual port ID.

Parameters **neighbor —** Displays LLDP neighbor information.

Sample Output

```
*A:Dut-C# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information
===============================================================================
NB = nearest-bridge   NTMPR = nearest-non-tpmr   NC = nearest-customer
===============================================================================
Port      Scope  Chassis ID           Index    Port ID     System Name
-------------------------------------------------------------------------------
1/1/1     NB     16:2f:ff:00:00:00    1        35717120    Dut-A
2/1/2     NB     16:34:ff:00:00:00    1        35782656    Dut-D
2/1/1     NB     16:36:ff:00:00:00    2        35684352    Dut-E
1/1/2     NB     16:30:ff:00:00:00    2        35749888    Dut-B
1/1/3     NB     16:30:ff:00:00:00    3        35782656    Dut-B
2/1/3     NB     16:30:ff:00:00:00    3        35815424    Dut-B
===============================================================================
Number of neighbors : 6
*A:Dut-C#


A:GHR-API# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information
```

```
===============================================================================
NB = nearest-bridge   NTMPR = nearest-non-tpmr   NC = nearest-customer
===============================================================================
Port      Scope  Chassis ID           Index    Port ID     System Name
-------------------------------------------------------------------------------
1/1/6     NTPMR  00:21:05:1b:bc:17    1        36044800    RXI-AMI
1/1/8     NTPMR  00:21:06:6d:bd:53    2        36110336    YOY-WOW
1/1/9     NTPMR  00:21:08:2b:ab:81    3        36143104    FRI-MON
===============================================================================
Number of neighbors : 3
```

load-balancing-alg

Syntax **load-balancing-alg** [**detail**]

Context show>system

Description This command displays system load balancing settings.

Parameters **detail —** Displays port settings.

Sample Output

```
*A:ALA-49>show>system# load-balancing-alg
===============================================================================
System-wide Load Balancing Algorithms
===============================================================================
L4  - Load Balance                    : exclude-L4
LSR - Load Balance                    : lbl-only
===============================================================================
*A:ALA-49>show>system#
```

memory-pools

Syntax **memory-pools**

Context show>system

Description This command displays system memory status.

Output **Memory Pools Output —** The following table describes memory pool output fields.

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.

Label	Description
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.

Sample Output

```
A:ALA-1# show system memory-pools
===============================================================================
Memory Pools
===============================================================================
Name                Max Allowed    Current Size      Max So Far           In Use
-------------------------------------------------------------------------------
System                No limit      24,117,248      24,117,248      16,974,832
Icc                  8,388,608       1,048,576       1,048,576          85,200
RTM/Policies          No limit       5,242,912       5,242,912       3,944,104
OSPF                  No limit       3,145,728       3,145,728       2,617,384
MPLS/RSVP             No limit       9,769,480       9,769,480       8,173,760
LDP                   No limit               0               0               0
IS-IS                 No limit               0               0               0
RIP                   No limit               0               0               0
VRRP                  No limit       1,048,576       1,048,576              96
BGP                   No limit       2,097,152       2,097,152       1,624,800
Services              No limit       2,097,152       2,097,152       1,589,824
IOM                   No limit     205,226,800     205,226,800     202,962,744
SIM                   No limit       1,048,576       1,048,576             392
CFLOWD                No limit               0       1,048,576               0
IGMP                  No limit               0               0               0
PIM                   No limit               0               0               0
ATM                   No limit       2,872,648       2,872,648       2,790,104
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#
```

ntp

Syntax **ntp**

Context show>system

Description This command displays NTP protocol configuration and state.

Output **Show NTP Output —** The following table describes NTP output fields.

Label	Description
Enabled	yes — NTP is enabled. no — NTP is disabled.
Admin Status	yes — Administrative state is enabled. no — Administrative state is disabled.
NTP Server	Displays NTP server state of this node.
Stratum	Displays stratum level of this node.
Oper Status	yes — The operational state is enabled. no — The operational state is disabled.
Auth Check	Displays the authentication requirement
System Ref. ID	IP address of this node or a 4-character ASCII code showing the state.
Auth Error	Displays the number of authentication errors.
Auth Errors Ignored	Displays the number of authentication errors ignored.
Auth key ID Errors	Displays the number of key identification errors.
Auth Key Type Errors	Displays the number of authentication key type errors.
Reject	The peer is rejected and will not be used for synchronization. Rejection reasons could be the peer is unreachable, the peer is synchronized to this local server so synchronizing with it would create a sync loop, or the synchronization distance is too large. This is the normal startup state.
Invalid	The peer is not maintaining an accurate clock. This peer will not be used for synchronization.
Excess	The peer's synchronization distance is greater than ten other peers. This peer will not be used for synchronization.
Outlyer	The peer is discarded as an outlyer. This peer will not be used for synchronization.
Candidate	The peer is accepted as a possible source of synchronization.
Selected	The peer is an acceptable source of synchronization, but its synchronization distance is greater than six other peers.
Chosen	The peer is chosen as the source of synchronization.

Label	Description (Continued)
ChosenPPS	The peer is chosen as the source of synchronization, but the actual synchronization is occurring from a pulse-per-second (PPS) signal.
Remote	The IP address of the remote NTP server or peer with which this local host is exchanging NTP packets.
Reference ID	When stratum is between 0 and 15 this field shows the IP address of the remote NTP server or peer with which the remote is exchanging NTP packets. For reference clocks, this field shows the identification assigned to the clock, such as, ".GPS." For an NTP server or peer, if the client has not yet synchronized to a server/peer, the status cannot be determined and displays the following codes: Peer Codes: ACST – The association belongs to any cast server. AUTH – Server authentication failed. 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 due to local policy. No further messages will be sent to the server. INIT – The association has not yet synchronized for the first time. MCST – The association belongs to a manycast server. NKEY – No key found. Either the key was never installed or is not trusted. RATE – Rate exceeded. The server has temporarily denied access because the client exceeded the rate threshold. RMOT – The association from a remote host running ntpdc has had unauthorized attempted access. STEP – A step change in system time has occurred, but the association has not yet resynchronized. System Codes INIT – The system clock has not yet synchronized for the first time. STEP – A step change in system time has occurred, but the system clock has not yet resynchronized.
St	Stratum level of this node.
Auth	yes – Authentication is enabled. no – Authentication is disabled.

Label	Description (Continued)
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.

Sample Output

```
A:pc-40>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:Dut-A# 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
    138.120.193.198
===============================================================================
A:Dut-A#


A:pc-40>config>system>time>ntp# show system ntp detail
===============================================================================
NTP Status
===============================================================================
Enabled            : Yes                Stratum              : 3
Admin Status       : up                 Oper Status          : up
Server enabled     : No                 Server keyId         : none
```

```
System Ref Id      : 192.168.15.221     Auth Check           : Yes
Auth Errors        : 0                  Auth Errors Ignored  : 0
Auth Key Id Errors : 0                  Auth Key Type Errors : 0
===============================================================================
NTP Configured Broadcast/Multicast Interfaces
===============================================================================
vRouter         Interface           Address             Type    Auth    Poll
-------------------------------------------------------------------------------
Base            i3/1/1              Host-ones           bcast   yes     off
management      management          224.0.1.1           mcast   no      off
Base            t2                                      bclnt   no      n/a
management      management          224.0.1.1           mclnt   no      n/a
===============================================================================
A:pc-40>config>system>time>ntp#


A:pc-40>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          224.0.1.1           mcast   no      off
Base            t2                                      bclnt   no      n/a
management      management          224.0.1.1           mclnt   no      n/a
===============================================================================
NTP Active Associations
===============================================================================
State      Remote          Reference ID    St  Type   Auth  Poll  R  Offset
-------------------------------------------------------------------------------
reject     192.168.15.221  192.168.14.50   2   srvr   none  64    y  0.901
chosen     192.168.15.221  192.168.1.160   4   mclnt  none  64    y  1.101
===============================================================================
A:pc-40>config>system>time>ntp#
```

rollback

Syntax **rollback**

Context show>system

Description This command displays rollback configuration and state.

Sample Output

```
A:dut-a_a># show system rollback
===============================================================================
Rollback Information
===============================================================================
Rollback Location               : cf1:/Rollback
Save
  Last Rollback Save Result     : In Progress, Successful or Failed
  Last Save Completion Time     : 10/15/2010 21:24:06
Revert
  In Progress                   : Yes, No
  Last Revert Initiated Time    : 10/15/2010 21:26:23
  Last Revert Initiated User    : xyz
  Last Initiated Checkpoint     : cf1:/Rollback.rb.3
  Last Completed Revert Result  : Successful or Failed
  Last Revert Completion  Time  : 10/15/2010 21:27:19
===============================================================================
Rollback Files
===============================================================================
Idx      Suffix   Creation time        Release  User
           Comment
-------------------------------------------------------------------------------
latest   .rb      2010/10/15 21:24:02  9.0.R4   fred
           This checkpoint was saved after the 3 VPLS services were created
1        .rb.1    2010/10/15 21:23:58  9.0.R4   John
           John's checkpoint on Sunday
2        .rb.2    2010/10/15 21:23:52  9.0.R4   admin
           A long checkpoint comment that an operator is using to summarize
           various some of the changes that were made.   They may even have so
           much to say that they use the maximum comment size.   Notice that
           words are not chopped.
…
9        .rb.9    2010/10/14 22:00:01  9.0.R4   admin
           VPLS services 1000-2000 created
…
53       .rb.53   2010/10/14 22:10:10  9.0.R4   admin
-------------------------------------------------------------------------------
No. of Rollback Files: 10
===============================================================================
```

ptp

Syntax **ptp [standby]**
ptp [unicast [router *router-instance*]]
ptp [statistics]
ptp peers [router *router-instance*] **[detail]**
ptp peer ip-address [router *router-instance*] **[detail]**

Context show>system

Description These commands display Precision Time Protocol (PTP) configuration and state information. This information can be displayed for the entire node or on a per router instance basis.

Parameters **standby —** Displays information for PTP on the standby control module.

unicast — Displays information related to the unicast sessions.

statistics — Displays the message and error statistics for the node.

peers — Displays summary information for the PTP peers.

peer — Displays information for a single PTP peer.

router router-instance — Qualifier to show only the information for a specific router instance.

detail — Provides additional information on the specified area.

router-instance — router-name|service-id

Values router-name - "Base"

Values service-id - [1..2147483647]

Output **Show PTP Output —** The following table describes PTP output fields.

Label	Description
Pending	When the SR/ESS has initiated a request to a peer but has not yet received a response.
Granted	When the SR/ESS has initiated a request to a peer and it was granted OR a peer has made a request of the SR/ESS and it was granted.
Denied	When the SR/ESS has initiated a request to a peer but it was rejected.
Canceled	When a cancel message has been received from or transmitted toward a peer.
Expired	When a unicast session between the SR/ESS and the peer has expired without being renewed.

Sample Output

```
B:NS082761964# 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
Peer Limit        : none (Base Router)
Clock Id          : 001af0fffeb2fead   Clock Class         : 255 (slave-only)
Clock Accuracy    : 0xfe (unknown)     Clock Variance      : ffff (not computed)
Clock Priority1   : 128                Clock Priority2     : 128
PTP Recovery State: locked             Last Changed        : 08/24/2010 13:17:37
```

```
Frequency Offset  : +231.920 ppb
-------------------------------------------------------------------------------
Parent Clock
-------------------------------------------------------------------------------
IP Address        : 2.1.1.1            Router            : Base
Parent Clock Id   : 001af0fffeab36ad   Parent Port Number: 2
GM Clock Id       : 00b0aefffe011ca6   GM Clock Class    : 13
GM Clock Accuracy : 0xfe (unknown)     GM Clock Variance : 0x6400 (3.7E-09)
GM Clock Priority1: 128                GM Clock Priority2: 128
-------------------------------------------------------------------------------
Time Information
-------------------------------------------------------------------------------
Timescale           : PTP
Current Time        : 2011-08-30 15:31:42.99 UTC
Frequency Traceable : yes
Time Traceable      : yes
Time Source         : gps
===============================================================================


B:NS082761964# show system ptp standby
===============================================================================
IEEE 1588/PTP Clock Information
===============================================================================
-------------------------------------------------------------------------------
Local Clock
-------------------------------------------------------------------------------
Clock Type        : ordinary,slave     PTP Profile         : ieee1588-2008
Domain            : 0
Admin State       : up                 Oper State          : up
Announce Interval : 1 pkt/2 s          Announce Rx Timeout : 3 intervals
Clock Id          : 001af0fffeb2fead   Clock Class         : 255 (slave-only)
Clock Accuracy    : 0xfe (unknown)     Clock Variance      : ffff (not computed)
Clock Priority1   : 128                Clock Priority2     : 128
PTP Port State    : listening          Last Changed        : 02/11/2013 18:09:58
PTP Recovery State: locked             Last Changed        : 08/24/2010 13:17:37
Frequency Offset  : +231.920 ppb
-------------------------------------------------------------------------------
Parent Clock
-------------------------------------------------------------------------------
IP Address        : 2.1.1.1
Parent Clock Id   : 001af0fffeab36ad   Remote PTP Port Number: 2
GM Clock Id       : 00b0aefffe011ca6   GM Clock Class    : 13
GM Clock Accuracy : 0xfe (unknown)     GM Clock Variance : 0x6400 (3.7E-09)
GM Clock Priority1: 128                GM Clock Priority2: 128
-------------------------------------------------------------------------------
Time Information
-------------------------------------------------------------------------------
Timescale           : PTP
Current Time        : 2011-08-30 15:31:42.99 UTC
Frequency Traceable : yes
Time Traceable      : yes
Time Source         : gps
===============================================================================


A:bksim1619# show system ptp statistics
===============================================================================
IEEE 1588/PTP Packet Statistics
```

```
===============================================================================
                                                      Input              Output
-------------------------------------------------------------------------------
PTP Packets                                         2910253             2393354
  Announce                                            9015               22682
  Sync                                             1153275              622585
  Follow Up                                              0                   0
  Delay Request                                     594036             1153568
  Delay Response                                   1153044              593614
  Signaling                                            883                 905
    Request TLVs                                       428                 598
      Announce                                         304                 350
      Sync                                              62                 124
      Delay Response                                    62                 124
    Grant TLVs (Granted)                               514                 428
      Announce                                         272                 304
      Sync                                             121                  62
      Delay Response                                   121                  62
    Grant TLVs (Rejected)                                0                   0
      Announce                                           0                   0
      Sync                                               0                   0
      Delay Response                                     0                   0
    Cancel TLVs                                          3                   0
      Announce                                           1                   0
      Sync                                               1                   0
      Delay Response                                     1                   0
    Ack Cancel TLVs                                      0                   3
      Announce                                           0                   1
      Sync                                               0                   1
      Delay Response                                     0                   1
    Other TLVs                                           0                   0
  Other                                                  0                   0
  Event Packets timestamped at port                 215523              215371
  Event Packets timestamped in software                  0                   0
  Discards                                               0                   0
    Bad domain value                                     0                   0
    Alternate Master Flag Set                            0                   0
    Other                                                0                   0
===============================================================================
===============================================================================
IEEE 1588/PTP Clock Recovery State Statistics
===============================================================================
State                                                                  Seconds
-------------------------------------------------------------------------------
Initial                                                                    136
Acquiring                                                                    0
Phase-Tracking                                                               0
Locked                                                                       0
Hold-over                                                                    0
===============================================================================
===============================================================================
IEEE 1588/PTP Clock Recovery Event Statistics
===============================================================================
Event                                                                  Count
-------------------------------------------------------------------------------
Packet Loss                                                                  0
Excessive Packet Loss                                                        0
Excessive Phase Shift Detected                                               0
Too Much Packet Delay Variation                                              0
```

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


*A:bksim1618# show system ptp peers
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
Base
  1.4.1.21                  tx        n/a         master         no
1
  1.2.1.20                  rx+tx     up          master         no
  1.3.1.19                  rx        up          slave          yes
2
  1.1.1.21                  tx        n/a         master         no
-------------------------------------------------------------------------------
No. of PTP Peers: 4
===============================================================================


*A:bksim1618# show system ptp peers router Base
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
Base
  1.4.1.21                  tx        n/a         master         no
-------------------------------------------------------------------------------
No. of PTP Peers: 1
===============================================================================


*A:bksim1618# show system ptp peers router 1
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address                Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
1
  1.2.1.20                  rx+tx     up          master         no
  1.3.1.19                  rx        up          slave          yes
-------------------------------------------------------------------------------
No. of PTP Peers: 2
===============================================================================


*A:bksim1618# show system ptp peers detail
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router            : Base
IP Address        : 1.4.1.21           Announce Direction : tx
Admin State       : n/a                G.8265.1 Priority  : n/a
Local PTP Port    : 3                  PTP Port State     : master
```

```
Clock Id          : ac65fffffe000000   Remote PTP Port    : 1
-------------------------------------------------------------------------------
Router            : 1
IP Address        : 1.2.1.20           Announce Direction : rx+tx
Admin State       : up                 G.8265.1 Priority  : n/a
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        : 1.3.1.19           Announce Direction : rx
Admin State       : up                 G.8265.1 Priority  : n/a
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        : 1.1.1.21           Announce Direction : tx
Admin State       : n/a                G.8265.1 Priority  : n/a
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        : 1.2.1.20           Announce Direction : rx+tx
Admin State       : up                 G.8265.1 Priority  : n/a
Local PTP Port    : 2                  PTP Port State     : master
Clock Id          : ac5effffe000000    Remote PTP Port    : 1
-------------------------------------------------------------------------------
Router            : 1
IP Address        : 1.3.1.19           Announce Direction : rx
Admin State       : up                 G.8265.1 Priority  : n/a
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
===============================================================================


A:bksim1620# show system ptp peer 6.1.1.2 router 5
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router            : 5
IP Address        : 6.1.1.2            Announce Direction : rx+tx
Admin State       : up                 G.8265.1 Priority  : n/a
Local PTP Port    : 2                  PTP Port State     : passive
Clock Id          : ac5dfffffe000000   Remote PTP Port    : 2
```

```
GM Clock Id       : ac5cffffe000000   GM Clock Class     : 13
GM Clock Accuracy : 0xfe (unknown)    GM Clock Variance  : ffff (not computed)
GM Clock Priority1: 128               GM Clock Priority2 : 128
Steps Removed     : 1                 Parent Clock       : no
===============================================================================


A:bksim1620# show system ptp peer 6.1.1.2 router 5 detail
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router Instance   : 5
IP Address        : 6.1.1.2           Announce Direction : rx+tx
Admin State       : up                G.8265.1 Priority  : n/a
Local PTP Port    : 2                 PTP Port State     : passive
Clock Id          : ac5dffffe000000   Remote PTP Port    : 2
GM Clock Id       : ac5cffffe000000   GM Clock Class     : 13
GM Clock Accuracy : 0xfe (unknown)    GM Clock Variance  : ffff (not computed)
GM Clock Priority1: 128               GM Clock Priority2 : 128
Steps Removed     : 1                 Parent Clock       : no
===============================================================================
===============================================================================
IEEE 1588/PTP Unicast Negotiation Information
===============================================================================
IP Address      Dir Type       Rate       Duration State    Time
-------------------------------------------------------------------------------
6.1.1.2         Rx  Announce   1 pkt/2 s  300      Granted  09/01/2010 17:23:04
6.1.1.2         Tx  Announce   1 pkt/2 s  300      Granted  09/01/2010 17:23:04
===============================================================================
===============================================================================
IEEE 1588/PTP Packet Statistics
===============================================================================
                                                          Input              Output
-------------------------------------------------------------------------------
PTP Packets                                                 253                 11
  Announce                                                  243                  1
  Sync                                                        0                  0
  Follow Up                                                   0                  0
  Delay Request                                               0                  0
  Delay Response                                              0                  0
  Signaling                                                  10                 10
    Request TLVs                                              6                  4
      Announce                                                6                  4
      Sync                                                    0                  0
      Delay Response                                          0                  0
    Grant TLVs (Granted)                                      4                  6
      Announce                                                4                  6
      Sync                                                    0                  0
      Delay Response                                          0                  0
    Grant TLVs (Rejected)                                     0                  0
      Announce                                                0                  0
      Sync                                                    0                  0
      Delay Response                                          0                  0
    Cancel TLVs                                               0                  0
      Announce                                                0                  0
      Sync                                                    0                  0
      Delay Response                                          0                  0
    Ack Cancel TLVs                                           0                  0
      Announce                                                0                  0
```

```
      Sync                                                          0          0
      Delay Response                                                0          0
    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:bksim1618# show system ptp unicast
===============================================================================
IEEE 1588/PTP Unicast Negotiation Information
===============================================================================
Router
  IP Address      Dir Type     Rate       Duration State    Time
-------------------------------------------------------------------------------
Base
  1.4.1.21        Tx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:14:09
1
  1.2.1.20        Rx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:14:19
  1.2.1.20        Tx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:13:25
  1.2.1.20        Tx  Sync     64 pkt/s   300      Granted  04/21/2013 19:13:30
  1.2.1.20        Rx  DelayReq 64 pkt/s   300      Granted  04/21/2013 19:13:30
  1.2.1.20        Tx  DelayRsp 64 pkt/s   300      Granted  04/21/2013 19:13:30
  1.3.1.19        Rx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:13:16
  1.3.1.19        Rx  Sync     64 pkt/s   300      Granted  04/21/2013 19:13:21
  1.3.1.19        Tx  DelayReq 64 pkt/s   300      Granted  04/21/2013 19:13:21
  1.3.1.19        Rx  DelayRsp 64 pkt/s   300      Granted  04/21/2013 19:13:21
2
  1.1.1.21        Tx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:14:08
  1.1.1.21        Tx  Sync     64 pkt/s   300      Granted  04/21/2013 19:14:15
  1.1.1.21        Rx  DelayReq 64 pkt/s   300      Granted  04/21/2013 19:14:15
  1.1.1.21        Tx  DelayRsp 64 pkt/s   300      Granted  04/21/2013 19:14:15
-------------------------------------------------------------------------------
PTP Peers               : 4
Total Packet Rate       : 578 packets/second
===============================================================================
*A:bksim1618#


A:bksim1618# show system ptp router 1 unicast
===============================================================================
IEEE 1588/PTP Unicast Negotiation Information
===============================================================================
Router
  IP Address      Dir Type     Rate       Duration State    Time
-------------------------------------------------------------------------------
1
  1.2.1.20        Rx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:14:19
  1.2.1.20        Tx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:13:25
  1.2.1.20        Tx  Sync     64 pkt/s   300      Granted  04/21/2013 19:13:30
  1.2.1.20        Rx  DelayReq 64 pkt/s   300      Granted  04/21/2013 19:13:30
  1.2.1.20        Tx  DelayRsp 64 pkt/s   300      Granted  04/21/2013 19:13:30
  1.3.1.19        Rx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:13:16
  1.3.1.19        Rx  Sync     64 pkt/s   300      Granted  04/21/2013 19:13:21
```

```
  1.3.1.19        Tx  DelayReq 64 pkt/s   300      Granted  04/21/2013 19:13:21
  1.3.1.19        Rx  DelayRsp 64 pkt/s   300      Granted  04/21/2013 19:13:21
-------------------------------------------------------------------------------
PTP Peers               : 2
Total Packet Rate       : 385 packets/second
===============================================================================
*A:bksim1618#
```

sntp

Syntax **sntp**

Context show>system

Description This command displays SNTP protocol configuration and state.

Output **Show SNTP Output —** The following table describes SNTP output fields.

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.

Sample Output

```
A:ALA-1# show system sntp
===============================================================================
SNTP
===============================================================================
SNTP Server            Version            Preference         Interval
-------------------------------------------------------------------------------
10.10.20.253           3                  Preferred          64
===============================================================================
A:ALA-1#
```

thresholds

Syntax **thresholds**

Context show>system

Description This command display system monitoring thresholds. The “Threshold Events Log” table will keep only the last 201 entries.

Output **Thresholds Output —** following table describes system threshold output fields.

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** 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
Owner	Displays the owner of the event.

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
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#
```

time

Syntax **time**

Context show>system

Description This command displays the system time and zone configuration parameters.

Output **System Time Output —** The following table describes system time output fields.

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.
Current Time Zone	Indicates the process currently controlling the system time. SNTP, NTP, PTP or NONE.
Zone type	Non-standard — The zone is user-defined.
	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.

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
-------------------------------------------------------------------------------
No DST zone configured
===============================================================================
A:ALA-1#
```

time

Syntax **time**

Context show

Description This command displays the current day, date, time and time zone.

The time is displayed either in the local time zone or in UTC depending on the setting of the root level **time-display** command for the console session.

Output **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

Description This command displays information on the configured time-of-day suite.

Output **CRON TOD Suite Output —** The following table describes TOD suite output fields:

Label	Description
Associations	Shows which SAPs this tod-suite is associated with.

Label	Description
failed-associations	Shows the SAPs or Multiservice sites where the TOD Suite could not be applied successfully.
Detail	Shows the details of this tod-suite.

Sample Output

```
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
Egress Qos Policy
  1160                          day                             5     Inact
  1190                          night                           6     Activ
Egress Scheduler Policy
  SchedPolCust1Egress_Day       day                             5     Inact
===============================================================================
A:kerckhot_4#
```

The following example shows output for TOD suite associations.

```
A:kerckhot_4# show cron tod-suite suite_sixteen associations
===============================================================================
Cron tod-suite associations for suite suite_sixteen
===============================================================================
Service associations
-------------------------------------------------------------------------------
Service Id  : 1                         Type   : VPLS
 SAP 1/1/1:1
 SAP 1/1/1:2
 SAP 1/1/1:3
 SAP 1/1/1:4
 SAP 1/1/1:5
 SAP 1/1/1:6
 SAP 1/1/1:20
-------------------------------------------------------------------------------
Number of SAP's : 7
Customer Multi-Service Site associations
-------------------------------------------------------------------------------
Multi Service Site: mss_1_1
-------------------------------------------------------------------------------
Number of MSS's: 1
===============================================================================
A:kerckhot_4#
```

The following example shows output for TOD suite failed-associations.

```
A:kerckhot_4# show cron tod-suite suite_sixteen failed-associations
===============================================================================
Cron tod-suite associations failed
===============================================================================
tod-suite suite_sixteen : failed association for SAP
-------------------------------------------------------------------------------
Service Id  : 1                         Type   : VPLS
  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#
```

Zooming in on one of the failed SAPs, the assignments of QoS and scheduler policies are shown as not as intended:

```
A:kerckhot_4# show service id 1 sap 1/1/1:2
===============================================================================
Service Access Points(SAP)
===============================================================================
Service Id         : 1
SAP                : 1/1/1:2                 Encap             : q-tag
Dot1Q Ethertype    : 0x8100                  QinQ Ethertype    : 0x8100
Admin State        : Up                      Oper State        : Up
Flags              : None
Last Status Change : 10/05/2006 18:11:34
Last Mgmt Change   : 10/05/2006 22:27:48
Max Nbr of MAC Addr: No Limit                Total MAC Addr    : 0
Learned MAC Addr   : 0                       Static MAC Addr   : 0
Admin MTU          : 1518                    Oper MTU          : 1518
Ingress qos-policy : 1130                    Egress qos-policy : 1130
Intend Ing qos-pol*: 1190                    Intend Egr qos-po*: 1190
Shared Q plcy      : n/a                     Multipoint shared : Disabled
Ingr IP Fltr-Id    : n/a                     Egr IP Fltr-Id    : n/a
Ingr Mac Fltr-Id   : n/a                     Egr Mac Fltr-Id   : n/a
Ingr IPv6 Fltr-Id  : n/a                     Egr IPv6 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
-------------------------------------------------------------------------------
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     : 138.203.228.28
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#
```

If a filter is referred to in a TOD Suite assignment, use the show filter associations command to view the output:

```
A:kerckhot_4# show filter ip 160 associations
===============================================================================
IP Filter
===============================================================================
Filter Id    : 160                             Applied        : No
Scope        : Template                        Def. Action    : Drop
Entries      : 0
```

```
-------------------------------------------------------------------------------
Filter Association : IP
-------------------------------------------------------------------------------
Tod-suite "english_suite"
 - ingress, time-range "day" (priority 5)
===============================================================================
A:kerckhot_4#
```

redundancy

Syntax **redundancy**

Context show

Description This command enables the context to show redundancy information.

multi-chassis

Syntax **multi-chassis**

Context show>redundancy

Description This command enables the context to show multi-chassis redundancy information.

all

Syntax **all** [**detail**]

Context show>redundancy>multi-chassis

Description This command displays brief multi-chassis redundancy information.

Parameters **detail —** Shows detailed multi-chassis redundancy information.

Output **Show Redundancy Multi-Chassis All Output —** The following table describes Redundancy Multi-Chassis All fields:

Label	Description
Peer IP Address	Displays the multi-chassis redundancy peer.
Description	The text string describing the peer.
Authentication	If configured, displays the authentication key used between this node and the MC peer.
Source IP Address	Displays the source address used to communicate with the MC peer.
Admin State	Displays the administrative state of the peer.

Sample Output

```
B:Dut-B# show redundancy multi-chassis all
===============================================================================
Multi-chassis Peer Table
===============================================================================
Peer
-------------------------------------------------------------------------------
Peer IP Address         : 10.10.10.2
Description             : Mc-Lag peer 10.10.10.2
Authentication          : Disabled
Source IP Address       : 0.0.0.0
Admin State             : Enabled
===============================================================================
B:Dut-B#


B:Dut-B# show lag detail
===============================================================================
LAG Details
===============================================================================
LAG 1
-------------------------------------------------------------------------------
Description: Description For LAG Number 1
-------------------------------------------------------------------------------
Details
-------------------------------------------------------------------------------
Lag-id              : 1                     Mode                : access
Adm                 : up                    Opr                 : up
Thres. Exceeded Cnt : 9                     Port Threshold      : 0
Thres. Last Cleared : 05/20/2006 00:12:35   Threshold Action    : down
Dynamic Cost        : false                 Encap Type          : null
Configured Address  : 1c:71:ff:00:01:41     Lag-IfIndex         : 1342177281
Hardware Address    : 1c:71:ff:00:01:41     Adapt Qos           : distribute
Hold-time Down      : 0.0 sec
LACP                : enabled               Mode                : active
LACP Transmit Intvl : fast                  LACP xmit stdby     : enabled
Selection Criteria  : highest-count         Slave-to-partner    : disabled
Number of sub-groups: 1                     Forced              : -
System Id           : 1c:71:ff:00:00:00     System Priority     : 32768
Admin Key           : 32768                 Oper Key            : 32666
Prtr System Id      : 20:f4:ff:00:00:00     Prtr System Priority : 32768
Prtr Oper Key       : 32768

MC Peer Address     : 10.10.10.2            MC Peer Lag-id      : 1
MC System Id        : 00:00:00:33:33:33     MC System Priority  : 32888
MC Admin Key        : 32666                 MC Active/Standby   : active
MC Lacp ID in use   : true                  MC extended timeout : false
MC Selection Logic  : peer decided
MC Config Mismatch  : no mismatch
-------------------------------------------------------------------------------
Port-id        Adm    Act/Stdby Opr    Primary   Sub-group     Forced   Prio
-------------------------------------------------------------------------------
331/2/1          up     active    up     yes       1             -        32768
331/2/2          up     active    up               1             -        32768
331/2/3          up     active    up               1             -        32768
331/2/4          up     active    up               1             -        32768
-------------------------------------------------------------------------------
Port-id        Role      Exp   Def   Dist  Col   Syn   Aggr  Timeout  Activity
```

```
-------------------------------------------------------------------------------
331/2/1          actor     No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/1          partner   No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/2          actor     No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/2          partner   No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/3          actor     No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/3          partner   No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/4          actor     No    No    Yes   Yes   Yes   Yes   Yes      Yes
331/2/4          partner   No    No    Yes   Yes   Yes   Yes   Yes      Yes
===============================================================================
B:Dut-B#
```

mc-endpoint

Syntax **mc-endpoint statistics**
mc-endpoint peer *[ip-address*] **statistics**
mc-endpoint endpoint [*mcep-id*] **statistics**
mc-endpoint peer [*ip-address*]

Context show>redundancy>multi-chassis

Description This command displays multi-chassis endpoint information.

Parameters **statistics —** Displays the global statistics for the MC endpoint.

peer *ip-address* **—** Specifies the IP address of multi-chassis end-point peer.

endpoint *mcep-id* **—** Specifies the nulti-chassis endpoint.

Values 1 — 4294967295

Sample Output

```
*A:Dut-B# show redundancy multi-chassis mc-endpoint statistics
===============================================================================
Multi-Chassis Endpoint Global Statistics
===============================================================================
Packets Rx                                  : 533
Packets Rx Keepalive                        : 522
Packets Rx Config                           : 3
Packets Rx Peer Config                      : 1
Packets Rx State                            : 7
Packets Dropped Keep-Alive Task             : 7
Packets Dropped Too Short                   : 0
Packets Dropped Verify Failed               : 0
Packets Dropped Tlv Invalid Size            : 0
Packets Dropped Out Of Seq                  : 0
Packets Dropped Unknown Tlv                 : 0
Packets Dropped Tlv Invalid MC-Endpoint Id  : 0
Packets Dropped MD5                         : 0
Packets Dropped Unknown Peer                : 0
Packets Dropped MC Endpoint No Peer         : 0
Packets Tx                                  : 26099
Packets Tx Keepalive                        : 8221
Packets Tx Config                           : 2
```

```
Packets Tx Peer Config                     : 17872
Packets Tx State                           : 4
Packets Tx Failed                          : 0
===============================================================================
*A:Dut-B#

*A:Dut-B# show redundancy multi-chassis mc-endpoint peer 3.1.1.3 statistics
===============================================================================
Multi-Chassis MC-Endpoint Statistics
===============================================================================
Peer Addr                        : 3.1.1.3
-------------------------------------------------------------------------------
Packets Rx                       : 597
Packets Rx Keepalive             : 586
Packets Rx Config                : 3
Packets Rx Peer Config           : 1
Packets Rx State                 : 7
Packets Dropped State Disabled   : 0
Packets Dropped Packets Too Short : 0
Packets Dropped Tlv Invalid Size  : 0
Packets Dropped Tlv Invalid LagId : 0
Packets Dropped Out of Seq       : 0
Packets Dropped Unknown Tlv      : 0
Packets Dropped MD5              : 0
Packets Tx                       : 636
Packets Tx Keepalive             : 600
Packets Tx Peer Config           : 30
Packets Tx Failed                : 0
Packets Dropped No Peer          : 0
===============================================================================
*A:Dut-B#

*A:Dut-B# show redundancy multi-chassis mc-endpoint  endpoint 1 statistics
===============================================================================
Multi-Chassis Endpoint Statistics
===============================================================================
===============================================================================
MC-Endpoint Id 1
===============================================================================
Packets Rx Config                : 3
Packets Rx State                 : 7
Packets Tx Config                : 2
Packets Tx State                 : 4
Packets Tx Failed                : 0
===============================================================================
Number of Entries 1
===============================================================================
```

mc-lag

Syntax **mc-lag** [**lag** *lag-id*]

Context show>redundancy>multi-chassis

Description This command displays multi-chassis LAG information.

Parameters **lag** *lag-id* **—** Shows information for the specified LAG identifier.

Values 1 — 20020064

mc-mobile

Syntax **mc-mobile peer** {*ip-address* | *ip6-address*}

Context show>redundancy>multi-chassis

Description This command displays multi-chassis LAG information.

Parameters *ip-address* — Shows information for the specified IPv4 peer.

ipv6-address — Shows information for the specified IPv6 peer.

Sample Output

```
*A:Dut-A# show redundancy multi-chassis mc-mobile peer 10.90.1.2
===============================================================================
Multi-chassis Peer Mc-Mobile Table
===============================================================================
Peer                 : 10.90.1.2
Last State Change    : 12/04/2012 23:23:43
Admin State          : Up/Down               Oper State      : Up/Down/ISSU
Peer Version         : 5.0Rx
Keep Alive           : 10 deci-sec      Hold On Nbr Fail     : 3
BFD Svc ID           : 0                BFD Interface Name   : mc_intloopback
-------------------------------------------------------------------------------
Gateway Id           : 2
-------------------------------------------------------------------------------
Admin Role           : Primary          Oper Role            : Master
Peer Admin Role      : Secondary        Peer Oper Role       : Slave
Admin State          : Up               Oper State           : Up
Last Time Peer Connected : 12/04/2012 23:23:43

Last State Change    : 12/04/2012 23:23:43
Last State Chg Reason: Traffic Evnt
Geo-Redundancy State : Hot

CPM                  : 0                Geo Redundancy       : Hot
MSCP Group           : 1                Geo Redundancy       : Hot
===============================================================================
*A:Dut-A#
```

peer

Syntax **peer** *ip-address* [**lag** *lag-id*]

Context show>redundancy>multi-chassis>mc-lag

Description This command enables the context to display mc-lag peer-related redundancy information.

Parameters *ip-address* — Shows peer information about the specified IP address.

lag *lag-id* **—** Shows information for the specified LAG identifier.

Values 1 — 20020064

Output **Show Redundancy Multi-chassis MC-Lag Peer Output —** The following table describes show redundancy multi-chassis mc-lag peer output fields:

Label	Description
Last Changed	Displays date and time of the last mc-lag peer.
Admin State	Displays the administrative state of the mc-lag peer.
Oper State	Displays the operation state of the mc-lag peer.
KeepAlive	Displays the length of time to keep alive the mg-lag peer.
Hold On Ngbr Failure	Specifies how many “keepalive” intervals the standby SR will wait for packets from the active node before assuming a redundant-neighbor node failure.

Sample Output

```
A:subscr_mgt# show redundancy multi-chassis mc-lag peer 10.10.10.30
===============================================================================
Multi-Chassis MC-Lag Peer 10.10.10.30
===============================================================================
Last Changed    : 01/23/2007 18:20:13
Admin State     : Up                  Oper State           : Up
KeepAlive       : 10 deci-seconds     Hold On Ngbr Failure : 3
-------------------------------------------------------------------------------
Lag Id Lacp Key Remote Lag Id System Id          Sys Prio Last Changed
-------------------------------------------------------------------------------
1      1        1             00:00:00:00:00:01  1        01/23/2007 18:20:13
2      2        2             00:00:00:00:00:02  2        01/24/2007 08:53:48
-------------------------------------------------------------------------------
Number of LAGs : 2
===============================================================================
A:subscr_mgt#


A:subscr_mgt# show redundancy multi-chassis mc-lag peer 10.10.10.30 lag 1
===============================================================================
Multi-Chassis MC-Lag Peer 10.10.10.30
===============================================================================
Last Changed    : 01/23/2007 18:20:13
Admin State     : Up                  Oper State           : Up
KeepAlive       : 10 deci-seconds     Hold On Ngbr Failure : 3
-------------------------------------------------------------------------------
Lag Id Lacp Key Remote Lag Id System Id          Sys Prio Last Changed
-------------------------------------------------------------------------------
1      1        1             00:00:00:00:00:01  1        01/23/2007 18:20:13
-------------------------------------------------------------------------------
Number of LAGs : 1
===============================================================================
```

```
A:subscr_mgt#
```

statistics

Syntax **statistics mc-lag** [**peer** *ip-address* [**lag** *lag-id*]]

Context show>redundancy>multi-chassis>mc-lag

Description This command displays multi-chassis statistics.

Parameters **mc-lag —** Displays multi-chassis LAG statistics.

peer *ip-address* **—** Shows the specified address of the multi-chassis peer.

lag *lag-id* **—** Shows information for the specified LAG identifier.

Values 1 — 20020064

Output **Show Redundancy Multi-chassis MC-Lag Peer Statistics Output —** The following table describes show redundancy multi-chassis mc-lag peer output fields:

Label	Description
Packets Rx	Indicates the number of MC-Lag packets received from the peer.
Packets Rx Keepalive	Indicates the number of MC-Lag keepalive packets received from the peer.
Packets Rx Config	Indicates the number of received MC-Lag configured packets from the peer.
Packets Rx Peer Config	Indicates the number of received MC-Lag packets configured by the peer.
Packets Rx State	Indicates the number of MC-Lag “lag” state packets received from the peer.
Packets Dropped State Disabled	Indicates the number of packets that were dropped because the peer was administratively disabled.
Packets Dropped Packets Too Short	Indicates the number of packets that were dropped because the packet was too short.
Packets Dropped Tlv Invalid Size	Indicates the number of packets that were dropped because the packet size was invalid.
Packets Dropped Tlv Invalid LagId	Indicates the number of packets that were dropped because the packet referred to an invalid or non multi-chassis lag.
Packets Dropped Out of Seq	Indicates the number of packets that were dropped because the packet size was out of sequence.
Packets Dropped Unknown Tlv	Indicates the number of packets that were dropped because the packet contained an unknown TLV.

Label	Description (Continued)
Packets Dropped MD5	Indicates the number of packets that were dropped because the packet failed MD5 authentication.
Packets Tx	Indicates the number of packets transmitted from this system to the peer.
Packets Tx Keepalive	Indicates the number of keepalive packets transmitted from this system to the peer.
Packets Tx Peer Config	Indicates the number of configured packets transmitted from this system to the peer.
Packets Tx Failed	Indicates the number of packets that failed to be transmitted from this system to the peer.

Sample Output

```
A:subscr_mgt# show redundancy multi-chassis mc-lag statistics
===============================================================================
Multi-Chassis Statistics
===============================================================================
Packets Rx                        : 52535
Packets Rx Keepalive              : 52518
Packets Rx Config                 : 2
Packets Rx Peer Config            : 4
Packets Rx State                  : 6
Packets Dropped KeepaliveTask     : 0
Packets Dropped Packet Too Short  : 0
Packets Dropped Verify Failed     : 0
Packets Dropped Tlv Invalid Size  : 0
Packets Dropped Out of Seq        : 0
Packets Dropped Unknown Tlv       : 0
Packets Dropped Tlv Invalid LagId : 0
Packets Dropped MD5               : 0
Packets Dropped Unknown Peer      : 0
Packets Tx                        : 52583
Packets Tx Keepalive              : 52519
Packets Tx Config                 : 2
Packets Tx Peer Config            : 54
Packets Tx State                  : 8
Packets Tx Failed                 : 0
===============================================================================
A:subscr_mgt#

B:Dut-B# show redundancy multi-chassis mc-lag peer 10.10.10.2 statistics
===============================================================================
Multi-Chassis Statistics, Peer 10.10.10.2
===============================================================================
Packets Rx                        : 231
Packets Rx Keepalive              : 216
Packets Rx Config                 : 1
Packets Rx Peer Config            : 2
Packets Rx State                  : 12
```

```
Packets Dropped State Disabled    : 0
Packets Dropped Packets Too Short : 0
Packets Dropped Tlv Invalid Size  : 0
Packets Dropped Tlv Invalid LagId : 0
Packets Dropped Out of Seq        : 0
Packets Dropped Unknown Tlv       : 0
Packets Dropped MD5               : 0
Packets Tx                        : 235
Packets Tx Keepalive              : 216
Packets Tx Peer Config            : 3
Packets Tx Failed                 : 0
===============================================================================
B:Dut-B#
```

mc-ring

Syntax **mc-ring peer** *ip-address* **statistics**
mc-ring peer *ip-address* [**ring** *sync-tag* [**detail**|**statistics**]]
mc-ring peer *ip-address* **ring** *sync-tag* **ring-node** [*ring-node-name* [**detail**|**statistics**]]
mc-ring global-statistics

Context show>redundancy>multi-chassis

Description This command displays multi-chassis ring information.

Parameters *ip-address* — Specifies the address of the multi-chassis peer to display.

ring *sync-tag* **—** Specifies a synchronization tag to be displayed that was used while synchronizing this port with the multi-chassis peer.

node *ring-node-name* **—** Specifies a ring-node name.

global-statistics — Displays global statistics for the multi-chassis ring.

detail — Displays detailed peer information for the multi-chassis ring.

Output **Show mc-ring peer ip-address ring Output —** The following table describes mc-ring peer ip-address ring output fields.

Label	Description
Sync Tag	Displays the synchronization tag that was used while synchronizing this port with the multi-chassis peer.
Oper State	noPeer – The peer has no corresponding ring configured. connected – The in-band control connection with the peer is operational. broken – The in-band control connection with the peer has timed out.

Label	Description
	`conflict` — The in-band control connection with the peer has timed out but the physical connection is still OK; the failure of the in-band signaling connection is caused by a misconfiguration. For example, a conflict between the configuration of this system and its peer, or a misconfiguration on one of the ring access node systems. `testingRing` — The in-band control connection with the peer is being set up. Waiting for result. `waitingForPeer` — Verifying if this ring is configured on the peer. `configErr` — The ring is administratively up, but a configuration error prevents it from operating properly. `halfBroken` — The in-band control connection indicates that the ring is broken in one direction (towards the peer). `localBroken` — The in-band control connection with the peer is known to be broken due to local failure or local administrative action. `shutdown` — The ring is shutdown.
`Failure Reason`	Displays the reason of the failure of the operational state of a MC ring.
`No. of MC Ring entries`	Displays the number of MC ring entries.

Sample Output

```
*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2 ring ring11 detail
===============================================================================
Multi-Chassis MC-Ring Detailed Information
===============================================================================
Peer           : 10.0.0.2
Sync Tag       : ring11
Port ID        : 1/1/3
Admin State    : inService
Oper State     : connected
Admin Change   : 01/07/2008 21:40:07
Oper Change    : 01/07/2008 21:40:24
Failure Reason : None
-------------------------------------------------------------------------------
In Band Control Path
-------------------------------------------------------------------------------
Service ID     : 10
Interface Name : to_an1
Oper State     : connected
Dest IP        : 10.10.0.2
Src  IP        : 10.10.0.1
-------------------------------------------------------------------------------
VLAN Map B Path Provisioned
-------------------------------------------------------------------------------
range 13-13
```

```
range 17-17
-------------------------------------------------------------------------------
VLAN Map Excluded Path Provisioned
-------------------------------------------------------------------------------
range 18-18
-------------------------------------------------------------------------------
VLAN Map B Path Operational
-------------------------------------------------------------------------------
range 13-13
range 17-17
-------------------------------------------------------------------------------
VLAN Map Excluded Path Operational
-------------------------------------------------------------------------------
range 18-18
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#


*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 192.251.10.104
===============================================================================
MC Ring entries
===============================================================================
Sync Tag                        Oper State      Failure Reason
-------------------------------------------------------------------------------
No. of MC Ring entries: 0
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#


*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2
===============================================================================
MC Ring entries
===============================================================================
Sync Tag                        Oper State      Failure Reason
-------------------------------------------------------------------------------
ring11                          connected       None
ring12                          shutdown        None
-------------------------------------------------------------------------------
No. of MC Ring entries: 4
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#


*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2 ring ring11 ring-node an1
detail
===============================================================================
Multi-Chassis MC-Ring Node Detailed Information
===============================================================================
Peer           : 10.0.0.2
Sync Tag       : ring11
Node Name      : an1
Oper State Loc : connected
Oper State Rem : notTested
In Use         : True
Admin Change   : 01/07/2008 21:40:07
Oper Change    : 01/07/2008 21:40:25
Failure Reason : None
-------------------------------------------------------------------------------
Ring Node Connectivity Verification
```

```
-------------------------------------------------------------------------------
Admin State    : inService
Service ID     : 11
VLAN Tag       : 11
Dest IP        : 10.11.3.1
Src  IP        : None
Interval       : 1 minutes
Src MAC        : None
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#


*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2 ring ring11 ring-node
===============================================================================
MC Ring Node entries
===============================================================================
Name                              Loc Oper St.      Failure Reason
  In Use                            Rem Oper St.
-------------------------------------------------------------------------------
an1                               connected         None
  Yes                               notTested
an2                               connected         None
  Yes                               notTested
-------------------------------------------------------------------------------
No. of MC Ring Node entries: 2
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#
```

Show Redundancy Multi-Chassis Ring Peer Statistics Output — The following table describes multi-chassis ring peer output fields.

Label	Description
Message	Displays the message type.
Received	Indicates the number of valid MC-ring signalling messages received from the peer.
Transmitted	Indicates the number of valid MC-ring signalling messages transmitted from the peer.
MCS ID Request	Displays the number of valid MCS ID requests were received from the peer.
MCS ID Response	Displays the number of valid MCS ID responses were received from the peer.
Ring Exists Request	Displays the number of valid 'ring exists' requests were received from the peer.
Ring Exists Response	Displays the number of valid ring exists' responses were received from the peer.
Keepalive	Displays the number of valid MC-ring control packets of type 'keepalive' were received from the peer.

Sample Output

```
*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 192.251.10.104 statistics
===============================================================================
MC Ring statistics for peer 192.251.10.104
===============================================================================
Message                                              Received     Transmitted
-------------------------------------------------------------------------------
MCS ID Request                                       0            0
MCS ID Response                                      0            0
Ring Exists Request                                  0            0
Ring Exists Response                                 0            0
Keepalive                                            0            0
-------------------------------------------------------------------------------
Total                                                0            0
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#
```

Show mc-ring ring-node Command Output

Label	Description
Oper State	Displays the state of the connection verification (both local and remote). notProvisioned – Connection verification is not provisioned. configErr – Connection verification is provisioned but a configuration error prevents it from operating properly. notTested – Connection verification is administratively disabled or is not possible in the current situation. testing – Connection Verification is active, but no results are yet available. connected – The ring node is reachable. disconnected – Connection verification has timed out.
In Use	Displays “True” if the ring node is referenced on an e-pipe or as an inter-dest-id on a static host or dynamic lease.

Show mc-ring global-statistics Command Output

Label	Description
Rx	Displays the number of MC-ring signalling packets were received by this system.
Rx Too Short	Displays the number of MC-ring signalling packets were received by this system that were too short.
Rx Wrong Authentication	Displays the number of MC-ring signalling packets were received by this system with invalid authentication.
Rx Invalid TLV	Displays the number of MC-ring signalling packets were received by this system with invalid TLV.
Rx Incomplete	Displays the number of MC-ring signalling packets were received by this system that were incomplete.
Rx Unknown Type	Displays the number of MC-ring signalling packets were received by this system that were of unknown type.
Rx Unknown Peer	Displays the number of MC-ring signalling packets were received by this system that were related to an unknown peer.
Rx Unknown Ring	Displays the number of MC-ring signalling packets were received by this system that were related to an unknown ring.

Label	Description
Rx Unknown Ring Node	Displays the number of MC-ring signalling packets were received by this system that were related to an unknown ring node.
Tx	Displays the number of MC-ring signalling packets were transmitted by this system.
Tx No Buffer	Displays the number of MC-ring signalling packets could not be transmitted by this system due to a lack of packet buffers.
Tx Transmission Failed	Displays the number of MC-ring signalling packets could not be transmitted by this system due to a transmission failure.
Tx Unknown Destination	Displays the number of MC-ring 'unknown destination' signalling packets were transmitted by this system.
Missed Configuration Events	Displays the number of missed configuration events on this system.
Missed BFD Events	Displays the number of missed BFD events on this system.

```
*A:ALA-48>show>redundancy>multi-chassis# mc-ring global-statistics
===============================================================================
Global MC Ring statistics
===============================================================================
Rx                          : 0
Rx Too Short                : 0
Rx Wrong Authentication     : 0
Rx Invalid TLV              : 0
Rx Incomplete               : 0
Rx Unknown Type             : 0
Rx Unknown Peer             : 0
Rx Unknown Ring             : 0
Rx Unknown Ring Node        : 0
Tx                          : 36763
Tx No Buffer                : 0
Tx Transmission Failed      : 0
Tx Unknown Destination      : 0
Missed Configuration Events : 0
Missed BFD Events           : 0
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#
```

sync

Syntax **sync** [**port** *port-id* | *lag-id*]

Context show>redundancy>multi-chassis

Description This command displays synchronization information.

Parameters **port** *port-id* **—** Shows the specified port ID of the multi-chassis peer.

lag *lag-id* **—** Shows information for the specified LAG identifier.

Values 1 — 20020064

Output **Show Redundancy Multi-chassis Sync Output —** The following table describes show redundancy multi-chassis sync output fields:

Label	Description
Peer IP Address	Displays the multi-chassis redundancy peer.
Description	The text string describing the peer.
Authentication	If configured, displays the authentication key used between this node and the multi-chassis peer.
Source IP Address	Displays the source address used to communicate with the multi-chassis peer.
Admin State	Displays the administrative state of the peer.
Client Applica-tions	Displays the list of client applications synchronized between SRs.
Sync Admin State	Displays the administrative state of the synchronization.
Sync Oper State	Displays the operation state of the synchronization.
DB Sync State	Displays the database state of the synchronization.
Num Entries	Displays the number of entries on local router.
Lcl Deleted Entries	Displays the number of deleted entries made at the local router.
Alarm Entries	Displays the alarm entries on the local router.
Rem Num Entries	Displays the number of entries on the remote router.
Rem Lcl Deleted Entries	Displays the number of locally deleting entries made by the remote router.
Rem Alarm Entries	Displays alarm entries on the remote router.

Sample Output

```
*A:subscr_mgt_2# show redundancy multi-chassis sync
===============================================================================
Multi-chassis Peer Table
===============================================================================
Peer
-------------------------------------------------------------------------------
Peer IP Address         : 10.10.10.20
Description             : Mc-Lag peer 10.10.10.20
Authentication          : Disabled
```

```
Source IP Address       : 0.0.0.0
Admin State             : Enabled
-------------------------------------------------------------------------------
Sync-status
-------------------------------------------------------------------------------
Client Applications     : SUBMGMT
Sync Admin State        : Up
Sync Oper State         : Up
DB Sync State           : inSync
Num Entries             : 1
Lcl Deleted Entries     : 0
Alarm Entries           : 0
Rem Num Entries         : 1
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
===============================================================================
A:subscr_mgt_2#
```

peer

Syntax **peer** *ip-address*

Context show>redundancy>multi-chassis>sync

Description This command enables the context to display peer-related redundancy information.

Parameters *ip-address* — Shows peer information about the specified IP address.

Output **Show Redundancy Multi-chassis Sync Peer Output —** The following table describes show redundancy multi-chassis sync output fields:

Label	Description
Peer IP Address	Displays the multi-chassis redundancy peer.
Description	The text string describing the peer.
Authentication	If configured, displays the authentication key used between this node and the multi-chassis peer.
Source IP Address	Displays the source address used to communicate with the multi-chassis peer.
Admin State	Displays the administrative state of the peer.
Client Applications	Displays the list of client applications synchronized between SRs.
Sync Admin State	Displays the administrative state of the synchronization.
Sync Oper State	Displays the operation state of the synchronization.
DB Sync State	Displays the database state of the synchronization.
Num Entries	Displays the number of entries on local router.

Label	Description
Lcl Deleted Entries	Displays the number of deleted entries made at the local router.
Alarm Entries	Displays the alarm entries on the local router.
Rem Num Entries	Displays the number of entries on the remote router.
Rem Lcl Deleted Entries	Displays the number of locally deleting entries made by the remote router.
Rem Alarm Entries	Displays alarm entries on the remote router.

Sample Output

```
*A:subscr_mgt_2# show redundancy multi-chassis sync peer 10.10.10.20
===============================================================================
Multi-chassis Peer Table
===============================================================================
Peer
-------------------------------------------------------------------------------
Peer IP Address         : 10.10.10.20
Description             : Mc-Lag peer 10.10.10.20
Authentication          : Disabled
Source IP Address       : 0.0.0.0
Admin State             : Enabled
-------------------------------------------------------------------------------
Sync-status
-------------------------------------------------------------------------------
Client Applications     : SUBMGMT
Sync Admin State        : Up
Sync Oper State         : Up
DB Sync State           : inSync
Num Entries             : 1
Lcl Deleted Entries     : 0
Alarm Entries           : 0
Rem Num Entries         : 1
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
===============================================================================
MCS Application Stats
===============================================================================
Application             : igmp
Num Entries             : 0
Lcl Deleted Entries     : 0
Alarm Entries           : 0
-------------------------------------------------------------------------------
Rem Num Entries         : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
-------------------------------------------------------------------------------
Application             : igmpSnooping
Num Entries             : 0
Lcl Deleted Entries     : 0
Alarm Entries           : 0
-------------------------------------------------------------------------------
```

```
Rem Num Entries         : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
-------------------------------------------------------------------------------
Application             : subMgmt
Num Entries             : 1
Lcl Deleted Entries     : 0
Alarm Entries           : 0
-------------------------------------------------------------------------------
Rem Num Entries         : 1
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
-------------------------------------------------------------------------------
Application             : srrp
Num Entries             : 0
Lcl Deleted Entries     : 0
Alarm Entries           : 0
-------------------------------------------------------------------------------
Rem Num Entries         : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
===============================================================================
*A:subscr_mgt_2#
```

detail

Syntax **detail**

Context show>redundancy>multi-chassis>peer

Description This command displays detailed peer information.

Output **Show Redundancy Multi-chassis Sync Peer Detail Output —** The following table describes show redundancy multi-chassis sync detail output fields:

Label	Description
Peer IP Address	Displays the multi-chassis redundancy peer.
Description	The text string describing the peer.
Authentication	If configured, displays the authentication key used between this node and the multi-chassis peer.
Source IP Address	Displays the source address used to communicate with the multi-chassis peer.
Admin State	Displays the administrative state of the peer.
Client Applica-tions	Displays the list of client applications synchronized between routers.
Sync Admin State	Displays the administrative state of the synchronization.

Label	Description (Continued)
Sync Oper State	Displays the operation state of the synchronization.
DB Sync State	Displays the database state of the synchronization.
Num Entries	Displays the number of entries on local router.
Lcl Deleted Entries	Displays the number of deleted entries made at the local router.
Alarm Entries	Displays the alarm entries on the local router.
Rem Num Entries	Displays the number of entries on the remote router.
Rem Lcl Deleted Entries	Displays the number of locally deleting entries made by the remote router.
Rem Alarm Entries	Displays alarm entries on the remote router.

Sample Output

```
*A:subscr_mgt_2# show redundancy multi-chassis sync peer 10.10.10.20 detail
===============================================================================
Multi-chassis Peer Table
===============================================================================
Peer
-------------------------------------------------------------------------------
Peer IP Address         : 10.10.10.20
Description             : Mc-Lag peer 10.10.10.20
Authentication          : Disabled
Source IP Address       : 0.0.0.0
Admin State             : Enabled
-------------------------------------------------------------------------------
Sync-status
-------------------------------------------------------------------------------
Client Applications     : SUBMGMT
Sync Admin State        : Up
Sync Oper State         : Up
DB Sync State           : inSync
Num Entries             : 1
Lcl Deleted Entries     : 0
Alarm Entries           : 0
Rem Num Entries         : 1
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
===============================================================================
MCS Application Stats
===============================================================================
Application             : igmp
Num Entries             : 0
Lcl Deleted Entries     : 0
Alarm Entries           : 0
-------------------------------------------------------------------------------
Rem Num Entries         : 0
```

```
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
-------------------------------------------------------------------------------
Application             : igmpSnooping
Num Entries             : 0
Lcl Deleted Entries     : 0
Alarm Entries           : 0
-------------------------------------------------------------------------------
Rem Num Entries         : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
-------------------------------------------------------------------------------
Application             : subMgmt
Num Entries             : 1
Lcl Deleted Entries     : 0
Alarm Entries           : 0
-------------------------------------------------------------------------------
Rem Num Entries         : 1
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
-------------------------------------------------------------------------------
Application             : srrp
Num Entries             : 0
Lcl Deleted Entries     : 0
Alarm Entries           : 0
-------------------------------------------------------------------------------
Rem Num Entries         : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries       : 0
===============================================================================
Ports synced on peer 10.10.10.20
===============================================================================
Port/Encap                    Tag
-------------------------------------------------------------------------------
lag-1                         test123
===============================================================================
*A:subscr_mgt_2#
```

synchronization

Syntax **synchronization**

Context show>redundancy

Description This command displays redundancy synchronization times.

Sample Output

```
A:ALA-48>show>redundancy# synchronization
===============================================================================
Synchronization Information
===============================================================================
Standby Status               : disabled
Last Standby Failure         : N/A
Standby Up Time              : N/A
Failover Time                : N/A
Failover Reason              : N/A
Boot/Config Sync Mode        : None
Boot/Config Sync Status      : No synchronization
Last Config File Sync Time   : Never
Last Boot Env Sync Time      : Never
===============================================================================
A:ALA-48>show>redundancy#
```

time-range

Syntax **time-range** *name* **associations [detail]**

Context show>cron

Description This command displays information on the configured time ranges.

Output **Time Range Output —** The following table displays system time range output fields:

Label	Description
Associations	Shows the time-range as it is associated with the TOD suites and ACL entries as well as the SAPs using them.
Detail	Shows the details of this time-range.

Sample Output

The following example shows time-range detail output.

```
A:ala# show cron time-range time-range2 detail
===============================================================================
```

```
Cron time-range
===============================================================================
Name     : time-range1
Periodic    : Start * * * * End * * * *
Absolute     : Start * * * * End * * * *
```

The following example shows output for time-range associations with previously created IP and MAC filters.

```
A:ala# show 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
===============================================================================
```

uptime

Syntax **uptime**

Context show

Description This command displays the time since the system started.

Output **Uptime Output —** The following table describes uptime output fields.

Label	Description
System Up Time	Displays the length of time the system has been up in days, hr:min:sec format.

Sample Output

```
A:ALA-1# show uptime
System Up Time         : 11 days, 18:32:02.22 (hr:min:sec)

A:ALA-1#
```

switch-fabric

Syntax **switch-fabric**

Context show>system

Description This command displays switch fabric information.

Output **Switch fabric output —** The following table describes switch-fabric output fields for 12-slot and 7-slot chassis models:.

Label	Description
Slot/MDA	Displays the fabric slot within a chassis in the system. The CPM cards and IOM cards cannot be physically inserted into the switch fabric card slots.
Min. Forwarding Capacity	Displays the minimum forwarding capacity of the slot and MDA as a percentage.
Max. Forwarding Capacity	Displays the maximum forwarding capacity of the slot and MDA as a percentage.

Sample Output

```
A:ALA-7# show system switch-fabric
===============================================================================
Switch Fabric
===============================================================================
Slot/Mda Min. Forwarding Capacity Max. Forwarding Capacity
-------------------------------------------------------------------------------
1/1  100%     100%
1/2  100%     100%
2/1  100%     100%
2/2  100%     100%
3/1  100%     100%
3/2  100%     100%
4/1  100%     100%
4/2  100%     100%
5/1  100%     100%
5/2  100%     100%
A    100%     100%
B    100%     100%
===============================================================================
A:ALA-7#

A:ALA-12# show system switch-fabric
===============================================================================
Switch Fabric
===============================================================================
Slot/Mda Min. Forwarding Capacity Max. Forwarding Capacity
-------------------------------------------------------------------------------
1/1  100%     100%
1/2  100%     100%
2/1  100%     100%
```

```
2/2  100%     100%
3/1  100%     100%
3/2  100%     100%
4/1  100%     100%
4/2  100%     100%
5/1  100%     100%
5/2  100%     100%
6/1  100%     100%
6/2  100%     100%
7/1  100%     100%
7/2  100%     100%
8/1  100%     100%
8/2  100%     100%
A    100%     100%
B    100%     100%
===============================================================================
A:ALA-12
```

sync-if-timing

Syntax **sync-if-timing**

Context show>system

Description This command displays synchronous interface timing operational information.

Output **System Timing Output —** The following table describes sync-if-timing output fields.

Label	Description
System Status CPM A/B	Indicates the present status of the synchronous timing equipment subsystem (SETS). Not Present — Only shown on systems without central clocks (7750 SR-1 and 7450 ESS-1) Master Freerun — The clock is in free-run because it hasn't had a qualified input reference to lock to Master Holdover — The clock was locked to an input reference but has lost all qualified input references and is in holdover. Master Locked — The clock is locked to an input reference Acquiring — The clock is training to a qualified input reference.
Reference Input Mode	Revertive — Indicates that for a re-validated or a newly validated reference source which has a higher priority than the currently selected reference has reverted to the new reference source. Non-revertive — The clock cannot revert to a higher priority clock if the current clock goes offline.
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.

Label	Description (Continued)
Reference Selected	Indicates which reference has been selected: • ref1, ref2 - (for all chassis) • BITS A, BITS B - (7750 SR-7/12) • Mate CPM (BITS A), Mate CPM (BITS B) - (7750 SR-7/12 on the active CPM) • Mate CPM (none) - **show>system>sync-if-timing> standby** when standby locked to active which is freerun or holdover - (7750 SR-7/12) • Mate CPM (ref1), Mate CPM (ref2) - **show>system>sync-if-timing>standby** when standby locked to active which is locked to ref1 or ref2 - (7750 SR-7/12) • BITS 1, BITS2 - (7750 SR-c4 only)
System Quality Level	Indicates the quality level being generated by the system clock.
Current Frequency Offset	(value) — The frequency offset of the currently selected timing reference in parts per million.
Reference Order	ref1, ref2, bits — Indicates that the priority order of the timing references.
Reference Mate CPM	Data within this block represents the status of the timing reference provided by the Mate CPM. This will be the BITS input from the standby CPM.
Admin Status	down — The **ref1** or **ref2** configuration is administratively shutdown. up — The **ref1** or **ref2** configuration is administratively enabled. diag — Indicates the reference has been forced using the force-reference command.
Quality Level Override	Indicates whether the QL value used to determine the reference was configured directly by the user.
Rx Quality Level	Indicates the QL value received on the interface. • inv - SSM received on the interface indicates an invalid code for the interface type. • unknown - No QL value was received on the interface.
Qualified for Use	Indicates whether the reference has been qualified to be used as a source of timing for the node.
Not Qualified Due To	Indicates the reason why the reference has not been qualified: - disabled - LOS - OOPIR - OOF

Label	Description (Continued)
Selected for Use	Indicates whether the method is presently selected.
Not Selected Due To	Indicates the reason why the method is not selected: - disabled - not qualified - previous failure - LOF - AIS-L - validating - on standby - ssm quality
Source Port	Identifies the Source port for the reference.
Interface Type	The interface type configured for the BITS port.
Framing	The framing configured for the BITS port.
Line Coding	The line coding configured for the BITS port.
Line Length	The line length value of the BITS output.
Output Admin Status	down — The BITS output is administratively shutdown. up — The BITS output is administratively enabled. diag — Indicates the BITS output has been forced using the force-reference command.
Output Source	The source to be used to provide the signal on the BITS output port. line reference — unfiltered recovered line reference. internal clock — filtered node clock output.
Output Reference Selected	The reference selected as the source for the BITS output signal (ref1 or ref2).
TX Quality Level	QL value for BITS output signal.

The following example is for a node locked to the active BITS input and directing the signal on ref1 to the BITS output:

Sample Output

```
*A:SR7# show system sync-if-timing
===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM A                : Master Locked
    Reference Input Mode           : Non-revertive
    Quality Level Selection        : Disabled
    Reference Selected             : BITS A
    System Quality Level           : prs
```

```
    Current Frequency Offset (ppm) : +0

Reference Order                    : bits ref1 ref2

Reference Mate CPM
    Qualified For Use              : Yes
    Selected For Use               : No
        Not Selected Due To        :     on standby

Reference Input 1
    Admin Status                   : up
    Rx Quality Level               : prs
    Qualified Level Override       : none
    Qualified For Use              : Yes
    Selected For Use               : No
        Not Selected Due To        :     on standby
    Source Port                    : 3/1/2

Reference Input 2
    Admin Status                   : down
    Rx Quality Level               : unknown
    Qualified Level Override       : none
    Qualified For Use              : No
        Not Qualified Due To       :     disabled
    Selected For Use               : No
        Not Selected Due To        :     disabled
    Source Port                    : None

Reference BITS A
    Admin Status                   : up
    Rx Quality Level               : prs
    Qualified Level Override       : none
    Qualified For Use              : Yes
    Selected For Use               : Yes
    Interface Type                 : DS1
    Framing                        : ESF
    Line Coding                    : B8ZS
    Line Length                    : 550-660ft
    Output Admin Status          : up
    Output Admin State           : ref1
    Output Source                : prs
    Output Reference Selected    : ptp
    Tx Quality Level             : prs

===============================================================================
*A:SR7#
```

The following example is for a node locked to the standby CPM BITS input and directing the ref1 signal to the BITS output port:

```
*A:Dut-B# show system sync-if-timing
===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM A                : Master Locked
    Reference Input Mode           : Non-revertive
    Quality Level Selection        : Disabled
    Reference Selected             : Mate CPM (BITS B)
```

```
    System Quality Level           : prs
    Current Frequency Offset (ppm) : +0

Reference Order                    : bits ref1 ref2

Reference Mate CPM
    Qualified For Use              : Yes
    Selected For Use               : Yes

Reference Input 1
    Admin Status                   : up
    Rx Quality Level               : prs
    Quality Level Override         : none
    Qualified For Use              : Yes
    Selected For Use               : No
        Not Selected Due To        : on standby
    Source Port                    : 3/1/2

Reference Input 2
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       : disabled
    Selected For Use               : No
        Not Selected Due To        : disabled
    Source Port                    : None

Reference BITS A
    Admin Status                   : up
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       : LOS
    Selected For Use               : No
        Not Selected Due To        : not qualified
    Interface Type                 : DS1
    Framing                        : ESF
    Line Coding                    : B8ZS
    Line Length                    : 550-660ft
    Output Admin Status            : up
    Output Admin State             : ref1
    Output Source                  : prs
    Output Reference Selected      : ptp
    Tx Quality Level               : prs
===============================================================================
```

The following example is for a node whose standby CPM is locked to its local BITS port and the signal from ref1 is directed to the BITS output port:

```
A:SR7# show system sync-if-timing standby
===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM B                : Master Locked
    Reference Input Mode           : Non-revertive
    Quality Level Selection        : Disabled
    Reference Selected             : BITS B
    System Quality Level           : prs
```

```
    Current Frequency Offset (ppm) : +0

Reference Order                    : bits ref1 ref2

Reference Mate CPM
    Qualified For Use              : Yes
    Selected For Use               : No
        Not Selected Due To        : on standby

Reference Input 1
    Admin Status                   : down
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       : disabled
    Selected For Use               : No
        Not Selected Due To        : disabled
    Source Port                    : None

Reference Input 2
    Rx Quality Level               : unknown
    Quality Level Override         : none
    Qualified For Use              : No
        Not Qualified Due To       : disabled
    Selected For Use               : No
        Not Selected Due To        : disabled
    Source Port                    : None

Reference BITS B
    Admin Status                   : up
    Rx Quality Level               : prs
    Quality Level Override         : none
    Qualified For Use              : Yes
    Selected For Use               : Yes
    Interface Type                 : DS1
    Framing                        : ESF
    Line Coding                    : B8ZS
    Line Length                    : 550-660ft
    Output Admin Status            : up
    Output Admin State             : ref1
    Output Source                  : prs
    Output Reference Selected      : ptp
    Tx Quality Level               : prs
===============================================================================
*A:SR7#
```

synchronization

Syntax **synchronization**

Context show>redundancy>synchronization

Description This command displays redundancy synchronization times.

Output **Synchronization Output —** The following table describes redundancy synchronization output fields.

Label	Description
Standby Status	Displays the status of the standby CPM.
Last Standby Failure	Displays the timestamp of the last standby failure.
Standby Up Time	Displays the length of time the standby CPM has been up.
Failover Time	Displays the timestamp when the last redundancy failover occurred causing a switchover from active to standby CPM. If there is no redundant CPM card in this system or no failover has occurred since the system last booted, the value will be 0.
Failover Reason	Displays a text string giving an explanation of the cause of the last redundancy failover. If no failover has occurred, an empty string displays.
Boot/Config Sync Mode	Displays the type of synchronization operation to perform between the primary and secondary CPMs after a change has been made to the configuration files or the boot environment information contained in the boot options file (BOF).
Boot/Config Sync Status	Displays the results of the last synchronization operation between the primary and secondary CPMs.
Last Config File Sync Time	Displays the timestamp of the last successful synchronization of the configuration files.
Last Boot Env Sync Time	Displays the timestamp of the last successful synchronization of the boot environment files.

Sample Output

```
A:ALA-1>show>redundancy# synchronization
===============================================================================
Synchronization Information
===============================================================================
Standby Status               : disabled
Last Standby Failure         : N/A
Standby Up Time              : N/A
Failover Time                : N/A
Failover Reason              : N/A
Boot/Config Sync Mode        : None
Boot/Config Sync Status      : No synchronization
Last Config File Sync Time   : Never
Last Boot Env Sync Time      : Never
===============================================================================
A:ALA-1>show>redundancy#
```

Debug Commands

sync-if-timing

Syntax **sync-if-timing**

Context debug

Description The context to debug synchronous interface timing references.

force-reference

Syntax **force-reference** {**ref1 | ref2 | bits | ptp**}
no force-reference

Context debug>sync-if-timing

Description This command allows an operator to force the system synchronous timing output to use a specific reference.

Note: The debug sync-if-timing force-reference command should only be used to test and debug problems. Network synchronization problems may appear if network elements are left with this manual override setting. Once the system timing reference input has been forced, it may be cleared using the no force-reference command.

The CPM clock can be forced to use a specific input reference using the force-reference command.

When the command is executed, the CPM clock on the active CPM immediately switches its input reference to that specified by the command. If the specified input is not available (shutdown), or in a disqualified state, the CPM clock shall use the next qualified input reference based on the selection rules.

This command also affects the BITS output port on the active CPM. If the BITS output port selection is set to line-reference and the reference being forced is not the BITS input port, then the system uses the forced reference to generate the signal out the BITS output port. If the BITS output port selection is set to internal-clock, then the system uses the output of the CPM clock to generate the signal for the BITS output port.

On a CPM activity switch, the force command is cleared and normal reference selection is determined.

Debug configurations are not saved between reboots.

Note: The 7750 SR-c4 has two BITS input ports on the CFM. The force reference command on this system allows the selection of the specific port.

7750 SR-c4 CLI Syntax: **debug>sync-if-timing>force-reference** {**ref1** | **ref2** | **bits1** | **bits2**}

Parameters **ref1 —** The clock will use the first timing reference.

ref2 — The clock will use the second timing reference.

bits — The clock will use the external network interface on the active CPM to be the highest priority input.

bits1 — (7750 SR-c4) The clock will use the bits1 timing reference.

bits2 — (7750 SR-c4) The clock will use the bits2 timing reference.

ptp — The clock will use the PTP slave as the timing reference.

system

Syntax [**no**] **system**

Context debug

Description This command displays system debug information.

http-connections

Syntax **http-connections** [*host-ip-address/mask*]
http-connections

Context debug>system

Description This command displays HTTP connections debug information.

Parameters *host-ip-address/mask* — Displays information for the specified host IP address and mask.

ntp

Syntax [**no**] **router** *router-name* **interface** *ip-int-name*

Context debug>system

Description This command enables and configures debugging for NTP.

The **no** form of the command disables debugging for NTP.

Parameters *router-name* — Base, management

Default Base

ip-int-name — maximum 32 characters; must begin with a letter. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

persistence

Syntax [**no**] **persistence**

Context debug>system

Description This command displays persistence debug information.

Tools Commands

redundancy

Syntax **redundancy**

Context tools>dump

Description This command enables the context to dump redundancy parameters.

multi-chassis

Syntax **multi-chassis**

Context tools>dump>redundancy

Description This command enables the context to dump multi-chassis parameters.

mc-endpoint

Syntax **mc-endpoint peer** *ip-address*

Context tools>dump>redundancy>multi-chassis

Description This command dumps multi-chassis endpoint information.

Parameters **peer** *ip-address* — Specifies the peer's IP address.

Sample Output

```
*A:Dut-B# tools dump redundancy multi-chassis mc-endpoint peer 3.1.1.3
MC Endpoint Peer Info
    peer addr                   : 3.1.1.3
    peer name                   : Dut-C
    peer name refs              : 1
    src addr conf               : Yes
    source addr                 : 2.1.1.2
    num of mcep                 : 1
    num of non-mcep             : 0
    own sess num                : 58ba0d39
    mc admin state              : Up
    tlv own mc admin state      : Up
    tlv peer mc admin state     : Up
    reachable                   : Yes

    own sys priority            : 50
    own sys id                  : 00:03:fa:72:c3:c0
    peer sys priority           : 21
```

```
    peer sys id                  : 00:03:fa:c6:31:f8
    master                       : No

    conf boot timer              : 300
    boot timer active            : No
    conf ka intv                 : 10
    conf hold on num of fail     : 3
    tlv own ka intv              : 10
    tlv peer ka intv             : 10
    ka timeout tmr active        : Yes
    ka timeout tmr intvl         : 20
    ka timeout tmr time left     : 4
    peer ka intv                 : 10
    mc peer timed out            : No

    initial peer conf rx         : Yes
    peer-mc disabled             : No
    initial peer conf sync       : Yes
    peer conf sync               : Yes

    own passive mode             : Disable
    peer passive mode            : No

    retransmit pending           : No
    non-mcep retransmit pending  : No
    retransmit intvl             : 5
    last tx time                 : 1437130
    last rx time                 : 1437156

    own bfd                      : Enable
    peer bfd                     : Enable
    bfd vrtr if                  : 2
    bfd handle                   : 1
    bfd state                    : 3
    bfd code                     : 0

*A:Dut-B#
```

mc-ring

Syntax **mc-ring**
mc-ring peer *ip-address* [**ring** *sync-tag*]

Context tools>dump>redundancy>multi-chassis

Description This command dumps multi-chassis ring information.

peer *ip-address* **—** Specifies the peer's IP address.

ring *sync-tag* **—** Specifies the ring's sync-tag created in the **config>redundancy>mc>peer>mcr> ring** context.

sync-database

Syntax **sync-database** [**peer** *ip-address*] [**port** *port-id* | *lag-id*] [**sync-tag** *sync-tag*] [**application** *application*] [**detail**] [**type** *type*]

Context tools>dump>redundancy>multi-chassis

Description This command dumps MCS database information.

peer *ip-address* **—** Specifies the peer's IP address.

port *port-id* | *lag-id* **—** Indicates the port or LAG ID to be synchronized with the multi-chassis peer.

slot/mda/port or lag-*lag-id*

sync-tag *sync-tag* **—** Specifies a synchronization tag to be used while synchronizing this port with the multi-chassis peer.

application *application* **—** Specifies a particular multi-chassis peer synchronization protocol application.

Values		
	dhcp-server:	local dhcp server
	igmp:	Internet group management protocol
	igmp-snooping:	igmp-snooping
	mc-ring:	multi-chassis ring
	mld-snooping:	multicast listener discovery-snooping
	srrp:	simple router redundancy protocol
	sub-host-trk:	subscriber host tracking
	sub-mgmt:	subscriber management

type *type* **—** Indicates the locally deleted or alarmed deleted entries in the MCS database per multi-chassis peer.

Values alarm-deleted, local-deleted

detail — Displays detailed information.

srrp-sync-data

Syntax **srrp-sync-database** [**instance** *instance-id*] [**peer** *ip-address*]

Context tools>dump>redundancy>multi-chassis

Description This command dumps SRRP database information.

peer *ip-address* **—** Specifies the peer's IP address.

instance *instance-id* **—** Dumps information for the specified Subscriber Router Redundancy Protocol instance configured on this system.

Values 1 — 4294967295

set-fabric-speed

Syntax **set-fabric-speed** *speed*

Context tools>perform

Description This command sets fabric speed. With the introduction of SFM5-12e and the mini-SFM5-12e, a new tools command (**set-fabric-speed**) was added to set the fabric operating speed. (tools command does not apply to SFM4-12e) **fabric-speed-a**).

Parameters **fabric-speed-a —** The 7750 SR-12e chassis defaults to the **fabric-speed-a** when initially deployed with SFM5-12e. It operates at 200GB per slot which permits a mixture of FP2/FP3 based cards to co-exist.

fabric-speed-b — Eenables the 7750 SR-12e to operate at up to 400 Gb/s, for which all cards in the 7750 SR-12e are required to be T3 based (FP3 IMM and/or IOM3-XP-C). The system will not support any FP2 based cards when the chassis is set to **fabric-speed-b**.

Clear Commands

application-assurance

Syntax **application-assurance**

Context clear

Description This command clears application assurance commands.

group

Syntax **group** *isa-aa-group-id* **statistics**
group *isa-aa-group-id* **status**

Context clear>app-assure

Description This command clears application assurance group data.

Parameters *isa-aa-group-id* — Specifies the ISA-AA group index.

Values 1

status — Specifies that application assurance system statistics are cleared.

statistics — Specifies that application assurance statistics are cleared.

cron

Syntax **cron action completed** [*action-name*] [**owner** *action-owner*]

Context clear

Description This command clears completed CRON action run history entries.

Parameters **action-name —** Specifies the action name.

Values maximum 32 characters

owner *action-owner* **—** Specifies the owner name.

Default TiMOS CLI

redundancy

Syntax **redundancy**

Context clear

Description This command enables the context to clear redundancy parameters.

multi-chassis

Syntax **multi-chassis**

Context clear>redundancy

Description This command enables the context to clear multi-chassis parameters.

mc-mobile

Syntax **mc-mobile statistics peer** {**ip-address** | **ipv6-address**}

Context clear>redundancy

Description This command enables the context to clear multi-chassis parameters.

mc-endpoint

Syntax **mc-endpoint endpoint** [*mcep-id*] **statistics**
mc-endpoint statistics
mc-endpoint peer [*ip-address*] **statistics**

Context clear>redundancy>multi-chassis

Description This command clears multi-chassis endpoint statistics.

endpoint *mcep-id* **—** Clears information for the specified multi-chassis endpoint ID.

Values 1 — 4294967295

peer *ip-address* **—** Clears information for the specified peer IP address.

statistics — Clears statistics for this multi-chassis endpoint.

mc-lag

Syntax **mc-lag** [**peer** *ip-address* [**lag** *lag-id*]]

Context clear>redundancy>multi-chassis

Description This command clears multi-chassis Link Aggregation Group (LAG) information.

Parameters **peer** *ip-address* **—** Clears the specified address of the multi-chassis peer.

lag ***lag-id*** — Clears the specified LAG on this system.

Values 1 — 100

mc-ring

Syntax **mc-ring**

Context clear>redundancy>multi-chassis

Description This command clears multi-chassis ring data.

debounce

Syntax **debounce peer** *ip-address* **ring** *sync-tag*

Context clear>redundancy>multi-chassis

Description This command clears multi-chassis ring operational state debounce history.

Parameters *ip-address* — Clears debounce history for the specified IP address.

ring *sync-tag* **—** Clears debounce history for the specified sync tag.

ring-nodes

Syntax **ring-nodes peer** *ip-address* **ring** *sync-tag*

Context clear>redundancy>multi-chassis>mcr

Description This command clears multi-chassis ring unreferenced ring nodes.

Parameters *ip-address* — Clears ring statistics for the specified IP address.

ring *sync-tag* **—** Clears ring statistics for the specified sync tag.

statistics

Syntax **statistics**

Context clear>redundancy>multi-chassis>mcr

Description This command clears multi-chassis ring

global

Syntax **global**

Context clear>redundancy>multi-chassis>mcr>statistics

Description This command clears multi-chassis ring global statistics.

peer

Syntax **peer** *ip-address*

Context clear>redundancy>multi-chassis>mcr>statistics

Description This command clears multi-chassis ring peer statistics.

Parameters *ip-address* — Clears ring peer statistics for the specified IP address.

ring

Syntax **ring peer** *ip-address* **ring** *sync-tag*

Context clear>redundancy>multi-chassis>mcr>statistics

Description This command clears multi-chassis ring statistics.

Parameters *ip-address* — Clears ring statistics for the specified IP address.

ring *sync-tag* **—** Clears ring statistics for the specified sync tag.

ring-node

Syntax **ring-node peer** *ip-address* **ring** *sync-tag* **node** *ring-node-name*

Context clear>redundancy>multi-chassis>mcr>statistics

Description This command clears multi-chassis ring statistics.

Parameters **peer** *ip-address* **—** Clears ring-node peer statistics for the specified IP address.

ring *sync-tag* **—** Clears ring-node peer statistics for the specified sync-tag.

node *ring-node-name* **—** Clears ring-node peer statistics for the specified ring node name.

ptp

Syntax **ptp inactive-peers**
ptp statistics
ptp peer *ip_address* **statistics**

Context clear>system

Description This command clears PTP statistics.

Parameters **inactive-peers —** Removes 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.

sync-database

Syntax **sync-database peer** *ip-address* **all application** *application*
sync-database peer *ip-address* { **port** *port-id* | *lag-id* | **sync-tag** *sync-tag* } **application** *application*
sync-database peer *ip-address* **port** *port-id* | *lag-id* **sync-tag** *sync-tag* **application** *application*

Context clear>redundancy>multi-chassis

Description This command clears multi-chassis sync database information.

Parameters **peer** *ip-address* **—** Clears the specified address of the multi-chassis peer.

port *port-id* **—** Clears the specified port ID of the multi-chassis peer.

port *lag-id* **—** Clears the specified Link Aggregation Group (LAG) on this system.

all — Clears all ports and/or sync tags.

sync-tag *sync-tag* **—** Clears the synchronization tag used while synchronizing this port with the multi-chassis peer.

application — Clears the specified application information that was synchronized with the multi-chassis peer.

Values		
	all:	All supported applications
	dhcp-server:	local dhcp server
	igmp:	internet group management protocol
	igmp-snooping:	igmp-snooping
	mc-ring:	multi-chassis ring
	mld-snooping:	multicast listener discovery-snooping
	srrp:	simple router redundancy protocol
	sub-host-trk	subscriber host tracking
	sub-mgmt:	subscriber management

screen

Syntax **screen**

Context clear

Description This command allows an operator to clear the Telnet or console screen.

system

Syntax **system sync-if-timing** {**ref1** | **ref2** | **bits**}

Context clear

Description This command allows an operator to individually clear (re-enable) a previously failed reference. As long as the reference is one of the valid options, this command is always executed. An inherent behavior enables the revertive mode which causes a re-evaluation of all available references.

sync-if-timing

Syntax **system sync-if-timing** {**ref1** | **ref2**}

Context clear

Description This command allows an operator to individually clear (re-enable) a previously failed reference. As long as the reference is one of the valid options, this command is always executed. An inherent behavior enables the revertive mode which causes a re-evaluation of all available references.

Parameters **ref1 —** clears the first timing reference

ref2 — clears the second timing reference

trace

Syntax **trace log**

Context clear

Description This command allows an operator to clear the trace log.

Standards and Protocol Support

Note that this Standards Compliance list is subject to change.

Ethernet Standards

IEEE 802.1ab-REV/D3 Station and Media Access Control Connectivity Discovery
IEEE 802.1d Bridging
IEEE 802.1p/Q VLAN Tagging
IEEE 802.1s Multiple Spanning Tree
IEEE 802.1w Rapid Spanning Tree Protocol
IEEE 802.1x Port Based Network Access Control
IEEE 802.1ad Provider Bridges
IEEE 802.1ah Provider Backbone Bridges
IEEE 802.1ag Service Layer OAM
IEEE 802.3ah Ethernet in the First Mile
IEEE 802.1ak Multiple MAC Registration Protocol
IEEE 802.3 10BaseT
IEEE 802.3ad Link Aggregation
IEEE 802.3ae 10Gbps Ethernet
IEEE 802.3ah Ethernet OAM
IEEE 802.3u 100BaseTX
IEEE 802.3x Flow Control
IEEE 802.3z 1000BaseSX/LX
ITU-T Y.1731 OAM functions and mechanisms for Ethernet based networks
ITU-T G.8031 Ethernet linear protection switching
ITU-T G.8032 Ethernet Ring Protection Switching (version 2)

OSPF

RFC 1765 OSPF Database Overflow
RFC 2328 OSPF Version 2
RFC 2370 Opaque LSA Support
RFC 2740 OSPF for IPv6 (OSPFv3)
RFC 3101 OSPF NSSA Option
RFC 3137 OSPF Stub Router Advertisement
RFC 3623 Graceful OSPF Restart – GR helper
RFC 3630 Traffic Engineering (TE) Extensions to OSPF Version 2
RFC 4203 OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS) - (support of Link Local/Remote Identifiers and SRLG sub-TLVs)
RFC 5185 OSPF Multi-Area Adjacency
RFC5243 OSPF Database Summary List Optimization

BGP

RFC 1397 BGP Default Route Advertisement
RFC 1772 Application of BGP in the Internet
RFC 1965 Confederations for BGP
RFC 1997 BGP Communities Attribute
RFC 2385 Protection of BGP Sessions via MD5
RFC 2439 BGP Route Flap Dampening
RFC 2558 Multiprotocol Extensions for BGP-4
RFC 2918 Route Refresh Capability for BGP-4
RFC 3107 Carrying Label Information in BGP-4
RFC 3392 Capabilities Advertisement with BGP4
RFC 4271 BGP-4 (previously RFC 1771)
RFC 4360 BGP Extended Communities Attribute
RFC 4364 BGP/MPLS IP Virtual Private Networks (VPNs) (previously RFC 2547bis BGP/MPLS VPNs)
RFC 4456 BGP Route Reflection: Alternative to Full-mesh IBGP
RFC 4486 Subcodes for BGP Cease Notification Message
RFC 4577 OSPF as the Provider/ Customer Edge Protocol for BGP/ MPLS IP Virtual Private Networks (VPNs)
RFC 4659 BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN
RFC 4684 Constrained Route Distribution for Border Gateway Protocol/MultiProtocol Label Switching (BGP/MPLS) Internet Protocol (IP) Virtual Private Networks (VPNs)
RFC 4724 Graceful Restart Mechanism for BGP – GR helper
RFC 4760 Multi-protocol Extensions for BGP
RFC 4798 Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE)
RFC 4893 BGP Support for Four-octet AS Number Space
RFC 5004 Avoid BGP Best Path Transitions from One External to Another
RFC 5065 Confederations for BGP (obsoletes 3065)
RFC 5291 Outbound Route Filtering Capability for BGP-4
RFC 5575 Dissemination of Flow Specification Rules
RFC 5668 4-Octet AS Specific BGP Extended Community
draft-ietf-idr-add-paths Advertisement of Multiple Paths in BGP
Advertisement of the Best External Route in BGP
draft-ietf-idr-best-external

IS-IS

ISO/IEC 10589:2002, Second Edition Intermediate System to Intermediate System Intra-Domain Routeing Information Exchange Protocol
RFC 1195 Use of OSI IS-IS for Routing in TCP/IP and Dual Environments
RFC 2973 IS-IS Mesh Groups
RFC 3359 Reserved Type, Length and Value (TLV) Codepoints in Intermediate System to Intermediate System
RFC 3719 Recommendations for Interoperable Networks using Intermediate System to Intermediate System (IS-IS)
RFC 3787 Recommendations for Interoperable IP Networks using

Intermediate System to Intermediate System (IS-IS)
RFC 4971 Intermediate System to Intermediate System (IS-IS) Extensions for Advertising Router Information
RFC 5120 M-ISIS: Multi Topology (MT) Routing in IS-IS
RFC 5301 Dynamic Hostname Exchange Mechanism for IS-IS
RFC 5302 Domain-wide Prefix Distribution with Two-Level IS-IS
RFC 5303 Three-Way Handshake for IS-IS Point-to-Point Adjacencies
RFC 5304 IS-IS Cryptographic Authentication
RFC 5305 IS-IS Extensions for Traffic Engineering TE
RFC 5306 Restart Signaling for IS-IS
RFC 5307 IS-IS Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS)
RFC 5309 Point-to-Point Operation over LAN in Link State Routing Protocols
RFC 5310 IS-IS Generic Cryptographic Authentication
RFC 6213 IS-IS BFD-Enabled TLV
RFC 6329 IS-IS Extensions Supporting IEEE 802.1aq Shortest Path Bridging
draft-ietf-isis-mi-02 IS-IS Multi-Instance

IPSec

RFC 2401 Security Architecture for the Internet Protocol
RFC 2406 IP Encapsulating Security Payload (ESP)
RFC 2409 The Internet Key Exchange (IKE)
RFC 2560 X.509 Internet Public Key Infrastructure
Online Certificate Status Protocol - OCSP
RFC 3706 IKE Dead Peer Detection
RFC 3947 Negotiation of NAT-Traversal in the IKE
RFC 3948 UDP Encapsulation of IPsec ESP Packets
RFC 4210 Internet X.509 Public Key Infrastructure
Certificate Management Protocol (CMP)
RFC 4211 Internet X.509 Public Key Infrastructure
Certificate Request Message Format (CRMF)
RFC 5996 Internet Key Exchange Protocol Version 2 (IKEv2)
RFC 5998 An Extension for EAP-Only Authentication in IKEv2
draft-ietf-ipsec-isakmp-xauth-06 – Extended Authentication within ISAKMP/Oakley (XAUTH)
draft-ietf-ipsec-isakmp-modecfg-05 – The ISAKMP Configuration Method

IPv6

RFC 1981 Path MTU Discovery for IPv6
RFC 2375 IPv6 Multicast Address Assignments
RFC 2460 Internet Protocol, Version 6 (IPv6) Specification
RFC 2461 Neighbor Discovery for IPv6
RFC 2462 IPv6 Stateless Address Auto configuration
RFC 2464 Transmission of IPv6 Packets over Ethernet Networks
RFC 2529 Transmission of IPv6 over IPv4 Domains without Explicit Tunnels
RFC 2545 Use of BGP-4 Multiprotocol Extension for IPv6 Inter-Domain Routing
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2740 OSPF for IPv6
RFC 3306 Unicast-Prefix-based IPv6 Multicast Addresses
RFC 3315 Dynamic Host Configuration Protocol for IPv6
RFC 3587 IPv6 Global Unicast Address Format
RFC3590 Source Address Selection for the Multicast Listener Discovery (MLD) Protocol
RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6
RFC 4007 IPv6 Scoped Address Architecture
RFC 4193 Unique Local IPv6 Unicast Addresses
RFC 4291 IPv6 Addressing Architecture
RFC 4443 Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification
RFC 4552 Authentication/Confidentiality for OSPFv3
RFC 4659 BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN
RFC 5072 IP Version 6 over PPP
RFC 5095 Deprecation of Type 0 Routing Headers in IPv6
draft-ietf-isis-ipv6-05
draft-ietf-isis-wg-multi-topology-xx.txt

Multicast

RFC 1112 Host Extensions for IP Multicasting (Snooping)
RFC 2236 Internet Group Management Protocol, (Snooping)
RFC 3376 Internet Group Management Protocol, Version 3 (Snooping)
RFC 2362 Protocol Independent Multicast-Sparse Mode (PIMSM)
RFC 3618 Multicast Source Discovery Protocol (MSDP)
RFC 3446 Anycast Rendevous Point (RP) mechanism using Protocol Independent Multicast (PIM) and Multicast Source Discovery Protocol (MSDP)
RFC 4601 Protocol Independent Multicast - Sparse Mode (PIM-SM): Protocol Specification (Revised)
RFC 4604 Using IGMPv3 and MLDv2 for Source-Specific Multicast
RFC 4607 Source-Specific Multicast for IP
RFC 4608 Source-Specific Protocol Independent Multicast in 232/8
RFC 4610 Anycast-RP Using Protocol Independent Multicast (PIM)
draft-ietf-pim-sm-bsr-06. Bootstrap Router (BSR) Mechanism for PIM
draft-rosen-vpn-mcast-15.txt Multicast in MPLS/BGP IP VPNs
draft-ietf-l3vpn-2547bis-mcast-07: Multicast in MPLS/BGP IP VPNs
draft-ietf-l3vpn-2547bis-mcast-bgp-05: BGP Encodings and Procedures for Multicast in MPLS/BGP IP VPNs
RFC 3956: Embedding the Rendezvous Point (RP) Address in an IPv6 Multicast Address

MPLS-GENERAL

RFC 2430 A Provider Architecture DiffServ & TE

RFC 2474 Definition of the DS Field the IPv4 and IPv6 Headers (Rev)

RFC 2597 Assured Forwarding PHB Group (rev3260)

RFC 2598 An Expedited Forwarding PHB

RFC 3031 MPLS Architecture

RFC 3032 MPLS Label Stack Encoding

RFC 3140 Per-Hop Behavior Identification Codes

RFC 3443 Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks

RFC 4182 Removing a Restriction on the use of MPLS Explicit NULL

RFC 4023 Encapsulating MPLS in IP or Generic Routing Encapsulation (GRE)

RFC 5332 MPLS Multicast Encapsulations

MPLS — LDP

RFC 3037 LDP Applicability

RFC 3478 Graceful Restart Mechanism for LDP – GR helper

RFC 5036 LDP Specification

RFC 5283 LDP extension for Inter-Area LSP

RFC 5443 LDP IGP Synchronization

RFC 6388 LDP Extensions for Point-to-Multipoint and Multipoint-to-Multipoint LSP

RFC 6826 Multipoint LDP in-band signaling for Point-to-Multipoint and Multipoint-to-Multipoint Label Switched Paths

draft-pdutta-mpls-tldp-hello-reduce-04, Targeted LDP Hello Reduction

MPLS/RSVP-TE

RFC 2702 Requirements for Traffic Engineering over MPLS

RFC2747 RSVP Cryptographic Authentication

RFC 2961 RSVP Refresh Overhead Reduction Extensions

RFC3097 RSVP Cryptographic Authentication - Updated Message Type Value

RFC 3209 Extensions to RSVP for Tunnels

RFC 3473 Generalized Multi-Protocol Label Switching (GMPLS) Signaling

Resource ReserVation Protocol-Traffic Engineering (RSVP-TE) Extensions – (support of IF_ID RSVP_HOP object with unnumbered interface and RSVP-TE Graceful Restart Helper Procedures)

RFC 3477 Signalling Unnumbered Links inResourceReSerVationProtocol-Traffic Engineering (RSVP-TE)

RFC 3564 Requirements for Diff-Serv-aware TE

RFC 3906 Calculating Interior Gateway Protocol (IGP) Routes Over Traffic Engineering Tunnels

RFC 4090 Fast reroute Extensions to RSVP-TE for LSP Tunnels

RFC 4124 Protocol Extensions for Support of Diffserv-aware MPLS Traffic Engineering

RFC 4125 Maximum Allocation Bandwidth Constraints Model for Diffserv-aware MPLS Traffic Engineering

RFC 4127 Russian Dolls Bandwidth Constraints Model for Diffserv-aware MPLS Traffic Engineering

RFC 4561 Definition of a RRO Node-Id Sub-Object

RFC 4875 Extensions to Resource Reservation Protocol - Traffic Engineering (RSVP-TE) for Point-to-Multipoint TE Label Switched Paths (LSPs)

RFC 5151 Inter-domain MPLS and GMPLS Traffic Engineering – RSVP-TE Extensions

RFC 5712 MPLS Traffic Engineering Soft Preemption

RFC 5817 Graceful Shutdown in GMPLS Traffic Engineering Networks

draft-newton-mpls-te-dynamic-overbooking-00 A Diffserv-TE Implementation Model to dynamically change booking factors during failure events

MPLS — OAM

RFC 4379 Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures

RFC 6424 Mechanism for Performing Label Switched Path Ping (LSP Ping) over MPLS Tunnels

RFC 6425 Detecting Data Plane Failures in Point-to-Multipoint Multiprotocol Label Switching (MPLS) - Extensions to LSP Ping

MPLS-TP (7750/7450 only)

RFC 5586 MPLS Generic Associated Channel

RFC 5921 A Framework for MPLS in Transport Networks

RFC 5960 MPLS Transport Profile Data Plane Architecture

RFC 6370 MPLS-TP Identifiers

RFC 6378 MPLS-TP Linear Protection

RFC 6428 Proactive Connectivity Verification, Continuity Check and Remote Defect indication for MPLS Transport Profile

RFC 6426 MPLS On-Demand Connectivity and Route Tracing

RFC 6478 Pseudowire Status for Static Pseudowires

draft-ietf-mpls-tp-ethernet-addressing-02 MPLS-TP Next-Hop Ethernet Addressing

RIP

RFC 1058 RIP Version 1

RFC 2080 RIPng for IPv6

RFC 2082 RIP-2 MD5 Authentication

RFC 2453 RIP Version 2

TCP/IP

RFC 768 UDP

RFC 1350 The TFTP Protocol (Rev.

RFC 791 IP

RFC 792 ICMP

RFC 793 TCP

RFC 826 ARP

RFC 854 Telnet

RFC 951 BootP (rev)

RFC 1519 CIDR

RFC 1542 Clarifications and Extensions for the Bootstrap Protocol

RFC 1812 Requirements for IPv4 Routers

RFC 2347 TFTP option Extension
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