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

BASIC SYSTEM CONFIGURATION GUIDE
RELEASE 16.0.R4

Table of Contents

1 Getting Started

1.1 About This Guide

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

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

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

- 7450 ESS
- 7750 SR
- 7950 XRS
- VSR

Table 1 lists the available chassis types for each SR OS router.

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

7450 ESS	7750 SR	7950 XRS
• 7450 ESS-7/12 running in standard mode (not mixed-mode)	• 7450 ESS-7/12 running in mixed-mode (not standard mode) • 7750 SR-a4/a8 • 7750 SR-c4/c12 • 7750 SR-1e/2e/3e • 7750 SR-7/12 • 7750 SR-12e • 7750 SR-7s/14-s • 7750 SR-1	• 7950 XRS-16c • 7950 XRS-20/40

For a list of unsupported features by platform and chassis, refer to the SR OS 16.0.R*x* Software Release Notes, part number 3HE 14220 000*x* TQZZA or the *VSR Release Notes*, part number 3HE 14204 000*x* TQZZA.

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

Note: This guide generically covers Release 16.0.R*x* content and may contain some content that will be released in later maintenance loads. Refer to the SR OS 16.0.R*x* Software Release Notes, part number 3HE 14220 000*x* TQZZA or the *VSR Release Notes*, part number 3HE 14204 000*x* TQZZA, for information about features supported in each load of the Release 16.0.R*x* software.

1.2 Router System Configuration Process

Table 2 lists the tasks necessary to configure boot option files (BOF) and system and file management functions. Each chapter in this book is presented in an overall logical configuration flow. Each section describes a software area and provides CLI syntax and command usage to configure parameters for a functional area. After the hardware installation has been properly completed, proceed with the router configuration tasks in the following order:

Table 2   **Configuration Process**

Area	Task	Section
CLI Usage	Navigate in the CLI	Navigating in the CLI
	Get help in the CLI	Getting Help in the CLI
	Configure environment commands	CLI Environment Commands
	Configure monitor commands	CLI Monitor Commands
	Enter CLI commands	Entering CLI Commands
	Use the vi commands	Using the vi Commands
	Undo configurations	Configuration Rollback
	Edit candidate configurations	Transactional Configuration
Operational functions	Directory and file management	File Management Tasks
Boot options	Configure boot option files (BOF)	Configuring Boot Options File with CLI
	Service management	Service Management Tasks
System configuration	Perform administrative tasks	Administrative Tasks
	Configure system management features	Configuring System Management with CLI
	Configure system parameters	Common Configuration Tasks
	Configure system timing	System Timing
	Configure system monitoring thresholds	Configuring System Monitoring Thresholds
	Configure LLDP	Configuring LLDP

2 CLI Usage

2.1 CLI Structure

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

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

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

Figure 1 and Figure 2 are examples displaying the major contexts for router configuration, and are not a definitive list.

→ **Note:** The CLI engine used to execute scripts is the primary CLI engine configured with **configure system management-interface cli cli-engine**.

Figure 1   **Root Commands**

Root
Admin ——— application-assur
                                                  certificate
BOF —————————————————————————————————— compare
                address   debug-save
Configure ———————————————— autonegotiate   disconnect
           aaa   console-speed   display-config
           application-assurance   dnm-domain   radius-disc
           card   duplex   reboot
           cflowd   li-local-save   redundancy
           connection-profile   li-separate   save
           cron   persist   set-time
Environment ———— delivery-appliance   primary-config rollback
                alias   eth-cfm   primary-dns   tech-support
                create   eth-ring   primary-image view
                more   eth-tunnel   save
                reduced-prompt filter   secondary-config
                saved-ind-prompt ipsec   secondary-dns
                suggest-int-obj   interface-group-handler secondary-image
                terminal isa   speed
                time-display lag   static-route
                time-stamp li   tertiary-config
                        log   tertiary-dns
                        mcast-management tertiary-image
                        mirror   wait
                        port
                        port-policy
                        pw-port
                        python
                        qos
                        redundancy
                        router
                        saa
                        service
                        subscriber-mgmt
                        system
                        test-oam
                        vrrp
                        vsm

File —— attrib
                                                  cd
Monitor ————————————————————————————— copy
                               card   delete
                               ccag   dir
                               cpm-filter format
                               filter   md
                               lag   move
                               management-acc rd
                               port   repair
                               qos   scp
Help ———————————————————————— router   shutdown
                            help   service   type
                            help edit   version
                            help globals   vi

Password   *7750_SR_Basics_1*

Figure 2 **Operational Root Commands**

Root
Show ──
aaa
alias
application-as
aps
bof
boot-messages
card
ccag
certificate
cflowd
chassis
config
connection-profile
cron
debug
delivery-appliance
egress-replication
elmi
eth-cfm
eth-ring
eth-tunnel
filter
interface-group-handler
ip
ipsec
isa
lag
li
log
mcast-management
mda
megapools
mirror
multilink-bundle
pools
port
port-policy
port-free
pw-port
qos
radius
redundancy
router
saa
service
snmp
srrp
subscriber-mgmt
system
test-oam
time
trace
uptime
users
version
video
vrrp

Clear ──────────────────
aaa
application-assurance
card
ccag
cflowd
cpm-filter
cpm-queue
cpu-protection
cron
delivery-appliance
eth-cfm
filter
ip
ipsec
lag
li
log
mcast-management
mda
nat
port
qos
radius
reassembly-statistios
redundancy
router
saa
screen
service
subscriber-mgmt
system
tacplus
test-oam
trace
video
vrrp
wlan-gw

Debug ──────────
aaa
application-assurance
atm
cisco-hdlc
cmpv2
diameter
ethernet
frame-relay
ipsec
l2tp
lag
mcast-management
mirror-source
nat
oam
ocsp
ppp
radius
router
service
snmp
subscriber-mgmt
sync-if-timing
system
trace
wlan-gw

Tools ──────
dump
perform

7750_SR_Basics_2

2.2   Navigating in the CLI

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

2.2.1   CLI Contexts

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

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

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

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

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

Method 1:

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

Method 2:

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

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

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

2.2.2   Basic CLI Commands

The console control commands are the commands that are used for navigating within the CLI and displaying information about the console session. Most of these commands are implemented as global commands. They can be entered at any level in the CLI hierarchy with the exception of the password command which must be entered at the ROOT level. The console control commands are listed in Table 3.

Table 3   **Console Control Commands**

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

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

Command	Description
telnet	Telnet to a host.
traceroute	Determines the route to a destination address.
tree	Displays a list of all commands at the current level and all sublevels.
write	Sends a console message to a specific user or to all users with active console sessions.

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

```
*A:ALA-12# help globals
    back             - Go back a level in the command tree
    candidate        + Commands used for editing candidate configurations
    echo             - Echo the text that is typed in
    enable-admin     - Enable the user to become a system administrator
    exec             - Execute a file - use -echo to show the commands and
                       prompts on the screen
    exit             - Exit to intermediate mode - use option all to exit to
                       root prompt
    help             - Display help
    history          - Show command history
    logout           - Log off this system
    mrinfo           - Request multicast router information
    mstat            - Trace multicast path from a source to a receiver and
                       display multicast packet rate and loss information (IGMP
                       based)
    mstat2           - Trace multicast path from a source to a receiver and
                       display multicast packet rate and loss information (UDP
                       based)
    mtrace           - Trace multicast path from a source to a receiver (IGMP
                       based)
    mtrace2          - Trace multicast path from a source to a receiver (UDP
                       based)
    oam              + OAM Test Suite
    ping             - Verify the reachability of a remote host
    pwc              - Show the present working context
    sleep            - Sleep for specified number of seconds
    ssh              - SSH to a host
    telnet           - Telnet to a host
    traceroute       - Determine the route to a destination address
    tree             - Display command tree structure from the context of
                       execution
    write            - Write text to another user
*A:ALA-12#
```

Table 4 describes command syntax symbols.

Table 4   **Command Syntax Symbols**

Symbol	Description
|	A vertical line indicates that one of the parameters within the brackets or braces is required. tcp-ack {true | false}
[ ]	Brackets indicate optional parameters. redirects [number seconds]
{ }	Braces indicate that one of the parameters must be selected. default-action {drop | forward}
[{ }]	Braces within square brackets 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 that you must enter text based on the parameter. interface *interface-name*

2.2.3   CLI Environment Commands

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

Table 5   **CLI Environment Commands**

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

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

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

2.2.4   CLI Monitor Commands

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

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

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

The CLI monitor command contexts are listed in Table 6.

Table 6   **CLI Monitor Command Contexts**

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

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

Command	Description
lag	Enables Link Aggregation Group (LAG) monitoring to display statistics for individual port members and the LAG.
management-access-filter	Enables management access filter monitoring.
port	Enables port traffic monitoring. The specified port(s) statistical information displays at the configured interval until the configured count is reached.
qos	Enables arbiter and scheduler statistics monitoring.
router	Enables virtual router instance monitoring at a configurable interval until that count is reached.
service	Monitors commands for a particular service.

2.3   Getting Help in the CLI

The **help** system commands and the ? key display different types of help in the CLI. Table 7 lists the different help commands.

Table 7   **Online Help Commands**

Command	Description
help ?	List all commands in the current context.
string ?	List all commands available in the current context that start with *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 useful when searching for a command in a lower-level context.

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

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

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

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

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

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

2.4   The CLI Command Prompt

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

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

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

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

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

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

2.5   Displaying Configuration Contexts

The **info**, **info detail** and **objective** commands display configuration for the current level. The **info** command shows non-default configurations. The **info detail** command shows the entire configuration for the current level, including defaults. The **info** [**objective**] command provides an output objective that controls the configuration parameters to be displayed.

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

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


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

2.6   EXEC Files

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

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

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

2.7   CLI Script Control

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

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

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

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

2.8   Entering CLI Commands

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

2.8.1   Command Completion

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

System commands are available in all CLI context levels.

2.8.2   Unordered and Unnamed Parameters

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

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

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

<ip-prefix/prefix-*> : ipv4-prefix    - a.b.c.d (host bits must be 0)
                       ipv4-prefix-le - [0..32]
                       ipv6-prefix    - x:x:x:x:x:x:x:x   (eight 16-bit pieces)
                                        x:x:x:x:x:x:d.d.d.d
                                        x - [0..FFFF]H
                                        d - [0..255]D

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

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

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

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

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

2.8.3   Editing Keystrokes

When entering a command, special keystrokes allow for editing of the command.
Table 8 lists the command editing keystrokes.

Table 8   **Command Editing Keystrokes**

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

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

Editing Action	Keystrokes
Convert rest of word to lowercase	<Esc><l>
Delete remainder of word	<Esc><d>
Delete word up to cursor	<Ctrl-w>
Transpose current and previous character	<Ctrl-t>
Enter command and return to root prompt	<Ctrl-z>
Refresh input line	<Ctrl-l>

2.8.4 Absolute Paths

CLI commands can be executed in any context by specifying the full path from the
CLI root. To execute an out-of-context command, enter a forward slash "*/*" or
backward slash "\" at the beginning of the command line. The commands are
interpreted as an absolute path. The forward slash "*/*" or backward slash "\" cannot
be used as an absolute path at the beginning of the command-string of the
environment alias command. Spaces between the slash and the first command will
return an error.

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

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

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

or

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

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

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

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

behaves the same as the following series of commands:

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

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

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

becomes:

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

2.8.5 History

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

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

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

2.8.6   Entering Numerical Ranges

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

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

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

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

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

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

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

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

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

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

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

```
#config>service>vpls>sap$ static-mac aa:bb:[0x19..0x21]:dd:ee:ff create
#config>service>vpls>sap$ info
----------------------------------------------
                static-mac aa:bb:19:dd:ee:ff create
                static-mac aa:bb:1a:dd:ee:ff create
                static-mac aa:bb:1b:dd:ee:ff create
                static-mac aa:bb:1c:dd:ee:ff create
                static-mac aa:bb:1d:dd:ee:ff create
                static-mac aa:bb:1e:dd:ee:ff create
                static-mac aa:bb:1f:dd:ee:ff create
                static-mac aa:bb:20:dd:ee:ff create
                static-mac aa:bb:21:dd:ee:ff create
----------------------------------------------
```

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

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

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

Specifying a range in the CLI does have limitations. These limitations are summarized in Table 9.

Table 9   **CLI Range Use Limitations**

Limitation	Description
Up to 6 ranges (including references) may be specified in a single command, and they may not combine to more than 1000 iterations of the command.	It is possible to shut down ports 1 through 10 on XMA/MDA 1 and XMA/MDA 2: configure port 1/[1..2]/[1..10]
Ranges within quotation marks are interpreted literally.	In the CLI, enclosing a string in quotation marks ("string") causes the string to be treated literally and as a single parameter. For example, several commands in the CLI allow the configuration of a descriptive string. If the string is more than one word and includes spaces, it must be enclosed in quotation marks. A range that is enclosed in quotes is also treated literally. For example, configure router interface "A[1..10]" no shutdown creates a single router interface with the name "A[1..10]". However, a command such as: configure router interface A[1..10] no shutdown creates 10 interfaces with names A1, A2 .. A10.
Command completion will 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, will cease to work. If the command line entered is correct and unambiguous, the command works properly; otherwise, an error is returned.

2.8.7 Pipe/Match

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

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

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

  admin display-config | match "echo" > cf1:\test\echo_list.txt
- Task: Display all the lines that do not include "echo":

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

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

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

  admin display-config | match interface | count

Command syntax:

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

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

where:

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

For example:

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

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

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


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


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


*A:Dut# show log event-control | match ignore-case pre-lines 10 SyncStatus
L  2016 tmnxLogOnlyEventThrottled         MA  gen           0              0
MCPATH:
   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 10 describes regular expression symbols and their interpretation (similar to what is used for route policy regexp matching). Table 11 describes special characters.

Table 10   **Regular Expression Symbols**

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

Table 11   **Special Characters**

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

Table 11   **Special Characters (Continued)**

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

2.8.8   Pipe/Count

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

For example:

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

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

2.8.9 Range Operator Support of Regular Expression Match

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

SR OS performs the following steps:

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

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

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

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

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

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

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

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

show router mpls sr-te-lsp RENO194_DET190_LSP1_Profile10

show router mpls sr-te-lsp RENO194_DET190_LSP3

show router mpls sr-te-lsp RENO194_ATL224_LSP1

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

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

2.8.9.1 Regular Expression Symbols in a Regular Expression Match Operation

The user can use all the regular expression symbols listed in Table 10 and Table 11 inside the regular expression to match.

For example, the user can list all LSP names that begin with the string "RENO194_" followed by the string "ATL" as follows:

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

3HE 14127 AAAB TQZZA 01

===

> **Note:** The following conventions are used in the previous example.
>
> • Use the character "^", which matches the start of the string, directly inside the regular expression to indicate a match at the start of the string. However, if you want to match it as character, enter it as "\\^".
> • Use the range delimiter with the escape symbol in front "\[" inside the regular expression because the range delimiter encloses the regular expression itself.

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

Table 12   **Rules Governing Regular Expression Symbols**

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

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

For example, if you want to display the SR-TE LSP names that begin with the string "RENO194_ATL" with part of the string entered directly and the rest of the string entered inside a regular expression, the command will return no match. The following example demonstrates incorrect syntax:

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

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

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

2.8.10   Redirection

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

For example:

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

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

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

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

2.9   VI Editor

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

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

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

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

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

2.9.1   Summary of vi Commands

The vi editor operates in two modes:

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

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

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

  In the insert mode, every character typed is added to the text in the file. Pressing ESC turns off the insert mode.

2.9.2   Using the vi Commands

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

Table 13 describes the commands to cut, paste, and delete text.

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

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

Table 14 describes the commands to insert new text.

Table 14   **Inserting New Text**

vi Command	Description
A	Append at the end of the current line.
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 15 describes the commands to move the cursor within the file.

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

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

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

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

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

vi Command	Description
w	Move the cursor forward one word. If the cursor is in the middle of a word, move the cursor to the first character of the next word.

Table 16 describes the commands to move the cursor around the screen.

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

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

Table 17 describes the commands to replace text.

Table 17   **Replacing Text**

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

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

Table 18   **Searching for Text or Characters**

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

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

Table 19   **Manipulating Character/Line Formatting**

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

Table 20 describes the commands to save and quit.

Table 20   **Saving and Quitting**

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

Table 21 describes miscellaneous commands.

Table 21   **Miscellaneous**

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

2.9.3 EX Commands

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

Table 22 describes the EX commands.

Table 22   **EX commands**

vi Command	Description
:ab string strings	Abbreviation. If a word is typed in vi corresponding to string1, the editor automatically inserts the corresponding words. For example, the abbreviation :ab usa United States of America would insert the words, United States of America whenever the word usa is typed in.
:map keys new_seq	Mapping. This lets you map a key or a sequence of keys to another key or a sequence of keys.
:q	Quit vi. If there have been changes made, the editor 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.
: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.

2.10   Configuration Rollback

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

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

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

The advantages of this feature include the following:

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

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

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

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

Figure 3   **Rollback Operation**
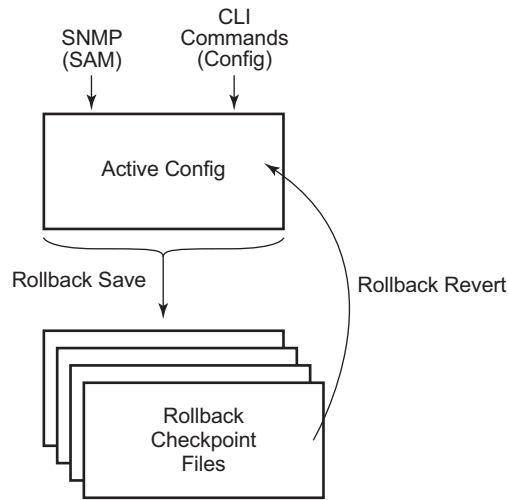
7750_SR_Basics_3

2.10.1   Feature Behavior

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

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

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

- Rollback checkpoints include all current, operationally active configurations:

  - Changes from direct CLI commands in the configuration branch.

  - SNMP sets

- Rollback checkpoints do not include BOF configurations. The BOF file (and bof config) is not part of a rollback-save or rollback. A rollback does not change any of the BOF configuration. The BOF contains basic information for the node and does not change frequently (mostly during initial commissioning of the node).

- A rollback save feature can be automatically executed (for example, scheduled monthly) using the CRON facility of SR OS.

- The latest rollback checkpoint file uses a suffix of ".rb". The next latest rollback checkpoint file has a suffix of ".rb.1", the next oldest has a suffix of "rb.2", and so on.

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

```
file-url.rb.1

...

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

- When a **rollback save** is executed, the system shifts the file suffix of all the previous checkpoints by 1 (new id = old id + 1). If there are already as many checkpoint files as the maximum number supported then the last checkpoint file is deleted.

- The maximum number of rollback checkpoints is configurable and defaults to 10 ("latest" and 1 through 9, where checkpoint file 9 is deleted during the next rollback-save).

- The location and name of the rollback checkpoint files is configurable to be local (on compact flash) or remote. The *file-url* must not contain a suffix (just a path/ directory + filename). The suffix for rollback checkpoint files is .rb and is automatically appended to rollback checkpoint files.

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

- There is no default rollback-location. If one is not specified (or it is cleared using **no rollback-location**) and a **rollback save** is attempted, the **rollback save** will fail and return an error message.

- The entire set of rollback checkpoint files can be copied from the active CPM CF to the standby CPM CF. This synchronization is done via the following command:

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

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

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

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

- **config>redundancy>synchronize {boot-env | config}** and **admin>redundancy>synchronize {boot-env | config}** do not apply to rollback checkpoint files. These commands do not manually or automatically sync rollback checkpoint files. The dedicated **rollback-sync** commands must be used to synchronize rollback checkpoint files.

- Rollback files can be deleted using a dedicated rollback checkpoint deletion command.

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

- Deleting a rollback checkpoint causes the suffixes to be adjusted (decremented) for all checkpoints older 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**
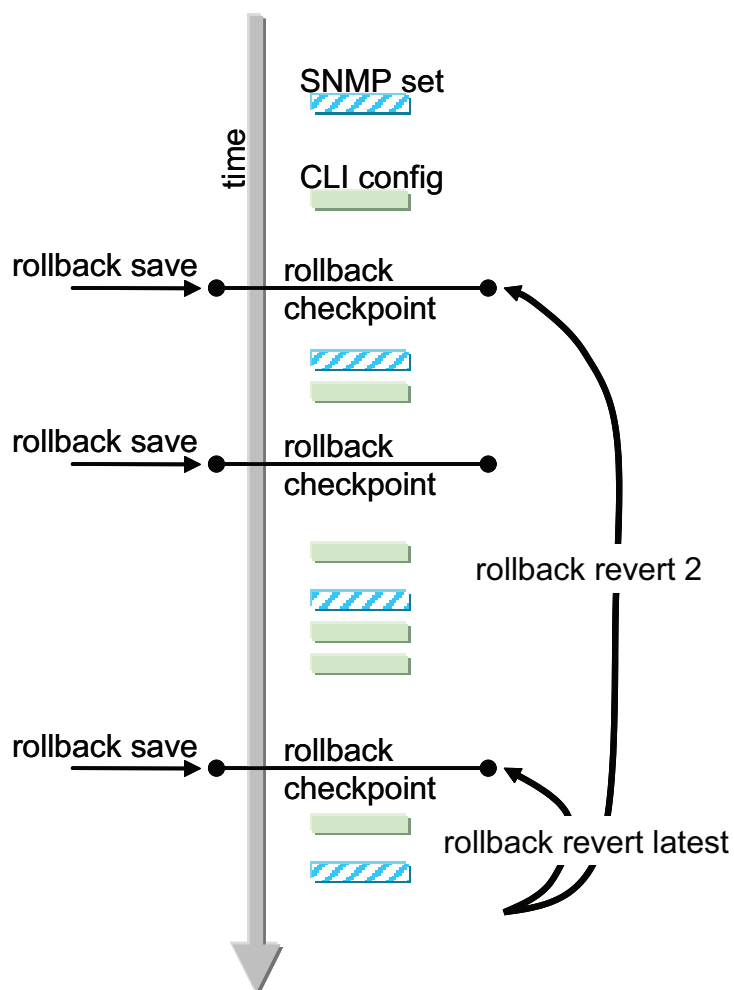
- A rollback revert does not affect the currently stored rollback checkpoint files (no deletions or renumbering). This means that if an operator issues the command **rollback revert 3** and then issues the **rollback save** command, the resulting rollback checkpoint files "file-url.rb" and "file-url.rb.4" 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 configuration 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 an MC-APS port will start with neighbor 1, then be configured as **no neighbor**, and then configured with neighbor 2. Moving through the **no neighbor** intermediate state requires the working and protect circuits to be torn down and rebuilt. This impacts the 7450 ESS and 7750 SR.

- A rollback will undo any SNMP sets or direct CLI configuration commands that occurred since the last checkpoint creation.

- During the period when a node is processing a **rollback revert**, 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 configuration files or executable scripts. A normal configuration file (from an **admin save**) cannot be renamed as a rollback checkpoint and then referenced for a **rollback revert** operation. Only rollback checkpoint files generated with **rollback save** can be used to rollback revert.

- If a hardware change is made after a **rollback save**, then:

  - a rollback can be executed as long as the hardware change was an addition of hardware to the node (for example, added a new card or IOM into a previously empty slot).

  - a rollback is not guaranteed to work if hardware was removed or changed (for example, XCM/IOM was removed, or XMA/MDA was swapped for a different XMA/MDA type).

- Rollback across a change to the following parameters is not supported:

  - chassis-mode

  - 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 the primary configuration in the BOF is changed and an **admin reboot** is performed). **Admin reboot** does not "break the chain" for rollback.

- Lawful Intercept configuration under the **config>li** branch is not affected by a rollback or rescue. LI configuration is not saved in the rollback checkpoint or rescue file, and a rollback revert does not affect any configuration under the **config>li** branch.

- Any configuration or state change performed under the debug branch of CLI is not saved in the rollback checkpoint file or impacted by a rollback.

- Rollbacks to a checkpoint created in a more recent release is not supported (for example, node running in 9.0r5 cannot rollback to a checkpoint created in 9.0r7).

- The following list captures some side effects and specific behaviors of a rollback revert. Some of these side effects are not related purely to configuration (that is, in the CLI configuration branch) and may have interactions with tools commands, RADIUS, and so on.

  – SAA jobs that are running when a rollback revert is initiated, and need configuration changes due to the rollback, will be stopped. If the SAA job is a continuous type, then it will be restarted as part of the rollback revert after the configuration changes have been applied (just as if the operator had typed **no shutdown** for the continuous SAA job). Non-continuous SAA jobs that were modified by the rollback would need to be manually restarted if they need to be run again.

  – If **max-nbr-mac-addr** is reduced as part of the revert and the number of MAC addresses in the forwarding database is greater than the max-nbr-mac-addr, then the rollback is aborted (before any actions are taken) and an informative error message is provided. The operator must take actions to remove the MAC addresses if they wish to proceed with the rollback.

  – If active subscribers or subscriber hosts or DHCP lease states are present, some associated configuration changes may be blocked (just as those same changes would be blocked if an operator tried to make them via CLI – trying to delete an SLA profile being used by active subscriber hosts, or trying to change a NAT policy in a subscriber profile). If certain configuration changes associated with the hosts or lease states are required as part of the rollback but those changes are blocked, then for each blocked configuration item, a warning will be printed, that particular configuration item will not be changed and the rollback will continue. This is supported on the 7450 ESS and 7750 SR.

– After multi-chassis peer shutdown or configuration changes have occurred that affect the contents of the distributed database (for example, sync tag creation or deletion), further configuration changes related to that peer may be temporarily refused. The duration of the temporary configuration freeze will depend on the size of the distributed database. A rollback attempting to make those refused configuration changes will fail and an error message will be provided to the CLI user.

– If a **force-switchover** command (for example, **tools perform service id 1 endpoint "x" force-switchover spoke-sdp-fec 1**) has been applied to a spoke-sdp-fec of a dynamic multi-segment pseudo wire, and a rollback revert needs to change the admin state of the spoke-sdp-fec (for example, to modify spoke-sdp-fec parameters that may be dependent on the admin state), then the rollback revert 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 require a shut/no-shut on the VPRN service.

  • Changes to OSPF or ISIS export-limit require a shut/no-shut on OSPF or ISIS.

  • Configuration changes to an MSAP policy that normally require a **tools perform subscriber-mgmt eval-msap** command to take operational effect on subscribers that are already active. Rollback 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 (for example, the **begin** command was entered, some changes made, but the **commit** command was never entered) in the following areas will be lost or cleared when a rollback revert is initiated:

  • **config>app-assure>group policy**

  • **config>router>policy-options**

  • **config>system>sync-if-timing**

- Some **card** and **mda** commands require a reboot, remove or rebuild of an entire card or XMA/MDA. When these commands need to be executed as part of a rollback, the impacted cards and MDAs will be listed in a warning and the operator will be prompted with a single y/n prompt to decide whether to proceed. This prompting will not occur for a rollback initiated via SNMP, or if the operator uses the **now** keyword with the **rollback revert** command. Some examples of **card** and **mda** commands that may cause a prompt are:
    - **configure>card>card-type**
    - **configure>card>named-pool-mode (7450 ESS and 7750 SR)**
    - **configure>card>mda**
    - **configure>card>mda>mda-type**
- Although the use of the CTRL-C key combination is not recommended during a rollback revert, it is supported (via CLI or SNMP). Interrupting a rollback revert may leave the router in a state that is not necessarily something between the old active configuration and the rollback checkpoint, as the rollback processing may have been in the middle of tearing things down or rebuilding configurations. A strong warning is issued in this case to indicate that the operator must examine the configuration and potentially issue another rollback revert to return to a known (and coherent) configuration.
- An HA CPM switchover during a rollback revert 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.
- A rollback revert operation does not check authorization of each command that is applied during the revert. Permission to execute the revert operation (authorization for the "**admin rollback revert** command itself) should only be given to users who are allowed to initiate a rollback revert. It is generally advised to only allow system administrators access to the file system where the rollback files are stored so that they cannot be manually edited.

2.10.2 Rollback and SNMP

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

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

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

2.10.3   Rescue Configuration

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

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

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

2.10.4   Operational Guidelines

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

- The **admin save** and **admin rollback save** commands should be performed periodically:
- The **admin save** command can be used to backup a complete configuration file that can be used during router reboot, with the following considerations:
    - used with a reboot as a last resort
    - performed after any major hardware changes or major service changes
    - performed after any software upgrade
- The **admin rollback save** command can be used to create a rollback checkpoint as follows:
    - to be used for intermediate checkpoints that can be recovered with minimal impacts to services
    - to be performed each time that a moderate amount of configuration changes have been made
    - to be performed after any hardware changes
    - to be performed after any software upgrade
    - to be scheduled with CRON (for example, once every one or two weeks)

- A new **admin rollback save rescue** must be created when hardware is changed.

- Rollback checkpoint files are not editable, or compatible or interchangeable with configuration files (generated with **admin save**).

- The repeated use of the **admin rollback save**, **admin rollback delete**, and **admin rollback revert** commands over the course of weeks or months is not recommended without also executing an occasional **admin save**. In a serious situation, use one of the saved configurations as the primary configuration for an **admin reboot**.

- For a software upgrade, it is recommended to create a Rollback Checkpoint (**admin rollback save**), in addition to saving the configuration (**admin save**), after an upgrade has been performed and the system is operating as expected. This ensures a good checkpoint that is fully compatible with the new release is available at a point shortly after the upgrade.

- An operator could create a set of rollback checkpoints to support busy or quiet days or weekends or weekdays and use CRON to shift between them.

- It is beneficial to create a rollback checkpoint before a rollback revert is initiated (especially if significant configuration changes have been applied since the last checkpoint was created). If the rollback is especially significant (a lot of major changes), it is also a good practice to perform an **admin save** in case a full reboot is required to recover from an issue.

- A rollback failure may occur in some limited cases where the node needs a long time to complete one of the resulting configuration changes. If a rollback (for example, rollback revert 5) fails during execution, it should be attempted again. The second attempt will typically complete the remaining configuration changes required to fully revert to the desired checkpoint.

- When a new backup CPM is commissioned, the user executes the **admin redundancy rollback-sync** command to copy the entire set of rollback files from the active CPM CF to the new standby CPM CF. If the operator wants the system to automatically copy new rollback checkpoints to both CFs whenever a new checkpoint is created, then the **configure redundancy rollback-sync** should be configured.

- An HA CPM switchover during a rollback revert 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- and remote-max-checkpoint values, and it is possible that a rollback revert operation can change those values. If an operator changes the local- or remote-max-checkpoint values, it is recommended to delete all the existing checkpoints to prevent a subsequent rollback revert from changing the maximum values to any of the previous values..

- If a warning prompt (**y/n**) is displayed when a rollback revert is initiated, it is highly suggested to respond **no** to the warning prompt the first time, save a rollback checkpoint before attempting this rollback revert, execute the revert again, and respond **yes**. If the rollback encounters problems, then a revert to the saved checkpoint can be used to return to the initial configuration state.

2.11   Transactional Configuration

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

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

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

Figure 5   **Router Configuration with Rollback and Transactions**
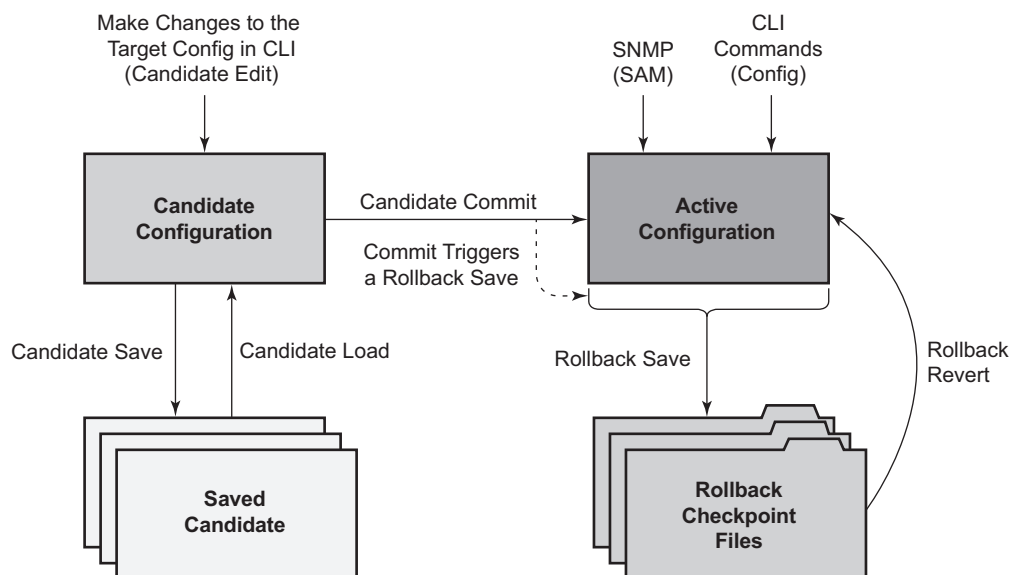
2.11.1   Basic Operation

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

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

Just as there is a single operational active configuration that can be modified simultaneously by multiple users in the SR OS, there is also a single global candidate configuration instance. All users make changes in the same global candidate configuration and a commit operation by any user 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**, and so on) are available to correct and reorder the candidate configuration.

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

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

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

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

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

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

Error messages that 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 pressing Enter) non-transactional CLI and SNMP commands are not blocked during the creation or editing of a candidate or the processing of a commit. These commands take immediate effect as normal.

2.11.2 Transactions and Rollback

By default, the SR OS 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 configurations that are not supported in a rollback revert are also not supported in edit-cfg mode; for example, changes to chassis-mode.

2.11.3   Authorization

Authorization works transparently in edit-cfg mode and no unique or new local profile or TACACS+ permissions rules are required (other than allowing access to the **candidate** branch). For example: if an operator has permissions to access the **configure filter** context, then they 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 these 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, and so on) only allow operations on items that the user is authorized to access.

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

2.12   Basic CLI Command Reference

2.12.1   Command Hierarchies

- Global Commands
- Monitor Commands
- Environment Commands
- Candidate Commands
- Rollback Commands

2.12.1.1   Global Commands

— **back**
— **echo** [*text-to-echo*] [*extra-text-to-echo*] [*more-text*]
— **enable-admin**
— **exec** [**-echo**] [**-syntax**] {*filename | eof-marker-string*} [**-arguments** [*256 chars max*] [[*256 chars max*]]
— **exit** [**all**]
— **help**
— **help edit**
— **help globals**
— **history**
— **info** [**detail**] [**objective**]
— **logout**
— **password**
— **ping** {*ip-address | dns-name*} [**rapid | detail**] [**ttl** *time-to-live*] [**tos** *type-of-service*] [**size** *bytes*] [**pattern** *pattern*] [**source** *ip-address*] [**interval** *centisecs | secs*] [{**next-hop** *ip-address*} | {**interface** *interface-name*} | **bypass-routing**] [**count** *requests*] [**do-not-fragment**] [**router** *router-instance* | **service-name** *service-name*] [**timeout** *timeout*] [**fc** *fc-name*]
— **pwc** [**previous**]
— **sleep** [*seconds*]
— **ssh** *host* [**-l** *username*] [**-v** *ssh-version*] [**router** *router-instance* | **service-name** *service-name*] [**re-exchange-min** *minutes*] [**re-exchange-mbyte** *megabytes*]
— **telnet** {*ip-address | dns-name*} [*port*] **service-name** *service-name*
— **telnet** {*ip-address | dns-name*} [*port*] [**router** *router-instance*]
— **traceroute** {*ip-address | dns-name*} [**ttl** *ttl*] [**wait** *milliseconds*] [**no-dns**] [**source** *ip-address*] [**tos** *type-of-service*] [**router** *router-instance* | **service-name** *service-name*] [**detail**]
— **tree** [**detail**] [**flat**]
— **write** {*user-name | broadcast*} *message*

2.12.1.2 Monitor Commands

monitor
— **card** *slot-number***fp** *fp-number***ingress** {**access** | **network**} **queue-group** *queue-group-name*
  instance *instance-id* [**interval** *seconds*] [**repeat** *repeat*] **policer** *policer-id* [**absolute** |
  | *percent-rate* | *reference-rate*]
— **ccag** *ccag-id* [**path** *path-id*] [**type** *type*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
— **cpm-filter**
    — **ip** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    — **ipv6** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    — **mac** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
— **filter**
    — **ip** *ip-filter-id* **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    — **ipv6** *ipv6-filter-id* **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    — **mac** *mac-filter-id* **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
— **lag** *lag-id* [*lag-id*] [**bytes** | **packets** | **errors** | **utilization**] [**interval** *seconds*] [**repeat** *repeat*]
  [**absolute** | **rate**]
— **management-access-filter**
    — **ip** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    — **ipv6** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    — **mac** **entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
— **port** *port-id* [*port-id*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] [**multiclass**]
— **port** *port-id* [*port-id*] **atm**
— **port** **all-ethernet-rates** [**interval** *seconds*] [**repeat** *repeat*]
— **qos**
    — **arbiter-stats**
        — **card** *slot-number* **fp** *fp-number* **queue-group** *queue-group-name* **instance**
            instance-id [**ingress**] [**access** | **network**] [**interval** *seconds*] [**repeat** *repeat*]
            [**absolute** | **percent-rate** | *reference-rate*] [**arbiter** {**root** | *name*}]
        — **customer** *customer-id* **site** *customer-site-name* [**arbiter** {**root** | *name*}]
            [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
        — **port** *port-id* **egress** *network* **queue-group** *queue-group-name* **instance**
            instance-id [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] [**arbiter**
            {**root** | *name*}]
        — **sap** *sap-id* [**arbiter** {**root** | *name*}] [**ingress** | **egress**] [**interval** *seconds*] [**repeat**
            repeat] [**absolute** | **rate**]
        — **subscriber** *sub-ident-string* [**arbiter** {**root** | *name*}] [**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*]
- **router service-name** *service-name*
  - **bgp**
    - **neighbor** *ip-addr* [*ip-addr*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **isis** [*isis-instance*]
    - **statistics** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **ldp**
    - **fec-egress-stats** *ip-prefix/mask* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **session** *ldp-id* [*ldp-id*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **statistics** [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **mpls**
    - **interface** *interface* [*interface*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] [**aux-stats**]
    - **lsp-egress-stats lsp** *lsp-name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] [**bits**]
    - **lsp-ingress-stats lsp** *lsp-name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] *ip-address* [**bits**]
    - **tp-lsp-egress-stats lsp** *lsp-name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **tp-lsp-ingress-stats lsp** *lsp-name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **ospf** [*ospf-instance*]
    - **interface** *interface* [*interface*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **neighbor** *ip-addr* [*ip-addr*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **virtual-link** *nbr-rtr-id* **area** *area-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **virtual-neighbor** *nbr-rtr-id* **area** *area-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **ospf3** [*ospf-instance*]
    - **interface** *interface* [*interface*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **neighbor** *router-id interface-name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] **area** *area-id*
    - **virtual-link** *nbr-rtr-id* **area** *area-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    - **virtual-neighbor** *nbr-rtr-id* **area** *area-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **pim**
    - **group** *grp-ip-address* [**source** *ip-address*] [**interval** *interval*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **rip**
    - **neighbor** *neighbor* [*neighbor*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **rsvp**
    - **interface** *interface* [*interface*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
  - **vrrp**

— **instance interface** *interface-name* **vr-id** *virtual-router-id* [**ipv6**] [**interval**
  seconds] [**repeat** *repeat*] [**absolute** | **rate**]
— **service**
  — **id** *service-id*
    — **sap** *sap-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
    — **sap** *sap-id* **encap-group** *group-name* [**member** *encap-id*] [**interval** *seconds*]
      [**repeat** *repeat*] [**absolute** | **rate**]
    — **sdp** {*sdp-id* [*:vc-id*] | **far-end** *ip-address*} [**interval** seconds] [**repeat** *repeat*]
      [**absolute** | **rate**]
  — **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [**interval** *seconds*]
    [**repeat** *repeat*] [**absolute** | **rate**] [**base**]
  — **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [**interval** *seconds*]
    [**repeat** *repeat*] [**absolute** | **rate**] **egress-policer-id** *egress-policer-id*
  — **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [**interval** *seconds*]
    [**repeat** *repeat*] [**absolute** | **rate**] **egress-queue-id** *egress-queue-id*
  — **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* **interval** [*seconds*]
    [**repeat** *repeat*] [**absolute** | **rate**] **ingress-policer-id** *ingress-policer-id*
  — **subscriber** *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* **interval** [*seconds*]
    [**repeat** *repeat*] [**absolute** | **rate**] **ingress-queue-id** *ingress-queue-id*

2.12.1.3   Environment Commands

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

2.12.1.4   Candidate Commands

— **candidate**
  — **edit** [**exclusive**]
  — **commit** [**confirmed** *timeout*] [**comment** *comment*]
  — **commit no-checkpoint** [**confirmed** *timeout*]
  — **confirm**

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

show
— **system**
— **candidate**

2.12.1.5   Rollback Commands

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

config
— **system**
— **rollback**
— **local-max-checkpoints** [*1 to 50*]
— **no local-max-checkpoints**
— **remote-max-checkpoints** [*1 to 200*]
— **no remote-max-checkpoints**
— **rescue-location** *file-url*
— **no rescue-location**
— **rollback-location** *file-url*/*rollback filename*
— **no rollback-location**

2.12.2   Command Descriptions

2.12.2.1   Global Commands

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.

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.

enable-admin

Syntax	**enable-admin**
Context	<global>
Description	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 are determined by the **complexity** command.

The following shows a password configuration example:

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

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

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

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

exec

Syntax   **exec** [**-echo**] [**-syntax**] {*file-name | eof-marker-string*} [**-argument** [*256 chars max*] [[*256 chars max*]]

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.

Related Commands:

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

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

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

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

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

> **Default**   echo disabled

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

> **Default**   execute file commands

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

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

> **Default**   EOF

-argument — Specifies up to five arguments, each up to 254 characters in length.

exit

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

Context   <global>

Description   This command returns to the context from which the current level was entered. For example, to navigate to the current level on a context by context basis, then the **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
```

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

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

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

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

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

help

Syntax   **help**
help edit
help global
help special-characters

Context   <global>

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

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

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

edit — Displays help on editing.

Available editing keystrokes:

```
Delete current character.....................Ctrl-d
Delete text up to cursor.....................Ctrl-u
Delete text after cursor.....................Ctrl-k
Move to beginning of line....................Ctrl-a
Move to end of line..........................Ctrl-e
Get prior command from history...............Ctrl-p
Get next command from history................Ctrl-n
```

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

global — Displays help on global commands.

Available global commands:

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

special-characters — Displays help on special characters.

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

? — Lists all commands in the current context.

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

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

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

history

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.

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**] [**objective**]

Context   <global>

Description   This command displays the running configuration for the configuration context.

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

By default, the command only enters the configuration parameters that vary from the default values. The **detail** keyword causes all configuration parameters to be displayed. The "include-dynamic" **objective** keyword includes configuration parameters from dynamic sources such as VSD or dynamic data service Python scripts. These dynamic configuration parameters are not saved in the configuration file.

Example:

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

```
                            admin-group "red"
                            admin-group "yellow"
                            label-map 35
                                swap 36 nexthop 10.10.10.91
                                no shutdown
                            exit
                            no shutdown
                        exit
                        path "secondary-path"
                            hop 1 10.10.0.111  strict
                            hop 2 10.10.0.222  strict
                            hop 3 10.10.0.123  strict
                            no shutdown
                        exit
                        path "to-NYC"
                            hop 1 10.10.10.104  strict
                            hop 2 10.10.0.210  strict
                            no shutdown
                        exit
                        path "to-104"
                            no shutdown
                        exit
                        lsp "to-104"
                            to 10.10.10.104
                            from 10.10.10.103
                            rsvp-resv-style ff
                            adaptive
                            cspf
                            include "red"
                            exclude "green"
                            adspec
                            fast-reroute one-to-one
                                no bandwidth
                                no hop-limit
                                node-protect
                            exit
                            hop-limit 10
                            retry-limit 0
                            retry-timer 30
                            secondary "secondary-path"
                                no standby
                                no hop-limit
                                adaptive
                                no include
                                no exclude
                                record
                                record-label
                                bandwidth 50000
                                no shutdown
                            exit
                            primary "to-NYC"
                                hop-limit 50
                                adaptive
                                no include
                                no exclude
                                record
                                record-label
                                no bandwidth
                                no shutdown
```

```
                       exit
                     no shutdown
                 exit
...
        -------------------------------------------
        A:ALA-48>config>router>mpls#
```

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

objective — Provides an output objective that controls the configuration parameters to be displayed.

Values   *include-dynamic* — Includes configuration parameters from dynamic sources such as vsd or dynamic data service Python scripts.

logout

Syntax   **logout**

Context   <global>

Description   This command logs out of the router session.

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

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

password

Syntax   **password**

Context   <root>

Description   This command changes a user's 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 to access the CLI.

A user cannot configure a non-conformant password for themselves using the global **password** command. A password value that does not conform to the minimum-length or other password complexity rules can be configured using the **config>system>security>user>password** command (for example, by an administrator), but a warning is provided in the CLI. This allows, for example, an administrator to configure a non-conformant password for a user.

ping

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

Context   <global>

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

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

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

  ipv6-address:

  • x:x:x:x:x:x:x:x[-interface]

  • x:x:x:x:x:x:d.d.d.d[-interface]

  • x: [0 to FFFF] H

  • d: [0 to 255] D

  dns-name: 128 characters max

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

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

Example output:

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

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

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

Values   0 to 128

Default   64

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

Values   0 to 255

Default   0

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

Values   0 to 16384

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

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

Values   0 to 65535

Default   system-generated sequential pattern

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

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

              ipv6-address:

                   • x:x:x:x:x:x:x:x (eight 16-bit pieces)
                   • x:x:x:x:x:x:d.d.d.d
                   • x: [0 to FFFF] H
                   • d: [0 to 255] D

Default   The IP address of the egress IP interface.

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

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

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

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

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

              ipv6-address:

                   • x:x:x:x:x:x:x:x (eight 16-bit pieces)
                   • x:x:x:x:x:x:d.d.d.d

3HE 14127 AAAB TQZZA 01   Issue: 01

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

> **Default**   Per the routing table.

interface-name — Specifies the interface name. 32 characters maximum.

bypass-routing — Sends the ping request to a host on a directly attached network bypassing the routing table. The host must be on a directly attached network or an error is returned.

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

> **Values**   1 to 10000

> **Default**   5

do-not-fragment — Specifies that the request frame should not be fragmented. This option is particularly useful in combination with the size parameter for maximum MTU determination (does not apply to ICMPv6).

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

> **Values**

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

router-name	"Base" | "management" | *cpm-vr-name* | "vpls-management"	
cpm-vr-name	[32 characters maximum]	
vprn-service-id	1 to 2147483647	

> **Default**   Base

service-name — Specifies the service name up to 64 characters in length.

timeout — Specifies the timeout in seconds.

> **Values**   1 to 10

> **Default**   5

fc-name — Specifies the forwarding class.

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

> **Default**   nc

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.

The following example is from a 7750 SR:

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

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

The following example is from a 7450 ESS:

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

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

sleep

Syntax   **sleep** [*seconds*]

Context   <global>

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

Default   sleep 1

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

        Values   1 to 100

        Default   1

ssh

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

Context   <global>

Description   This command initiates a client SSH session with the remote host and is independent from the administrative or operational state of the SSH server. However, to be the target of an SSH session, the SSH server must be operational. This command also allows the user to initiate a SSH session, with a key re-exchange, based on maximum megabytes or minutes, whichever occurs first. If the re-exchange options are not set, the default behavior will not perform a key re-exchange.

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

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

        Values

host: *user@hostname* - [255 chars max]	
user	32 chars max
hostname	[*dns-name* | *ipv4-address* | *ipv6-address*]
ipv4-address	a.b.c.d
ipv6-address	x:x:x:x:x:x:x:x[-*interface*]
	x:x:x:x:x:x:d.d.d.d[-*interface*]
	x - [0 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, mandatory for link local addresses
dns-name	128 chars max

username — Specifies the user name to use when opening the SSH session; 32 characters maximum.

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

        Values

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

	router-name	"Base", "management", "vpls-management"
	vprn-svc-id	1 to 2147483647

Default   Base

service-name — Specifies the service name up to 64 characters in length.

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

Values   1 **to** 1440 minutes

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

Values   1 **to** 64000 megabytes

telnet

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

Context   <global>

Description   This command opens a Telnet session to a remote host. Telnet servers in SR-series networks limit Telnet clients to three attempts to login; this number is not user configurable. The Telnet server disconnects the Telnet client session after three attempts.

Parameters   *ip-address*   — Specifies the IP address or the DNS name (providing DNS name resolution is configured).

         Values

ipv4-address	*a.b.c.d*	
ipv6-address	*x:x:x:x:x:x:x:x*[-interface]	*x*: [0 to FFFF]H
	x:x:x:x:x:x:d.d.d.d[-interface]	*d*: [0 to 255]D *ipv6-address*
		interface: 32 chars max, mandatory for link local addresses
dns-name	128 chars max	

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

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

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

> **Values**   1 to 65535
>
> **Default**   23

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

> **Values**

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

> **Default**   Base

service-name — Specifies the service name up to 64 characters in length.

traceroute

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

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 192.168.25.114
traceroute to 192.168.25.114, 30 hops max, 40 byte packets
 1  192.168.25.114 0.000 ms  0.000 ms  0.000 ms
A:ALA-1#
```

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

> **Values**

ipv4-address	a.b.c.d		
ipv6-address	*x:x:x:x:x:x:x:x*[-interface]	*x*:	[0 to FFFF]H
	x:x:x:x:x:x:d.d.d.d[-interface]	*d*:	[0 to 255]D
dns-name	63 characters maximum		

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

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

Values   1 to 255

Default   30 hops

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

Values   10 to 60000

Default   5000 milliseconds

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

Default   DNS lookups are performed

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

Values

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

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

Values   0 to 255

Default   0

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

Values

router-instance : *router-name* or *service-id*		
	router-name	Base, management, *cpm-vr-name*, vpls-management
	cpm-vr-name	[32 characters maximum]
	vprn-service-id	1 to 2147483647

Default   Base

service-name — Specifies the service name up to 64 characters in length.

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

tree

Syntax	**tree** [**detail**] [**flat**]
Context	<global>
Description	This command displays the command hierarchy structure of the current working context.
Parameters	**detail** — Displays parameter information for each command shown in the tree output.
	flat — Displays the full context on each line.

write

Syntax	**write** {*user-name*	*broadcast*} *message*
Context	<global>
Description	This command sends a console message to a specific user or to all users with active console sessions.
Parameters	*user-name* — Specifies the name of a user up to 32 characters in length with an active console session to which to send a console message.

           Values   any valid CLI username

        broadcast — Sends the *message-string* to all users logged into the router.

        message — Specifies the message string to send. Allowed values are any string up to 256 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

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

> **Values**   1 to 10

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

> **Values**   1 to 8

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

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

> **Values**   1 to 65535

repeat — Configures how many times the command is repeated.

> **Values**   1 to 999

> **Default**   10

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

> **Values**   1 to 32

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

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

> **Values**   1 to 999

> **Default**   10

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

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

> **Default**   10G

ccag

Syntax   **ccag** *ccag-id* [**path** *path-id*] [**type** *type*] [**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.

        Values   1 to 8

    path-id — 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.

        Values   a, b

    type — Specifies cross connect type.

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

    seconds — Configures the interval for each display in seconds.

        Values   3 to 60

        Default   10 seconds

    repeat — Configures how many times the command is repeated.

        Values   1 to 999

        Default   10

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

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

cpm-filter

Syntax   **cpm-filter**

Context   monitor

Description   This command displays monitor command output for CPM filters.

ip

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

Context   monitor>cpm-filter

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

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

        Values   1 to 2048

seconds — Configures the interval for each display in seconds.

    Values   3 to 60

    Default   10 seconds

repeat — Configures how many times the command is repeated.

    Values   1 to 999

    Default   10

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

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

ipv6

Syntax	**ipv6 entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
Context	monitor>cpm-filter
Description	This command displays monitor command statistics for IPv6 filter entries.
Parameters	*entry-id* — Displays information on the specified filter entry ID for the specified filter ID only.

    Values   1 to 2048

seconds — Configures the interval for each display in seconds.

    Values   3 to 60

    Default   10 seconds

repeat — Configures how many times the command is repeated.

    Values   1 to 999

    Default   10

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

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

mac

Syntax	**mac entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
Context	monitor>cpm-filter
Description	This command displays monitor command statistics for MAC filter entries.

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

        Values   1 to 2048

      seconds — Configures the interval for each display in seconds.

        Values   3 to 60

        Default   10 seconds

      repeat — Configures how many times the command is repeated.

        Values   1 to 999

        Default   10

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

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

filter

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>management-access-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 to 65535] | fSpec-[0 to 2147483647] | [1 to 65535 to 8192] | [1 to 65535:P1 to 4096] | _tmnx_tms_egr-*mda-id*-F | _tmnx_tms-ing-*mda-id*-F | _tmx_ofs_*ofs-name* | _tmnx_vsd_[1 to 65535] | *name*: 64 chars max

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

> **Values**   [1 to 65535], fSpec-[0 to 2147483647]-[1 to 65353]

seconds — Configures the interval for each display in seconds.

> **Values**   3 to 60

> **Default**   10 seconds

repeat — Configures how many times the command is repeated.

> **Values**   1 to 999

> **Default**   10

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

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

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

Sample Output

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


A:ALA-1>monitor# filter ip 10 entry 1 interval 3 repeat 3 rate
==========================================================================
Monitor statistics for IP filter 10 entry 1
```

```
=========================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------
Ing. Matches: 0                                     Egr. Matches    : 0
-------------------------------------------------------------------------
At time t = 3 sec (Mode: Rate)
-------------------------------------------------------------------------
Ing. Matches: 0                                     Egr. Matches    : 0
-------------------------------------------------------------------------
At time t = 6 sec (Mode: Rate)
-------------------------------------------------------------------------
Ing. Matches: 0                                     Egr. Matches    : 0
-------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------
Ing. Matches: 0                                     Egr. Matches    : 0
=========================================================================
A:ALA-1>monitor#
```

ipv6

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

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

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

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

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

Parameters   *ipv6-filter-id* — Displays detailed information for the specified IPv6 filter ID and its filter entries.

> **Values**   [1 to 65535] | fSpec-[0 to 2147483647] | [1 to 65535 to 8192] | [1 to 65535:P1 to 4096] | _tmnx_tms_egr-*mda-id*-F | _tmnx_tms-ing-*mda-id*-F | _tmx_ofs_*ofs-name* | _tmnx_vsd_[1 to 65535] | *name*: 64 chars max

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

> **Values**   1 to 65535

seconds — Configures the interval for each display in seconds.

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

repeat — Configures how many times the command is repeated.

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

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

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

Output   The following output is an example of filter IPv6 information.

Sample Output

```
A:ALA-48# monitor filter ipv6 100 entry 10 interval 3 repeat 3 absolute
===============================================================================
Monitor statistics for IPv6 filter 100 entry 10
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Ing. Matches : 0                               Egr. Matches   : 1
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches : 0                               Egr. Matches   : 1
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches : 0                               Egr. Matches   : 1
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Ing. Matches : 0                               Egr. Matches   : 01
===============================================================================
A:ALA-48#


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

```
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------------
Ing. Matches : 0                                        Egr. Matches   : 1
===============================================================================
A:ALA-48#
```

mac

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

Context monitor>filter

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

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

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

Parameters *mac-filter-id* — Specifies the MAC filter policy ID.

Values *filter-id | filter-name*
filter-id: 1 to 65535
filter-name: 64 chars max

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

Values 1 to 65535

seconds — Configures the interval for each display in seconds.

Values 3 to 60

Default 10 seconds

repeat — Configures how many times the command is repeated.

Values 1 to 999

Default 10

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

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

Output The following output is an example of filter mac information.

Sample Output

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


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

lag

Syntax   **lag** *lag-id* [*lag-id*] [**bytes** | **packets** | **errors** | **utilization**] [**interval** *seconds*] [**repeat** *repeat*]
[**absolute** | **rate**]

Context   monitor

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

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

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

Parameters   *lag-id* — Specifies the number of the LAG, with a maximum of five LAG numbers specified in a single statement.

      Values   1 to 200

bytes — Displays the statistics in bytes only.

packets — Displays the statistics in packets only.

errors — Displays the statistics for errors only.

utilization — Displays the statistics in percentage utilization only.

seconds — Configures the interval for each display in seconds.

      Values   3 to 60

      Default   10 seconds

repeat — Configures how many times the command is repeated.

      Values   1 to 999

      Default   10

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

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

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

Sample Output

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

```
                    0                              0
--------------------------------------------------------------------------------
Totals      49                             33
            4394                           3070
            0                              0
--------------------------------------------------------------------------------
At time t = 3 sec (Mode: Delta)
--------------------------------------------------------------------------------
1/2/1       3                              3
            306                            306
            0                              0
1/2/2       0                              0
            0                              0
            0                              0
--------------------------------------------------------------------------------
Totals      3                              3
            306                            306
            0                              0
================================================================================


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

management-access-filter

Syntax   **management-access-filter**

Context   monitor

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

ip

Syntax	**ip entry** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute**	**rate**]
Context	monitor>management-access-filter
Description	This command monitors statistics for the MAF IP filter entry.
Parameters	*entry-id* — Specifies an existing IP MAF entry ID.

> **Values**   1 to 9999

seconds — Configures the interval for each display in seconds.

> **Values**   3 to 60
>
> **Default**   10

repeat — Configures how many times the command is repeated.

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

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

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

ipv6

Syntax	**ipv6** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute**	**rate**]
Context	monitor>management-access-filter
Description	This command monitors statistics for the MAF IPv6 filter entry.
Parameters	*entry-id* — Specifies an existing IP MAF entry ID.

> **Values**   1 to 9999

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

> **Values**   3 to 60
>
> **Default**   10

repeat — Configures how many times the command is repeated.

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

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

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

mac

Syntax	**mac** *entry-id* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | *rate*]
Context	monitor>management-access-filter
Description	This command monitors statistics for the MAF MAC filter entry.
Parameters	*entry-id* — Specifies an existing IP MAF entry ID.

> **Values**   1 to 9999

        seconds — Configures the interval for each display in seconds.

> **Values**   3 to 60
>
> **Default**   10

        repeat — Configures how many times the command is repeated.

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

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

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

port

Syntax	**port** *port-id* [*port-id*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] [**multiclass**] **port** *port-id* [*port-id*] **atm. . .** **port all-ethernet-rates** [**interval** *seconds*] [**repeat** *repeat*]
Context	monitor
Description	This command enables port traffic monitoring. The specified port(s) statistical information displays at the configured interval until the configured count is reached.

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

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

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

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

> *port-id*   *slot*/*mda*/*port* [.*channel*]

eth-sat-id	**esat**-*id*/*slot*/*port*	
	esat	keyword
	id	1 to 20
pxc-id	**pxc**-*id*.*sub-port*	
	pxc	keyword
	id	1 to 64
	sub-port	a, b
aps-id	**aps**-*group-id*[.*channel*]	
	aps	keyword
	group-id	1 to 64 (16 for 7750 SR-c12 and 7750 SR-c4)
bundle-id	**bundle**-*type*-*slot*/*mda*.*bundle-num*	
	bundle	keyword
	type	ima, ppp
	bundle-num	1 to 128 (16 for 7750 SR-c12 and 7750 SR-c4)

seconds — Configures the interval for each display in seconds.

>   **Default**   10 seconds

>   **Values**   3 to 60

repeat — Configures how many times the command is repeated.

>   **Values**   1 to 999

>   **Default**   10

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

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

multiclass — Displays multiclass information.

atm — Displays ATM information.

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

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

Sample Output

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

```
-------------------------------------------------------------------------------
Octets                                            0                          0
Packets                                          39                        175
Errors                                            0                          0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Octets                                            0                          0
Packets                                          39                        175
Errors                                            0                          0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Octets                                            0                          0
Packets                                          39                        175
Errors                                            0                          0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Absolute)
-------------------------------------------------------------------------------
Octets                                            0                          0
Packets                                          39                        175
Errors                                            0                          0
===============================================================================
A:ALA-12>monitor#

A:ALA-12>monitor# port 2/1/4 interval 3 repeat 3 rate
===============================================================================
Monitor statistics for Port 2/1/4
===============================================================================
                                          Input                     Output
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Octets                                            0                          0
Packets                                          39                        175
Errors                                            0                          0
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Rate)
-------------------------------------------------------------------------------
Octets                                            0                          0
Packets                                            0                          0
Errors                                            0                          0
Bits                                              0                          0
Utilization (% of port capacity)          0.00                       0.00
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Rate)
-------------------------------------------------------------------------------
Octets                                            0                          0
Packets                                            0                          0
Errors                                            0                          0
Bits                                              0                          0
Utilization (% of port capacity)          0.00                       0.00
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------------
Octets                                            0                          0
Packets                                            0                          0
Errors                                            0                          0
Bits                                              0                          0
```

```
                    Utilization (% of port capacity)              0.00                   0.00
                    ===============================================================================
                    A:ALA-12>monitor#


                    ===============================================================================
                    *A:Cpm-A> monitor port bundle-fr-1/1.1
                    ===============================================================================
                    Monitor statistics for Port bundle-fr-1/1.1
                    ===============================================================================
                                                                  Input                 Output
                    -------------------------------------------------------------------------------
                    At time t = 0 sec (Base Statistics)
                    -------------------------------------------------------------------------------
                    Octets                                           0                      0
                    Packets                                          0                      0
                    Errors                                           0                      0
```

qos

Syntax   **qos**

Context   monitor

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

arbiter-stats

Syntax   **arbiter-stats**

Context   monitor>qos

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

card

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

Context   monitor>qos>arbiter-stats

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

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

      Values   1 to 10

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

>   **Values**   1 to 8

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

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

>   **Values**   1 to 65535

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

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

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

seconds — Configures the interval for each display in seconds.

>   **Values**   11 to 60

>   **Default**   11 seconds

repeat — Configures how many times the command is repeated.

>   **Values**   1 to 999

>   **Default**   10

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

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

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

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

>   **Default**   10G

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

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

root — Specifies the root arbiter.

customer

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

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

Description   This command monitors arbiter statistics for a customer site.

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

    Values   1 to 2147483647

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

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

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

  root — Specifies the root arbiter.

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

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

  seconds — Configures the interval for each display in seconds.

    Values   11 to 60

    Default   11 seconds

  repeat — Configures how many times the command is repeated.

    Values   1 to 999

    Default   10

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

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

port

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

Context   monitor>qos>arbiter-stats

Description   This command monitors arbiter statistics for a customer site.

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

    Values   slot/mda/port [.channel]

  network — Specifies statistics for an egress network queue group.

    Values   network

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

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

> **Values**   1 to 65535

seconds — Configures the interval for each display in seconds.

> **Values**   11 to 60
>
> **Default**   11 seconds

repeat — Configures how many times the command is repeated.

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

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

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

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

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

root — Specifies the root arbiter.

sap

Syntax	**sap** *sap-id* [**arbiter** {**root** | *name*}] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** repeat] [**absolute** | **rate**]
Context	monitor>qos>arbiter-stats
Description	This command monitors arbiter statistics for a SAP.
Parameters	*sap-id* — Specifies the physical port identifier portion of the SAP definition.

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

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

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

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

seconds — Configures the interval for each display in seconds.

> **Values**   11 to 60
>
> **Default**   11 seconds

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

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

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

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

subscriber

Syntax   **subscriber** *sub-ident-string* [**arbiter** {**root** | *name*}] [**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 identification policy name, up to 32 characters in length.

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

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

ingress — Displays arbiter name statistics applied on the ingress SAP.

egress — Displays arbiter name statistics applied on the egress SAP.

seconds — Configures the interval for each display in seconds.

> **Values**   11 to 60
>
> **Default**   11 seconds

repeat — Configures how many times the command is repeated.

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

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

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

port

Syntax	**port** *port-id* **exp-secondary-shaper** *shaper-name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
	port *port-id* **vport** *name* [**interval** *seconds*] [**repeat** *repeat*]
Context	monitor>qos
Description	This command monitors expanded secondary shaper statistics.
Parameters	*port-id* — Specifies the port ID.

        Values   *slot/mda/port*

                        esat-*id*/*slot*/*port*

                        pxc-*id*.*sub-port*

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

        seconds — Configures the interval for each display in seconds.

        Values   11 to 60

        Default   11 seconds

        repeat — Configures how many times the command is repeated.

        Values   1 to 999

        Default   10

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

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

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

scheduler-stats

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

customer

Syntax	**customer** *customer-id* **site** *customer-site-name* [**scheduler** *scheduler-name*] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
Context	monitor>qos>scheduler-stats

Description   This command monitors scheduler statistics per customer multi-service-site. The first screen displays the current statistics related to the specified customer ID and customer site name. The subsequent statistical information listed for each interval is displayed as a delta to the previous display. When the keyword **rate** is specified, the rate-per-second for each statistic is displayed instead of the delta.

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

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

   Values   1 to 2147483647

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

   scheduler-name — Specifies an existing *scheduler-name*. Scheduler names are configured in the **config>qos>scheduler-policy>tier** *level* context. This parameter is mandatory if the customer resides on a LAG in adapt-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, and so on), the entire string must be enclosed within double quotes.

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

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

   seconds — Configures the interval for each display in seconds.

   Values   11 to 60

   Default   11 seconds

   repeat — Configures how many times the command is repeated.

   Values   1 to 999

   Default   10

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

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

port

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

Context   monitor>qos>scheduler-stats

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

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

> **Values**   *slot*/*mda*/*port*

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

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

> **Values**   1 to 65535

ingress — Specifies statistics are for an ingress queue group.

egress — Specifies statistics are for an egress queue group.

seconds — Configures the interval for each display in seconds.

> **Values**   11 to 60
>
> **Default**   11 seconds

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

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

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

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

access — Displays scheduler statistics applied on an access port.

network — Displays scheduler statistics applied on a network port.

name — Displays statistics for the named Vport up to 32 characters in length.

sap

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

Context   monitor>qos>scheduler-stats

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

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

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

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

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

scheduler-name — Specifies an existing *scheduler-name,* up to 32 characters in length. Scheduler names are configured in the **config>qos>scheduler-policy>tier** *level* context. This parameter is mandatory if the SAP resides on a LAG in adapt-qoslink or port-fair mode.

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

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

seconds — Configures the interval for each display in seconds.

> **Values**   11 to 60

> **Default**   11 seconds

repeat — Configures how many times the command is repeated.

> **Values**   1 to 999

> **Default**   10

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

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

sap

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

Context   monitor>qos>scheduler-stats

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

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

group-name — Displays statistics for the encap group up to 32 characters in length.

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

> **Values**   0 to 16777215

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

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

seconds — Configures the interval for each display in seconds.

    Values   11 to 60

    Default   11 seconds

repeat — Configures how many times the command is repeated.

    Values   1 to 999

    Default   10

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

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

subscriber

Syntax	**subscriber** *sub-ident-string* [**scheduler** *scheduler-name*] [**ingress** | **egress**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
	subscriber *sub-ident-string* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] **sap** *sap-id* **sla-profile** *sla-profile-name*
Context	monitor>qos>scheduler-stats
Description	This command monitors scheduler statistics for a subscriber.
Parameters	*sub-ident-string* — Specifies an existing subscriber identification policy name up to 32 characters in length.

scheduler-name — Specifies an existing QoS scheduler policy name up to 32 characters in length. Scheduler names are configured in the **config>qos>scheduler-policy>tier** level context.

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

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

seconds — Configures the interval for each display in seconds.

    Values   11 to 60

    Default   11 seconds

repeat — Configures how many times the command is repeated.

    Values   1 to 999

    Default   10

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

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

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

sla-profile-name — Specifies the SLA profile belonging to the subscriber host. 32
characters max.

router

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

Values

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

Default   Base

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

bgp

Syntax	**bgp**
Context	monitor>router
Description	This command monitors commands for the BGP instance.

neighbor

Syntax	**neighbor** *ip-addr* [*ip-addr*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute**	**rate**]
Context	monitor>router>bgp
Description	This command displays statistical BGP neighbor information at the configured interval until the configured count is reached.

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

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

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

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

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

seconds — Configures the interval for each display in seconds.

> **Values**   3 to 60

> **Default**   10 seconds

repeat — Configures how many times the command is repeated.

> **Values**   1 to 999

> **Default**   10

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

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

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

Sample Output

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

```
Recd. Paths      : 0                  Suppressed Paths : 0
Num of Flaps     : 0
i/p Messages     : 0                  o/p Messages     : 0
i/p Octets       : 0                  o/p Octets       : 0
i/p Updates      : 0                  o/p Updates      : 0
-------------------------------------------------------------------------------
At time t = 9 sec
-------------------------------------------------------------------------------
Recd. Prefixes   : 0                  Sent Prefixes    : 0
Recd. Paths      : 0                  Suppressed Paths : 0
Num of Flaps     : 0
i/p Messages     : 0                  o/p Messages     : 0
i/p Octets       : 6                  o/p Octets       : 0
i/p Updates      : 0                  o/p Updates      : 0
===============================================================================
A:ALA-12>monitor>router>bgp#
```

isis

Syntax	**isis** [*isis-instance*]
Context	monitor>router
Description	This command monitors commands for the ISIS instance.
Parameters	*isis-instance* — Specifies the ISIS protocol instance within the router instance.

> **Values**   0 to 31

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

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

repeat — Configures how many times the command is repeated.

>**Values** 1 to 999

>**Default** 10

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

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

Output The following output is an example of ISIS statistics.

Sample Output

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

CSPF Statistics

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

CSPF Statistics

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

```
CSPF Statistics

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


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

CSPF Statistics

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

CSPF Statistics

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

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

CSPF Statistics

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

ldp

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

fec-egress-stats

Syntax	**fec-egress-stats** *ip-prefix/mask* [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]
Context	monitor>router>ldp
Description	This command monitors egress statistics for LDP FEC prefixes.
Parameters	*ip-prefix/mask* —

Values

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

seconds — Configures the interval for each display in seconds.

> **Values**   3 to 60
>
> **Default**   10

repeat — Configures how many times the command is repeated.

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

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

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

session

Syntax	**session** *ldp-id* [*ldp-id*] [**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* — Specifies the IP address of the LDP session to display. Up to five IP addresses can be specified in a single statement.

> **Values**

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

seconds — Configures the interval for each display in seconds.

    Values   3 to 60

    Default   10 seconds

repeat — Configures how many times the command is repeated.

    Values   1 to 999

    Default   10

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

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

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

Sample Output

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

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


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

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

statistics

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

Context   monitor>router>ldp

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

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

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

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

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

repeat — Configures how many times the command is repeated.

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

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

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

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

Sample Output

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


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

```
Serv FECs Sent    : 1                       Serv FECs Recv    : 2
-------------------------------------------------------------------------------
At time t = 3 sec (Mode: Rate)
-------------------------------------------------------------------------------
Addr FECs Sent    : 0                       Addr FECs Recv    : 0
Serv FECs Sent    : 0                       Serv FECs Recv    : 0
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Rate)
-------------------------------------------------------------------------------
Addr FECs Sent    : 0                       Addr FECs Recv    : 0
Serv FECs Sent    : 0                       Serv FECs Recv    : 0
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------------
Addr FECs Sent    : 0                       Addr FECs Recv    : 0
Serv FECs Sent    : 0                       Serv FECs Recv    : 0
===============================================================================
A:ALA-12>monitor>router>ldp#
```

mpls

Syntax	**mpls**
Context	monitor>router
Description	This commands monitors commands for the MPLS instance.

interface

Syntax	**interface** *interface* [*interface*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**] [**aux-stats**]
Context	monitor>router>mpls
Description	This command displays statistics for MPLS interfaces at the configured interval until the configured count is reached.

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

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

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

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

seconds — Configures the interval for each display in seconds.

> **Values**   11 to 60
>
> **Default**   11 seconds

repeat — Configures how many times the command is repeated.

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

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

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

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

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

Sample Output

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


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

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

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

lsp-egress-stats

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

Context monitor>router>mpls

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

Default no lsp-egress-stats

Parameters *lsp-name* — Specifies the LSP name up to 64 characters in length.

repeat — Specifies how many times the command is repeated.

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

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

> **Values** 3 to 60
>
> **Default** 10

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

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

bits — Displays the output values in bits rather than in octets.

Output The following output is an example of LSP egress statistics information.

Sample Output

```
B:Dut-C-cpm2# monitor router mpls lsp-egress-stats lsp sample repeat 3 interval 10
absolute
===============================================================================
Monitor egress statistics for MPLS LSP "sample"
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
LSP Name     : sample
-------------------------------------------------------------------------------
Collect Stats : Enabled               Accting Plcy. : 5
Adm State    : Up                     PSB Match     : True
FC BE
InProf Pkts  : 0                      OutProf Pkts  : 551
InProf Octets : 0                     OutProf Octets: 560918
FC L2
InProf Pkts  : 0                      OutProf Pkts  : 551
InProf Octets : 0                     OutProf Octets: 560918
FC AF
InProf Pkts  : 551                    OutProf Pkts  : 0
InProf Octets : 560918               OutProf Octets: 0
FC L1
InProf Pkts  : 551                    OutProf Pkts  : 0
InProf Octets : 560918               OutProf Octets: 0
FC H2
InProf Pkts  : 0                      OutProf Pkts  : 551
InProf Octets : 0                     OutProf Octets: 560918
FC EF
InProf Pkts  : 0                      OutProf Pkts  : 551
InProf Octets : 0                     OutProf Octets: 560918
FC H1
InProf Pkts  : 0                      OutProf Pkts  : 551
InProf Octets : 0                     OutProf Octets: 560918
FC NC
InProf Pkts  : 551                    OutProf Pkts  : 0
InProf Octets : 560918               OutProf Octets: 0
-------------------------------------------------------------------------------
At time t = 10 sec (Mode: Absolute)
-------------------------------------------------------------------------------
LSP Name     : sample
-------------------------------------------------------------------------------
Collect Stats : Enabled               Accting Plcy. : 5
Adm State    : Up                     PSB Match     : True
FC BE
InProf Pkts  : 0                      OutProf Pkts  : 580
InProf Octets : 0                     OutProf Octets: 590440
FC L2
InProf Pkts  : 0                      OutProf Pkts  : 580
InProf Octets : 0                     OutProf Octets: 590440
FC AF
InProf Pkts  : 580                    OutProf Pkts  : 0
```

```
InProf Octets : 590440                    OutProf Octets: 0
FC L1
InProf Pkts   : 580                       OutProf Pkts  : 0
InProf Octets : 590440                    OutProf Octets: 0
FC H2
InProf Pkts   : 0                         OutProf Pkts  : 580
InProf Octets : 0                         OutProf Octets: 590440
FC EF
InProf Pkts   : 0                         OutProf Pkts  : 580
InProf Octets : 0                         OutProf Octets: 590440
FC H1
InProf Pkts   : 0                         OutProf Pkts  : 580
InProf Octets : 0                         OutProf Octets: 590440
FC NC
InProf Pkts   : 580                       OutProf Pkts  : 0
InProf Octets : 590440                    OutProf Octets: 0
-------------------------------------------------------------------------------
At time t = 20 sec (Mode: Absolute)
-------------------------------------------------------------------------------
LSP Name     : sample
-------------------------------------------------------------------------------
Collect Stats : Enabled                   Accting Plcy. : 5
Adm State    : Up                         PSB Match     : True
FC BE
InProf Pkts   : 0                         OutProf Pkts  : 609
InProf Octets : 0                         OutProf Octets: 619962
FC L2
InProf Pkts   : 0                         OutProf Pkts  : 609
InProf Octets : 0                         OutProf Octets: 619962
FC AF
InProf Pkts   : 609                       OutProf Pkts  : 0
InProf Octets : 619962                    OutProf Octets: 0
FC L1
InProf Pkts   : 609                       OutProf Pkts  : 0
InProf Octets : 619962                    OutProf Octets: 0
FC H2
InProf Pkts   : 0                         OutProf Pkts  : 609
InProf Octets : 0                         OutProf Octets: 619962
FC EF
InProf Pkts   : 0                         OutProf Pkts  : 609
InProf Octets : 0                         OutProf Octets: 619962
FC H1
InProf Pkts   : 0                         OutProf Pkts  : 609
InProf Octets : 0                         OutProf Octets: 619962
FC NC
InProf Pkts   : 609                       OutProf Pkts  : 0
InProf Octets : 619962                    OutProf Octets: 0
-------------------------------------------------------------------------------
At time t = 30 sec (Mode: Absolute)
-------------------------------------------------------------------------------
LSP Name     : sample
-------------------------------------------------------------------------------
Collect Stats : Enabled                   Accting Plcy. : 5
Adm State    : Up                         PSB Match     : True
FC BE
InProf Pkts   : 0                         OutProf Pkts  : 638
InProf Octets : 0                         OutProf Octets: 649484
FC L2
InProf Pkts   : 0                         OutProf Pkts  : 638
```

```
        InProf Octets : 0                    OutProf Octets: 649484
        FC AF
        InProf Pkts   : 638                  OutProf Pkts  : 0
        InProf Octets : 649484               OutProf Octets: 0
        FC L1
        InProf Pkts   : 638                  OutProf Pkts  : 0
        InProf Octets : 649484               OutProf Octets: 0
        FC H2
        InProf Pkts   : 0                    OutProf Pkts  : 638
        InProf Octets : 0                    OutProf Octets: 649484
        FC EF
        InProf Pkts   : 0                    OutProf Pkts  : 638
        InProf Octets : 0                    OutProf Octets: 649484
        FC H1
        InProf Pkts   : 0                    OutProf Pkts  : 638
        InProf Octets : 0                    OutProf Octets: 649484
        FC NC
        InProf Pkts   : 638                  OutProf Pkts  : 0
        InProf Octets : 649484               OutProf Octets: 0
===============================================================================
B:Dut-C-cpm2#
```

lsp-ingress-stats

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

Context monitor>router>mpls

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

Parameters *lsp-name* — Specifies the LSP name up to 64 characters.

repeat — Specifies how many times the command is repeated.

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

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

> **Values** 3 to 60
>
> **Default** 10

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

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

ip-address — Specifies the IP address.

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

bits — Displays the output values in bits rather than in octets.

Output The following output is an example of LSP ingress statistics information.

Sample Output

```
B:Dut-C-cpm2# monitor router mpls lsp-ingress-stats lsp sample 192.0.2.1 repeat 3
interval 10 absolute
===============================================================================
Monitor ingress statistics for MPLS LSP "sample"
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
LSP Name     : sample
Sender       : 192.0.2.1
-------------------------------------------------------------------------------
Collect Stats : Enabled              Accting Plcy. : None
Adm State    : Up                    PSB Match    : True
FC BE
InProf Pkts  : 539                   OutProf Pkts  : 0
InProf Octets : 548702               OutProf Octets: 0
FC L2
InProf Pkts  : 0                     OutProf Pkts  : 539
InProf Octets : 0                    OutProf Octets: 548702
FC AF
InProf Pkts  : 0                     OutProf Pkts  : 0
InProf Octets : 0                    OutProf Octets: 0
FC L1
InProf Pkts  : 1078                  OutProf Pkts  : 0
InProf Octets : 1097404              OutProf Octets: 0
FC H2
InProf Pkts  : 0                     OutProf Pkts  : 539
InProf Octets : 0                    OutProf Octets: 548702
FC EF
InProf Pkts  : 539                   OutProf Pkts  : 0
InProf Octets : 548702               OutProf Octets: 0
FC H1
InProf Pkts  : 539                   OutProf Pkts  : 0
InProf Octets : 548702               OutProf Octets: 0
FC NC
InProf Pkts  : 0                     OutProf Pkts  : 539
InProf Octets : 0                    OutProf Octets: 548702
-------------------------------------------------------------------------------
At time t = 10 sec (Mode: Absolute)
-------------------------------------------------------------------------------
LSP Name     : sample
Sender       : 192.0.2.1
-------------------------------------------------------------------------------
Collect Stats : Enabled              Accting Plcy. : None
Adm State    : Up                    PSB Match    : True
FC BE
InProf Pkts  : 568                   OutProf Pkts  : 0
InProf Octets : 578224               OutProf Octets: 0
FC L2
InProf Pkts  : 0                     OutProf Pkts  : 568
InProf Octets : 0                    OutProf Octets: 578224
FC AF
InProf Pkts  : 0                     OutProf Pkts  : 0
InProf Octets : 0                    OutProf Octets: 0
FC L1
InProf Pkts  : 1136                  OutProf Pkts  : 0
InProf Octets : 1156448              OutProf Octets: 0
FC H2
```

```
InProf Pkts   : 0                        OutProf Pkts  : 568
InProf Octets : 0                        OutProf Octets: 578224
FC EF
InProf Pkts   : 568                      OutProf Pkts  : 0
InProf Octets : 578224                   OutProf Octets: 0
FC H1
InProf Pkts   : 568                      OutProf Pkts  : 0
InProf Octets : 578224                   OutProf Octets: 0
FC NC
InProf Pkts   : 0                        OutProf Pkts  : 568
InProf Octets : 0                        OutProf Octets: 578224
-------------------------------------------------------------------------------
At time t = 20 sec (Mode: Absolute)
-------------------------------------------------------------------------------
LSP Name      : sample
Sender        : 192.0.2.1
-------------------------------------------------------------------------------
Collect Stats : Enabled                  Accting Plcy. : None
Adm State     : Up                       PSB Match     : True
FC BE
InProf Pkts   : 597                      OutProf Pkts  : 0
InProf Octets : 607746                   OutProf Octets: 0
FC L2
InProf Pkts   : 0                        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        : 192.0.2.1
-------------------------------------------------------------------------------
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#
```

tp-lsp-egress-stats

Syntax	**tsp-lsp-egress-stats lsp** *lsp-name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute**	**rate**]
Context	monitor>router>mpls
Description	This command monitors MPLS TP LSP egress statistics.
Parameters	*lsp-name* — Specifies the LSP name up to 64 characters in length.

repeat — Specifies how many times the command is repeated.

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

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

> **Values**   3 to 60
>
> **Default**   10

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

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

tp-lsp-ingress-stats

Syntax	**tsp-lsp-ingress-stats lsp** *lsp-name* [**interval** *seconds*] [**repeat** *repeat*] [**absolute**	**rate**]
Context	monitor>router>mpls
Description	This command monitors MPLS TP LSP ingress statistics.
Parameters	*lsp-name* — Specifies the LSP name up to 64 characters in length.

repeat — Specifies how many times the command is repeated.

    Values   1 to 999

    Default   10

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

    Values   3 to 60

    Default   10

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

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

ospf

Syntax	**ospf** [*ospf-instance*]
Context	monitor>router
Description	This command enables the context to configure monitor commands for the OSPF instance.
Parameters	*ospf-instance* — Specifies the OSPF instance.

    Values   0 to 31

ospf3

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

    Values

ospf-instance	0 to 31, 64 to 95	
	0 to 31	ipv6-unicast address-family
	64 to 95	ipv4-unicast address-family

interface

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

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

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

   Values   3 to 60

   Default   10

repeat — Configures how many times the command is repeated.

   Values   1 to 999

   Default   10

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

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

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

Sample Output

```
A:ALA-12>monitor>router>ospf# interface to-104 interval 3 repeat 3 absolute
===============================================================================
Monitor statistics for OSPF Interface "to-104"
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
Tot Rx Packets : 8379                    Tot Tx Packets : 8528
Rx Hellos     : 8225                     Tx Hellos      : 8368
Rx DBDs       : 6                        Tx DBDs        : 12
Rx LSRs       : 2                        Tx LSRs        : 1
Rx LSUs       : 55                       Tx LSUs        : 95
Rx LS Acks    : 91                       Tx LS Acks     : 52
Retransmits   : 2                        Discards       : 0
```

```
Bad Networks  : 0                    Bad Virt Links : 0
Bad Areas     : 0                    Bad Dest 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*] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context monitor>router>ospf

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

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

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

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

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

    Values a.b.c.d

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

    Values 3 to 60

    Default 10

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

    Values 1 to 999

    Default 10

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

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

Output   The following output is an example of OSPF neighbor information.

Sample Output

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


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

```
                    Bad Nbr States   : 0                 LSA Inst fails   : 0
                    Bad Seq Nums     : 0                 Bad MTUs         : 0
                    Bad Packets      : 0                 LSA not in LSDB  : 0
                    Option Mismatches: 0                 Nbr Duplicates   : 0
                    -------------------------------------------------------------------------------
                    At time t = 6 sec (Mode: Rate)
                    -------------------------------------------------------------------------------
                    Bad Nbr States   : 0                 LSA Inst fails   : 0
                    Bad Seq Nums     : 0                 Bad MTUs         : 0
                    Bad Packets      : 0                 LSA not in LSDB  : 0
                    Option Mismatches: 0                 Nbr Duplicates   : 0
                    -------------------------------------------------------------------------------
                    At time t = 9 sec (Mode: Rate)
                    -------------------------------------------------------------------------------
                    Bad Nbr States   : 0                 LSA Inst fails   : 0
                    Bad Seq Nums     : 0                 Bad MTUs         : 0
                    Bad Packets      : 0                 LSA not in LSDB  : 0
                    Option Mismatches: 0                 Nbr Duplicates   : 0
                    ===============================================================================
                    A:ALA-12>monitor>router#
```

neighbor

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

Context monitor>router>ospf3

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

The first screen displays the current statistics related to the specified OSPF3 neighbor(s). The subsequent statistical information listed for each interval is displayed as a delta to the previous display.

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 *router-id* — Specifies the IP address.

    Values a.b.c.d

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

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

    Values 3 to 60

    Default 10

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

    Values   1 to 999

    Default   10

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

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

area-id — Specifies the OSPF area, up to 256 characters.

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* — Specifies the IP address to uniquely identify a neighboring router in the autonomous system.

        Values   a.b.c.d

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

        Values   *ip-address*, 0 to 4294967295

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

        Values   3 to 60

        Default   10

        repeat — Configures how many times the command is repeated.

        Values   1 to 999

        Default   10

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

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

virtual-neighbor

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

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

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

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

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

    Values   a.b.c.d

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

    Values   *ip-address*, 0 to 4294967295

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

    Values   3 to 60

    Default   10

repeat — Configures how many times the command is repeated.

    Values   1 to 999

    Default   10

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

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

pim

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

group

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

> *ip-address* — Specifies the source IP address to use in the ping requests in dotted decimal notation.
>
> > **Values**   0.0.0.0 to 255.255.255.255
> >
> > **Default**   the IP address of the egress IP interface
>
> *interval* — Configures the interval for each display, in seconds.
>
> > **Values**   10, 20, 30, 40, 50, 60
> >
> > **Default**   10
>
> *repeat* — Configures how many times the command is repeated.
>
> > **Values**   1 to 999
> >
> > **Default**   10
>
> **absolute** — Displays raw statistics, without processing. No calculations are performed on the delta or rate statistics.
>
> **rate** — Displays rate-per-second for each statistic instead of the delta.

rip

Syntax	**rip**
Context	router>monitor
Description	This command monitors commands for the RIP instance.

neighbor

Syntax	**neighbor** *neighbor* [*neighbor*] [**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* — Specifies the IP interface name or the IP address of the neighbor to be monitored. Up to five can be specified in a single statement.

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

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

> **Values**   3 to 60
>
> **Default**   10

repeat — Configures how many times the command is repeated.

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

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

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

rsvp

Syntax	**rsvp**
Context	monitor>router
Description	This command monitors commands for the RSVP instance.

interface

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

Context   monitor>router>rsvp

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

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

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

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

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

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

Values   3 to 60

Default   10

repeat — Configures how many times the command is repeated.

Values   1 to 999

Default   10

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

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

vrrp

Syntax   **vrrp**

Context   monitor>router

Description   This command enables the context to configure criteria to monitor VRRP statistical information for a VRRP enabled on a specific interface.

instance

Syntax   **instance interface** *interface-name* **vr-id** *virtual-router-id* [**ipv6**] [**interval** *seconds*] [**repeat** *repeat*] [**absolute** | **rate**]

Context	monitor>router>vrrp
Description	This command monitors statistics for a VRRP instance.
Parameters	*interface-name* — Specifies the name of the existing IP interface on which VRRP is configured. The name may can up to 32 characters long.
	virtual-router-id — Specifies the virtual router ID for the existing IP interface, expressed as a decimal integer.

       Values   1 to 255

    ipv6 — Specifies the IPv6 instance.

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

       Values   3 to 60

       Default   10

    repeat — Configures how many times the command is repeated.

       Values   1 to 999

       Default   10

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

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

service

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

id

Syntax	**id** *service-id*
Context	monitor>service
Description	This command displays statistics for a specific service, specified by the *service-id*, at the configured interval until the configured count is reached.
	The first screen displays the current statistics related to the *service-id*. The subsequent statistical information listed for each interval is displayed as a delta to the previous display. When the keyword **rate** is specified, the rate-per-second for each statistic is displayed instead of the delta.

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

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

sap

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

Context   monitor>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

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

ima-grp	bundle-id [:vpi/vci | vpi | vpi1.vpi2 | **cp**.*conn-prof-id*]	
	cp	keyword
	conn-prof-id	1 to 8000
port-id	*slot/mda/port*[.channel]	
	esat-*id*/*slot*/*port*	
	pxc-*id*.*sub-port*	
bundle-id	**bundle**-*type*-slot/mda.-*bundle-nu*	
	bundle	keyword
	type	ima | fr | ppp
	bundle-num	1 to 336
bpgrp-id	**bpgrp**-*type*-*bpgrp-num*	
	bgrp	keyword
	type	ima | ppp
	bgrp-num	1 to 2000
aps-id	**aps**-*group-id*[.channel]	
	aps	keyword
	group-id	1 to 128
ccag-id	**ccag**-*id*.*path-id*[*cc-type*]:*cc-id*	
	ccag	keyword
	id	1 to 8
	path-id	a | b
	cc-type	.sap-net | .net-sap
	cc-id	1 to 4094
eth-tunnel	eth-tunnel-*id*[:*eth-tun-sap-id*]	
	id	1 to 1024
	eth-tun-sap-id	0 to 4094
lag-id	**lag**-*id*	
	lag	keyword
	id	1 to 800
pw-id	**pw**-*id*	
	pw	keyword
	id	1 to 10239
qtag1	* | 0 to 4094	
qtag2	* | null | 0 to 4094	
vpi	0 to 4095 (NNI)	
	0 to 255 (UNI)	
vci	1 | 2 | 5 to 65535	
dlci	16 to 1022	
tunnel-id	**tunnel**-*id*.*private* | *public*:*tag*	

tunnel	keyword
id	1 to 16
tag	0 to 4094

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

> If the card in the slot has XMAs/MDAs installed, the *port-id* must be in the slot_number/MDA_number/port_number format. For example, 6/2/3 specifies port 3 on XMA/MDA 2 in slot 6.

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

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

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

> The command syntax must be configured as follows:

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

> bundle-id value range: 1 to 128

> For example:

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

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. This parameter applies to the 7750 SR.

> The command syntax must be configured as follows:

bpgrp-id:	bpgrp-*type-bpgrp-num*
type:	ima
bpgrp-num value range:	1 to 1280

> Example:

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

qtag1, qtag2 — Specifies the encapsulation value used to identify the SAP on the port or sub-port. If this parameter is not specifically defined, the default value is 0.

> **Values**

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

The values depends on the encapsulation type configured for the interface. Table 23 describes the allowed values for the port and encapsulation types.

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

Port Type	Encap-Type	Allowed Values	Comments
Ethernet	Null	0	The SAP is identified by the port.
Ethernet	Dot1q	0 to 4094	The SAP is identified by the 802.1Q tag on the port. Note that a 0 qtag1 value also accepts untagged packets on the dot1q port.
Ethernet	QinQ	qtag1: 0 to 4094 qtag2: 0 to 4094	The SAP is identified by two 802.1Q tags on the port. Note that a 0 qtag1 value also accepts untagged packets on the dot1q port.
SONET/ SDH	IPCP	—	The SAP is identified by the channel. No BCP is deployed and all traffic is IP.
SONET/ SDH TDM	BCP-Null	0	The SAP is identified with a single service on the channel. Tags are assumed to be part of the customer packet and not a service delimiter.
SONET/ SDH TDM	BCP-Dot1q	0 to 4094	The SAP is identified by the 802.1Q tag on the channel.
SONET/ SDH TDM	Frame Relay	16 to 991	The SAP is identified by the data link connection identifier (DLCI).
SONET/ SDH ATM	ATM	vpi (NNI) 0 to 4095 vpi (UNI) 0 to 255 vci 1, 2, 5 to 65535	The SAP is identified by port or by PVPC or PVCC identifier (vpi, vpi/ vci, or vpi range)

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

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

> **Values**   0 to 16777215

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

>**Values**   11 to 60
>
>**Default**   11

repeat — Configures how many times the command is repeated.

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

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

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

Output   The following output is an example of SAP information.

Sample Output

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

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

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

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

```
For. InProf              : 0                           0
For. OutProf             : 0                           0
```

sdp

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

Context   monitor>service>id

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

Parameters *sdp-id* — Specifies the SDP identifier.

> **Values**   sdp-id: 1 to 17407
>
> vc-id: 1 to 4294967295

ip-address — Specifies the system address of the far-end router for the SDP in dotted decimal notation. The string may be up to 32 characters.

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

> **Values**   11 to 60
>
> **Default**   11

repeat — Configures how many times the command is repeated.

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

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

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

Output   The following output is an example of SDP information.

Sample Output

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

```
E. Fwd. Pkts.   : 0                           E. Fwd. Octets  : 0
-------------------------------------------------------------------------------
At time t = 33 sec (Mode: Delta)
-------------------------------------------------------------------------------
I. Fwd. Pkts.   : 0                           I. Dro. Pkts.   : 0
E. Fwd. Pkts.   : 0                           E. Fwd. Octets  : 0
===============================================================================
A:ALA-12#
```

subscriber

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

   subscriber *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [**repeat** *repeat*] [**absolute** | **rate**] **egress-policer-id** *egress-policer-id*

   subscriber *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [**repeat** *repeat*] [**absolute** | **rate**] **egress-queue-id** *egress-queue-id*

   subscriber *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [**repeat** *repeat*] [**absolute** | **rate**] **ingress-policer-id** *ingress-policer-id*

   subscriber *sub-ident-string* **sap** *sap-id* **sla-profile** *sla-profile-name* [**repeat** *repeat*] [**absolute** | **rate**] **ingress-queue-id** *ingress-queue-id*

Context   monitor>service

Description   This command monitors statistics for a subscriber.

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

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

   Values

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

	cp	keyword
	conn-prof-id	1 to 8000
port-id	*slot/mda/port*[.channel]	
	esat-*id*/*slot*/*port*	
	pxc-*id*.*sub-port*	
bundle-id	**bundle**-*type*-slot/mda.-*bundle-nu*	
	bundle	keyword
	type	ima | fr | ppp
	bundle-num	1 to 336
bpgrp-id	**bpgrp**-*type*-*bpgrp-num*	
	bgrp	keyword
	type	ima | ppp
	bgrp-num	1 to 2000
aps-id	**aps**-*group-id*[.channel]	
	aps	keyword
	group-id	1 to 128
ccag-id	**ccag**-*id*.*path-id*[*cc-type*]:*cc-id*	
	ccag	keyword
	id	1 to 8
	path-id	a | b
	cc-type	.sap-net | .net-sap
	cc-id	1 to 4094
eth-tunnel	eth-tunnel-*id*[:*eth-tun-sap-id*]	
	id	1 to 1024
	eth-tun-sap-id	0 to 4094
lag-id	**lag**-*id*	
	lag	keyword
	id	1 to 800
pw-id	**pw**-*id*	
	pw	keyword
	id	1 to 10239
qtag1	* | 0 to 4094	
qtag2	* | null | 0 to 4094	
vpi	0 to 4095 (NNI)	
	0 to 255 (UNI)	
vci	1 | 2 | 5 to 65535	
dlci	16 to 1022	
tunnel-id	**tunnel**-*id*.*private* | *public*:*tag*	
	tunnel	keyword

id	1 to 16
tag	0 to 4094

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

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

Values   11 to 60

Default   11

repeat — Configures how many times the command is repeated.

Values   1 to 999

Default   10

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

Default   mode delta

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

base — Monitor base statistics.

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

Values   1 to 63

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

Values   1 to 8

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

Values   1 to 63

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

Values   1 to 32

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

Sample Output

```
A:Dut-A# monitor service subscriber nokia_100 sap 1/2/1:101 sla-profile sla_
default
===============================================================================
Monitor statistics for Subscriber nokia_100
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
SLA Profile Instance statistics
-------------------------------------------------------------------------------
                     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 nokia_100 sap 1/2/1:101 sla-
profile  sla_default base rate
===============================================================================
Monitor statistics for Subscriber nokia_100
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
SLA Profile Instance statistics
-------------------------------------------------------------------------------
                        Packets              Octets
Off. HiPrio             : 0                  0
Off. LowPrio            : 109099             35427060
Off. Uncolor            : 0                  0
Queueing Stats (Ingress QoS Policy 1000)
Dro. HiPrio             : 0                  0
Dro. LowPrio            : 8449               2894798
For. InProf             : 0                  0
For. OutProf            : 100523             32489663
Queueing Stats (Egress QoS Policy 1000)
Dro. InProf             : 880                127660
Dro. OutProf            : 0                  0
For. InProf             : 105578             15104553
For. OutProf            : 0                  0
-------------------------------------------------------------------------------
At time t = 11 sec (Mode: Rate)
-------------------------------------------------------------------------------
SLA Profile Instance statistics
-------------------------------------------------------------------------------
                        Packets              Octets               % Port
                                                                  Util.
Off. HiPrio             : 0                  0                    0.00
Off. LowPrio            : 1469               477795               0.38
Off. Uncolor            : 0                  0                    0.00
Queueing Stats (Ingress QoS Policy 1000)
Dro. HiPrio             : 0                  0                    0.00
Dro. LowPrio            : 119                40691                0.03
For. InProf             : 0                  0                    0.00
For. OutProf            : 1349               437350               0.34
Queueing Stats (Egress QoS Policy 1000)
Dro. InProf             : 0                  0                    0.00
Dro. OutProf            : 0                  0                    0.00
For. InProf             : 1469               209129               0.16
For. OutProf            : 0                  0                    0.00
===============================================================================
```

```
A:Dut-A#



A:Dut-A# monitor service subscriber nokia_100 sap 1/2/1:101 sla-
profile sla_ default ingress-queue-id 1
===============================================================================
Monitor statistics for Subscriber nokia_100
===============================================================================
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
                      Packets                   Octets
Ingress Queue 1 (Unicast) (Priority)
Off. HiPrio          : 0                        0
Off. LowPrio         : 0                        0
Off. Uncolor         : 0                        0
Dro. HiPrio          : 0                        0
Dro. LowPrio         : 0                        0
For. InProf          : 0                        0
For. OutProf         : 0                        0
===============================================================================
A:Dut-A#



A:Dut-A# monitor service subscriber nokia_100 sap 1/2/1:101 sla-profile
sla_default egress-queue-id 1
===============================================================================
Monitor statistics for Subscriber nokia_100
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
                      Packets                   Octets
Egress Queue 1
Dro. InProf          : 880                      127660
Dro. OutProf         : 0                        0
For. InProf          : 164366                   23506178
For. OutProf         : 0                        0
===============================================================================
A:Dut-A#
```

2.12.2.3   CLI Environment Commands

alias

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

Context   environment

Description   This command enables the substitution of a command line (or part of a command line) by an alias. Use the **alias** command to create alternative or easier to remember/understand names for an entity or command string. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes. The special characters "/" and "\" cannot be used as the first character inside an alias string. An alias can contain a double quote character by preceding the quote with a "\" character (for example, **alias my-alias "| match \"***string***\""**). Only a single command can be present in the command string (the command can be long with many parameters but there is no support for aliases that include multiple CLI commands/lines). The **alias** command can be entered in any context but must be created in the **root>environment** context.

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

alias soi "show router ospf interface"

Complex aliases can be created to have shortcuts for customized show routine output:

environment alias my-summary "| match expression \"----|Description|Interface|Admin State|Oper State|Transceiver Type|Optical Compliance|Link Length\" | match invert-match expression \"Ethernet Interface|OTU Interface\" | match invert-match expression \"----\" post-lines 1"

and then used like this:

show port detail my-summary

Parameters   *alias-name* — Specifies the alias name. Do not use a valid command string for the name of the alias. If the alias specified is an actual command, this causes the command to be replaced by the alias. The string may be up to 80 characters in length.

alias-command-name — Specifies the command name to be associated. The name can be a maximum of 320 characters long.

create

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

Context   environment

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

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

Default   create

kernel

Syntax   **kernel password** *password*

no kernel

Context   environment

Description   This command enables and disables the kernel.

Parameters   *password* — Specifies the password to access the kernel, up to 256 characters in length.

more

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

Context   environment

Description   This command enables per-screen CLI output, meaning that the output is displayed on a screen-by- screen basis. The terminal screen length can be modified with the **terminal** command.

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

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

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

Default   more

reduced-prompt

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

Context   environment

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

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

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

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

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

Default   no reduced-prompt

Parameters   *no-of-nodes-in-prompt* — Specifies the maximum number of higher-level nodes displayed by name in the prompt, expressed as a decimal integer.

> **Values**   0 to 15
>
> **Default**   2

saved-ind-prompt

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

Context   environment

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

```
*A:ALA-48# admin save
Writing file to ftp://192.0.2.43/./sim48/sim48-config.cfg
Saving configuration .... Completed.
A:ALA-48#
```

shell

Syntax   **shell -password** *password*
              no shell

Context   environment

Description   This command enables and disables the shell.

Parameters   *password* — Specifies the password to enter the shell. The password can be up to 256 characters.

suggest-internal-objects

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

Context   environment

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

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

terminal

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

      Values   1 to 512

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

width

Syntax	**width** *width*
Context	environment>terminal
Description	This command determines display terminal width.
Default	width 80
Parameters	*width* — Sets the width of the display terminal.

      Values   1 to 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	local
Parameters	**local** — Indicates that local time should be used.
	utc — Indicates that UTC time should be used.

time-stamp

Syntax	[**no**] **time-stamp**
Context	environment
Description	This command specifies whether the time-stamp should be displayed before the prompt.

2.12.2.4   Candidate Commands

candidate

Syntax	**candidate**
Context	<root>
Description	This command enables the context to edit candidate configurations.
	Commands in the **candidate** CLI branch, except **candidate edit**, are available only when in edit-cfg mode.

edit

Syntax	**edit** [**exclusive**]
Context	candidate

Description   This command enables the edit-cfg mode where changes can be made to the candidate configuration and sets the edit-point to the end of the candidate. In edit-cfg mode the CLI prompt contains **edit-cfg** near the root of the prompt. Commands in the **candidate** CLI branch, except **candidate edit**, are available only when in edit-cfg mode.

Parameters   **exclusive** — Allows a user to exclusively create a candidate configuration by blocking other users (and other sessions of the same user) from entering edit-cfg mode. Exclusive edit-cfg mode can only be entered if the candidate configuration is empty and no user is in edit-cfg mode. Once a user is in exclusive edit-cfg mode no other users/sessions are allowed in edit-cfg mode. The user must either commit or discard the exclusive candidate before leaving exclusive edit-cfg mode. If the CLI session times out while a user is in exclusive edit-cfg mode then the contents of the candidate are discarded. The **admin disconnect** command can be used to force a user to disconnect (and to clear the contents of the candidate) if they have the candidate locked.

commit

Syntax   **commit** [**confirmed** *timeout*] [**comment** *comment*]
commit no-checkpoint [**confirmed** *timeout*]

Context   candidate

Description   This command applies the changes in the candidate configuration to the active running configuration. The candidate changes will take operational effect.

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

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

A commit operation is blocked if a rollback revert is currently being processed.

Parameters   **confirmed** — specifies that the commit operation (if successful) should be automatically reverted (undone) at the end of the timeout period unless the operator issues the confirm command before the timeout period expires.   A rollback checkpoint is created after the commit operation (if successful) and will remain available whether the commit is auto-reverted or not. The contents of the candidate will remain visible (candidate view) and changes to the candidate are blocked until the timeout is completed or the **candidate confirm** command is executed. If the timeout expires and an auto-revert occurs, then the original candidate config will be available in edit-cfg mode.

Standard line-by-line non-transactional configuration commands (including via SNMP) are not blocked during the countdown period and any changes made to the configuration during the countdown period will be rolled back if the timeout expires. The confirmed option is useful when changes are being made that could impact management reachability to the router.

A rollback revert is blocked during the countdown period until the commit has been confirmed.

timeout — Specifies the auto-revert timeout period, in minutes

    Values   1 to 168

no-checkpoint — Specifies to avoid the automatic creation of a rollback checkpoint for a successful commit

comment *comment* — Adds a comment up to 255 characters to the automatic rollback checkpoint

confirm

    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* — Specifies which line to copy.

        Values   line, offset, **first**, **edit-point**, **last**
                line — absolute line number

offset — relative line number to the current edit point. Prefixed with
'+' or '-'.

first — keyword to indicate the first line

edit-point — keyword to indicate the current edit point

last — keyword to indicate the 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* — Indicates which line to delete.

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** — Indicates which line to change starting at the point indicated by the following options.

Values

line, offset, **first**, **edit-point**, **last**

line	absolute line number
offset	relative line number to current edit point. Prefixed with '+' or '-'
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. If the lines to be inserted are supported at the context of the insertion point then the lines are simply inserted into the configuration. If the lines to be inserted are not supported at the context of the insertion point, then the context at the insertion point is first closed using multiple exit statements, the context of the lines to be inserted is built (added) into the candidate at the insertion point, then the lines themselves are added, the context of the inserted lines is closed using exit statements and finally the context from the original insertion point is built again leaving the context at the same point as it was before the insertion.

Parameters   *line* — Indicates where to insert the line starting at the point indicated by the following options.

Values

line, offset, **first**, **edit-point**, **last**

line	absolute line number
offset	relative line number to current edit point. Prefixed with '+' or '-'

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, and so on, must be specified.

Parameters   *file-url* — Specifies 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 exits 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** — Specifies the number of previous changes to reapply.

       Values   1 to 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* — Indicates which line to replace starting at the point indicated by the following options.

       Values

       line, offset, **first**, **edit-point**, **last**

line	absolute line number
offset	relative line number to current edit point. Prefixed with '+' or '-'
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* — Specifies 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* — Specifies the number of previous changes to remove.

               Values   1 to 50

               Default   1

view

Syntax   **view** [*line*]

Context   candidate

Description   This command displays the candidate configuration along with line numbers that can be used for editing the candidate configuration.

Parameters   *line* — Displays the candidate configuration starting at the point indicated by the following options (the display is not limited to the current CLI context/branch).

               Values

            line, offset, **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

Syntax   **info** [**operational**]

Context   <root>

Description   This command displays the operational configuration of the context that the operator is currently in. In edit-cfg mode, the **operational** keyword is mandatory when using the **info** command.

candidate

Syntax	**candidate**
Context	show>system
Description	This command shows candidate configuration information.
Output	The following output is an example of candidate information, and Table 24 describes the output fields.

Sample Output

```
*A:bksim3107# show system candidate
===============================================================================
Candidate Config Information
===============================================================================
Candidate configuration state        : modified
Num editors/viewers                  : 0
Candidate cfg exclusive locked       : no
Last commit state                    : revert-failed
Last commit time                     : 10/23/2012 17:21:47
Checkpoint created with last commit   : yes
Scheduled revert time                : N/A
Last commit revert time              : 10/23/2012 17:22:47


===============================================================================
Users in edit-cfg mode
===============================================================================
Username        Type (from)
===============================================================================
admin           Console
Joris           Telnet (192.0.2.239)
===============================================================================
```

Table 24   **Candidate Output Fields**

Label	Description
Candidate configuration state	• 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	Displays the number of CLI sessions currently in edit-cfg mode
Candidate cfg exclusive locked	Indicates if a user has exclusively locked the candidate using the **candidate edit exclusive** command

Table 24   **Candidate Output Fields (Continued)**

Label	Description (Continued)
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	Displays the time at which the last commit attempt was started
Checkpoint created with last commit	Indicates if a rollback checkpoint was created after the previous commit completed
Scheduled revert time	Indicates the currently scheduled auto-revert time based on the confirmed option being used with a candidate commit
Last commit revert time	Displays the time the commit was last reverted
Users in edit-cfg mode	Lists all the user sessions that are currently in edit-cfg mode
Type (from)	Indicates the type of session (such as Console, Telnet, and so on) and also the source of the session (such as the source IP address of the remote host)

2.12.2.5   Rollback Commands

compare

Syntax   **compare** [**to** *checkpoint2*]

compare *checkpoint1* **to** *checkpoint2*

Context   admin
admin>rollback
config>xx (where xx is any sub-branch at any level below config, but not at the config context itself)

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.

A compare operation does not check authorization of each line of output. Permission to execute the compare operation from the admin branch of CLI (authorization for the **admin rollback compare** or **admin compare** command itself) should only be given to users who are allowed to view the entire configuration, similar to permissions for **admin display-config**.

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 = latest-rb

   compare: equivalent to "compare active-cfg to latest-rb"

   compare to source2: equivalent to "compare active-cfg to source2"
- In a config>*xx* node:

   compare to source2: equivalent to "compare active-cfg to source2"

Parameters   *checkpoint1, checkpoint2* — 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 to 9] indicating a specific rollback checkpoint. A checkpoint-id of 1 indicates the rollback checkpoint file (at the configured rollback-location) with "*.rb.1" as the suffix, 2 for file "*.rb.2", and so on.

delete

Syntax   **delete** {*checkpoint-id* | **rescue** | **latest-rb**}

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.

Parameters   *checkpoint-id* — An ID from [1 to *9*] indicating a specific rollback checkpoint. A checkpoint-id of 1 indicates the rollback checkpoint file (at the configured rollback location) with *.rb.1 as the suffix, 2 for file *.rb.2, and so on.

latest-rb — Specifies the most recently created rollback checkpoint (corresponds to the file-url.rb rollback checkpoint file).

rescue — Deletes the rescue checkpoint. No checkpoint suffix numbers are changed.

revert

Syntax   **revert** {**latest-rb**| *checkpoint-id* | **rescue**} [**now**]

Context   admin>rollback

Description   This command initiates a configuration rollback revert operation that will return the configuration state of the node to a previously saved checkpoint. The rollback revert minimizes impacts to running services. There are no impacts in areas of configuration that did not change since the checkpoint. Configuration parameters that changed (or items on which changed configuration have dependencies) are first removed (revert to default) and the previous values are then restored (can be briefly service impacting in changed areas).

Parameters   **latest-rb** — Specifies the most recently created rollback checkpoint (corresponds to the file-url.rb rollback checkpoint file).

checkpoint-id — Specifies the configuration to return to (which rollback checkpoint file to use). Checkpoint-id of 1 corresponds to the file-url.rb.1 rollback checkpoint file. The higher the id, the older the checkpoint. Max is the highest rollback checkpoint supported or configured.

Values   1 to 9

rescue — Specifies to revert to the rescue checkpoint.

now — Forces a rollback revert without any interactive confirmations (assumes 'y' for any confirmations that would have occurred).

save

Syntax	**save** [**comment** *comment*] [**rescue**]
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.
Parameters	*comment-string* — Specifies a comment of up to 255 characters that is associated with the checkpoint.
	rescue — Saves the rescue checkpoint instead of a normal rollback checkpoint.

view

Syntax	**view** [*checkpoint-id*	**rescue**	**latest-rb**]
Context	admin>rollback
Description	This command displays the checkpoint.
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 to 9
	rescue — Displays the rescue configuration.

view

Syntax	**view** {*source*}
Context	admin
Description	The context to configure administrative system viewing parameters. Only authorized users can execute the commands in the **admin** context.

Parameters   *source* — Specifies the source of the configuration to view.

        Values   active-cfg, rescue, latest-rb, checkpoint-id

    active-cfg — Specifies current running configuration.

    rescue — Specifies a rescue checkpoint configuration.

    latest-rb — Specifies the latest configuration.

    checkpoint-id — Specifies a specific checkpoint file configuration.

        Values   1 to 9

local-max-checkpoints

Syntax   **local-max-checkpoints** [*1 to 50*]
        no local-max-checkpoints

Context   config>system>rollback

Description   Configures the maximum number of rollback checkpoint files when the rollback-location is on local compact flash.

Default   no local-max-checkpoints

remote-max-checkpoints

Syntax   **remote-max-checkpoints** [*1 to 200*]
        no remote-max-checkpoints

Context   config>system>rollback

Description   Configures the maximum number of rollback checkpoint files when the rollback-location is remote (for example, ftp).

Default   no remote-max-checkpoints

rescue-location

Syntax   **rescue-location** *file-url*
        no rescue-location

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	no rescue location	
Parameters	*file-url* — Specifies the URL.	
	Values	
	*local-url	remote-url*	
	local-url	[*cflash-id/*][*file-path*] 200 chars max, including flash-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 to FFFF]H
		d - [0 to 255]D
		interface - 32 chars max, for link local addresses
	cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
	rescue filename	suffixed with rc during rescue file creation

rollback-location

Syntax	**rollback-location** *file-url* / *rollback filename* **no rollback-location**
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	no rollback-location
Parameters	*file-url* — Specifies the URL.

	Values	
	*local-url	remote-url*	
	local-url	[*cflash-id/*][*file-path*] 200 chars max, including flash-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 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

rollback-filename — Specifies the rollback file name.

Values suffixed with .rb, .rb.1 up to .9 during rollback checkpoint creation

2.12.2.6 Show Commands

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

alias

Syntax **alias**

Context <root>

Description This command displays a list of existing aliases.

Output The following output is an example of alias information, and Table 25 describes the output fields.

Sample Output

```
A:ALA-103>config>system# show alias
===============================================================================
Alias-Name                  Alias-command-name
===============================================================================
sri                         show router interface
sse                         show service service-using 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#
```

Table 25   **Show Alias Output Fields**

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

3 File System Management

3.1 The File System

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

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

Although some of the storage devices on routers are not actually compact flash devices (for example, cf1: on the 7950 XRS is an internal SSD), we refer to all storage devices as compact flash.

3.1.1 Compact Flash Devices

The file system is based on a DoS file system (with an optional Reliance file system). In the 7750 SR and 7450 ESS, each control processor can have up to three compact flash devices numbered one through three. In the 7950 XRS, each CCM has an SSD and up to two compact flash devices. The names for these devices are:

- cf1:
- cf2:
- cf3:

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

The three compact flash devices on the 7450 ESS and 7750 SR OS are removable and have an administrative state (shutdown/no shutdown).

The cf2: and cf3: compact flash devices on the 7950 XRS routers are removable and have an administrative state (shutdown/no shutdown). cf1: is an internal SSD.

Note: To prevent corrupting open files in the file system, you should only remove a compact flash that is administratively shutdown. The SR OS gracefully closes any open files on the device, so it can be safely removed.

3.1.2 URLs

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

The SR OS supports operations on both the local file system and on remote files. For the purposes of categorizing the applicability of commands to local and remote file operations, URLs are divided into three types of URLs: local, ftp and tftp. The syntax for each of the URL types are listed in Table 26.

Table 26   **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.

On the 7750 SR and 7950 XRS, if the host portion of the URL is an IPv6 address, then the address should be enclosed in square brackets. For example:

ftp://user:passw@[3ffe::97]/./testfile.txt

tftp://[2001:db8:3333:4444:5555:6666:7777:8888]/./testfile.txt

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

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

3.1.3 Wildcards

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

Example:
```
A:ALA-1>file cf3:\ # copy test*.cfg
siliconvalleycf1:\testfile.cfg
1 file(s) copied.
A:ALA-1>file cf3:\ # cd siliconvalley
A:ALA-1>file cf3:\siliconvalley\ # dir
 Volume in drive cf1 on slot A has no label.
Directory of cf3:\siliconvalley\
05/10/2006 11:32p      <DIR>             .05/10/2006
11:14p       <DIR>            ..
05/10/2006 11:32p                  7597 testfile.cfg
1 File(s)                   7597 bytes.
2 Dir(s)               1082368 bytes free.
A:ALA-1>file cf3:\siliconvalley\ #
```

As in a DoS file system, the wildcard characters can only be used in some of the file commands.

Another example of wildcard usage:

```
A:21# show router mpls lsp l-63-8*
===============================================================================
MPLS LSPs (Originating)
===============================================================================
LSP Name                         To               Fastfail
Adm   Opr
Config
-------------------------------------------------------------------------------
l-63-8-cc                        192.0.2.8        No
Up    Dwn
l-63-8-cw                        192.0.2.8        No
Up    Dwn
-------------------------------------------------------------------------------
LSPs : 2
===============================================================================
A:21#
```

All the commands can operate on the local file system. Table 27 indicates which commands also support remote file operations.

Table 27   **File Command Local and Remote File System Support**

Command	local-url	ftp-url	tftp-url
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			

3.2   File Management Tasks

The following sections are basic system tasks that can be performed.

Note that when a file system operation is performed with the **copy**, **delete**, **move**, **rd**, or **scp** commands that can potentially delete or overwrite a file system entry, a prompt appears to confirm the action. The **force** keyword performs the copy, delete, move, rd, and scp actions without displaying the confirmation prompt.

3.2.1   Modifying File Attributes

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

Use the CLI syntax displayed below to modify file attributes:

CLI Syntax: `file>`
                  `attrib [+r | -r] file-url`

The following shows an example of the command syntax:

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

The following example shows the file configuration:

```
    A:ALA-1>file cf3:\ # attrib
    cf3:\bootlog.txt
    cf3:\bof.cfg
    cf3:\boot.ldr
    cf3:\bootlog_prev.txt
    cf3:\BOF.SAV
A:ALA-1>file cf3:\ # attrib +r BOF.SAV
A:ALA-1>file cf3:\ # attrib
    cf3:\bootlog.txt
    cf3:\bof.cfg
    cf3:\boot.ldr
    cf3:\bootlog_prev.txt
R   cf3:\BOF.SAV
```

3.2.2   Creating Directories

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

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

Use the CLI syntax displayed below to modify file attributes:

CLI Syntax: `file>`
                   `md file-url`

The following is an example of the command syntax:

```
file cf1:\ # md test1file cf1:\ # cd test1
 file cf1:\test1\ # md test2
 file cf1:\test1\ # cd test2
 file cf1:\test1\test2\ # md test3
 file cf1:\test1\test2\ # cd test3
 file cf1:\test1\test2\test3 #
```

3.2.3   Copying Files

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

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

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

Use the CLI syntax displayed below to copy files:

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

The following displays an example of the copy command syntax:

Example: `A:ALA-1>file cf1:\ # copy`
                ` 104.cfgcf1:\test1\test2\test3\test.cfg`

```
A:ALA-1>file cf1:\ # scp file1
 admin@192.168.0.1:cf1:\file1

A:ALA-1>file cf1:\ # scp file2 user2@192.168.0.1:/user2/
 file2

A:ALA-1>file cf1:\ # scp cf2:/file3
 admin@192.168.0.1:cf1:\file3
```

3.2.4 Moving Files

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

Use the CLI syntax displayed below to move files:

CLI Syntax: `file>`
`move old-file-url new-file-url [force]`

The following displays an example of the command syntax:

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

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

3.2.5 Deleting Files and Removing Directories

Use the **delete** and **rd** commands to delete files and remove directories. Directories can be removed even if they contain files and/or subdirectories. To remove a directory that contains files and/or subdirectories, use the **rd rf** command. When files or directories are deleted, they cannot be recovered.

The **force** option deletes the file or directory without prompting the user to confirm.

Use the CLI syntax displayed below to delete files and then remove directories:

CLI Syntax: `file#`
               `delete file-url [force]`
               `rd file-url [force]`

The following displays an example of the command syntax:

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

Use the CLI syntax displayed below to remove a directory without first deleting files or subdirectories:

CLI Syntax: `file`
                 `rd file-url rf`

3.2.6   Displaying Directory and File Information

Use the **dir** command to display a list of files on a file system. The **type** command displays the contents of a file. The **version** command displays the version of a *.tim or iom.tim file. (iom.tim file is used for the XCM on the 7950 XRS).

Use the CLI syntax displayed below to display directory and file information:

CLI Syntax: `file>`
               `dir [file-url]`
               `type file-url`
               `version file-url`

The following shows an example of the command syntax:

```
A:ALA-1>file 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:\ #
```

3.2.7   Repairing the File System

Use the repair command to check a compact flash device for errors and repair any errors found.

Use the CLI syntax displayed below to check and repair a compact flash device:

CLI Syntax: file
                    repair [cflash-id]

The following example shows the command syntax:

```
A:ALA-1>file cf3:\ # repair
Checking drive cf3: on slot A for errors...
Drive cf31: on slot A is OK.
```

3.3   File Command Reference

3.3.1   Command Hierarchy

3.3.1.1   File Commands

file
— **attrib** [**+r** | **-r**] *file-url*
— **attrib**
— **cd** [*file-url*]
— **copy** *source-file-url dest-file-url* [**force**]
— **delete** *file-url* [**force**]
— **dir** [*file-url*] [**sort-order** {**d** | **n** | **s**}] [**reverse**]
— **format** [*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**]
— **scp** *local-file-url destination-file-url* [**force**] **service** *service-name*
— [**no**] **shutdown** [**active**] [**standby**]
— [**no**] **shutdown** *cflash-id*
— **type** *file-url*
— **version** *file-url* [**check**]
— **vi** *local-url*

3.3.2   Command Descriptions

3.3.2.1   File System Commands

shutdown

Syntax	[**no**] **shutdown** [**active**] [**standby**]
	[**no**] **shutdown** [*cflash-id*]
Context	file
Description	This command shuts down (unmounts) the specified CPM(s).

Use the **no shutdown** [**active**] [**standby**] command to enable one or both CPM.

Use the **no shutdown** [*cflash-id*] command to enable a compact flash (cf1:, cf2:, or cf3:) on the CPM/CFM/CCM. The **no shutdown** command can be issued for a specific slot when no compact flash is present. When a flash card is installed in the slot, the card will be activated upon detection.

In redundant systems, use the **no shutdown** command on cf3: on both SF/CPMs or CCMs in order to facilitate synchronization. See the synchronize command.

➡️ **Note:** The **shutdown** command must be issued prior to removing a flash card. If no parameters are specified, then the drive referred to by the current working directory will be shut down.

LED Status Indicators

Table 28 lists the possible states for the compact flash and their LED status indicators.

Table 28   **LED Status Indicators**

State	Description
Operational	If a compact flash is present in a drive and operational (no shutdown), the respective LED is lit green. The LED flickers when the compact flash is accessed. **Note:** Do not remove the compact flash during a read/write operation.
Flash defective	If a compact flash is defective, the respective LED blinks amber to reflect the error condition and a trap is raised.
Flash drive shut down	When the compact flash drive is shut down and a compact flash present, the LED is lit amber. In this state, the compact flash can be ejected.
No compact flash present, drive shut down	If no compact flash is present and the drive is shut down the LED is unlit.
No compact flash present, drive enabled	If no compact flash is present and the drive is not shut down the LED is unlit.
Ejecting a compact flash	The compact flash drive should be shut down before ejecting a compact flash card. The LED should turn to solid (not blinking) amber. This is the only mode to safely remove the flash card. If a compact flash drive is not shut down before a compact flash is ejected, the LED blinks amber for approximately 5 seconds before shutting off.

The **shutdown** or **no shutdown** state is not saved in the configuration file. Following a reboot all compact flash drives are in their default state.

Default   no shutdown

Parameters   *cflash-id* — Specifies the compact flash slot ID to be shut down or enabled. If *cflash-id* is specified, the drive is shut down or enabled. If no *cflash-id* is specified, the drive referred to by the current working directory is assumed. If a slot number is not specified, then the active CPM/CFM is assumed.

Values   cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

Default   the current compact flash device

active — Specifies that all drives on the active CPM are shutdown or enabled.

standby — Specifies that all drives on the standby CPM are shutdown or enabled.

When both **active** and **standby** keywords are specified, then all drives on both CPM are shutdown.

3.3.2.2   File Commands

file

Syntax   **file**

Context   root

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

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

attrib

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

Context   file

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

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

```
ALA-1>file cf3:\ # attrib
cf3:\bootlog.txt
cf3:\bof.cfg
cf3:\boot.ldr
cf3:\sr1.cfg
cf3:\test
cf3:\bootlog_prev.txt
cf3:\BOF.SAV
```

Parameters *file-url* — Specifies the URL for the local file.

> **Values**

file url	local-url | remote-url: 255 chars max
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*] 247 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 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses 255
cflash-id	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* — Specifies the file URL.

> **Values**

file url	local-url | remote-url: 255 chars max
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*] 247 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 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses 255
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

If no *file-url* is entered, the current working directory is displayed.

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

directory-url — Specifies the destination directory.

copy

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

Context   file

Description   This command copies a file or all files in a directory from a source URL to a destination URL. At least one of the specified URLs should be a local URL. The optional wildcard (*) can be used to copy multiple files that share a common (partial) prefix and/or (partial) suffix.

When a file is copied to a destination with the same file name, the original file is overwritten by the new file specified in the operation. The following prompt appears if the destination file already exists:

"Overwrite destination file (y/n)?"

For example:

To copy a file named **srcfile** in a directory called test on cf2 in slot B to a file called **destfile** in a directory called production on cf1 in slot A, the syntax is:

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

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

```
copy cf1-A/mydir/121201.cfg 192.0.2.79/backup/121201.cfg
```

Parameters   *source-file-url* — Specifies the location of the source file or directory to be copied.

Values	
file url	local-url | remote-url: 255 chars max
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*] 247 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 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses 255
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

dest-file-url — Specifies the destination of the copied file or directory.

force — Specifies to force an immediate copy of the specified file(s). Executes the command without displaying a user prompt message.

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)?"

Parameters   *file-url* — Specifies the file name to delete.

Values

file url	local-url | remote-url: 255 chars max
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*]
	247 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 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses 255
cflash-id	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). The command **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* — Specifies 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 current working directory.

sort-order {d | n | s} — Specifies the sort order.

Values   d — date
n — name
s — size

reverse — Reverses the sort order.

Output   The following output is an example of directory information.

Sample Output

```
A:cses-E12>file cf3:\ # dir
  - dir [<file-url>] [sort-order { d | n | s}] [reverse]

 <file-url>               : <local-url> | <remote-url>
                             local-url    - [<cflash-id>/][<file-path>]
                                            200 chars max, including cflash-id
                                            directory length 99 chars max each
                             remote-url   - [ftp://<login>:<pswd>@<remote-locn>/
                                            ][<file-path>]
                                            255 chars max
                                            directory length 99 chars max each
                             remote-locn  - [ <hostname> | <ipv4-address> |
                                            [<ipv6-address>]]
                             ipv4-address - a.b.c.d
                             ipv6-address - x:x:x:x:x:x:x:x[-interface]
                                            x:x:x:x:x:x:d.d.d.d[-interface]
                                            x - [0..FFFF]H
                                            d - [0..255]D
                                            interface - 32 chars max, for link
                                            local addresses
                             cflash-id    - cf1:|cf1-A:|cf1-B:|cf2:|cf2-A:|
                                            cf2-B:|cf3:|cf3-A:|cf3-B:
 < d | n | s>             : Sort order: d - date, n - name, s - size
 <reverse>                : keyword - reverse order
A:cses-E12>file cf3:\ # dir
```

format

Syntax	**format** [*cflash-id*] [**reliable**]
Context	root>file
Description	This command formats the compact flash. The compact flash must be shut down before starting the format.
Parameters	*cflash-id* — Specifies the compact flash type.

> **Values**   cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

reliable — Enables the reliance file system and disables the default DoS file system. This option is valid only on compact flashes 1 and 2.

md

Syntax	**md** *file-url*
Context	file
Description	This command creates a new directory in a file system.

Directories can only be created one level at a time.

         3HE 14127 AAAB TQZZA 01   Issue: 01

Parameters   *file-url* — Specifies the directory name to be created.

        Values

file url	local-url | remote-url: 255 chars max
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*]
	247 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 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses 255
cflash-id	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* — Specifies the file or directory to be moved.

        Values

file url	local-url | remote-url: 255 chars max
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*]
	247 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 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses 255
cflash-id	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

file url	local-url | remote-url: 255 chars max
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*]
	247 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 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses 255
cflash-id	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).

The **file move force** command moves the specified file(s) without displaying a user prompt message.

rd

Syntax	**rd** *file-url* **rf**
	rd *file-url* [**force**]
Context	file
Description	If the directory is empty, the **rd** command is used to remove it. The **force** option executes the command without prompting the user to confirm the action.
	If the directory contains files and/or subdirectories, the **rf** parameter must be used to remove the directory.
	Example:

```
A:nE1>file cf1:\ # rd test
Are you sure (y/n)? y
Deleting directory cf1:\test ..MINOR: CLI Cannot delete cf1:\test.
A:nE1>file cf1:\ # rd test force
Deleting directory cf1:\test .MINOR: CLI Cannot delete cf1:\test.


A:nE1>file cf1:\ # rd testbase rf
Deleting all subdirectories and files in specified directory. y/n ?y
Deleting directory cf1:\testbase\testbase1 ..OK
Deleting directory cf1:\test .OK
```

Parameters   *file-url* — Specifies the directory to be removed.

> **Values**
>
> *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*] 247 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 to FFFF]H *d* - [0 to 255]D *interface* - 32 chars max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

rf — Forces a recursive delete.

force — Forces an immediate deletion of the specified directory. The **rd** *file-url* **force** command executes the command without displaying a user prompt message.

repair

Syntax   **repair** [*cflash-id*]

Context   file

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

Parameters   *cflash-id* — Specifies the compact flash slot ID to be shut down or enabled. When a specific *cflash-id* is specified, then that drive is shut down. If no *flash-id* is specified, the drive referred to by the current working directory is assumed. If a slot number is not specified, then the active CSM is assumed.

    Values   cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

    Default   the current compact flash device.

scp

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

Context   file

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

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

Parameters   *local-file-url* — Specifies the local source file or directory.

    Values

[*cflash-id*/] *file-path*	200 characters max
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

destination-file-url — Specifies the destination file.

    Values

destination-file-*: *user@hostname*:*file-path* - [255 chars max]

user	32 chars max
hostname	[*dns-name* | *ipv4-address* | "["*ipv6-address*"]"]
ipv4-address	a.b.c.d
ipv6-address	x:x:x:x:x:x:x:x[-*interface*]
	x:x:x:x:x:x:d.d.d.d[-*interface*]
	x - [0 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, mandatory for link local addresses
dns-name	128 chars max
file-path	200 chars max

user — Specifies the SSH user.

hostname — Specifies the remote host IP address of DNS name.

file-path — Specifies the destination path.

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

Values

router-name	"Base", "management", "vpls-management"
vprn-service-id	1 to 2147483647

Default   Base

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

service-name — Specifies the service name used to identify the router instance. The service name can be a maximum of 64 characters long.

type

Syntax   **type** *file-url*

Context   file

Description   This command displays the contents of a text file.

Parameters   *file-url* — Specifies the file contents to display.

Values

local-url | remote-url

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

		d - [0 to 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 or iom.tim file. The iom.tim file is used for the XCM on the 7950 XRS.
Parameters	*file-url* — Specifies the file name of the target file.

> **Values**
>
> | | |
> |---|---|
> | *local-url \| remote-url* | |
> | *local-url* | [*cflash-id*/][*file-path*] |
> | | 200 chars max, including *cflash-id* |
> | | directory length 99 chars max each |
> | *remote-url* | [{ftp://\|tftp://}*login*:*pswd*@*remote-locn*/ [*file-path*] |
> | | 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 to FFFF]H |
> | | *d* - [0 to 255]D |
> | | *interface* - 32 chars max, for link local addresses |
> | *cflash-id* | cf1:, cf1-A:, cf1-B: |

check — Validates the .tim file.

Output	The following output is an example of SR OS version information.

Sample Output

```
A:Redundancy>file cf3:\ # version  ftp://test:1234@192.0.2.79/usr/global/images/
6.1/R4/cpm.tim
TiMOS-C-6.1.R4 for 7750
Thu Oct 30 14:21:09 PDT 2008 by builder in /rel6.1/b1/R4/panos/main
A:Redundancy>file cf3:\ # version check ftp://test:1234@192.0.2.79/usr/global/
images/6.1/R4/cpm.tim
```

```
TiMOS-C-6.1.R4 for 7750
Thu Oct 30 14:21:09 PDT 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. For more information, refer to VI Editor.

Parameters   *local-url* — Specifies the local source file or directory.

> **Values**   *[cflash-id/]file-path*
>   *cflash-id*: cf1:, cf2:, cf3:

4 Boot Options

4.1 System Initialization

The primary copy of SR OS software is located on a compact flash card. The removable media is shipped with each router and contains a copy of the OS image.

> **Note:**
>
> - The modules contain three slots for removable compact flash cards. The drives are named Compact Flash Slot #1 (cf1), Compact Flash Slot #2 (cf2), and Compact Flash Slot #3 (cf3). Configurations and executable images can be stored on flash cards or an FTP file location. 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).
> - You must have a console connection.

Starting a router begins with hardware initialization (a reset or power cycle). By default, the system searches Compact Flash Slot #3 (cf3) for the boot.ldr file (also known as the bootstrap file). The boot.ldr file is the image that reads and executes the system initialization commands configured in the boot option file (BOF). The default value to initially search for the boot.ldr file on *cf3* cannot be modified.

The following is an example of a console display output when the boot.ldr file cannot be located on cf3.

```
...
(memory test messages)
(serial number information)
Searching for boot.ldr on local drives:
No disk in cf3
No disk in cf3
No disk in cf3
Error - file boot.ldr not found on any drive
Please insert CF containing boot.ldr. Rebooting in 5 seconds.
```

When the bootstrap image is loaded, the BOF is read to obtain the location of the image and configuration files. The BOF must be located on the same compact flash drive as the boot.ldr file.

Figure 6 displays the system initialization sequence. In the figure, "A" refers to Figure 7, and "B" refers to the list of files on the compact flash.

Figure 6 **System Initialization - Part 1**
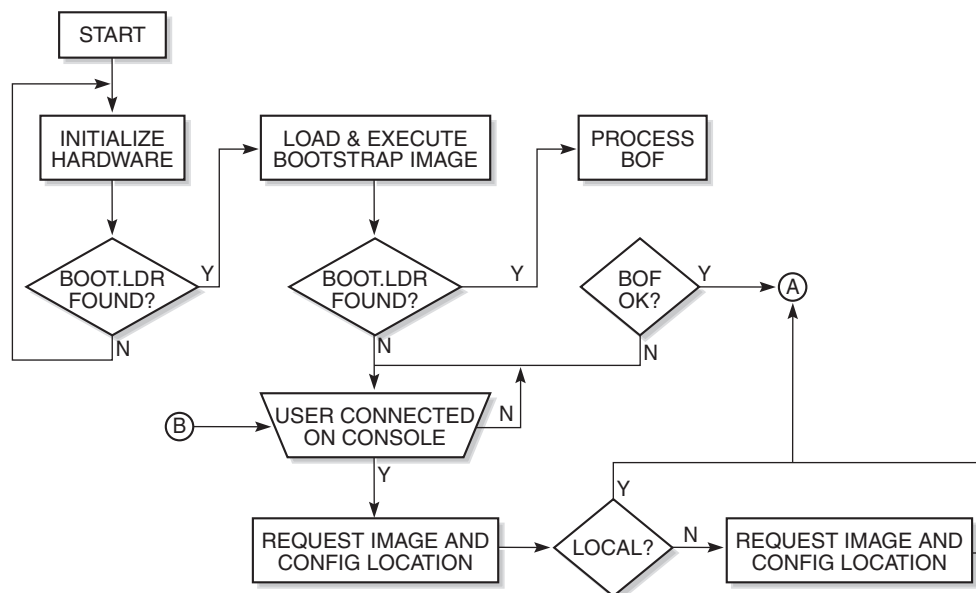
Figure 7 displays the compact flash directory structure and file names for the redundant chassis models.

Figure 7 **Files on the Compact Flash**
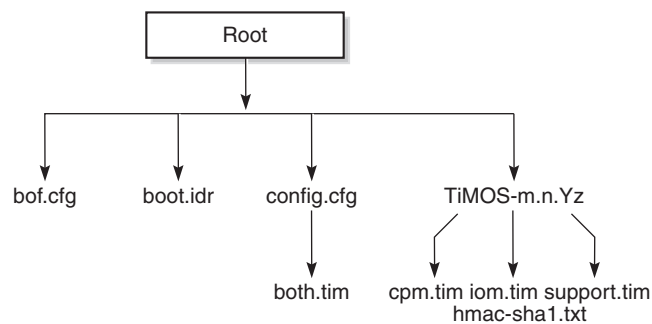
Files on compact flash are:

- bof.cfg — Boot option file
- boot.ldr — Bootstrap image
- config.cfg — Default configuration file
- TIMOS-m.n.Yz:

m — Major release number

n — minor release number

Y:A — Alpha release

B — Beta release

M — Maintenance release

R — Released software

z — Version number

- cpm.tim — CPM image file
- iom.tim — XCM/IOM image file
- support.tim — required data for SR OS .tim files
- hmac-sha1.txt (in FIPS-140-2 mode only)

→ **Note:** XCM applies to the 7950 XRS only.

Figure 8 displays the compact flash directory structure and file names for the 1-slot and 1-slot non-redundant models (the non-redundant models apply to the 7750 SR only).

Figure 8   **Files on the Compact Flash (1-slot and 1-slot non-redundant)**
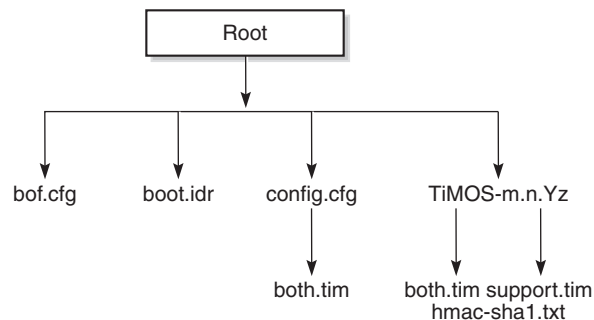
Files on the compact flash (1-slot models) are:

- 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

– hmac-sha1.txt (in FIPS-140-2 mode only)

The 7750 SR includes a boot option for running the node in a FIPS-140-2 mode. This mode limits the use of cryptographic algorithms on the CPM to only those that are in accordance with the FIPS-140-2 certifications associated with the 7750 SR.

4.1.1 Configuration and Image Loading

When the system executes the boot.ldr file, the initialization parameters from the BOF are processed. Three locations can be configured for the system to search for the files that contains the runtime image. The locations can be local or remote. The first location searched is the primary image location. If not found, the secondary image location is searched, and lastly, the tertiary image location is searched.

If the BOF cannot be found or loaded, then the system enters a console message dialog session prompting the user to enter alternate file locations and file names.

The **boot.ldr** can be interrupted during the boot sequence by pressing any key on the CPM console port. The operator must then type **sros** and press **ENTER** within 30 seconds or the **boot.ldr** 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 includes chassis, card, MDA, and port configurations, as well as system, routing, and service configurations.

Figure 9 displays the boot sequence.

Figure 9   **System Initialization - Part 2**
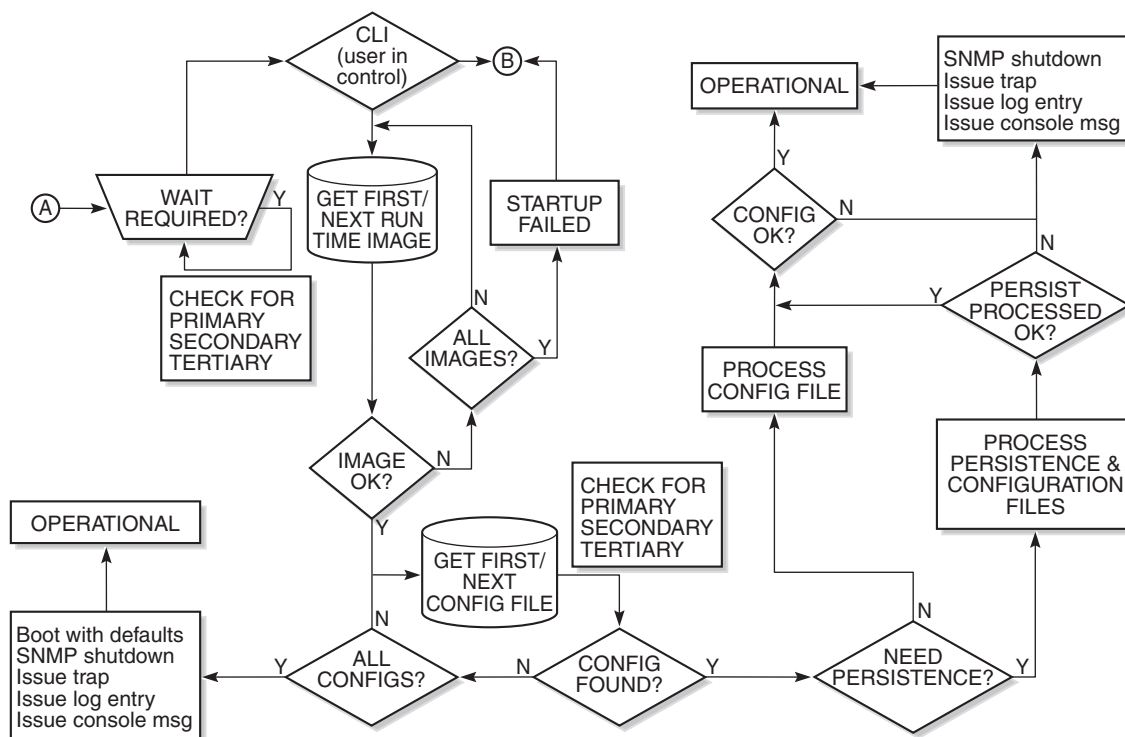
The following displays an example of BOF output:

```
A:ALA-1>bof# show bof
================================================================
Memory BOF
================================================================
no autonegotiate
duplex      full
speed      100
address    10.10.0.1/20 active
wait    3
primary-image cf3:\both.tim
```

```
primary-config cf3:\test123.cfg
primary-dns 192.168.10.20
persist     on
dns-domain test.nokia.com
================================================================
A:ALA-1>bof#
```

4.1.1.1   Persistence

Optionally, the BOF persist parameter can specify whether the system should preserve system indexes when a **save** command is executed. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index, LSP IDs, path IDs, etc. If persistence is not required and the configuration file is successfully processed, then the system becomes operational. If persist is required, then a matching x.ndx file must be located and successfully processed before the system can become operational. Matching files (configuration and index files) must have the same filename prefix such as **test123.cfg** and **test123.ndx** and are created at the same time when a **save** command is executed. Note that the persistence option must be enabled to deploy the Network Management System (NMS). The default is off.

Traps, logs, and console messages are generated if problems occur and SNMP shuts down for all SNMP gets and sets, however, traps are issued.

4.1.1.2   Lawful Intercept

Lawful Intercept (LI) describes a process to intercept telecommunications by which law enforcement authorities can unobtrusively monitor voice and data communications to combat crime and terrorism with higher security standards of lawful intercept capabilities in accordance with local law and after following due process and receiving proper authorization from competent authorities. The interception capabilities are sought by various telecommunications providers.

As lawful interception is subject to national regulation, requirements vary from one country to another. This implementation satisfies most national standard's requirements. LI is configurable for all service types.

4.1.1.3   FIPS-140-2 Mode

The 7750 SR includes a configurable parameter in the bof.cfg file to make the node run in FIPS-140-2 mode. When the node boots in FIPS-140-2 mode, the following behaviors are enabled on the node:

- The node performs an HMAC-SHA1 integrity test on the software images .tim files.
- The node limits the use of encryption and authentication algorithms to only those allowed for the associated FIPS-140-2 certification of the 7750-SR.
- Cryptographic module startup tests are executed on the CPM when the node boots to ensure the associated approved FIPS-140-2 algorithms are operating correctly.
- Cryptographic module conditional tests are executed when required during normal operation of associated when using FIPS-140-2 approved algorithms.
- When configuring user-defined encryption or authentication keys, CLI will prompt for the key to be re-entered. If the re-entered key does not match the original, the CLI command will be canceled. This affects several protocols and applications.

To support FIPS-140-2, an HMAC-SHA-1 integrity check is performed to verify the integrity of the software images. The following file is included in the TIMOS-m.n.Yz software bundle containing the hmac-sha-1 signature:

- hmac-sha1.txt

During the loading of the cpm.tim or both.tim, a HMAC-SHA-1 check is performed to ensure that the calculated HMAC-SHA-1 of the loaded image matches that stored in the hmac-sha1.txt file.

The HMAC-SHA-1 check is performed on the data loaded from the .tim file. Note that when configuring the primary-image, secondary-image and tertiary-image, the hmac-sha1.txt file must exist in the same directory as the .tim files. If the load has been verified correctly from the HMAC-SHA-1 integrity check, the load continues to startup as normal. If the load is not verified by the HMAC-SHA-1 integrity check, the image load will fail.

After the HMAC-SHA-1 integrity check passes, the nodes continues its normal startup sequence including reading the config.cfg file and loading the configuration. The config.cfg file used to boot the node in FIPS-140-2 mode must not contain any configuration that is not supported in FIPS-140-2 mode. If such configuration is present in the config.cfg file when the node boots, the node will load the config.cfg file until the location of the offending configuration and then halt the configuration at that point. Upon a failure to load the config.cfg file, a failure message is printed on the console.

Enabling FIPS-140-2 restricts the ability to configure and use cryptographic algorithms and functions that are not FIPS approved. FIPS-140-2 impacts the ability to configure SSH, SNMP and certificates. Refer to the *7450 ESS, 7750 SR, 7950 XRS, and VSR System Management Guide* for details of FIPS-140-2 related items.

In addition, signature algorithms of the following combinations only are approved for FIPS:

- FIPS-140 Approved - Digital Signature Standard (DSS)
    - DSA
    - RSA
    - ECDSA
- FIPS-140 Approved - Secured Hash Standard (SHS)
    - SHA-1
    - SHA-224
    - SHA-256
    - SHA-384
    - SHA-512

Any other combination is not supported in FIPS mode. Using other FIPS signature algorithms in certificates affecting IPSec can cause tunnels to fail. Restrictions to cryptographic algorithms are listed in the *7450 ESS, 7750 SR, 7950 XRS, and VSR System Management Guide*.

4.1.1.4   System Profiles

System profiles provide flexibility when using FP4-based line cards by supporting different system capabilities. The system profile is defined in the BOF and is used by the system when it is next rebooted. Contact your Nokia representative for system profile information.

The following system profiles are supported:

- Profile none

    This profile represents the existing system capabilities and allows FP3- and FP4-based hardware to co-exist within a system. This profile is indicated by the omission of the **system-profile** parameter in the BOF.
- Profile A

This profile is primarily targeted at subscriber services and Layer 2 and 3 VPN business services and is defined by configuring the BOF **system-profile** parameter to **profile-a**.

- Profile B

This profile is primarily targeted at infrastructure routing, core, peering, and DC-GW applications.

System profile **profile-a** and **profile-b** support only FP4-based line cards. Provisioning FP2- or FP3-based line cards is prohibited when the system profile is set to **profile-a** or **profile-b**. If FP2- or FP3-based card types are present in the boot configuration when using these profiles, the boot sequence aborts the loading of the configuration file when it encounters their configuration.

When changing between system profiles, it is mandatory to remove all configuration commands for features that are not supported in the target system profile before rebooting the system, otherwise the reboot will fail at the unsupported configuration command on startup.

On 7750 SR-1 and 7750 SR-s systems, the following conditions apply:

- The BOF **system-profile** parameter should be configured to either **profile-a** or **profile-b**.
- If the **system-profile** parameter is omitted from the BOF, system profile **profile-a** is used by the system.
- If the BOF **system-profile** parameter is configured to an invalid value, it is ignored and system profile **profile-a** is used by the system.

On 7750 SR-12e and 7950 XRS-20/20e systems, the following conditions apply:

- The default system profile is none when the **system-profile** parameter is omitted from the BOF.
- The BOF **system-profile** parameter can be configured to either **profile-a** or **profile-b**, in which case only FP4-based line cards are supported.
- If the BOF **system-profile** parameter is configured to an invalid value, it is ignored and system profile none is used by the system.

On all other systems, the following conditions apply:

- These systems must use profile none (the existing system capabilities). As a result, the **system-profile** parameter must not be configured in the BOF.

- If the **system-profile** parameter is configured to **profile-a** or **profile-b** in the BOF, the system will boot, allowing access using the console and CPM management interface, but FP2-based and FP3-based line cards cannot be provisioned; if these card types are present in the boot configuration, the boot sequence aborts loading the configuration file when it encounters their configuration. This issue can be corrected by removing the **system-profile** parameter from the BOF and rebooting the system.
- If the BOF **system-profile** parameter is configured to an invalid value, it is ignored and profile **none** is used by the system.

If a system has two CPMs, and the standby CPM boots with a different **system-profile** parameter than is used on the active CPM, the active CPM will reboot the standby CPM and keep it in a down state. To correct the situation, the BOF can be reconfigured on the standby CPM to match the one configured on the active CPM, and then reboot the system. Alternatively, automatic BOF synchronization can be enabled to keep both CPMs in sync using the following command:

configure redundancy synchronize boot-env

When performing a minor or major ISSU software upgrade on dual CPM systems, it is important that the system profile in the BOF on both the active and standby CPM is the same and has a value supported on the pre-upgrade software release. If the standby CPM happened to have a system profile which is only supported in the post-upgrade release, the active CPM will reboot the standby and keep it down due to a system profile mis-match.

The BOF system profile can be displayed as follows:

```
*A:PE-1# show bof | match system-profile
    system-profile profile-a
*A:PE-1#
```

The BOF system profile used by the system when it booted can be seen in the boot messages (using the **show boot-messages** command), which display the BOF read when rebooting.

The system profile in use on the system can be displayed as follows:

```
*A:PE-1# show chassis | match "System Profile"
  System Profile                   : none
*A:PE-1#
```

4.2   Initial System Startup Process Flow

Figure 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
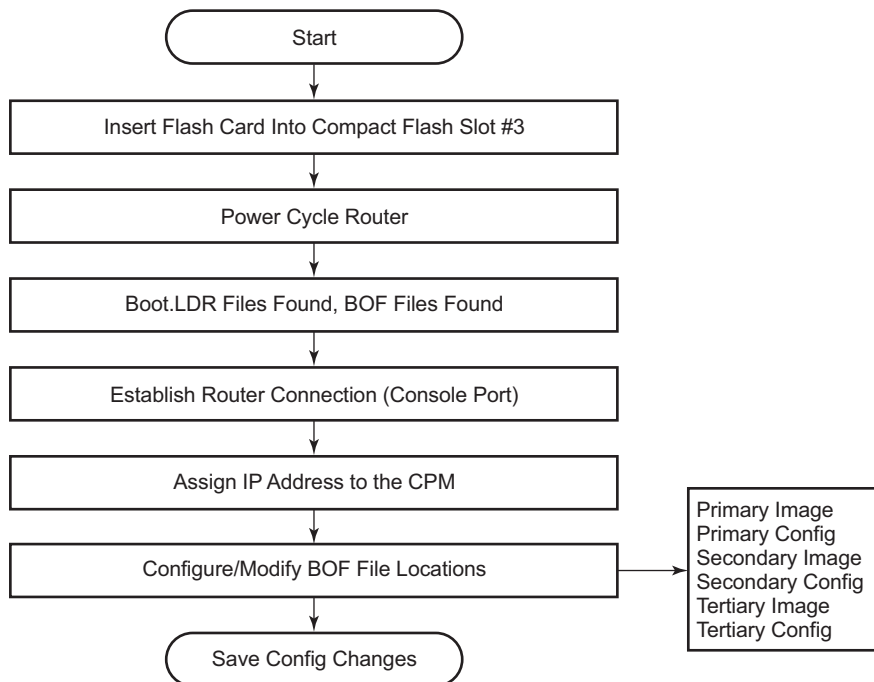
7750_SR_Basics_10

4.3   Configuration Notes

This section describes BOF configuration caveats.

- For router initialization, the compact flash card must be installed in the Compact Flash #3 slot.
- The loading sequence is based on the order in which it is placed in the configuration file. It is loaded as it is read in at boot time.

4.4   Configuring Boot Options File with CLI

This section provides information to configure BOF parameters with CLI.

4.4.1   BOF Configuration Overview

Nokia routers do not contain a boot EEPROM. The boot loader code is loaded from the boot.ldr file. The BOF file performs the following tasks:

Step 1.   Sets up the CPM/CCM Ethernet port (speed, duplex, auto).

Step 2.   Assigns the IP address for the CPM/CCM Ethernet port.

Step 3.   Creates static routes for the CPM/CCM Ethernet port.

Step 4.   Sets the console port speed.

Step 5.   Configures the Domain Name System (DNS) name and DNS servers.

Step 6.   Configures the primary, secondary, tertiary configuration source.

Step 7.   Configures the primary, secondary, and tertiary image source.

Step 8.   Configures operational parameters.

4.4.2   Basic BOF Configuration

The parameters which specify location of the image filename that the router will try to boot from and the configuration file are in the BOF.

The most basic BOF configuration should have the following:

- Primary address
- Primary image location
- Primary configuration location

The following is a sample of a basic BOF configuration.

```
A:SR-45# show bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image  cf3:/4.0.R20
    primary-config cf3:/ospf_default.cfg
    address 192.168.189.53/24 active
    static-route     192.168.0.0/16 next-hop 192.168.189.1
    static-route     172.16.0.0/8 next-hop 192.168.189.1
```

```
        autonegotiate
        duplexfull
        speed100
        wait3
        persiston
        console-speed     115200
===============================================================================
A:SR-45#
```

4.4.3 Common Configuration Tasks

The following sections are basic system tasks that must be performed.

For details about hardware installation and initial router connections, refer to the specific router hardware installation guide.

4.4.3.1 Searching for the BOF

The BOF should be on the same drive as the boot loader file. If the system cannot load or cannot find the BOF then the system checks whether the boot sequence was manually interrupted. The system prompts for a different image and configuration location.

The following example shows an example of the output when the boot sequence is interrupted.

```
...

Hit a key within 3 seconds to change boot params...

You must supply some required Boot Options. At any prompt, you can type:
    "restart" - restart the query mode.
    "reboot"  - reboot.
    "exit"    - boot with existing values.

Press ENTER to begin, or 'flash' to enter firmware update...

Software Location
-----------------
    You must enter the URL of the TiMOS software.
    The location can be on a Compact Flash device,
    or on the network.

    Here are some examples
        cf3:/timos1.0R1
        ftp://user:passwd@192.168.xx.xxx/./timos1.0R1
        tftp://192.168.xx.xxx/./timos1.0R1
```

```
The existing Image URL is 'ftp://vxworks:vxw0rks@192.168.10.20/./rel/0.0/xx'
Press ENTER to keep it.
Software Image URL:
Using: 'ftp://vxworks:vxw0rks@192.168.10.20/./rel/0.0/xx'

Configuration File Location
---------------------------
   You must enter the location of configuration
   file to be used by TiMOS.  The file can be on
   a Compact Flash device, or on the network.

   Here are some examples
      cf1:/config.cfg
      ftp://user:passwd@192.168.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' for no  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


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 if none 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
```

4.4.3.2 Accessing the CLI

To access the CLI to configure the software for the first time, follow these steps:

- When the CPM/CFM/CCM is installed, and power to the chassis is turned on, the SR OS software automatically begins the boot sequence.
- When the boot loader and BOF image and configuration files are successfully located, establish a router connection (console session).

4.4.3.2.1 Console Connection

To establish a console connection, you will need the following:

- An ASCII terminal or a PC running terminal emulation software set to the parameters shown in the table below.
- A standard serial cable with a male DB9.

Table 29 lists the console configuration parameter values.

Table 29   **Console Configuration Parameter Values**

Parameter	Value
Baud Rate	115,200
Data Bits	8

Table 29   **Console Configuration Parameter Values (Continued)**

Parameter	Value
Parity	None
Stop Bits	1
Flow Control	None

To establish a console connection:

Step 1. Connect the terminal to the Console port on the CPM/CFM/CCM using the serial cable.

Step 2. Power on the terminal.

Step 3. Establish the connection by pressing the <Enter> key a few times on your terminal keyboard.

Step 4. At the router prompt, enter the login and password.

The default login is admin.

The default password is admin.

4.4.4   Configuring BOF Parameters

The following example shows a BOF configuration on a 7750 SR:

```
A:ALA-1>bof# show bof
===============================================================
Memory BOF
===============================================================
no autonegotiate
duplex     full
speed     100
address    10.10.xx.xx/20 active
wait    3
primary-image cf3:\both.tim
primary-config cf3:\test123.cfg
primary-dns 192.168.xx.xx
persist     on
dns-domain test.nokia.com
===============================================================
A:ALA-1>bof#
```

4.5 Service Management Tasks

This section discusses service management tasks related to the BOF.

4.5.1 System Administration Commands

Use the following administrative commands to perform management tasks.

CLI Syntax:
```
A:ALA-1# admin
display-config
reboot [active | standby | upgrade] [hold] [now]
save [file-url] [detail] [index]
```

4.5.1.1 Viewing the Current Configuration

Use one of the following CLI commands to display the current configuration. The **detail** option displays all default values. The **index** option displays only the persistent indices. The info command displays context-level information.

CLI Syntax:
```
admin# display-config [detail | index]
        info detail
```

The following example shows a configuration file for the 7750 SR:

```
A:7750-3>admin# display-config
# TiMOS B-1.0.Ixxx - Copyright (c) 2000-2016 Nokia
# Built on Tues Jan 21 21:39:07 2007 by builder in /rel1.0/xx/panos/main

# Generated WED Jan 31 06:15:29 2007 UTC

exit all
configure
#-------------------------------------------------
echo "System Configuration"
#-------------------------------------------------
system
        name "7750-3"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        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#
```

4.5.1.2 Modifying and Saving a Configuration

If you modify a configuration file, the changes remain in effect only during the current power cycle unless a save command is executed. Changes are lost if the system is powered down or the router is rebooted without saving.

- Specify the file URL location to save the running configuration. If a destination is not specified, the files are saved to the location where the files were found for that boot sequence. The same configuration can be saved with different file names to the same location or to different locations.
- The **detail** option adds the default parameters to the saved configuration.
- The **index** option forces a save of the index file.
- Changing the active and standby addresses without reboot standby CPM may cause a boot-env sync to fail.

The following command saves a configuration:

CLI Syntax: bof# save [*cflash-id*]

Example: A:ALA-1# bof
              A:ALA-1>bof# save cf3:
              A:ALA-1>bof#

The following command saves the system configuration:

CLI Syntax: `admin# save [`*`file-url`*`] [detail] [index]`

Example: `A:ALA-1# admin save cf3:\test123.cfg`
`               Saving config.# Saved to cf3:\test123.cfg`
`               ... complete`
`               A:ALA-1#`

> **Note:** If the persist option is enabled and the **admin save** *file-url* command is executed with
> an FTP path used as the *file-url* parameter, two FTP sessions simultaneously open to the
> FTP server. The FTP server must be configured to allow multiple sessions from the same
> login, otherwise, the configuration and index files will not be saved correctly.

4.5.1.3   Deleting Bof Parameters

You can delete specific BOF parameters. The **no** form of these commands removes
the parameter from configuration. The changes remain in effect only during the
current power cycle unless a save command is executed. Changes are lost if the
system is powered down or the router is rebooted without saving.

Deleting a BOF address entry is not allowed from a Telnet session.

Use the following CLI syntax to save and remove BOF configuration parameters:

CLI Syntax: `bof# save [`*`cflash-id`*`]`

Example: `A:ALA-1# bof`
`               A:ALA-1>bof# save cf3:`
`               A:ALA-1>bof#`

CLI Syntax: `bof#`
`               no address `*`ip-address/mask`*` [active | standby]`
`               no autonegotiate`
`               no console-speed`
`               no dns-domain`
`               no li-local-save`
`               no li-separate`
`               no primary-config`
`               no primary-dns`
`               no primary-image`
`               no secondary-config`
`               no secondary-dns`
`               no secondary-image`

```
no static-route ip-address/mask next-hop ip-address
no system-profile
no tertiary-config
no tertiary-dns
no tertiary-image
```

4.5.1.4   Saving a Configuration to a Different Filename

Save the current configuration with a unique filename to have additional backup copies and to edit parameters with a text editor. You can save your current configuration to an ASCII file.

Use the following CLI syntax to save a configuration to a different location:

CLI Syntax: `admin# save [file-url] [detail] [index]`

Example:
```
A:ALA-1>admin# save cf3:\testABC.cfg
Saving config.# Saved to cf3:\testABC.cfg
... complete
A:ALA-1#
```

4.5.1.5   Rebooting

When an **admin>reboot** command is issued, routers with redundant CPM are rebooted as well as the XMAs, XCMs, and IOMs. Changes are lost unless the configuration is saved. Use the **admin>save** *file-url* command to save the current configuration. If no command line options are specified, the user is prompted to confirm the reboot operation.

Use the following CLI syntax to reboot:

CLI Syntax: `admin# reboot [active | standby | upgrade] [hold] [now]`

Example:
```
A:ALA-1>admin# reboot
A:DutA>admin# reboot
Are you sure you want to reboot (y/n)? y
Resetting...OK
Alcatel 7xxx Boot ROM. Copyright 2000-2007 Alcatel-
 Lucent.
All rights reserved. All use is subject to applicable
 license agreements.....
```

4.6   BOF Configuration Command Reference

4.6.1   Command Hierarchies

4.6.1.1   Configuration Commands

bof
- — [**no**] **address** *ip-prefix/ip-prefix-length* [**active** | **standby**]
- — [**no**] **autonegotiate**
- — **console-speed** *baud-rate*
- — **no console-speed**
- — **dns-domain** *dns-name*
- — **no dns-domain**
- — **duplex** {**full** | **half**}
- — [**no**] **ess-system-type**
- — [**no**] **fips-140-2**
- — [**no**] **li-local-save**
- — [**no**] **li-separate**
- — **persist** {**on** | **off**}
- — **primary-config** *file-url*
- — **no primary-config**
- — **primary-dns** *ip-address*
- — **no primary-dns** [*ip-address*]
- — **primary-image** *file-url*
- — **no primary-image**
- — **save** [*cflash-id*]
- — **secondary-config** *file-url*
- — **no secondary-config**
- — **secondary-dns** *ip-address*
- — **no secondary-dns** [*ip-address*]
- — **secondary-image** *file-url*
- — **no secondary-image**
- — **speed** *speed*
- — [**no**] **static-route** *ip-prefix/ip-prefix-length* **next-hop** *ip-address*
- — **system-base-mac** *mac-address*
- — **no system-base-mac**
- — **system-profile** {**profile-a** | **profile-b**}
- — **no system-profile**
- — **tertiary-config** *file-url*
- — **no tertiary-config**
- — **tertiary-dns** *ip-address*
- — **no tertiary-dns** [*ip-address*]
- — **tertiary-image** *file-url*
- — **no tertiary-image**
- — **wait** *seconds*

4.6.2   Command Descriptions

4.6.2.1   File Management Commands

bof

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.

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 slot A whether it is active or standby
- **bof save cf3-B:** — saves the BOF to cf3: on CPM 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* — Specifies 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:

4.6.2.2   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   wait 3

Parameters   *seconds* — Specifies the time to pause at the start of the boot process, in seconds.

        Values   1 to10

4.6.2.3   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   console-speed 115200

Parameters   *baud-rate* — Specifies the console port baud rate, expressed as a decimal integer.

        Values   9600, 19200, 38400, 57600, 115200

4.6.2.4   Image and Configuration Management

persist

Syntax   **persist** {**on** | **off**}

Context   bof

Description This command specifies whether the system will preserve system indexes when a **save** command is executed. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index, LSP IDs, path IDs, 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.

> **Note:**
> - Persistency files (.ndx) are saved on the same disk as the configuration files and the image files.
> - When an operator sets the location for the persistency file, the system will check to ensure that the disk has enough free space. If this there is not enough free space, the persistency will not become active and a trap will be generated. Then, it is up to the operator to free adequate disk space. In the meantime, the system will perform a space availability check every 30 seconds. As soon as the space is available the persistency will become active on the next (30 second) check.

Default   persist off

Parameters   **on** — Enables the system index saves between reboots.

off — Disables the system index saves between reboots.

primary-config

Syntax   **primary-config** *file-url*
no primary-config

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**.

If an error in the configuration file is encountered, the boot process aborts.

The **no** form of the command removes the **primary-config** configuration.

Parameters   *file-url* — Specifies the primary configuration file location, expressed as a file URL.

Values

file-url   {*local-url* | *remote-url*} (up to 180 characters)

local-url	[*cflash-id*/][*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.

Parameters *file-url* — Specifies 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:	

system-base-mac

Syntax **system-base-mac** *mac-address*
no system-base-mac

Context bof

Description This command is used to specify the base MAC address for a VSR-based system. The specified MAC address is used as the first MAC address by the system to assign MAC addresses to individual interfaces.

It is strongly recommended that a unique base MAC address is assigned to each VSR instance with a minimum gap of 1024 between base addresses to avoid a MAC address overlap.

The **no** form of this command removes the configured system base MAC address.

Default	no system-base-mac
Parameters	*mac-address* — Specifies the MAC address.

> **Values**   xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx

system-profile

Syntax	**system-profile {profile-a** | **profile-b}** **no system-profile**
Context	bof
Description	This command configures the system profile in the BOF.

System profile none represents the existing system capabilities and allows FP3- and FP4-based hardware to co-exist within a system. This is indicated by the omission of the **system-profile** parameter in the BOF, except on 7750 SR-1 systems.

System profile **profile-a** is primarily targeted at subscriber services and layer 2 and 3 VPN business services.

System profile **profile-b** is primarily targeted at infrastructure routing, core, peering, and DC-GW applications.

System profile **profile-a** and **profile-b** are supported on 7950 XRS-20/20e, 7750 SR-1 and 7750 SR-12e systems, and support only FP4-based line cards.

The system profile on 7750 SR-1 systems should be set to **profile-a**. It is set by default to **profile-a** when the **system-profile** parameter is omitted from the BOF, or configured to an invalid value.

On 7950 XRS-20/20e and 7750 SR-12e systems, default system profile is none.

On all other systems, the **system-profile** parameter must not be configured in the BOF which sets the system profile to none.

The **no** version of this command removes the **system-profile** parameter from the BOF.

Default	none
Parameters	**profile-a** — This system profile is for subscriber services and Layer 2 and 3 VPN business services.
	profile-b — This system profile is primarily targeted at infrastructure routing, core, peering, and DC-GW applications.

secondary-config

Syntax	**secondary-config** *file-url*
	no secondary-config
Context	bof
Description	This command specifies the name and location of the secondary configuration file.

The system attempts to use the configuration as specified in **secondary-config** if the primary config cannot be located. If the **secondary-config** file cannot be located, the system attempts to obtain the configuration from the location specified in the **tertiary-config**.

Note that if an error in the configuration file is encountered, the boot process aborts.

The **no** form of the command removes the **secondary-config** configuration.

Parameters   *file-url* — Specifies 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.

Parameters   *file-url* — Specifies 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.

Parameters   *file-url* — Specifies the tertiary 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: |

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.

Parameters   *file-url* — Specifies 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:

4.6.2.5 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.

Parameters   *ip-prefix/ip-prefix-length* — Specifies 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 to 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 to FFFF]H
                d: [0 to 255]D
    ipv6-prefix-length   0 to128

    ➡ **Note:** IPv6 is applicable to the 7750 SR and 7950 XRS only.

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**
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.

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). If the port is configured to autonegotiate this parameter will be ignored.
Parameters	**full** — Sets the link to full duplex mode.
	half — Sets the link to half duplex mode.

ess-system-type

Syntax	[**no**] **ess-system-type**
Context	bof
Description	This command allows a new RoHS compliant 7750 SR-12 or 7750 SR-7 chassis to operate as an 7450 ESS-12 or 7450 ESS-7 system.

After entering this command, the system must be rebooted for the change to take effect.

If the RoHS compliant 7750 SR-12 or 7750 SR-7 chassis is operating as an 7450 ESS system, it can operate with either the 7750 SR or 7450 ESS CPM (subject to SR OS support) but both should always be the same type.

In addition, the system can operate with supported 7450 ESS IOMs, MDAs, and IMMs with Layer 2 VPN service licenses. In this mode only 7450 ESS functionality is supported.

The system can also operate in mixed-mode, in which case a mixture of 7750 SR and 7450 ESS IOMs, MDAs, and IMMs are supported, as well as 7450 ESS and 7750 SR functionality. This is subject to all existing requirements and limitations for the mixed-mode feature.

The **no** version of this command disables this mode of operation and returns the system to a 7750 SR chassis type operation on the next reboot.

Default   no ess-system-type

fips-140-2

Syntax   [**no**] **fips-140-2**

Context   bof

Description   This command is used to configure the node in FIPS-140-2 mode. Before using this command, the operator must ensure that no current configuration exists in the config file that is not supported in FIPS-140-2 mode. Failing to remove unsupported configuration will result in the node being unable to boot up. The node must be rebooted after executing this command in order for the node to begin operating in FIPS-140-2 mode.

li-local-save

Syntax   [**no**] **li-local-save**

Context   bof

Description   This command enables the lawful intercept (LI) configuration to be saved locally.

li-separate

Syntax   [**no**] **li-separate**

Context   bof

Description   This command enables separate access to lawful intercept (LI) information.

speed

Syntax   **speed** *speed*

Context	bof
Description	This command configures the speed for the CPM management Ethernet port when autonegotiation is disabled in the running configuration and the Boot Option File (BOF).
	If the port is configured to autonegotiate, this parameter is ignored.
Default	speed 100
Parameters	*speed* — Sets the link speed, in Mb/s.
	Values 10, 100

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 static-route
Parameters	*ip-prefix/ip-prefix-length* — Specifies the destination address of the static route in dotted decimal notation.

Values

ip-prefix/ip-prefix-length	ipv4-prefix	a.b.c.d (host bits must be 0)
	ipv4-prefix-le	0 to32
	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 to FFFF]H
		d: [0to 255]D
	ipv6-prefix-le	0 to128
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 to FFFF]H

d: [0 to 255]D

➡️ **Note:** IPv6 is applicable to the 7750 SR and 7950 XRS only.

mask — Specifies the subnet mask, expressed as an integer or in dotted decimal notation.

Values   1 to32 (mask length), 128.0.0.0 to255.255.255.255 (dotted decimal)

ip-address — Specifies the next hop IP address used to reach the destination.

4.6.2.6   DNS Configuration Commands

dns-domain

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
Parameters	*dns-name* — Specifies the DNS domain name up to 178 characters.

primary-dns

Syntax	**primary-dns** *ip-address*
	no primary-dns [*ip-address*]
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

Parameters   *ip-address* — Specifies the IP or 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 to FFFF]H |
> | | d: [0 to 255]D |
> | interface | 32 chars max, for link local addresses |

➡️   **Note:** IPv6 is applicable to the 7750 SR and 7950 XRS only.

secondary-dns

Syntax   **secondary-dns** *ip-address*
no secondary-dns [*ip-address*]

Context   bof

Description   This command configures the secondary DNS server for DNS name resolution. The secondary DNS server is used only if the primary DNS server does not respond.

DNS name resolution can be used when executing ping, traceroute, and service-ping, and also when defining file URLs. DNS name resolution is not supported when DNS names are embedded in configuration files.

The **no** form of the command removes the secondary DNS server from the configuration.

Default   no secondary-dns

Parameters   *ip-address* — Specifies the IP or IPv6 address of the secondary DNS server.

> **Values**
>
> | | |
> |---|---|
> | ipv4-address | *a.b.c.d* |
> | ipv6-address | *x:x:x:x:x:x:x:x*[-interface] |
> | | *x:x:x:x:x:x:d.d.d.d*[-interface] |
> | | *x*: [0 to FFFF]H |
> | | *d:* [0 to 255]D |
> | interface | 32 chars max, for link local addresses |

➡ **Note:** IPv6 is applicable to the 7750 SR and 7950 XRS only.

tertiary-dns

Syntax **tertiary-dns** *ip-address*
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

Parameters *ip-address* — Specifies 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 to FFFF]H
	d: [0 to 255]D
interface	32 chars max, for link local addresses

➡ **Note:** IPv6 is applicable to the 7750 SR and 7950 XRS only.

4.7 BOF Show Command Reference

4.7.1 Command Hierarchies

show
— **bof** [*cflash-id* | **booted**]
— **boot-messages**

4.7.2 Command Descriptions

4.7.2.1 BOF Show Commands

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

bof

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* — Displays 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	The following output is an example of BOF, and Table 30 describes the output fields.

Sample Output

```
A:ALA-1# show bof cf3:
===============================================================
BOF on cf3:
===============================================================
```

```
autonegotiate
primary-image    ftp://test:test@192.168.xx.xx/./both.tim
primary-config   ftp://test:test@192.168.xx.xx/./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#
```

Table 30   **Show BOF Output Fields**

Label	Description
primary-image	The primary location of the directory that contains the runtime images of both CPM and XCM/IOM.
primary-config	The primary location of the file that contains the configuration.
primary-dns	The primary DNS server for resolution of host names to IP addresses.
secondary-image	The secondary location of the directory that contains the runtime images of both CPM and XCM/IOM.
secondary-config	The secondary location of the file that contains the configuration.

Table 30   **Show BOF Output Fields (Continued)**

Label	Description
secondary-dns	The secondary DNS server for resolution of host names to IP addresses.
tertiary-image	The tertiary location of the directory that contains the runtime images of both CPM and XCM/IOM.
tertiary-config	The tertiary location of the file that contains the configuration.
address	The IP address and mask associated with the CPM Ethernet port or the secondary CPM port.
tertiary-dns	The tertiary DNS server for resolution of host names to IP addresses.
persist	on — Persistent indexes between system reboots is enabled. off — Persistent indexes between system reboots is disabled.
wait	The time configured for the boot to pause while waiting for console input.
autonegotiate	no autonegotiate — Autonegotiate not enabled. autonegotiate — Autonegotiate is enabled.
duplex	half — Specifies that the system uses half duplex. full — Specifies that the system uses full duplex.
speed	The speed of the CPM Ethernet interface.
console speed	The console port baud rate.
dns domain	The domain name used when performing DNS address resolution.
uplinkA-address	Displays the Uplink-A IP address.
uplinkA-port	Displays the primary port to be used for auto-boot.
uplinkA-route	Displays the static route associated with Uplink-A.
uplinkA-vlan	Displays the VLAN ID to be used on Uplink-A.
uplinkB-address	Displays the Uplink-B IP address.
uplinkB-port	Displays the secondary port to be used for auto-boot.
uplinkB-route	Displays the static route associated with Uplink-B.
uplinkB-vlan	Displays the VLAN ID to be used on Uplink-B.
uplink-mode	Displays the uplink mode of the device.
no-service-ports	Displays the ports on which service traffic is not processed.

Table 30   **Show BOF Output Fields (Continued)**

Label	Description
use-expansion-card-type	Displays the expansion card type.
system-profile	The system profile used by the system when it is rebooted.

boot-messages

Syntax   **boot-messages**

Context   show

Description   This command displays boot messages generated during the last system boot.

Output   The following output is an example of boot-messages.

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-14.0.B1-217 boot/i386 Nokia 7750 SR Copyright (c) 2000-2016 Nokia.
```

```
                                                       All rights reserved. All use subject to applicable license agreements.
                                                       Built on Wed Jul 13 19:08:56 PDT 2016 by builder in /rel14.0/b1/B1-217/panos/main

                                                       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-L-14.0.B1-217 boot/i386 Nokia 7750 SR Copyright (c) 2000-2016 Nokia.
                                                       All rights reserved. All use subject to applicable license agreements.
                                                       Built on Wed Jul 13 19:08:56 PDT 2016 by builder in /rel14.0/b1/B1-217/panos/main
```
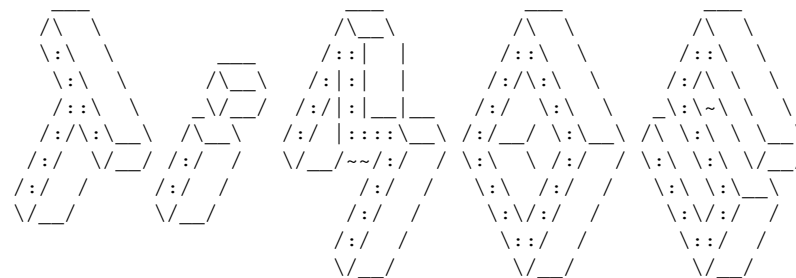
```
   ___                    ___               ___               ___
  /\  \                  /\__\             /\  \             /\  \
  \:\  \          ___   /::|  |           /::\  \           /::\  \
   \:\  \        /\__\ /:|:|  |          /:/\:\  \         /:/\ \  \
   /::\  \      _\/__/ /:/|:|__|__      /:/  \:\  \      _\:\~\ \  \
  /:/\:\__\    /\__\  /:/ |:::::\__\  /:/__/ \:\__\   /\ \:\ \ \__\
 /:/  \/__/   /:/  /  \/__/~~/:/  /   \:\  \ /:/  /   \:\ \:\ \/__/
/:/  /       /:/  /        /:/  /      \:\  /:/  /     \:\ \:\__\
\/__/        \/__/        /:/  /        \:\/:/  /       \:\/:/  /
                         /:/  /          \::/  /         \::/  /
                         \/__/            \/__/           \/__/
```

```
                                                       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#
```

5 System Management

5.1 System Management Parameters

System management commands allow you to configure basic system management functions such as the system name, the router's location and coordinates, and Common Language Location Identifier (CLLI) code as well as time zones, Network Time Protocol (NTP), Simple Network Time Protocol (SNTP) properties, CRON and synchronization properties.

On SR OS routers, it is possible to query the DNS server for IPv6 addresses. By default the DNS names are queried for A-records only (address-preference is IPv4-only). If the address-preference is set to IPv6 first, the DNS server will be queried for AAAA-records first, and if there is no successful reply, then A-records.

5.1.1 System Information

This section describes system information components.

5.1.1.1 System Name

The system name is the MIB II (RFC 1907, *Management Information Base for Version 2 of the Simple Network Management Protocol* (*SNMPv2*)) sysName object. By convention, this text string is the node's fully-qualified domain name. The system name can be any ASCII-printable text string of up to 32 characters.

5.1.1.2 System Contact

The system contact is the MIB II sysContact object. By convention, this text string is a textual identification of the contact person for this managed node, together with information on how to contact this person. The system contact can be any ASCII-printable text string of up to 80 characters.

5.1.1.3   System Location

The system location is the MIB II sysLocation object which is a text string conventionally used to describe the node's physical location, for example, "Bldg MV-11, 1st Floor, Room 101". The system location can be any ASCII-printable text string of up to 80 characters.

5.1.1.4   System Coordinates

The system coordinates is the Nokia Chassis MIB tmnxChassisCoordinates object. This text string indicates the Global Positioning System (GPS) coordinates of the location of the chassis.

Two-dimensional GPS positioning offers latitude and longitude information as a four dimensional vector:

<direction, hours, minutes, seconds>

where *direction* is one of the four basic values: N, S, W, E, *hours* ranges from 0 to 180 (for latitude) and 0 to 90 for longitude, and minutes and seconds range from 0 to 60.

<W, 122, 56, 89> is an example of longitude and <N, 85, 66, 43> is an example of latitude.

System coordinates can be expressed in different notations, examples include:

- N 45 58 23, W 34 56 12
- N37 37' 00 latitude, W122 22' 00 longitude
- N36*39.246', W121*40.121

The system coordinates can be any ASCII-printable text string up to 80 characters.

5.1.1.5   Naming Objects

Do not configure named objects with a name that starts with "_tmnx_", or with "_" in general.

5.1.1.6   Common Language Location Identifier

A CLLI code string for the device is an 11-character standardized geographic identifier that uniquely identifies the geographic location of places and certain functional categories of equipment unique to the telecommunications industry. The CLLI code is stored in the Nokia Chassis MIB tmnxChassisCLLICode object.

The CLLI code can be any ASCII-printable text string of up to 11 characters.

5.1.1.7   DNS Security Extensions

DNS Security (DNSSEC) Extensions are now implemented in the SR OS, allowing operators to configure DNS behavior of the router to evaluate whether the Authenticated Data bit was set in the response received from the recursive name server and to trust the response, or ignore it.

5.1.2   System Time

SR-series routers are equipped with a real-time system clock for time keeping purposes. When set, the system clock always operates on Coordinated Universal Time (UTC), but the SR-series routers OS software has options for local time translation as well as system clock synchronization.

5.1.2.1   Time Zones

Setting a time zone in SR OS allows for times to be displayed in the local time rather than in UTC. SR OS has both user-defined and system-defined time zones.

A user-defined time zone has a user-assigned name of up to four printable ASCII characters in length and is unique from the system-defined time zones. For user-defined time zones, the offset from UTC is configured as well as any summer time adjustment for the time zone.

SR OS includes multiple commands to control the presentation of times in either UTC or local time zone format. For a CLI session, the environment variable **time-display** may be set to indicate UTC or local time zone. This setting only affects time strings shown during that specific CLI session. In addition, a global setting of **config**>**system**>**time**>**prefer-local-time** can be used to control time strings for objects with larger scope that a single CLI session, including the following:

- log filenames and log header information
- times in rollback information
- times in rollback and configuration files header information
- times related to CRON scripts
- times in the event handler system

There is also a separate control per log file to control the format of the time strings on the event recorded into the logs (separate from the log filename and header information). Use the **config**>**log**>**log-id**>**time-format** command to set these time strings.

The SR OS system-defined time zones are listed in Table 31, which includes both time zones with and without summer time correction.

Table 31   **System-defined Time Zones**

Acronym	Time Zone Name	UTC Offset
Europe		
GMT	Greenwich Mean Time	UTC
BST	British Summer Time	UTC +1
IST	Irish Summer Time	UTC +1*
WET	Western Europe Time	UTC
WEST	Western Europe Summer Time	UTC +1
CET	Central Europe Time	UTC +1
CEST	Central Europe Summer Time	UTC +2
EET	Eastern Europe Time	UTC +2
EEST	Eastern Europe Summer Time	UTC +3
MSK	Moscow Time	UTC +3
MSD	Moscow Summer Time	UTC +4
US and Canada		
AST	Atlantic Standard Time	UTC -4
ADT	Atlantic Daylight Time	UTC -3
EST	Eastern Standard Time	UTC -5
EDT	Eastern Daylight Saving Time	UTC -4

Table 31   **System-defined Time Zones (Continued)**

Acronym	Time Zone Name	UTC Offset
ET	Eastern Time	Either as EST or EDT, depending on place and time of year
CST	Central Standard Time	UTC -6
CDT	Central Daylight Saving Time	UTC -5
CT	Central Time	Either as CST or CDT, depending on place and time of year
MST	Mountain Standard Time	UTC -7
MDT	Mountain Daylight Saving Time	UTC -6
MT	Mountain Time	Either as MST or MDT, depending on place and time of year
PST	Pacific Standard Time	UTC -8
PDT	Pacific Daylight Saving Time	UTC -7
PT	Pacific Time	Either as PST or PDT, depending on place and time of year
HST	Hawaiian Standard Time	UTC -10
AKST	Alaska Standard Time	UTC -9
AKDT	Alaska Standard Daylight Saving Time	UTC -8
Australia		
AWST	Western Standard Time (e.g., Perth)	UTC +8
ACST	Central Standard Time (e.g., Darwin)	UTC +9.5
AEST	Eastern Standard/Summer Time (e.g., Canberra)	UTC +10

5.1.2.2   Network Time Protocol (NTP)

NTP is the Network Time Protocol defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis* and RFC 5905, *Network Time Protocol Version 4: Protocol and Algorithms Specification*. It allows for the participating network nodes to keep time more accurately and more importantly they can maintain time in a more synchronized fashion between all participating network nodes.

NTP uses stratum levels to define the number of hops from a reference clock. The reference clock is considered to be a stratum-0 device that is assumed to be accurate with little or no delay. Stratum-0 servers cannot be used in a network. However, they can be directly connected to devices that operate as stratum-1 servers. A stratum-1 server is an NTP server with a directly-connected device that provides Coordinated Universal Time (UTC), such as a GPS or atomic clock.

The higher stratum levels are separated from the stratum-1 server over a network path, thus, a stratum-2 server receives its time over a network link from a stratum-1 server. A stratum-3 server receives its time over a network link from a stratum-2 server.

SR OS routers will normally operate as a stratum-2 or higher device. The router relies on an external stratum-1 server to source accurate time into the network. However, SR OS also allows for the use of the local PTP recovered time to be sourced into NTP. In this latter case, the local PTP source appears as a stratum-0 server and SR OS advertises itself as a stratum-1 server. Activation of the PTP source into NTP may impact the network NTP topology because the SR OS router will be promoted to stratum 1.

SR OS router runs a single NTP clock which then operates NTP message exchanges with external NTP clocks. Exchanges can be made with external NTP clients, servers, and peers. These exchanges can be through the base, management, or VPRN routing instances.

NTP operates associations between clocks as either client or server, symmetric active and symmetric passive, or broadcast modes. These modes of operation are applied according to which elements are configured on the router. To run server mode, the operator must enable NTP server mode for the base and each desired VPRN routing instance. To run client mode, the operator must configure external servers. If both the local router and remote router are configured with each other as peers, then the router will operate in symmetric active mode. If only one side of the association has peering configured, then the modes will be symmetric passive. To operate using broadcast mode, interfaces must be configured to transmit as broadcast servers or receive as broadcast clients.

NTP server operation for both unicast and broadcast communication within a VPRN is configured within the VPRN (see "NTP Within a VPRN Service" in the *Layer 3 Services Guide*).

The following NTP elements are supported:

• Server mode — In this mode, the node advertises the ability to act as a clock source for other network elements. The node will, by default, transmit NTP packets in NTP version 4 mode.

- Authentication keys — Authentication keys implement increased security support in carrier and other networks. Both DES and MD5 authentication are supported, as well as multiple keys.

- Operation in symmetric active mode — This capability requires that NTP be synchronized with a specific node that is considered more trustworthy or accurate than other nodes carrying NTP in the system. This mode requires that a specific peer is set.

- Server and peer addressing using IPv6 — Both external servers and external peers may be defined using IPv6 or IPv4 addresses. Other features (such as multicast, broadcast) use IPv4 addressing only.

- Broadcast or multicast modes — When operating in these modes, the node will receive or send using either a multicast (default 224.0.1.1) or a broadcast address. Multicast is supported only on the CPM MGMT port.

- Alert when NTP server is not available — When none of the configured servers are reachable on the node, the system reverts to manual timekeeping and issues a critical alarm. When a server becomes available, a trap is issued indicating that standard operation has resumed.

- NTP and SNTP — If both NTP and SNTP are enabled on the node, then SNTP transitions to an operationally down state. If NTP is removed from the configuration or shut down, then SNTP resumes an operationally up state.

- Gradual clock adjustment — As several applications (such as Service Assurance Agent (SAA)) can use the clock, and if determined that a major (128 ms or more) adjustment needs to be performed, the adjustment is performed by programmatically stepping the clock. If a minor (less than 128 ms) adjustment must be performed, then the adjustment is performed by either speeding up or slowing down the clock.

- In order to avoid the generation of too many events/trap the NTP module 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.

5.1.2.3 SNTP Time Synchronization

For synchronizing the system clock with outside time sources, the SR OS includes a Simple Network Time Protocol (SNTP) client. As defined in RFC 2030, SNTP Version 4 is an adaptation of the Network Time Protocol (NTP). SNTP typically provides time accuracy within 100 milliseconds of the time source. SNTP can only receive the time from NTP servers; it cannot be used to provide time services to other systems. SNTP is a compact, client-only version of NTP. SNTP does not authenticate traffic.

SNTP can be configured in both unicast client modes (point-to-point) and broadcast client modes (point-to-multipoint). SNTP should be used only at the extremities of the synchronization subnet. SNTP clients should operate only at the highest stratum (leaves) of the subnet and in configurations where no NTP or SNTP client is dependent on another SNTP client for synchronization. SNTP time servers should operate only at the root (stratum 1) of the subnet and then only in configurations where no other source of synchronization other than a reliable radio clock is available. External servers may only be specified using IPv4 addresses.

In the SR OS, the SNTP client can be configured for either broadcast or unicast client mode.

5.1.2.4 CRON

The CRON feature supports periodic and date and time-based scheduling in SR OS. CRON can be used, for example, to schedule Service Assurance Agent (SAA) functions. CRON functionality includes the ability to specify scripts that need to be run, when they will be scheduled, including one-time only functionality (one-shot), interval and calendar functions. Scheduled reboots, peer turn ups, service assurance agent tests and more can all be scheduled with CRON, as well as OAM events, such as connectivity checks, or troubleshooting runs.

CRON supports the schedule element. The schedule function configures the type of schedule to run, including one-time only (one-shot), periodic, or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute, and interval (seconds).

5.2   High Availability

This section discusses the high availability (HA) routing options and features available to service providers that help diminish vulnerability at the network or service provider edge and alleviate the effect of a lengthy outage on IP networks.

High availability is an important feature in service provider routing systems. High availability is gaining momentum due to the unprecedented growth of IP services and applications in service provider networks driven by the demand from the enterprise and residential communities. Downtime can be very costly, and, in addition to lost revenue, customer information and business-critical communications can be lost. High availability is the combination of continuous uptime over long periods (Mean Time Between Failures (MTBF)) and the speed at which failover or recovery occurs (Mean Time To Repair (MTTR)).

The popularity of high availability routing is evident at the network or service provider edge where thousands of connections are hosted and rerouting options around a failed piece of equipment can often be limiting. Or, a single access link exists to a customer because of additional costs for redundant links. As service providers converge business-critical services such as real-time voice (VoIP), video, and VPN applications over their IP networks, high availability becomes much more stringent compared to the requirements for best-effort data.   Network and service availability become critical aspects when offering advanced IP services which dictates that IP routers that are used to construct the foundations of these networks be resilient to component and software outages.

For high availability configuration information, see Synchronization and Redundancy.

5.2.1   HA Features

As more and more critical commercial applications move onto the IP/MPLS networks, providing high availability services becomes increasingly important. This section describes high availability features for routers. Most of these features only apply to routers with two Control Processor Modules (CPM), currently the 7750 SR-7, SR-12, SR-c12, and ESS-7 models.

5.2.1.1   Redundancy

The redundancy features enable the duplication of data elements and software functionality to maintain service continuation in case of outages or component failure.

Refer to the *7450 ESS, 7750 SR, and VSR Multiservice Integrated Service Adapter Guide* for information about redundancy for the Integrated Service Adapter (ISA).

5.2.1.1.1   Software Redundancy

Software outages are challenging even when baseline hardware redundancy is in place. There should be a balance to provide high availability routing otherwise router problems typically propagate not only throughout the service provider network, but also externally to other connected networks possibly belonging to other service providers. This could affect customers on a broad scale. Presently, there are several software availability features that contribute to the percentage of time that a router is available to process and forward traffic.

To fully appreciate high availability you should realize that all routing protocols specify minimum time intervals in which the peer device must receive an acknowledgment before it disconnects the session.

- OSPF default session timeout is approximately 40 seconds. The timeout intervals are configurable.
- BGP default session timeout is approximately 120 seconds. The timeout intervals are configurable for the 7750 SR and 7950 XRS only.

Therefore, router software has to recover faster than the specified time interval to maintain up time.

5.2.1.1.2   Configuration Redundancy

Features configured on the active device CPM are saved on the standby CPM as well. When the active device CPM fails, these features are brought up on the standby device CPM that takes over the mastership.

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. Nokia's newer generation service routers address this issue because they already have extra processing built into the system.

5.2.1.1.3   Component Redundancy

Component redundancy is critical to reduce MTTR for the system and primarily consists of the following router features:

- Dual route processor modules — For a highly available architecture, redundant Control Processor Modules (CPM) are essential. The route processing functions of the CPM calculate the most efficient route to an Internet destination and communicate the best path information to peer routers. Rapid information synchronization between the primary and secondary CPMs/CFMs is crucial to minimize recovery time.

- Switch fabric (SFM) redundancy — Failure of a single switch fabric card with little to no loss of traffic.

- Redundant line cards — LAG, ECMP and other techniques to spread traffic over multiple line cards so that a failure of one line card does not impact the services being delivered.

- Redundant power supply — A power module can be removed without impact on traffic.

- Redundant fan — Failure of a fan module without impacting traffic.

- Hot swap — Components in a live system can be replaced or become active without taking the system down or affecting traffic flow to/from other modules.

Router hardware architecture plays a key role in the availability of the system. The principle router architecture styles are centralized and distributed. In these architectures, both active and standby route processors, I/O modules (IOMs) (also called line cards), fans, and power supplies maintain a low MTTR for the routing system.

However, in a centralized architecture, packet processing and forwarding is performed in a central shared route processor and the individual line cards are relatively simple. The cards rely solely on the route processor for routing and forwarding intelligence and, should the centralized route processor fail, there is greater impact to the system overall, as all routing and packet forwarding 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.

5.2.1.1.4   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.

5.2.1.1.5   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.

5.2.1.2   Nonstop Forwarding

In a control plane failure or a forced switchover event, the router continues to forward packets using the existing stale forwarding information. Nonstop forwarding requires clean control plane and data plane separation. Usually the forwarding information is distributed to the IOMs, XCMs and XMAs.

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.

5.2.1.3   Nonstop Routing (NSR)

With NSR on the SR-series router devices, routing neighbors are unaware of a routing process fault. If a fault occurs, a reliable and deterministic activity switch to the inactive control complex occurs such that routing topology and reachability are not affected, even in the presence of routing updates. NSR achieves high availability through parallelization by maintaining up to date routing state information, at all times, on the standby route processor. This capability is achieved independently of protocols or protocol extensions, providing a more robust solution than graceful restart protocols between network routers.

The NSR implementation on the SR-series routers supports all routing protocols. NSR makes it possible to keep the existing sessions (BGP, LDP, OSPF, etc.) during a CPM switchover, including support for MPLS signaling protocols. Peers 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.

5.2.1.4 CPM Switchover

During a switchover, system control and routing protocol execution are transferred from the active to the standby CPM.

An automatic switchover may occur under the following conditions:

- A fault condition that causes the active CPM to crash or reboot.
- The active CPM is declared down (not responding).
- Online removal of the active CPM.

A manual switchover can occur under the following conditions:

- To force a switchover from an active CPM to a standby, use the admin redundancy force-switchover command. You can configure a batch file that executes after failover by using the **config system switchover-exec** CLI command.

5.2.1.5 Synchronization

Synchronization between the CPMs includes the following:

- Configuration and boot-env Synchronization
- State Database Synchronization

5.2.1.5.1 Configuration and boot-env Synchronization

Configuration and boot-env synchronization are supported in **admin>redundancy> synchronize** and **config>redundancy>synchronize** contexts.

5.2.1.5.2 State Database Synchronization

If a new standby CPM is inserted into the system, it synchronizes with the active CPM upon a successful boot process.

If the standby CPM is rebooted, it synchronizes with the active CPM upon a successful boot process.

When configuration or state changes occur, an incremental synchronization is conducted from the active CPM to the standby CPM.

If the synchronization fails, the standby does not reboot automatically. The **show redundancy synchronization** command displays synchronization output information.

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the **admin reboot standby** command on the active or the standby CPM.

5.3   Synchronization and Redundancy

SR-series routers supporting redundancy use a 1:1 redundancy scheme. Redundancy methods facilitate system synchronization between the active and standby Control Processor Modules (CPMs) so they maintain identical operational parameters to prevent inconsistencies in the event of a CPM failure.

When automatic system synchronization is enabled for an entity, any save or delete file operations configured on the primary, secondary or tertiary choices on the active CPM file system are mirrored in the standby CPM file system.

Although software configurations and images can be copied or downloaded from remote locations, synchronization can only occur locally between compact flash drives (cf1:, cf2:, and cf3:).

Synchronization can occur either:

- Automatically — Automatic synchronization is disabled by default. To enable automatic synchronization, the **config>redundancy>synchronization** command must be specified with either the **boot-env** parameter or the **config** parameter.

  When the **boot-env** parameter is specified, the BOF, boot.ldr, config, and image files are automatically synchronized. When the **config** parameter is specified, only the config files are automatically synchronized.

  Automatic synchronization also occurs whenever the BOF is modified and when an **admin>save** command is entered with no filename specified.

- Manually — To execute synchronization manually, the **admin>redundancy> synchronization** command must be entered with the **boot-env** parameter or the **config** parameter.

  When the **boot-env** parameter is specified, the BOF, boot.ldr, config, and image files are synchronized. When the **config** parameter is specified, only the config files are synchronized.

  The following shows the output displayed during a manual synchronization of configuration files.

```
A:ALA-12>admin>redundancy# synchronize config
Syncing configuration......

Syncing configuration.....Completed.
A:ALA-12#
```

5.3.1   Active and Standby Designations

Typically, the first Switch Fabric (SF)/CPM card installed in a redundant SR-series router chassis assumes the role as active, regardless of being inserted in Slot A or B. The next CPM installed in the same chassis then assumes the role as the standby CPM. If two CPM are inserted simultaneously (or almost simultaneously) and are booting at the same time, then preference is given to the CPM installed in Slot A.

If only one CPM is installed in a redundant router device, then it becomes the active CPM regardless of the slot it is installed in.

The active and standby designations can be visually determined by LEDs on the CPM/CFM/CCM faceplate. Refer to the appropriate platform *Installation* Guide for LED indicator details.

The following output shows that the CPM installed in Slot A is acting as the active CPM and the CPM installed in Slot B is acting as the standby.

The following is an example of the 7950 XRS output:

```
*A:7950 XRS-20# show card
===============================================================================
Card Summary
===============================================================================
Slot    Provisioned Type                          Admin Operational   Comments
           Equipped Type (if different)           State State
-------------------------------------------------------------------------------
1     xcm-x20                                     up    provisioned
A     cpm-x20                                     up    up/active
B     cpm-x20                                     up    up/standby
===============================================================================
```

The following console message displays when a CPM boots, sees an active CPM, and becomes the standby CPM:

```
...
Slot A contains the Active CPM
This CPM (Slot B) is the Standby CPM
```

5.3.2   When the Active CPM Goes Offline

When an active CPM goes offline (due to reboot, removal, or failure), the standby CPM takes control without rebooting or initializing itself. It is assumed that the CPMs are synchronized, therefore, there is no delay in operability. When the CPM that went offline boots and then comes back online, it becomes the standby CPM.

When the standby CPM comes online, the following output is shown:

```
Active CPM in Slot A has stopped
Slot B is now active CPM


Attempting to exec configuration file:
'cf3:/config.cfg' ...

...

Executed 49,588 lines in 8.0 seconds from file cf3:\config.cfg
```

5.3.3   OOB Management Ethernet Port Redundancy

The SR OS platform provides a resilient out-of-band (OOB) management Ethernet redundancy mode for system management.

When the management Ethernet port is down on the active CPM, the OOB Ethernet redundancy feature allows the active CPM to use the management Ethernet port of the standby CPM, as shown in Figure 11 and Figure 12.

OOB management Ethernet port redundancy is enabled using the **config>redundancy>mgmt-ethernet-redundancy** command.

Figure 11   **Management Ethernet: Normal Mode**
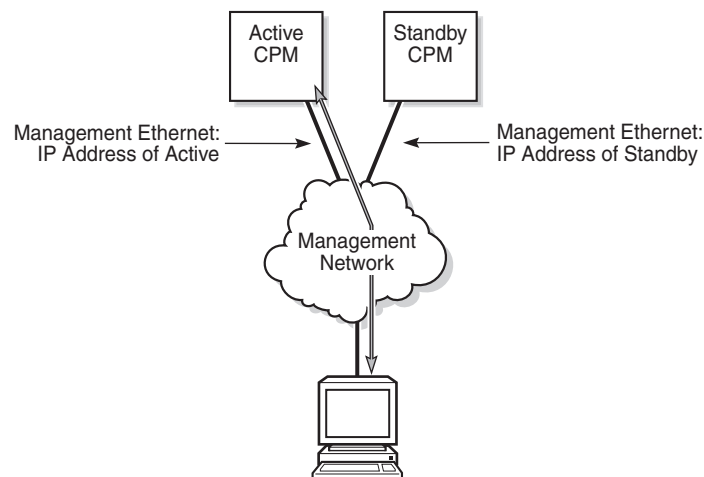
25169

Figure 12   **Management Ethernet: Redundancy Mode**
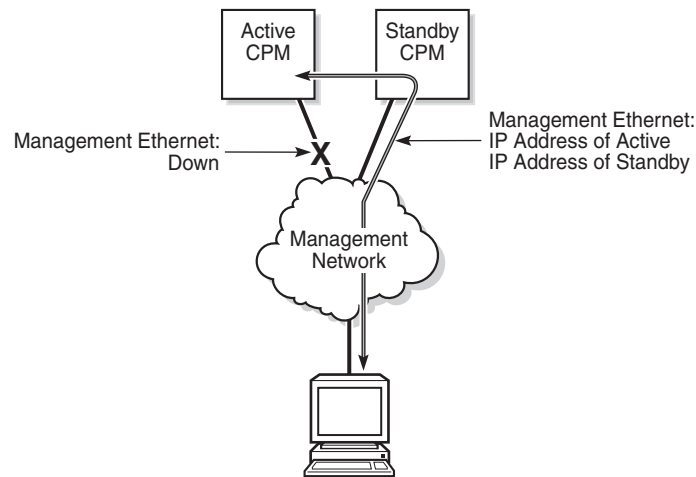
5.3.4 **Persistence**

The persistence feature on the 7750 SR allows information learned through DHCP snooping across reboots to be kept. This information can include data such as the IP address, MAC binding information, lease length information, and ingress sap information (required for VPLS snooping to identify the ingress interface). This information is referred to as the DHCP lease-state information.

When a DHCP message is snooped, there are steps that make the data persistent in a system with dual CPMs. In systems with only one CPM, only Step 1 applies. In systems with dual CPMs, all steps apply.

1. When a DHCP ACK is received from a DHCP server, the entry information is written to the active CPM Compact Flash. If writing was successful, the ACK is forwarded to the DHCP client. If persistency fails completely (bad cflash), a trap is generated indicating that persistency can no longer be guaranteed. If the complete persistency system fails the DHCP ACKs are still forwarded to the DHCP clients. Only during small persistency interruptions or in overload conditions of the Compact Flash, DHCP ACKs may get dropped and not forwarded to the DHCP clients.

2. DHCP message information is sent to the standby CPM and also there the DHCP information is logged on the Compact Flash. If persistency fails on the standby also, a trap is generated.

5.3.4.1 Dynamic Data Persistency (DDP) Access Optimization for DHCP Leases

A high rate of DHCP renewals can create a load on the compact flash file system when subscriber management and/or DHCP server persistence is enabled. To optimize the access to the Dynamic Data Persistency (DDP) files on the compact flash, a lease-time threshold can be specified that controls the eligibility of a DHCP lease for persistency updates when no other data other than the lease expiry time is to be updated.

```
configure
    system
        persistence
            subscriber-mgmt
                location cf2:
            exit
            dhcp-server
                location cf2:
            exit
            options
                dhcp-leasetime-threshold [days <days>] [hrs <hours>]
[min <minutes>] [sec <seconds>]
            exit
        exit
    exit
```

When the offered lease time of the DHCP lease is less than the configured threshold, the lease is flagged to skip persistency updates and will be installed with its full lease time upon a persistency recovery after a reboot.

The **dhcp-leasetime-threshold** command controls persistency updates for:

- DHCPv4 and DHCPv6 leases for a DHCP relay or proxy (enabled with **persistence subscriber-mgmt**)
- DHCPv4 leases for DHCP snooping in a VPLS service (enabled with **persistence subscriber-mgmt**)
- DHCPv4 and DHCPv6 leases for a DHCP server (enabled with **persistence dhcp-server**)

To check if a DHCP relay or proxy lease is flagged to skip persistency updates, use the **tools dump persistence submgt record** *record-key* CLI command. When flagged to skip persistency updates, the persistency record output will include "Skip Persistency Updates: true".

To check if a DHCP server lease is flagged to skip persistency updates, use the **tools dump persistence dhcp-server record** *record-key* CLI command. When flagged to skip persistency updates, the persistency record output will include "lease mode : LT" (LT = Lease Time) and a "lease time : …" field. When not flagged to skip persistency updates, the persistency record output will include "lease mode : ET" (ET = Expiry Time) and an "expires   : …" field.

5.4 Network Synchronization

This section describes network synchronization capabilities available on SR OS platforms. These capabilities involve multiple approaches to network timing; namely SDH/SONET, Synchronous Ethernet, BITS, and Adaptive clocking and a Precision Time Protocol (PTP) IEEE 1588v2. These features address barriers to entry by:

- Providing synchronization quality required by the mobile space; such as radio operations and circuit emulation services (CES) transport.
- Augmenting and potentially replacing the existing (SONET/SDH) timing infrastructure and delivering high quality network timing for time sensitive applications in the wireline space.

Network synchronization is commonly distributed in a hierarchical master-slave topology at the physical layer as shown in Figure 13.

Figure 13   **Conventional Network Timing Architecture (North American Nomenclature)**
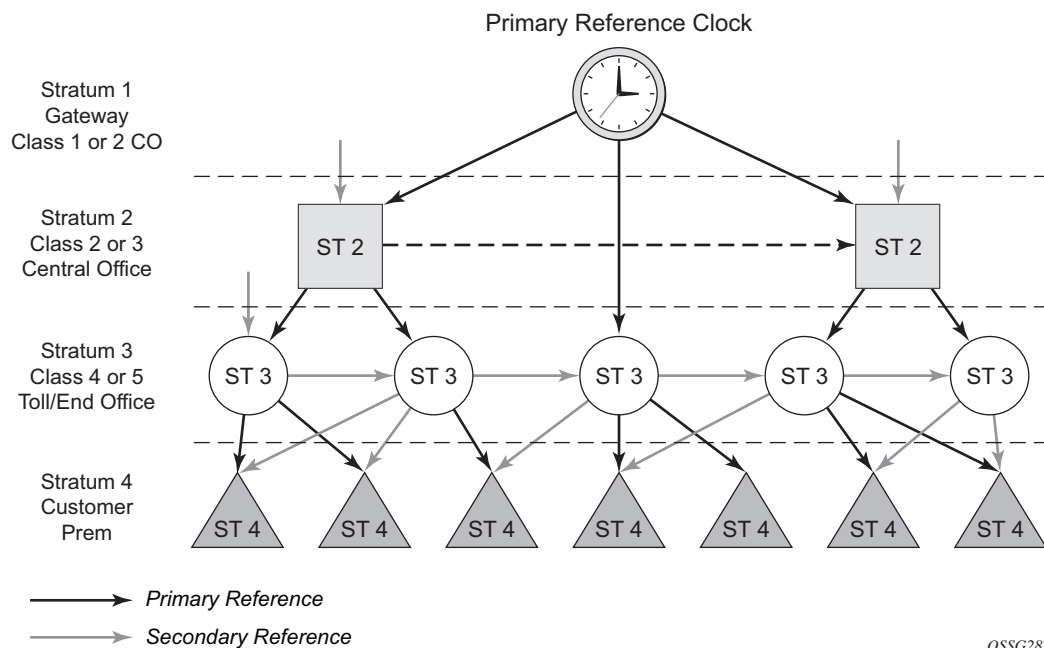
The architecture shown in Figure 13 provides the following benefits:

- 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 time-frame. A clock operating in this mode is said to hold the last known state over (or holdover) until the reference lock is once again achieved. Each level in the timing hierarchy is associated with minimum levels of network performance.

Each synchronization capable port can be independently configured to transmit data using the node reference timing or loop timing. In addition, some TDM channels can use adaptive timing.

Transmission of a reference clock through a chain of Ethernet equipment requires that all equipment supports Synchronous Ethernet. A single piece of equipment that is not capable of performing Synchronous Ethernet breaks the chain. Ethernet frames 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.

5.4.1   Central Synchronization Sub-System

The timing subsystem for the platforms has a central clock located on the CPM (motherboard). The timing subsystem performs many of the duties of the network element clock as defined by Telcordia (GR-1244-CORE) and ITU-T G.781.

The system can select from up to three (7950 XRS) or four (7450 ESS and 7750 SR) timing inputs to train the local oscillator. The priority order of these references must be specified. This is a simple ordered list of inputs: {bits, ref1, ref2, ptp}. The CPM clock output shall have the ability to drive the clocking for all line cards in the system. The routers support selection of the node reference using Quality Level (QL) indications. See Figure 14 for a description of the synchronization selection process for the CPM clock.

➡️   **Note:** Not all signals are available on all platforms.

Figure 14   **CPM Clock Synchronization Reference Selection**
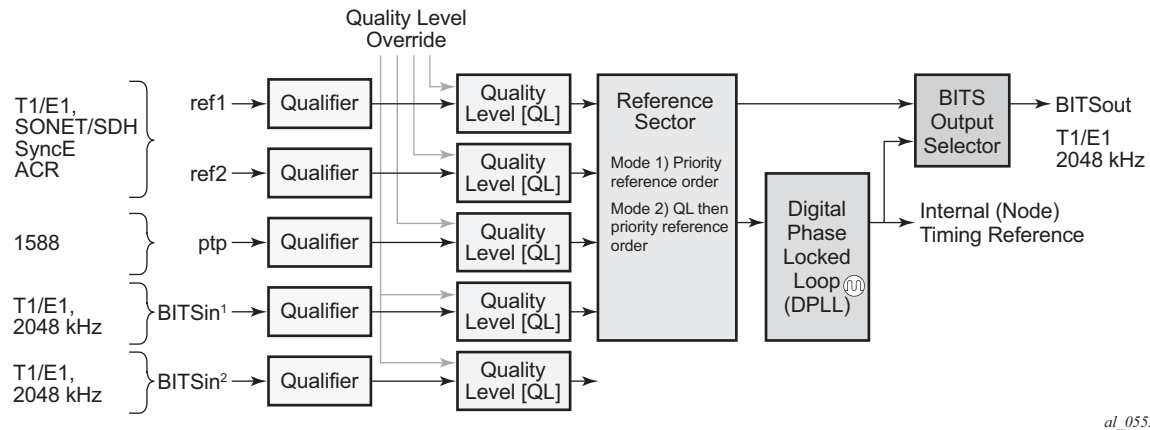
al_0553

The recovered clock will be able to derive its timing from any of the following:

- OC3/STM1, OC12/STM4, OC48/STM16, OC192/STM64 ports (7450 ESS and 7750 SR only)
- T1/E1 CES channel (adaptive clocking) (7750 SR only)
- Synchronous Ethernet ports
- T1/E1 port (7750 SR only)
- BITS port on a Channelized OC3/STM1 CES CMA (7750 SR-c12 only)
- BITS port on the CPM, CFM, or CCM module
- 10GE ports in WAN PHY mode
- IEEE 1588v2 slave port (PTP) (7450 ESS and 7750 SR only)

The BITS ports accept T1 or E1 signal formats. Some hardware also supports the 2048 kHz signal format. The format must be common between all BITSin and BITSout ports.

All settings of the signal characteristics for the BITS input apply to both ports. When the active CPM considers the BITS input as a possible reference, it will consider first the BITS input port on the active CPM or CCM followed by the BITS input port on the standby CPM or CCM in that relative priority order. This relative priority order is in addition to the user-definable **ref-order**. For example, a **ref-order** of **bits ref1 ref2** would actually be BITS in (active CPM or CCM), followed by BITS in (standby CPM or CPM), followed by ref1, followed by ref2. When **ql-selection** is enabled, the QL of each BITS input port is viewed independently. The higher QL source is chosen.

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, the QL of each BITS input port is viewed independently. The higher QL source is chosen.

The restrictions on the location for the source-port or source-bits for **ref1** and **ref2** are listed in Table 32.

Table 32   **Ref1 and Ref2 Timing References**

Platform	Ref1 Slots	Ref2 Slots	Notes
7450 ESS-7	1 to 2	3 to 5	—
7450 ESS-12	1 to 5	6 to 10	—
7750 SR-1	1	1	Ref1 and ref2 cannot be on the same MDA
7750 SR-1s	1	1	—
7750 SR-1e	1	1	Ref1 and ref2 cannot be on the same MDA
7750 SR-2e	1 to 2	1 to 2	Ref1 and ref2 cannot be on the same MDA
7750 SR-3e	1 to 3	1 to 3	Ref1 and ref2 cannot be on the same MDA
7750 SR-7	1 to 6	1 to 6	Ref1 and ref2 cannot be on the same slot. Slot 6 cannot be used if a CPM has been installed in that slot.
7750 SR-7s	1 to 6	1 to 6	Ref1 and ref2 cannot be on the same slot.
7750 SR-12	1 to 5	6 to 10	—
7750 SR-12e	1 to 5	6 to 9	—
7750 SR-14s	1 to 6	1 to 6	Ref1 and ref2 cannot be on the same slot.
7750 SR-a4	1	1	—

Table 32   **Ref1 and Ref2 Timing References (Continued)**

Platform	Ref1 Slots	Ref2 Slots	Notes
7750 SR-a8	1 to 2	1 to 2	Ref1 and ref2 cannot be on the same slot. Two CPMs must be installed to allow two references to be used.
7750 SR-c4	1	1	Ref1 and ref2 cannot be on the same MDA/CMA
7750 SR-c12	1	1	Ref1 and ref2 cannot be on the same MDA/CMA
7950 XRS-16c	1 to 8	1 to 8	Ref1 and ref2 cannot be on the same slot
7950 XRS-20	1 to 10	1 to 10	Ref1 and ref2 cannot be on the same slot
7950 XRS-20e	1 to 10	1 to 10	Ref1 and ref2 cannot be on the same slot
7950 XRS-40	1 to 10	1 to 10	Ref1 and ref2 cannot be on the same slot

The BITS output ports can be configured to provided either the unfiltered recovered line clock from a line card port or the output of the central clock. The first case would be used if the port was connected to deliver an input reference directly to dedicated timing device in the facility (BITS or SASE device). The second case would be used to test the quality of the clocking used by the router.

When QL selection mode is disabled, then the reversion setting controls when the central clock can re-select a previously failed reference.

The Table 33 shows the selection followed for two reference in both revertive and non-revertive modes:

Table 33   **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

Table 33   **Revertive, non-Revertive Timing Reference Switching Operation (Continued)**

Status of Reference A	Status of Reference B	Active Reference Non-revertive Case	Active Reference Revertive Case
OK	Failed	A	A
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

5.4.2   7950 XRS-40 Extension Chassis Central Clocks

The central clock architecture described above applies to each chassis of the 7950 XRS-40. There is a central clock located on each of the CPMs present in the extension chassis. However, there is no configuration for the central clocks on the CPMs of the extension chassis. The central clocks only use the BITS input ports of the extension chassis for their input reference. It is assumed that the quality of the reference provided into the BITS input ports of the extension chassis CPMs is equal to the quality of the Master chassis central clocks. Refer to the *Installation* Guide for appropriate physical cabling to support this architecture.

5.4.3   Synchronization Status Messages (SSM)

SSM provides a mechanism to allow the synchronization distribution network to both determine the quality level of the clock sourcing a given synchronization trail and to allow a network element to select the best of multiple input synchronization trails. Synchronization Status messages have been defined for various transport protocols including SONET/SDH, T1/E1, and Synchronous Ethernet, for interaction with office clocks, such as BITS or SSUs and embedded network element clocks.

SSM allows equipment to autonomously provision and reconfigure (by reference switching) their synchronization references, while helping to avoid the creation of timing loops. These messages are particularly useful to allow synchronization reconfigurations when timing is distributed in both directions around a ring.

The following sections provide details about the SSM message functionality for different signal types. These functions apply to all platforms that support the given signal type.

5.4.3.1 DS1 Signals

DS1 signals can carry an indication of the quality level of the source generating the timing information using the SSM transported within the 1544 Kbit/s signal's Extended Super Frame (ESF) Data Link (DL) as specified in Recommendation G.704. No such provision is extended to SF formatted DS1 signals.

The format of the data link messages in ESF frame format is "0xxx xxx0 1111 1111", transmitted rightmost bit first. The six bits denoted "xxx xxx" contain the actual message; some of these messages are reserved for synchronization messaging. It takes 32 frames (such as 4 ms) to transmit all 16 bits of a complete DL.

5.4.3.2 E1 Signals

E1 signals can carry an indication of the quality level of the source generating the timing information using the SSM as specified in Recommendation G.704.

One of the Sa4 to Sa8 bits, (the actual Sa bit is for operator selection), is allocated for Synchronization Status Messages. To prevent ambiguities in pattern recognition, it is necessary to align the first bit (San1) with frame 1 of a G.704 E1 multi-frame.

The numbering of the San (n = 4, 5, 6, 7, 8) bits. A San bit is organized as a 4-bit nibble San1 to San4. San1 is the most significant bit; San4 is the least significant bit.

The message set in San1 to San4 is a copy of the set defined in SDH bits 5 to 8 of byte S1.

5.4.3.3 SONET/SDH Signals

The SSM of SDH and SONET interfaces is carried in the S1 byte of the frame overhead. Each frame contains the four bit value of the QL.

5.4.3.4 DS3/E3

DS3/E3 signals are not required to be synchronous. However, it is acceptable for their clocking to be generated from a synchronization source. The 7750 SR and the 7450 ESS permit E3/DS3 physical ports to be specified as a central clock input reference.

DS3/E3 signals do not support an SSM channel. QL-override should be used for these ports if ql-selection is enabled

5.4.4 Synchronous Ethernet

Traditionally, Ethernet-based networks employ the physical layer transmitter clock to be derived from an inexpensive +/-100ppm crystal oscillator and the receiver locks onto it. There is no need for long term frequency stability because the data is packetized and can be buffered. For the same reason there is no need for consistency between the frequencies of different links. However, you can derive the physical layer transmitter clock from a high quality frequency reference by replacing the crystal with a frequency source traceable to a primary reference clock. This would not affect the operation of any of the Ethernet layers, for which this change would be transparent. The receiver at the far end of the link would lock onto the physical layer clock of the received signal, and thus itself gain access to a highly accurate and stable frequency reference. Then, in a manner analogous to conventional hierarchical master-slave network synchronization, this receiver could lock the transmission clock of its other ports to this frequency reference and a fully time synchronous network could be established.

The advantage of using Synchronous Ethernet, compared with methods that rely on sending timing information in packets over an 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, refer to ITU-T G.8264.

5.4.5 Clock Source Quality Level Definitions

The following clock source quality levels have been identified for the purpose of tracking network timing flow. These levels make up all of the defined network deployment options given in Recommendation G.803 and G.781. The Option I network is a network developed on the original European SDH model; whereas, the Option II network is a network developed on the North American SONET model.

In addition to the QL values received over SSM of an interface, the standards also define additional codes for internal use. These include the following:

- QL INVx is generated internally by the system if and when an unallocated SSM value is received, where x represents the binary value of this SSM. All of these independent values are assigned as the singled value of QL-INVALID.
- QL FAILED is generated internally by the system if and when the terminated network synchronization distribution trail is in the signal fail state.

There is also an internal quality level of QL-UNKNOWN. This is used to differentiate from a received QL-STU code but is equivalent for the purposes of QL selection.

Table 34 lists the synchronization message coding and source priorities for SSM received.

Table 34   **Synchronization Message Coding and Source Priorities — SSM Received**

SSM value received on port				
SDH interface SyncE interface in SDH mode	**SONET Interface SyncE interface in SONET mode**	**E1 interface**	**T1 interface (ESF)**	**Internal Relative Quality Level**
0010 (prc)	0001 (prs)	0010 (prc)	00000100 11111111 (prs)	1 - Best quality

Table 34   **Synchronization Message Coding and Source Priorities — SSM Received**

SSM value received on port				
SDH interface SyncE interface in SDH mode	**SONET Interface SyncE interface in SONET mode**	**E1 interface**	**T1 interface (ESF)**	**Internal Relative Quality Level**
	0000 (stu)		00001000 11111111 (stu)	2
	0111 (st2)		00001100 11111111 (ST2)	3
0100 (ssua)	0100 (tnc)	0100 (ssua)	01111000 11111111 (TNC)	4
	1101 (st3e)		01111100 11111111 (ST3E)	5
1000 (ssub)		1000 (ssub)		6
	1010 (st3/eec2)		00010000 11111111 (ST3)	7
1011 (sec/eec1)		1011 (sec)		8 - Lowest quality qualified in QL-enabled mode
	1100 (smc)		00100010 11111111 (smc)	9
			00101000 11111111 (st4)	10
	1110 (pno)		01000000 11111111 (pno)	11
1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)	12
Any other	Any other	Any other	N/A	13- QL_INVALID
				14- QL-FAILED
				15 - QL-UNC

Table 35 lists the synchronization message coding and source priorities for SSM transmitted.

Table 35   **Synchronization Message Coding and Source Priorities — SSM Transmitted**

SSM values to be transmitted by interface of type				
Internal Relative Quality Level	**SDH interface SyncE interface in SDH mode**	**SONET Interface SyncE interface in SONET mode**	**E1 interface**	**T1 interface (ESF)**
1 - Best quality	0010 (prc)	0001 (PRS)	0010 (prc)	00000100 11111111 (PRS)
2	0100 (ssua)	0000 (stu)	0100 (ssua)	00001000 11111111 (stu)

Table 35   **Synchronization Message Coding and Source Priorities — SSM Transmitted**

SSM values to be transmitted by interface of type				
Internal Relative Quality Level	**SDH interface SyncE interface in SDH mode**	**SONET Interface SyncE interface in SONET mode**	**E1 interface**	**T1 interface (ESF)**
3	0100 (ssua)	0111 (st2)	0100 (ssua)	00001100 11111111 (st2)
4	0100 (ssua)	0100 (tnc)	0100 (ssua)	01111000 11111111 (tnc)
5	1000 (ssub)	1101 (st3e)	1000 (ssub)	01111100 11111111 (st3e)
6	1000 (ssub)	1010 (st3/eec2)	1000 (ssub)	00010000 11111111 (st3)
7	1011 (sec/eec1)	1010 (st3/eec2)	1011 (sec)	00010000 11111111 (st3)
8 - Lowest quality qualified in QL-enabled mode	1011 (sec/ eec1)	1100 (smc)	1011 (sec)	00100010 11111111 (smc)
9	1111 (dnu)	1100 (smc)	1111 (dnu)	00100010 11111111 (smc)
10	1111 (dnu)	1111 (dus)	1111 dnu	00101000 11111111 (st4)
11	1111 (dnu)	1110 (pno)	1111 (dnu)	01000000 11111111 (pno)
12	1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)
13- QL_INVALID	1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)
14- QL-FAILED	1111 (dnu)	1111 (dus)	1111 (dnu)	00110000 11111111 (dus)
15 - QL-UNC	1011 (sec/eec1)	1010 (st3/eec2)	1011 (sec)	00010000 11111111 (st3)

➡   **Note:** When the internal Quality level is in the range of 9 through 14, the output codes shown in Table 35, 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.

5.4.6 Advanced G.781 Features

The central clock of the node supports several advanced features of the G.781 standard. These include the specification of a minimum acceptable QL value for the input references, the specification of a minimum acceptable QL value for the BITS output port, the ability to squelch the BITS output signal, and the specification of a Wait To Restore timer for input references. These features allow for more options in the management of the synchronization topology.

5.4.7   IEEE 1588v2 PTP

Precision Time Protocol (PTP) is a timing-over-packet protocol defined in the IEEE 1588v2 standard 1588 PTP 2008. Support for PTP is dependent on both platform and software release; see the *SR OS 16.0.Rx* Software Release Notes for applicability.

PTP may be deployed as an alternative timing-over-packet option to ACR. PTP provides the capability to synchronize network elements to a Stratum-1 clock or primary reference clock (PRC) traceable frequency source over a network that may or may not be PTP-aware. PTP has several advantages over ACR. It is a standards-based protocol, has lower bandwidth requirements, can transport both frequency and time, and can potentially provide better performance.

The PTP functionality has dependencies on hardware components in the applicable platform. Refer to the *SR OS 16.0.Rx* Software Release Notes for details.

Support is provided for an ordinary clock in slave or master mode or a boundary clock. When configured as an ordinary clock master, PTP can only be used for the distribution of a frequency reference, not a time reference. The boundary clock and ordinary clock slave can be used for both frequency and time distribution.

The ordinary clock master, ordinary clock slave, and boundary clock communicate with neighboring IEEE 1588v2 clocks. These neighbor clocks can be ordinary clock masters, ordinary clock slaves, or boundary clocks. The communication can be based on either unicast IPv4 sessions transported through IP interfaces or multicast Ethernet transported through Ethernet ports.

For the unicast IP sessions, the external clocks are labeled 'peers'. There are two types of peers: configured and discovered. An ordinary clock slave or a boundary clock should have configured peers for each PTP neighbor clock from which it might accept synchronization information. The router initiates unicast sessions with all configured peers. An ordinary clock master or boundary clock will accept unicast session requests from external peers. If the peer is not a configured peer, then it is considered a discovered peer. An ordinary clock master or boundary clock can deliver synchronization information toward discovered peers. Figure 15 shows the relationship of various neighbor clocks using unicast IP sessions to communicate with a 7750 SR configured as a boundary clock with two configured peers.

Figure 15   **Peer Clocks**

OSSG736
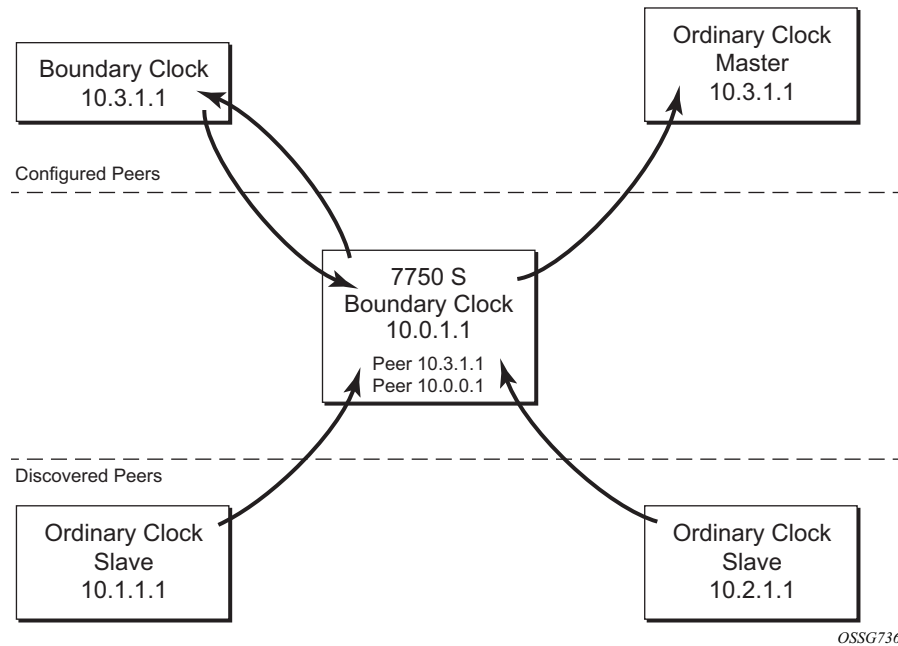
For multicast Ethernet operation, the router shall listen for and transmit PTP messages using the configured multicast MAC address. Neighbor clocks are discovered via the reception of messages through an enabled Ethernet port. An ordinary clock master, ordinary clock slave, and a boundary clock support more than one neighbor PTP clock connecting into a single port. This might be encountered with the deployment of an Ethernet multicast LAN segment between the local clock and the neighbor PTP ports using an End to end transparent clock or an Ethernet switch. The Ethernet switch is not recommended due to the introduction of PDV and the potential degradation of performance but it can be used if appropriate to the application. Figure 16 shows the relationship of various neighbor clocks using multicast Ethernet sessions to a 7750 SR configured as a boundary clock. The 7750 SR has three ports configured for multicast Ethernet communications. Port 1/2/1 of the 7750 SR shows a connection where there are two neighbor clocks connecting to one port of the 7750 SR through an end-to-end transparent clock.

Figure 16   Ethernet Multicast Ports
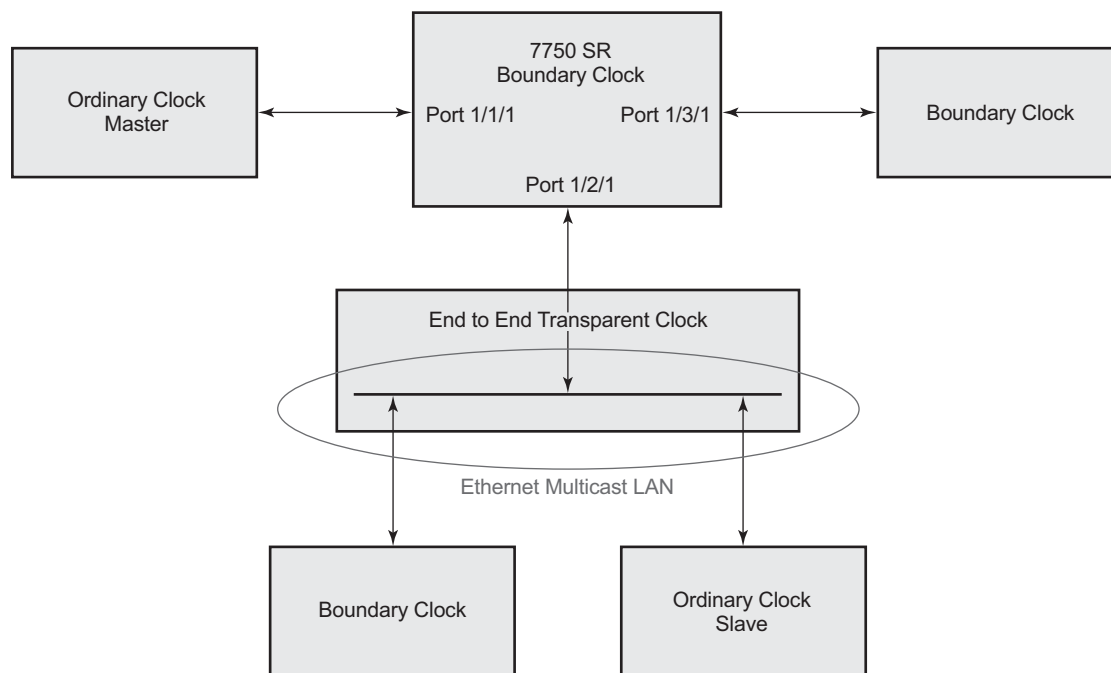
al_0527

The ordinary clock master, ordinary clock slave, and boundary clock allow for PTP operation over both unicast IPv4 and multicast Ethernet at the same time.

The IEEE 1588v2 standard includes the concept of PTP profiles. These profiles are defined by industry groups or standards bodies that define how IEEE 1588v2 is to be used for a particular application.

Currently, three profiles are supported:

- IEEE 1588v2 default profile
- ITU-T Telecom profile for frequency (G.8265.1)
- ITU-T Telecom profile for time with full timing support (G.8275.1)

When an ordinary clock slave or a boundary clock receive *Announce* messages from one or more configured peers or multicast neighbors, it executes a Best Master Clock Algorithm (BMCA) to determine the state of communication between itself and the peers. The system uses the BMCA to create a hierarchical topology allowing the flow of synchronization information from the best source (the Grandmaster clock) out through the network to all boundary and slave clocks. Each profile has a dedicated BMCA.

If the **profile** setting for the clock is ieee1588-2008, the precedence order for the best master selection algorithm is as follows:

- priority1
- clock class
- clock accuracy
- PTP variance (offsetScaledLogVariance)
- priority2
- clock identity
- steps removed from the grandmaster

The ordinary clock master, ordinary clock slave, and boundary clock set their local parameters as listed in Table 36:

Table 36   **Local Clock Parameters When Profile is set to ieee1588-2008**

Parameter	Value
clockIdentity	Chassis MAC address following the guidelines of 7.5.2.2.2 of IEEE 1588
clockClass	13 — local clock configured as ordinary clock master and is locked to an external reference 14 — local clock configured as ordinary clock master and in holdover after having been locked to an external source 248 — local clock configured as ordinary clock master and is in free run or the router is configured as a boundary clock 255 — local clock configured as ordinary clock slave
clockAccuracy	FE — unknown
offsetScaledLogVariance	FFFF — not computed

If the **profile** setting for the clock is g8265dot1-2010, the precedence order for the best master selection algorithm is:

- clock class
- priority

The ordinary clock master, ordinary clock slave, and boundary clock set their local parameters as listed in Table 37:

Table 37   **Local Clock Parameters When Profile is set to: itu-telecom-freq**

Parameter	Value
clockClass	80-110 — value corresponding to the QL out of the central clock as per Table 1/G.8265.1 255 — the clock is configured as ordinary clock slave

The g8265dot1-2010 profile is for use in an environment with only ordinary clock masters and slaves for frequency distribution.

If the **profile** setting for the clock is g8275dot1-2014, the precedence order for the best master selection algorithm is very similar to that used with the default profile. It ignores the **priority1** parameter, includes a **localPriority** parameter and includes the ability to force a port to never enter slave state (**master-only**). The precedence is as follows:

- clock class
- clock accuracy
- PTP variance (offsetScaledLogVariance)
- priority2
- localPriority
- clock identity
- steps removed from the grandmaster

The ordinary clock master, ordinary clock slave, and boundary clock set their local parameters as listed in Table 38:

Table 38   **Local Clock Parameters When Profile is set to: g8275dot1-2014**

Parameter	Value
clockIdentity	Chassis MAC address following the guidelines of 7.5.2.2.2 of IEEE 1588
clockClass	165 — local clock configured to a boundary clock and the boundary clock was previously locked to a grandmaster with a clock class of 6 248 — local clock configured as boundary clock 255 — local clock configured as ordinary clock slave
clockAccuracy	FE — unknown
offsetScaledLogVariance	FFFF — not computed

There is a limit on the number of external PTP clocks to which the ordinary clock slave or boundary clock will request unicast service (# configured peers) and also a limit to the number of external PTP clocks to which the ordinary clock master or boundary clock will grant unicast service (# discovered peers). An association where the boundary clock has a symmetric relationship with another boundary clock (i.e. they both have the other as a configured peer) will consume a request and a grant unicast service in each router.

The number of configured Ethernet ports is not restricted.

There are limits to the maximum transmitted and received event message rates supported in the router. Each unicast IP service established will consume a portion of one of the unicast message limits. Once either limit is reached, additional unicast service requests will be refused by sending a grant response with zero in the duration field.

Refer to the scaling guide for the appropriate release for the specific unicast message limits related to PTP.

Multicast messages are not considered when validating the unicast message limit. When multicast messaging on Ethernet ports is enabled, the PTP load needs to be monitored to ensure the load does not exceed the capabilities. There are several commands that can be used for this monitoring:

- 'show system cpu' will identify the load of the PTP software process. If the "capacity usage" reaches 100%, the PTP software process on the router is at its limit of transmitting and/or receiving PTP packets.

Because the user cannot control the amount of PTP messages being received over the Ethernet ports, the statistics commands can be used to identify the source of the message load:

- **show system ptp statistics** has aggregate packet rates
- **show system ptp port** and **show system ptp port** *port-id* [**detail**] display received packet rates

Figure 17 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 17   **Messaging Sequence Between the PTP Slave Clock and PTP Master Clock**
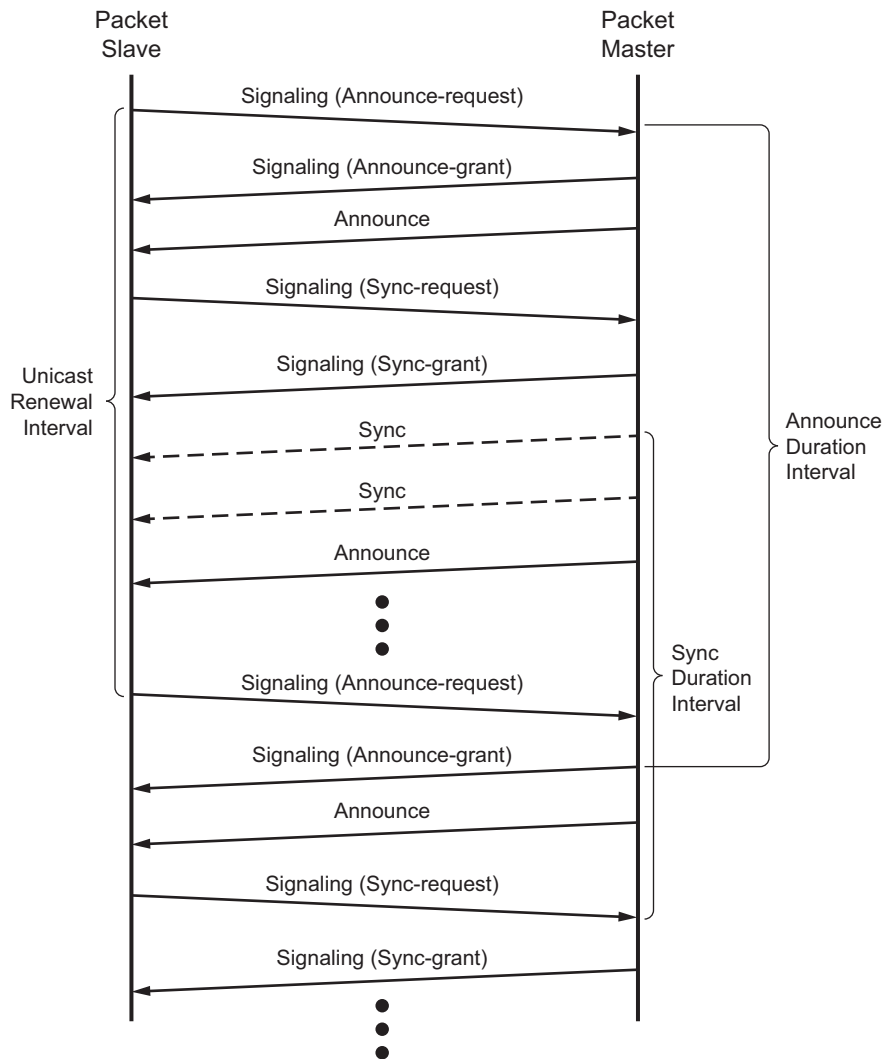
5.4.7.1 PTP Clock Synchronization

The IEEE 1588v2 standard allows for synchronization of the frequency and time from a master clock to one or more slave clocks over a packet stream. This packet-based synchronization can be over unicast UDP/IPv4 or multicast Ethernet.

As part of the basic synchronization timing computation, a number of event messages are defined for synchronization messaging between the PTP slave port and PTP master port. A one-step or two-step synchronization operation can be used, with the two-step operation requiring a follow-up message after each synchronization message. Ordinary clock master and boundary clock master ports use one-step operation; ordinary clock slave and boundary clock slave ports can accept messages from either one-step or two-step operation master ports.

The IEEE 1588v2 standard includes a mechanism to control the topology for synchronization distribution. The Best Master Clock Algorithm (BMCA) defines the states for the PTP ports on a clock. One port 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 18. This figure illustrates the offset of the slave clock referenced to the best master signal during startup.

Figure 18 **PTP Slave and Master Time Synchronization Computation**
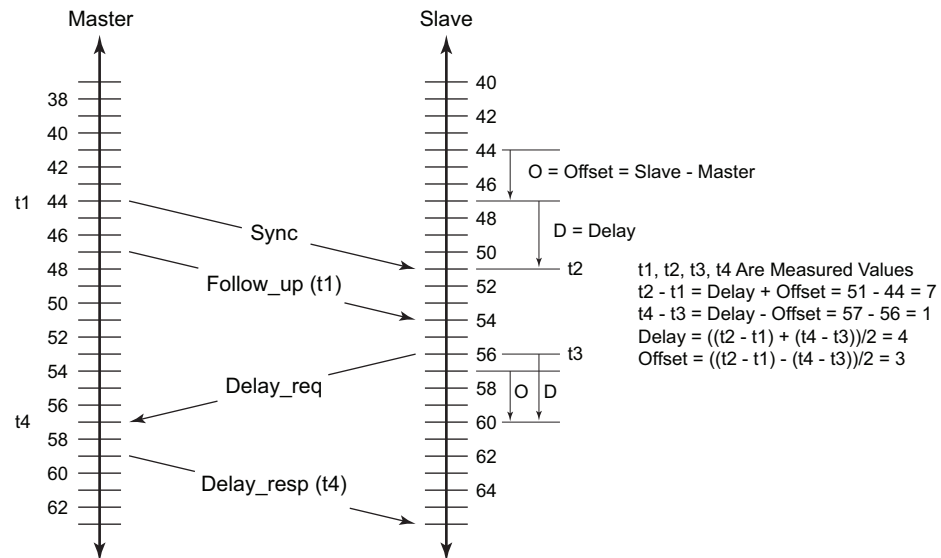
OSSG732

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 and 7450 ESS use the four timestamps exchanged using the IEEE 1588v2 messages to determine the offset between the router time base and the external master clock time base. The router determines the offset adjustment and then in between these adjustments, the router maintains the progression of time using the frequency from the central clock of the router. This allows time to be maintained using a BITS input source or a Synchronous Ethernet input source even if the IEEE 1588v2 communications fail. When using IEEE 1588v2 for time distribution, the central clock should at a minimum have a system timing input reference enabled. Figure 19 displays how IEEE 1588v2 is used for time distribution.

Figure 19   **Using IEEE 1588v2 For Time Distribution**
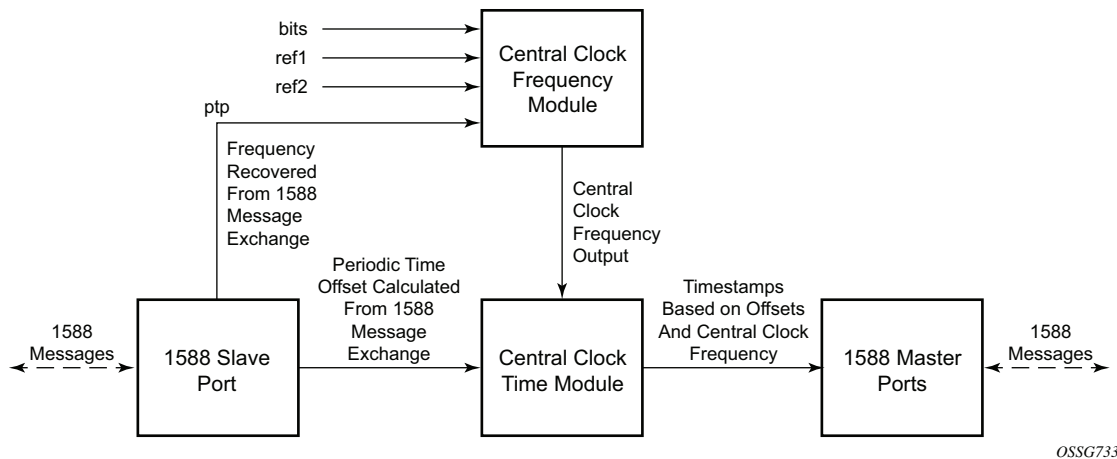
5.4.7.2   Performance Considerations

Although IEEE 1588v2 can be used on a network that is not PTP-aware, the use of PTP-aware network elements (boundary clocks) within the packet switched network improves synchronization performance by reducing the impact of PDV between the grand master clock and the slave clock. In particular, when IEEE 1588v2 is used to distribute high accuracy time, such as for mobile base station phase requirements, then the network architecture requires the deployment of PTP awareness in every device between the Grandmaster and the mobile base station slave.

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.

5.4.7.2.1   Port-Based Timestamping of PTP Messages

For optimal performance, the 1588 packets should be time-stamped at the ingress and egress. This avoids any possible PDV that might be introduced between the port and the CPM. The ability to timestamp in the interface hardware is provided on a subset of the IMM and MDA assemblies of the routers. Refer to the *SR OS 16.0.Rx* Software Release Notes for the complete list.

In order for this to operate, the CPM, IOM, IMM, and MDAs must be running firmware that supports this capability. The CPM firmware upgrade occurs automatically when the CPM card software is updated. Since upgrading of IOM, IMM, and MDA firmware is service impacting, this upgrade is not performed automatically on a soft reset of the MDA. The IOM/IMM firmware is upgraded when the IOM/IMM card is hard reset. The MDA firmware is programmed during system initialization, when the MDA is inserted, or when the MDA is hard reset via a **clear mda** or **clear card** command. However, when an MDA is soft reset via either a **clear card soft** command or during a major ISSU, the MDA firmware is not updated.

Port-based timestamping of 1588 packets cannot be used at the same time for Ethernet encapsulation and IP encapsulation on a given port. This means that PTP cannot be configured on an Ethernet port if **ptp-hw-assist** is already configured on a L3 interface associated with that port. Similarly, **ptp-hw-assist** cannot be configured on a L3 interface if its associated port is already configured as a PTP port.

5.4.7.3   PTP Capabilities

For each PTP message type to be exchanged between the router and an external 1588 clock, a Unicast Session must be established using the Unicast Negotiation procedures. The router allows configuration of the message rate to be requested from external 1588 clocks. The router also supports a range of message rates that it will grant to requests received from the external 1588 clocks.

Table 39 describes the ranges for both the rates that the router can request and grant.

Table 39   **Message Rates Ranges and Defaults**

Message Type	Rates Requested by the 7450 ESS, 7750 SR, and 7950 XRS		Rates Granted by the 7450 ESS, 7750 SR, and 7950 XRS	
	Min	**Max**	**Min**	**Max**
Announce	1 packet every 16 seconds	8 packets/second	packet every 16 seconds	8 packets/second
Sync	1 packet/second	64 packet/second	1 packet/second	128 packet/second
Delay_Resp	1 packet/second	64 packets/second	1 packet/second	128 packets/ second
(Duration)	300	300	1	1000

State and statistics data for each PTP peer are available to assist in the detection of failures or unusual situations.

5.4.7.4   PTP Ordinary Slave Clock For Frequency

Traditionally, only clock frequency is required to ensure smooth transmission in a synchronous network. The PTP ordinary clock with slave capability on the router provides another option to reference a Stratum-1 traceable clock across a packet switched network. The recovered clock can be referenced by the internal SSU and distributed to all slots and ports. Figure 20 shows a PTP ordinary slave clock network configuration.

Figure 20   **Slave Clock**
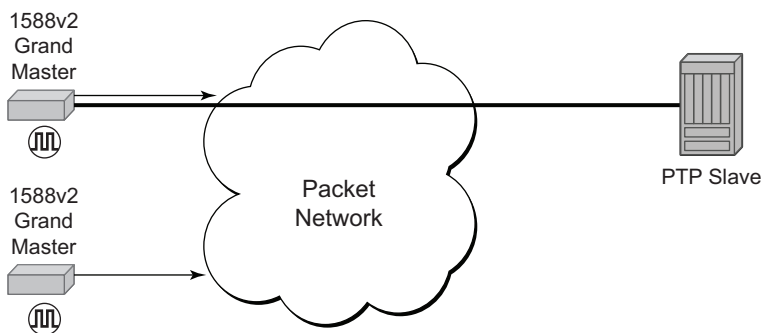
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The PTP slave capability is implemented on the CPM, version 3 or later. The IEEE 1588v2 messages can ingress and egress the router on any line interface. Figure 21 shows the operation of an ordinary PTP clock in slave mode.

Figure 21 **Ordinary Slave Clock Operation**

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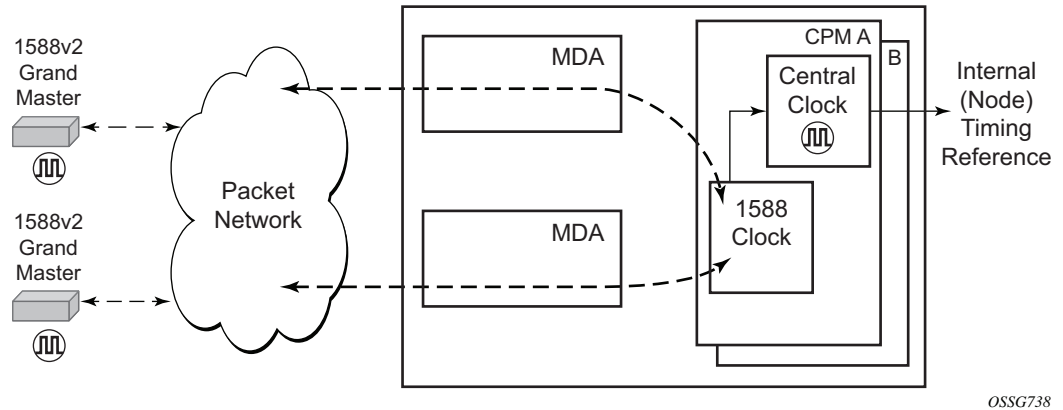
5.4.7.5   PTP Ordinary Master Clock For Frequency

The router supports the PTP ordinary clock in master mode. Normally, a IEEE 1588v2 grand master is used to support many slaves and boundary clocks in the network. In cases where only a small number of slaves and boundary clocks exist and only frequency is required, a PTP integrated master clock can greatly reduce hardware and management costs to implement PTP across the network. It also provides an opportunity to achieve better performance by placing a master clock closer to the edge of the network, as close to the slave clocks as possible. Figure 22 shows a PTP master clock network configuration.

Figure 22   **PTP Master Clock**
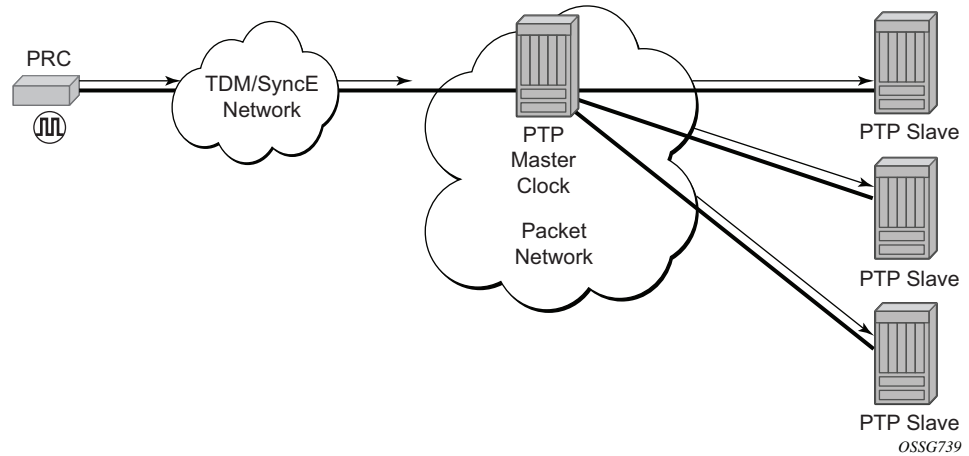
All packets are routed to their destination via the best route as determined in the route table; see Figure 23. It does not matter which ports are used to ingress and egress these packets (unless port based time stamping is enabled for higher performance).

Figure 23   **Ordinary Master Clock Operation**
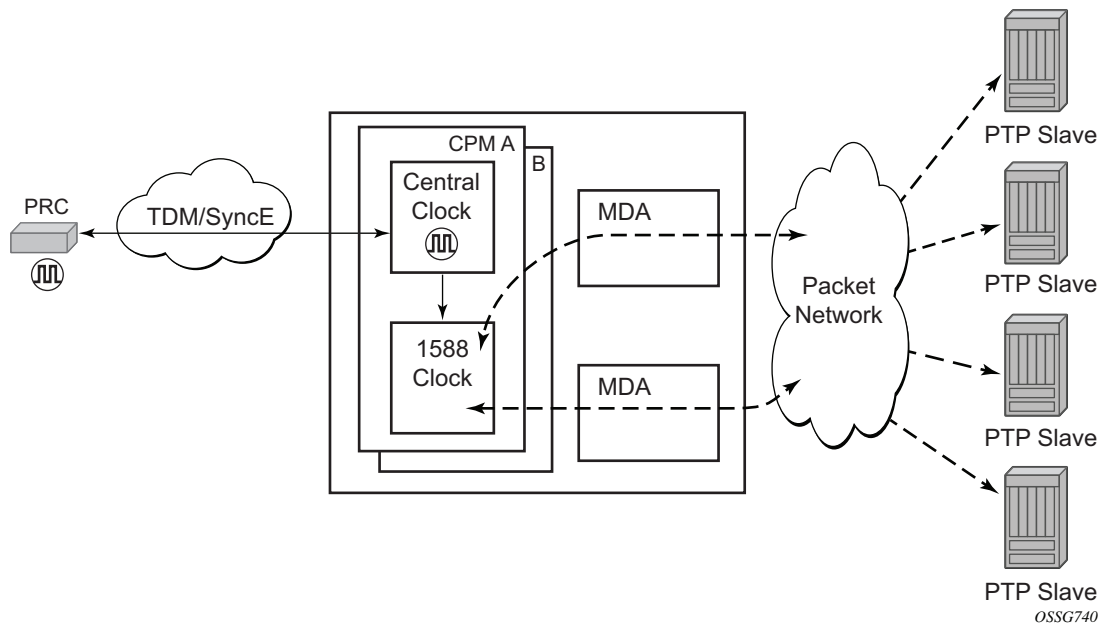
5.4.7.6   PTP Boundary Clock for Frequency and Time

The router supports boundary clock PTP devices in both master and slave states. IEEE 1588v2 can function across a packet network that is not PTP-aware; however, the performance may be unsatisfactory and unpredictable. PDV across the packet network varies with the number of hops, link speeds, utilization rates, and the inherent behavior of the routers. By using routers with boundary clock functionality in the path between the grand master clock and the slave clock, one long path over many hops is split into multiple shorter segments, allowing better PDV control and improved slave performance. This allows PTP to function as a valid timing option in more network deployments and allows for better scalability and increased robustness in certain topologies, such as rings. Boundary clocks can simultaneously function as a PTP slave of an upstream grand master (ordinary clock) or boundary clock, and as a PTP master of downstream slaves (ordinary clock) and/or boundary clocks, as shown in Figure 24.

Figure 24   **Boundary Clock**
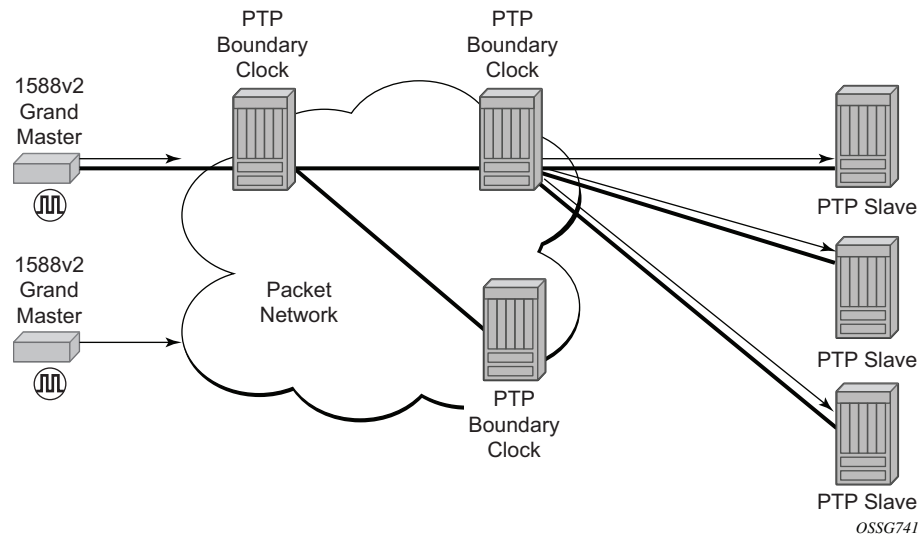
In addition, the use of port based timestamping in every network element between the grandmaster and the end slave application is highly recommended for delivering time to meet one microsecond accuracies required of mobile applications.

The router always uses the frequency output of the central clock to maintain the timebase within the router. The PTP reference into the central clock should always be enabled as an option if the router is configured as a boundary clock. This avoids the situation of the router entering holdover while propagating time with 1588.

5.4.7.7   PTP Clock Redundancy

The PTP module in the router exists on the CPM. The PTP module on the standby CPM is kept synchronized to the PTP module on the active CPM. All sessions with external PTP peers are maintained over a CPM switchover.

5.4.7.8   PTP Time for System Time and OAM Time

PTP has the potential to provide much more accurate time into the router than can be obtained with NTP. This PTP recovered time can be made available for system time and OAM packet time stamping to improve the accuracies of logged events and OAM delay measurements. The mechanism to activate PTP as the source for these internal time bases is to allocate PTP as a local server into NTP. This permits the NTP time recovery to use PTP as a source for time and then distribute it within the router to system time and the OAM process. This activation also affects the operation of the NTP server within the SR OS. The PTP server appears as NTP stratum 0 server and therefore the SR OS will advertise itself as an NTP Stratum 1 server to external peers and clients. This activation may impact the NTP topology.

5.4.7.9   PTP within Routing Instances

In addition to Base routing and IES services, PTP messaging is supported within VPRN services on the 7750 SR and 7950 XRS platforms. The 7450 ESS supports PTP in the Base routing instance. PTP messaging is not supported through the management router instance. Only one PTP clock exists within the router 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 router (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.

5.5   System-Wide ATM Parameters

On the 7750 SR, the ATM ping OAM loopback feature can be enabled on an ATM SAP for a period of time configured through the interval and the send-count parameters. When the ATM SAP terminates on IES or VPRN services, a failure of the loopback state machine does not bring down the Layer 3 interface. Only receiving AIS/RDI OAM cells or entering the AIS/RDI state brings down the Layer 3 interface.

The ATM ping OAM loopback feature can also be enabled on a continuous basis on an ATM SAP terminating on IES or VPRN services. When the loopback state machine fails, the Layer 3 interface is brought down.

The ATM OAM loopback parameters must first be enabled and configured in the **config>system>atm>oam** context, and then enabled in the IES or VPRN service interface SAP **atm oam** context.

Refer to the *7450 ESS, 7750 SR, 7950 XRS, and VSR Layer 3 Services Guide: IES and VPRN* for further information.

5.6   QinQ Network Interface Support

The creation of network interfaces on a QinQ-encapsulated VLAN can be enabled on a system-wide level using the **config>system>ip>allow-qinq-network-interface** command.

When enabled, the egress IOM limits are changed to allow a maximum of 11 MPLS labels instead of 12.

Table 40 lists the allowed and restricted QinQ combinations.

Table 40   **QinQ Combination (✓) and Restriction (x) Table**

	SAP x.0	SAP x.*	SAP x.y	Nw interface x.0	Nw interface x.*	Nw interface x.y	SAP *.*	SAP *.NULL	SAP 0.*	Inverse SAP
SAP x.0	x	✓	✓	x	x	x	✓	✓	✓	x
SAP x.*	✓	x	✓	x	x	x	✓	✓	✓	x
SAP x.z	✓	✓	✓	x	x	✓	✓	✓	✓	✓
Nw interface x.0	x	x	x	x	x	✓	✓	✓	✓	x
Nw interface x.*	x	x	x	x	x	x	✓	✓	✓	x
Nw interface x.z	x	x	✓	✓	x	✓	✓	✓	✓	x
SAP *.*	✓	✓	✓	✓	✓	✓	x	✓	✓	✓
SAP *.NULL	✓	✓	✓	✓	✓	✓	✓	x	✓	x
SAP 0.*	✓	✓	✓	✓	✓	✓	✓	✓	x	x
Inverse SAP	x	x	✓	x	x	x	✓	x	x	x

5.7   Link Layer Discovery Protocol (LLDP)

The IEEE 802.1ab Link Layer Discovery Protocol (LLDP) is a unidirectional protocol that uses the MAC layer to transmit specific information related to the capabilities and status of the local device. Separately from the transmit direction, the LLDP agent can also receive the same kind of information for a remote device which is stored in the related MIBs.

LLDP itself does not contain a mechanism for soliciting specific information from other LLDP agents, nor does it provide a specific means of confirming the receipt of information. LLDP allows the transmitter and the receiver to be separately enabled, making it possible to configure an implementation so the local LLDP agent can either transmit only or receive only, or can transmit and receive LLDP information.

The information fields in each LLDP frame are contained in a LLDP Data Unit (LLDPDU) as a sequence of variable length information elements, that each include type, length, and value fields (known as TLVs), where:

- Type identifies what kind of information is being sent.
- Length indicates the length of the information string in octets.
- Value is the actual information that needs to be sent (for example, a binary bit map or an alphanumeric string that can contain one or more fields).

Each LLDPDU contains four mandatory TLVs and can contain optional TLVs as selected by network management:

- Chassis ID TLV
- Port ID TLV
- Time To Live TLV
- Zero or more optional TLVs, as allowed by the maximum size of the LLDPDU
- End Of LLDPDU TLV

The chassis ID and the port ID values are concatenated to form a logical identifier that is used by the recipient to identify the sending LLDP agent/port. Both the chassis ID and port ID values can be defined in a number of convenient forms. Once selected however, the chassis ID/port ID value combination remains the same as long as the particular port remains operable.

A non-zero value in the TTL field of the time-to-live TLV tells the receiving LLDP agent how long all information pertaining to this LLDPDU's identifier 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.

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 25.

Figure 25   **LLDP Internal Architecture for a Network Node**
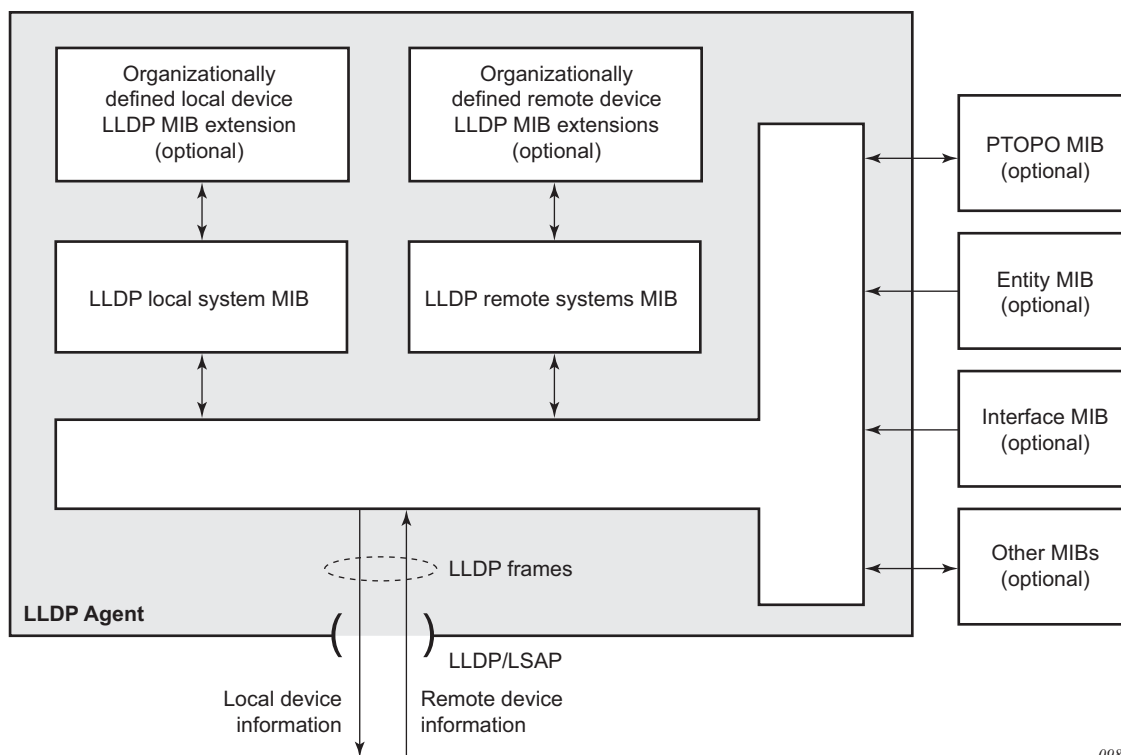
Network operators must be able to discover the topology information in order to detect and address network problems and inconsistencies in the configuration. Moreover, standard-based tools can address the complex network scenarios where multiple devices from different vendors are interconnected using Ethernet interfaces.

The example displayed in Figure 26 depicts a MPLS network that uses Ethernet interfaces in the core or as an access/hand off interfaces to connect to different kind of Ethernet enabled devices such as service gateway/routers, QinQ switches, DSLAMs or customer equipment.

Figure 26   **Customer Use Example For LLDP**
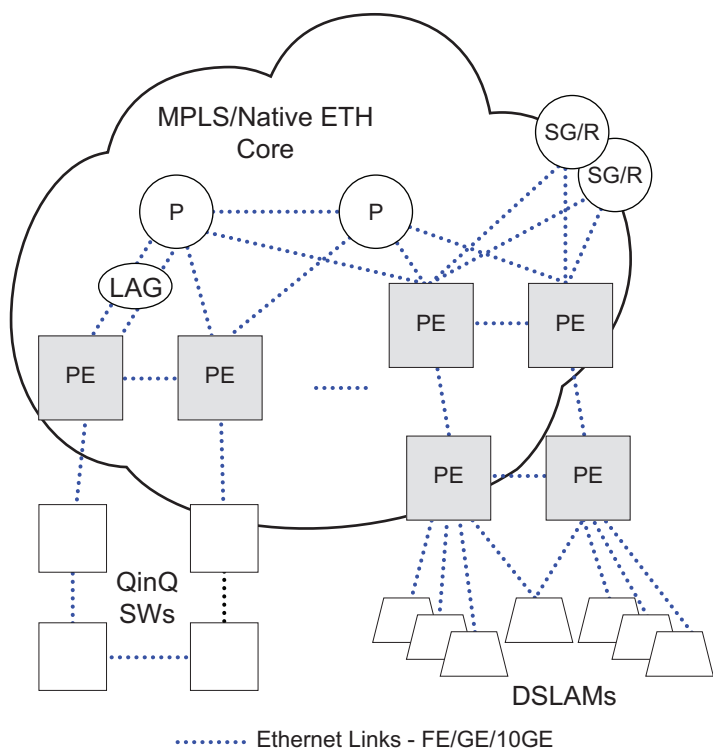
IEEE 802.1ab LLDP running on each Ethernet interfaces in between all the above network elements may be used to discover the topology information.

5.8   IP Hashing as an LSR

It is now possible to include IP header in the hash routine at an LSR for the purpose of spraying labeled-IPv4 and labeled-IPv6 packets over multiple equal cost paths in ECMP in an LDP LSP and/or over multiple links of a LAG group in all types of LSPs.

A couple of configurable options are supported. The first option is referred to as the Label-IP Hash option and is designated in the CLI as **lbl-ip**. When enabled, the hash algorithm parses down the label stack and once it hits the bottom of the stack, it checks the next nibble. If the nibble value is four or six then it will assume it is an IPv4 or IPv6 packet. The result of the hash of the label stack, along with the incoming port and system IP address, is fed into another hash along with source and destination address fields in the IP packet's header. The second option is referred to as IP-only hash and is enabled in CLI by entering the **iponly** keyword. It operates the same way as the Label-IP Hash method except the hash is performed exclusively on the source and destination address fields in the IP packet header. This method supports both IPv4 and IPv6 payload and operates on packets received on an IP interface on an IOM3-XP/IMM port only.

By default, MPLS packet hashing at an LSR is based on the whole label stack, along with the incoming port and system IP address. This method is referred to as Label-Only Hash option and is enabled in CLI by entering the **lbl-only** keyword.

The **lbl-only**, **lbl-ip** and **ip-only** hashing options can be configured system-wide and can also be overridden on a per-IP-interface basis.

5.9   Satellites

There are two types of SAS-Sx satellites supported on the 7750 SR:

- Ethernet satellites
- TDM satellites

The following primary tasks must be performed to configure a satellite.

1. Create a software repository that specifies where the SAS-Sx should obtain its correct software image.
2. Create an Ethernet or TDM satellite association that binds a chassis to a set of uplinks and a software repository.
3. Configure the satellite ports to specify port configuration and service association.

5.9.1   Ethernet Satellites

The Ethernet satellite support feature allows a 7210 SAS-Sx or SAS-S chassis to act as a port extension for the 7750 SR host. In this configuration, all configuration and management functions are performed through the host node. Management of the SAS-Sx/SAS-S node is not required when it is configured in an Ethernet satellite operations mode.

Table 41 lists the supported Ethernet satellite chassis.

Table 41   **Supported Ethernet Satellite Chassis**

Chassis Type	Sat-Type String
7210 SAS-Sx 24-port fiber	es24-1gb-sfp
7210 SAS-Sx 48-port fiber	es48-1gb-sfp
7210 SAS-S 24F4SFP+	es24-sass-1gb-sfp
7210 SAS-S 48F4SFP+	es48-sass-1gb-sfp
7210 SAS-Sx 24-port copper 7210 SAS-S 24-port copper	es24-1gb-tx
7210 SAS-Sx 48-port copper 7210 SAS-S 48-port copper	es48-1gb-tx

Table 41   **Supported Ethernet Satellite Chassis (Continued)**

Chassis Type	Sat-Type String
7210 SAS-Sx 24-port copper + PoE 7210 SAS-S 24-port copper + PoE	es24-1gb-tx
7210 SAS-Sx 48-port copper + PoE 7210 SAS-S 48-port copper + PoE	es48-1gb-tx
7210 SAS-Sx 64-port 10GE (CFP)	es64-10gb-sfpp+4-100gb-cfp4
7210 SAS-Sx 64-port 10GE + 4-port QSFP28	es64-10gb-sfpp+4-100gb-qsfp28
7210 SAS-Mxp	es24-sasmxp-1gb-sfp

→ **Note:**

- The 7210 SAS-Sx 64-port 10GE Ethernet satellite supports both 10GE and 1GE optics. See the *7210 Optics Guide* for a list of supported modules.
- The 64x10GE (CFP and QSFP28) SAS-Sx satellite does not support the local forwarding feature.
- The 7210 SAS-Mxp does not support the local forwarding feature.
- PoE functionality is not supported when the 7210 PoE capable switches are used in satellite mode.

5.9.2   TDM Satellites

The SONET/SDH ETR chassis is the only available TDM satellite and can be configured for different modes. Table 42 lists the supported modes of the this satellite chassis.

Table 42   **Supported SONET/SDH Satellite Chassis**

Chassis Type	Sat-Type String
4 port OC3	ts4-choc3-sfp
4 port STM1	ts4-chstm1-sfp
1 port OC12	ts1-choc12-sfp
1 port STM4	ts1-chstm4-sfp

The default type on a supplied TDM satellite is ts4-choc3-sfp. Updating to another type will initiate a reboot of the satellite.

The TDM satellite provides CEM functionalities supported on the 7750 SR OC3/OC12 CES MDAs. The satellite is built using the same architecture as the 7705 SAR-8 adapter cards and is designed to transport existing TDM services including:

- Cpipe service of DS1/E1 channels within SONET/SDH in structure-agnostic mode (SATOP) as described in RFC4553
- MEF8 service of DS1/E1 channels within SONET/SDH in structure-agnostic mode

The following types of synchronization are supported:

- DS1/E1 channels can be independently loop-timed, node-timed, or differentially-timed
- OC3/STM1/OC12/STM4 ports can be node-timed

To provide a stable frequency from the host to the SONET/SDH satellite, ensure that the host's clock is referenced to a suitable timing source (for example, BITS) and configure Synchronous Ethernet from the host's Ethernet port connecting to the satellite. Copper Ethernet SFPs are not supported because they do not support Synchronous Ethernet.

The TDM satellite is entirely managed through a 7750 SR host system, such as 7750 SR, 7750 SR-a, or 7750 SR-e. As a satellite, no new IP address needs to be assigned. Services on the satellite are provisioned on the host in the same manner as any ports in a native MDA. The TDM satellite connects to the SR host using a Gigabit Ethernet link, thereby not occupying valuable slots space in the host system. APS is supported across satellites connecting to a single host.

5.9.3   Software Repositories for Satellites

The software repositories define the locations from where the host can obtain software for subcomponents including Ethernet satellites. The software repository is also used to upgrade an existing subcomponent by changing the location of the image to be served to the remote device. The software repositories are not used for management of the host router software, which is managed using the standard procedures described in the *SR OS 16.0.Rx* Software Release Notes.

Each software repository supports up to three locations to search for the software. A location may be a URL or a directory on a compact flash. When an upgrade operation is initiated, each of the three locations is checked in sequence to locate the required software. The upgrade operation will fail if the software is not located in any of the configured locations. The satellite booting operation will also fail if the software cannot be located.

At least one software repository must be configured to support a satellite connected to the local host by using the **config>system>software-repository** CLI tree, as follows.

1. Create a software repository using a unique repository name.
2. Specify the primary location for the SAS-Sx image.
3. Optionally, specify a secondary or tertiary image location and a description.

Caution: Software for TDM satellites and Ethernet satellites should be stored in separate software repositories. There is one file that has the same name for both types of software, which will be overwritten if they are placed in the same repository.

5.9.4   Satellite Software Upgrade Overview

The process to change or upgrade the satellite software consists of the following steps.

1. Copy the new satellite software images to a local compact flash card. It is recommended that the new image files be placed in a different directory.

   Although you can store the satellite software on a remote server and use a URL to reference the remote location, it is recommended that the primary image location is locally accessible.

2. Create a new software repository using a new name and at least a primary-location for the 7210 SAS-Sx image.

3. Modify the satellite configuration such that the **software-repository** parameter references the newly created software repository.

   Use the following CLI context:

   config>system>satellite>eth-sat *sat-id*

   or

   config>system>satellite>tdm-sat *sat-id*

4. Reboot the satellite to load the new software.

   Depending on whether a firmware update is needed, perform one of the following steps to reboot the satellite.

a. A satellite firmware update is not required.

    i. The satellite loads the new software the next time it reboots.

    ii. You can reset the satellite with the following administrative command, if required.

       admin satellite eth-sat *sat-id* **reboot** [**now**]

       or

       admin satellite tdm-sat *sat-id* **reboot** [**now**]

b. A satellite firmware update is required.

    i. To continue the upgrade to the 7210 firmware image, enter one of the following commands and allow it to execute completely:

       admin satellite eth-sat *sat-id* **sync-boot-env**

       or

       admin satellite tdm-sat *sat-id* **sync-boot-env**

    ii. Reboot the satellite again using the **upgrade** keyword to update the firmware image.

       The **upgrade** keyword causes the 7210 SAS-Sx to upgrade the included firmware images. This process takes longer than a normal reboot.

       admin satellite eth-sat *sat-id* **reboot upgrade now**

       or

       admin satellite tdm-sat *sat-id* **reboot upgrade now**

5.9.5   100GE Client Ports

Ports 67 and 68 on the 64x10GE + 4x100GE satellites (sat-type es64-10gb-sfpp+4-100gb-cfp4) can be reassigned as client ports instead of uplinks. This provides the flexibility to offer 100GE services from these satellite chassis. These two 100GE ports can be reconfigured as client ports using the **port-template** configuration commands. The port template must be configured before port topology bindings are configured as well as before SAPs, interfaces, or services can be applied to the associated satellite ports.

This feature is not supported on the es64-10gb-sfpp+4-100gb-qsfp28 satellite.

5.9.6   Satellite Configuration

After creating the software repositories, configure the satellite. The satellite configuration is required to create a satellite binding to a satellite ID, and to provide additional information that will uniquely identify the satellite chassis, chassis type, and the software repository to be used to boot the remote satellite.

The following parameters can be specified for a satellite.

- **mac-address** — The satellite chassis MAC address must be specified. This is used to bind a specific chassis to the associated satellite ID. (The local host router will boot only satellites with configured MAC addresses.) This parameter is mandatory.
- **sat-type** — The satellite chassis type must be specified and must match the chassis type that the satellite advertises during the boot process. This parameter is mandatory.
- **software-repository**— A preconfigured software repository must be specified in the satellite configuration. This defines the location of the software image to boot the associated 7210 SAS-Sx. This parameter is mandatory.
- **no shutdown** — By default, a new satellite is in a shutdown state; use the **no shutdown** command to bring the satellite online. This parameter is mandatory.
- **description** — Use this command to configure a description string associated with the satellite. This parameter is optional.
- **sync-e** — Use this command to enable the **sync-e** option. This parameter is only available for an Ethernet satellite. This parameter is optional.

5.9.6.1   Satellite Client Port ID Formats

Use the following format to reference Ethernet satellite client ports:

port esat- *sat-id*/*slotNum*/*portNum*

where:

- *sat-id* is between 1 and 20
- *slotNum* is always 1
- *portNum* is between 1 and 64

Use the following format to reference Ethernet satellite uplink port:

port esat- *sat-id*/1/*uplink-id*

where:

- *sat-id* is between 1 and 20
- *uplink-id* is between **u**1 and **u**4

Use the following format to reference TDM satellite client ports:

port tsat- *sat-id*/*slotNum*/*portNum*.*channel*

where:

- *sat-id* is between 1 and 20
- *slotNum* is always 1
- *portNum* is between 1 and 4

Use the following format to reference TDM satellite uplink port:

port tsat- *sat-id*/1/**u**1

where:

- *sat-id* is between 1 and 20

5.9.6.2   Local Forwarding

The local forwarding capability allows traffic to be forwarded between two client satellite ports without going through the SR host, which allows for optimal forwarding by preserving uplink bandwidth.

- Locally forwarded traffic is identified based on the ingress VLAN tag.
- The outer VLAN tag used to identify the traffic to be locally forwarded can be different at the two bypass endpoints. In that case, as traffic is forwarded from the ingress to the egress, the outer VLAN tag is modified.
- The bypass paths are bidirectional, so only a single local-forwarding path needs to be defined to allow for traffic flow in both directions.

Figure 27 shows an example of local forwarding.

Figure 27   **Local Forwarding**
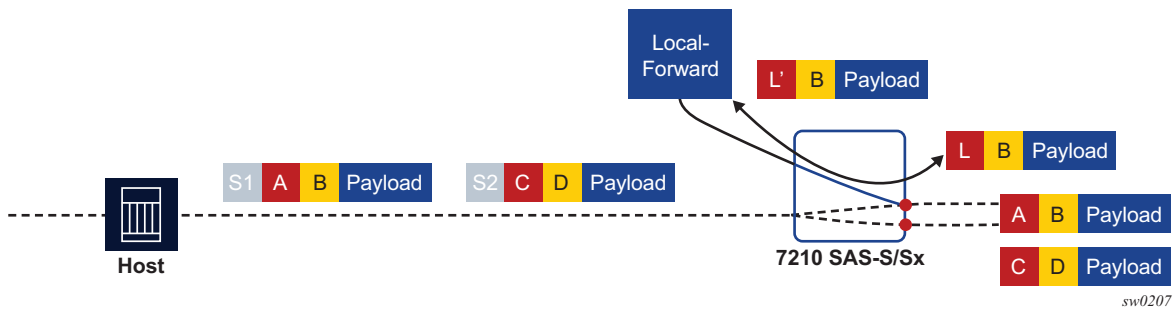
A local-forward bypass is created by using the following commands to create a local-forward bypass, then associating a set of two satellite access points as endpoints for the local-forward bypass.

- The two endpoints must be ports on the same Ethernet satellite chassis.
- If a LAG is used as an endpoint, all member links must be ports on the same Ethernet satellite.
- All satellite ports must be client ports by default, or must be configured as a client port using the port-template command.

```
config system satellite
    local-forward <id> [create]
        description <string>
        sap <sat-port>:qtag | <lag-id>:qtag
        exit
        sap <sat-port>:qtag | <lag-id>:qtag
        exit
        [no] shutdown
    exit
```

Example Configuration:

To configure a local-forward bypass between client ports esat-2/1/1:66 and esat-2/1/50:101, use the following commands:

```
config system satellite
    local-forward 10 create
        description "local-forward to offload router"
        sap esat-2/1/1:66
        exit
        sap esat-2/1/50:101
        exit
        no shutdown
    exit
```

5.9.6.3   Port Template

The **port-template** command hierarchy allows the creation of a satellite template that reconfigures the port role and uplink association for one or more satellite ports. This template can then be applied to one or more Ethernet satellite instances, in which case those satellites will inherit the specified port role and uplink associations.

The port template is necessary when reconfiguring a satellite uplink as a client port for use as part of a local-forward bypass path.

```
configure
    system
        satellite
            [no] port-template <template-name> sat-type <sat-type> [create]
                port <port-id>
                    role {none | uplink | client | system-default}
                    uplink {<port-id> | system-default | none}
                exit
                [no] description <string>
                [no] shutdown
```

5.9.6.4   10GE Client Ports

Ports 51 and 52 on the 48xGE + 4x10GE satellite chassis can be reassigned as client ports instead of uplink ports. This provides the flexibility to offer 10GE services from these satellite chassis. These two 10GE ports can be reconfigured as client ports using the **port-template** configuration commands described above. The port template configuration must be done before SAPs, interfaces, or services can be applied to the associated satellite ports.

5.9.6.5   10GE Uplinks on the 64x10GE+4x100GE Satellite

On the 7210 SAS-Sx 64x10GE + 4x100GE (es64-10gb-sfpp+4-100gb-cfp4) satellite, selected 10GE ports can be reconfigured and used as the satellite uplinks to the host router running SR OS.

Up to 16 10GE interfaces can be used as the uplinks for the associated satellite. A new satellite template that configures the desired 10GE interfaces as uplinks must be created. In addition, use the port template **port-template** to specify the uplink association between the remaining client ports and configured uplinks.

Apply the new template to the desired satellite using the
config>system>satellite>eth-sat *sat-id***>sat-type** *sat-type***>port-template**
template-name command, where the *template-name* is the name configured in the
port-template context.

This feature requires the 7210 SAS-Sx to be running at least Release 9.0.R10 or
later.

The following restrictions apply:

- The 10GE ports used as satellite uplinks must start at port 1 and be sequential,
  up to the maximum of 16 10GE uplinks.
- When 10GE ports are used as uplinks, the 4x100GE port are not available for
  use and should be configured as **role none**.

The following is an example configuration:

```
config>system
    satellite
        port-template "10gUp" sat-type "es64-10gb-sfpp+4-100gb-cfp4" create
            port 1/1/1
                role uplink
                uplink none
            exit
            port 1/1/2
                role uplink
                uplink none
            exit
            port 1/1/3
                role uplink
                uplink none
            exit
            port 1/1/4
                role uplink
                uplink none
            exit
            ...
            port 1/1/9
                uplink 1/1/1
            exit
            port 1/1/10
            ...
            port 1/1/16
                uplink 1/1/2
            exit
            ...
            port 1/1/65
                role none
            exit
            port 1/1/66
                role none
            exit
            ...
            no shutdown
        exit
```

```
                eth-sat 20 create
                    mac-address d0:99:d5:96:ee:41
                    sat-type "es64-10gb-sfpp+4-100gb-cfp4" port-template "10gUp"
                    software-repository "rep1"
                    no shutdown
                exit
            exit
        exit
```

5.9.6.6   Satellite Uplink Resiliency

An option in the **port-map** configuration allows a secondary uplink to be assigned to enable uplink resiliency. A secondary uplink is used to carry the traffic associated with the client port if the primary uplink becomes unavailable. If traffic is switched to the secondary uplink, once the primary uplink becomes available, traffic is reverted to the primary as soon as possible.

The configuration of a secondary uplink is performed on a per-client port basis using the **port-map** command.

config>system>sat>eth-sat>port-map *client-port-id* primary *primary-uplink-port-id* [secondary *secondary-uplink-port-id*]

config>system>sat>eth-sat>port-map *client-port-id* system-default

To configure a secondary uplink, after the primary uplink is specified, the **secondary** keyword should be included, followed by the intended uplink to be used as the secondary uplink.

For example,

```
config>system>satellite>eth-sat 1
    port-map esat-1/1/2 primary esat-1/1/u1 secondary esat-1/1/u3
```

- If there are not SAPs or interfaces bound to a client port, then any change can be made to the uplinks
- If a SAP or interface is bound to a client port, or the client port is member of a LAG or ETH tunnel, then only one uplink change per configuration command is allowed (see below)
- The primary cannot be changed directly, this requires multiple steps.
    1. swap primary and secondary
    2. remove secondary
    3. add new secondary
    4. perform a second swap of primary and secondary

The following are basic actions allowed with a single command:

- add or delete secondary uplink
- swap primary and secondary
- add a secondary uplink and swap secondary with primary

5.10   Auto-provisioning

Auto-provisioning is used to provision a node using an external DHCP server and file server. It is used to obtain a configuration file and an image file from an external server using an in-band mechanism. Auto-provisioning is not compatible with an out-of-band management port.

Before using auto-provisioning, the SR OS must be booted up and running the application image. In addition, it needs to have some minimum configuration before the auto-provision script is executed by the operator.

After the auto-provision application is triggered using a tools command, SR OS will check all operationally up ports without IP addresses and send DHCP discovery to these interfaces. The DHCP server needs to be configured with option 67 and the user must provide the SR OS with the URL of a file server and the corresponding directory for the image.

Figure 28 to Figure 30 describe scenarios in which auto-provisioning are used.

In Figure 28, there is no DHCP relay and all IP addresses are assigned from a single pool.

Figure 28   **Example of a Network with no DHCP Relay**
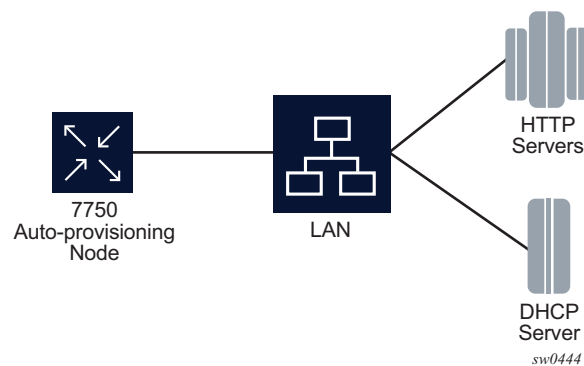
In Figure 29, there is a DHCP relay which injects the option 82 as a gateway address. The DHCP server will assigned the IP address from the pool dictated by the gateway address option 82. The DHCP server and HTTP server are in the same subnet. The DHCP offer has option 3 "router" which is used for a default gateway creation on the 7750 SR.

Figure 29   **Example of a Network with a DHCP Relay**
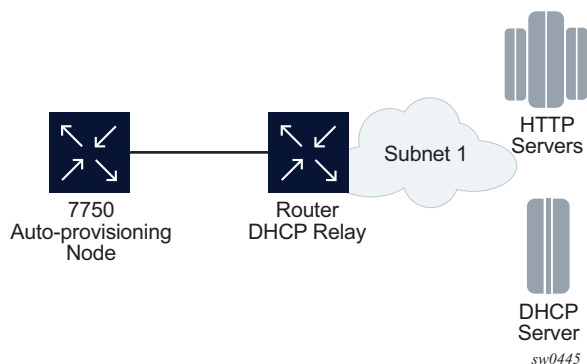
In Figure 30, all components are in different subnets. The DHCP relay will add option 82 to the DHCP request as the gateway address which is used for pool selection. The DHCP server will have to add the option 3 configured with the gateway address of the HTTP server.

Figure 30   **Example of a Network with Multiple Subnets**
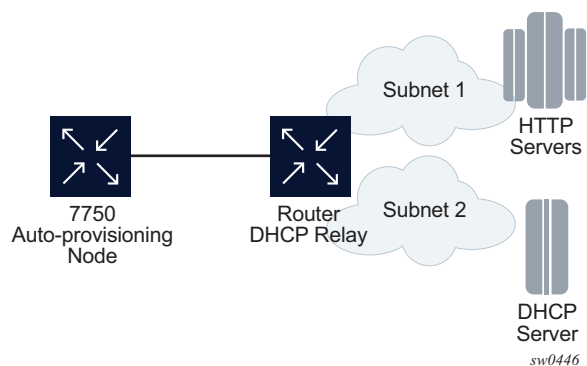
5.10.1   Auto-provisioning limits

The following are some configuration limits for auto-provisioning:

- A maximum of 12 L3 interfaces are supported for auto-provisioning
- Only IPv4 auto-provisioning is supported

- It is highly recommended to only have a basic card, MDA, port, and interface configuration as described in this document and no additional static routes or IGP or BGP protocols when performing auto-provisioning because auto-provisioning installs default static routes that may be affected by any extra routing configuration.

- A maximum of 255 characters is supported for the remote URL (200 character maximum for the filepath, the rest for the main URL consisting of the protocol, login credentials, and host IP). A maximum of 200 characters is supported for the local URL. The local file or folder name must not exceed 99 characters.

- The maximum number of file pairs for each image/config record is 10.

5.10.2   Auto-provisioning Process

1. The auto-provisioning process starts by going through interfaces with a port configuration and no IP address (IPv4 or IPv6) one by one.

2. The first interface that matches will trigger the DHCP client process. See Auto-provisioning DHCP Rules.

3. A static route is automatically configured with the default gateway received by DHCP offer (option 3 "Router" in DHCP offer).

4. Option 67 points to the location of a provisioning file. This is a URL in HTTP format.

5. The node downloads this provisioning file and places it on compact flash or RAM (configurable). The URL is in IP format and there is no need for DNS.

6. The node uses the primary-image/cfg-download parameter of the provisioning file to download the image and config file and places them at the destination dictated by the provisioning file. Only compact flash is supported.

   If the primary-image/cfg-download server times out, two more redundant servers can be configured using secondary and tertiary options.

   a. The node will go through the config file primary, secondary, and tertiary server first.

   b. Then the node will go through the image primary, secondary, and tertiary server.

   c. If the node fails to download the image or config, then the auto-provisioning process considers this interface unusable and moves to the next interface. The auto-provisioning also informs the DHCP task of the failure so DHCP releases the IP and sends a DHCP release.

7. The node will load the bof part of the provisioning file into the bof and save the bof. The bof must point to compact flash.

8. The user can force a reboot after successful execution or choose to clear the force reboot option and reboot the node manually.

9. After the reboot, the node boots from compact flash and comes back up with an operational bof.cfg

10. Any further image or config updates are done using a console.

5.10.3   Auto-provisioning DHCP Rules

The following are the DHCP rules in the auto-provisioning stage:

1. First, auto-provisioning walks through the interfaces with a configured port, where the port is in operational status up, one by one.

2. It sends a DHCP request to the first configured interface with a port up and no IP address configured.

    a. If, on this interface, multiple DHCP offers arrives, only the first offer is sent to the auto-provisioning task and the other offers are ignored. This could occur if the node is on a LAN and multiple DHCP servers are connected to the interface.

    b. The DHCP client has an exponential retry mechanism. If the DHCP offer does not arrive from the server, the client will resend a DHCP request at 2, 4, 8, 32 and 64 s, with 64 s being the maximum timeout, If the 64 s timeout interval is reached, the DHCP client will keep retrying every 64 s. The user can configure a timeout value. If no DHCP offer has arrived by this timeout value, the auto-provisioning process will move to the next interface.

    c. If the DHCP offer arrives on the port and the DHCP client task does not acknowledge the DHCP offer, for any reason, it will disable the DHCP client and remove the IP from the port.

    d. If the DHCP offer arrives on the port and the DHCP client acknowledges the offer, it will send the information to auto-provisioning. If auto-provisioning does not like the offer, because there is no option 67, option 67 is malformed, or for any other reason listed in Auto-provisioning Failure, the auto-provisioning process deconfigures the DHCP client and the DHCP client sends a DHCP release, and unassigns the IP address.

    e. In case of failure, detailed information is displayed by the auto-provisioning process and the process will move to the next port that is up and does not have an IP address.

3. If auto-provisioning is successful using the offer and its option then the provisioning file download will start through HTTP.

The **auto-provisioning** command is CLI blocking. All information about the auto-provisioning process is displayed on the CLI and logged.

5.10.4   Auto-provisioning Failure

Auto-provisioning will fail for the following reasons:

- There is no option 67.
- The option 67 format is not acceptable to auto-provisioning.
- The format is a URL or DNS is not supported.
- There is a failure in the download provisioning file or the server is not reachable.
- There is failure in the download of the image or config file using the provisioning file information, for example, the server is not available, the wrong directory is listed, or the wrong credentials are given.
- The image or config fails to copy to the compact flash.
- The image or config fails to sync to the inactive CPM.
- The BOF does not point to the compact flash, for example, it is pointing to the network.

If the auto-provisioning procedure on this interface fails, then auto-provisioning will:

1. Display all information on the blocked CLI and in the log, explaining the failure in detail.
2. Update the DHCP task so the DHCP task can take the appropriate actions to release the IP address on the interface. This is done by sending a DHCP release for the DHCP ack received from the server.
3. Go to the next interface with port up and no IP address.
4. If no other interface with port up is found, the auto-provisioning task stops and a failure error is displayed on the CLI and in the log.

5.11   Administrative Tasks

This section contains information to perform administrative tasks.

5.11.1   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 Options section.

5.11.2   Specifying Post-Boot Configuration Files

Two post-boot configuration extension files are supported and are triggered when either a successful or failed boot configuration file is processed. The **boot-bad-exec** and **boot-good-exec** commands specify URLs for the CLI scripts to be run following the completion of the 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.

5.11.3   Network Timing

In Time Domain Multiplexed (TDM)-based networks (for example, SONET or SDH circuit- switched networks), the concept of network timing is used to prevent over-run or under-run issues where circuits are groomed (rebundled) and switched. Hardware exists in each node that takes a common clock derived from an internal oscillator, a specific receive interface, or special BITS interface and provides it to each synchronous interface in the system. Usually, each synchronous interface is allowed

to choose between using the chassis-provided clock or the clocking recovered from the received signal on the interface. The clocking is used to drive the transmit side of the interface. The appropriate configuration at each node which defines how interface clocking is handled must be considered when designing a network that has a centralized timing source so each interface is operating in a synchronous manner.

The effect of timing on a network is dependent on the nature of the type of traffic carried on the network. With bit-wise synchronous traffic (traditional circuit-based voice or video), non-synchronous transmissions cause a loss of information in the streams affecting performance. With packet-based traffic, the applications expect and handle jitter and latency inherent to packet-based networks. When a packet-based network is used to carry voice or video traffic, the applications use data compression and elasticity buffering to compensate for jitter and latency. The network itself relies on appropriate Quality of Service (QoS) definitions and network provisioning to further minimize the jitter and latency the application may experience.

5.11.4   Power Supplies

SR OS supports a **power-supply** command to configure the type and number of power supplies present in the chassis. The operational status of a power source is always displayed by the LEDs on the Control Processor/Switch Fabric Module (CP/SFM) front panel, but the power supply information must be explicitly configured in order for a power supply alarm to be generated if a power source becomes operationally disabled.

5.11.5   Automatic Synchronization

Use the CLI syntax displayed below to configure synchronization components relating to active-to-standby CPM switchover. In redundant systems, synchronization ensures that the active and standby CPMs have identical operational parameters, including the active configuration, CPM, XCM, and IOM images in the event of a failure or reset of the active CPM.

The **force-switchover** command forces a switchover to the standby CPM card.

To enable automatic synchronization, either the **boot-env** parameter or the **config** parameter must be specified. The synchronization occurs when the **admin save** or **bof save** commands are executed.

When the **boot-env** parameter of the **synchronize** command is specified, the bof.cfg, primary/secondary/tertiary configuration files (.cfg and .ndx), li, and ssh files are automatically synchronized. When the **config** parameter is specified, only the configuration files are automatically synchronized.

Synchronization also occurs whenever the BOF is modified and when an **admin>save** command is entered with no filename specified.

5.11.5.1   Boot-Env Option

The **boot-env** option enables a synchronization of all the files used in system initialization.

When configuring the system to perform this synchronization, the following occurs:

1. The BOF used during system initialization is copied to the same compact flash on the standby CPM (in redundant systems). The synchronization parameters on the standby CPM are preserved.
2. The primary, secondary, and tertiary images, (provided they are locally stored on the active CPM) are copied to the same compact flash on the standby CPM.
3. The primary, secondary, and tertiary configuration files, (provided they are locally stored on the active CPM) are copied to the same compact flash on the standby CPM.

5.11.5.2   Config Option

The **config** option synchronizes configuration files by copying the files specified in the active CPM BOF file to the same compact flash on the standby CPM.

Both image files (CPM and IOM) on the 7450 ESS must be located in the same directory. Failure to locate and synchronize both images causes an error to be generated.

5.11.6   Manual Synchronization

The **admin redundancy synchronize** command performs manual CPM synchronizations. The **boot-env** parameter synchronizes the BOF, image, and configuration files in redundant systems. The **config** parameter synchronizes only the configuration files in redundant systems.

5.11.6.1 Forcing a Switchover

The **force-switchover now** command forces an immediate switchover to the standby CPM card.

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the **admin reboot standby** command on the active or the standby CPM.

5.12   System Router Instances

SR OS supports multiple Layer 3 router instances. These instances have their own IP addressing spaces and parameters. Router instances are isolated from each other.

The following are the different types of router instances in SR OS:

- **Base**

  All SR OS routers have the Base router instance: the system created default router instance used to forward user IP traffic among router line card ports. Router interfaces (that is, network interfaces configured under **configure router** [**Base**]) and IES services and interfaces exist in the Base router instance. The Base router instance is identified in SNMP as vRtrType = baseRouter (1) and has a vRtrID of 1.

- **VPRN instances**

  Another type of router instance is the set of operator configured VPRN services. Each VPRN service has a unique router instance. For more information about VPRN services and their associated router instances, refer to the *7450 ESS, 7750 SR, 7950 XRS, and VSR Layer 3 Services Guide: IES and VPRN*. VPRN router instances are identified in SNMP as vRtrType = vprn (2), and the vRtrID is dynamically allocated.

- **Special system router instances**

  SR OS routers also support the following special router instances:

  - **management**

    The management router instance is a system created router instance that is used for management of the router. The management router instance is bound to CPM/CFM/CCM ports A/1 and B/1. This is a CPM router instance which cannot be renamed or deleted by an operator. The management router instance is identified in SNMP as vRtrType = vr(3), and the vRtrID is 4095.

  - **vpls-management**

    The vpls-management router instance is used for management of VPLS services. It is identified in SNMP as vRtrType = vr(3), and the vRtrID is 4094.

  - **User created CPM router instances**

User created CPM router instances are user defined router instances that are mainly used with ethernet ports on the CPM/CFM/CCM cards: CPM router instances only use CPM/CFM/CCM ethernet ports as interfaces. CPM router instances have a user-defined name and are the only types of non-VPRN router instances that can be created by the user. User created CPM router instances are identified in SNMP as vRtrType = vr(3), and the vRtrID is dynamically allocated.

5.13   System Configuration Process Overview

Figure 31 shows the process to provision basic system parameters.

Figure 31   **System Configuration and Implementation Flow**

```
                    ┌──────────────────┐
                    │      Start       │
                    └──────────────────┘
                             │
                             ▼
        ┌──────────────────────────────────────────────┐
        │          Configure System Information          │
        └──────────────────────────────────────────────┘
                             │
                             ▼
        ┌──────────────────────────────────────────────┐
        │ Configure High Availability Parameters (Recommended) │
        └──────────────────────────────────────────────┘
                             │
                             ▼
        ┌──────────────────────────────────────────────┐
        │           Configure Time Parameters            │
        └──────────────────────────────────────────────┘
                             │
                             ▼
        ┌──────────────────────────────────────────────┐
        │ Configure Synchronization Parameters (Recommended) │
        └──────────────────────────────────────────────┘
                             │
                             ▼
        ┌──────────────────────────────────────────────┐
        │  Modify Network Timing Parameters (Optional)   │
        └──────────────────────────────────────────────┘
                             │
                             ▼
                    ┌──────────────────┐
                    │       End        │
                    └──────────────────┘
```
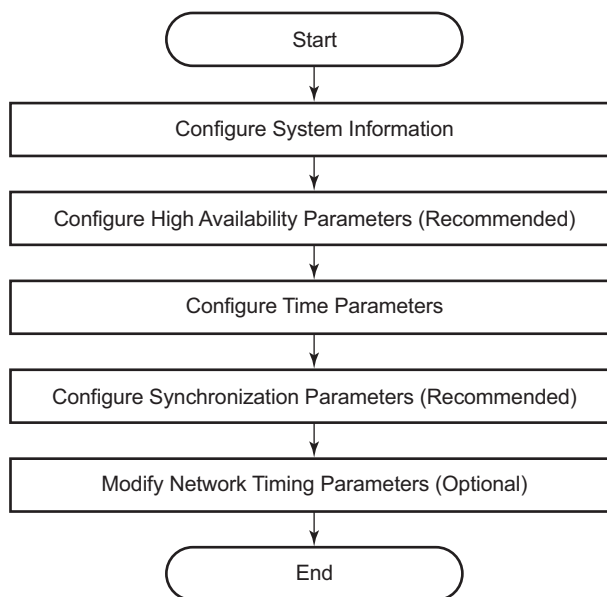
7750_SR_Basics_27

5.14 Configuration Notes

This section describes system configuration caveats.

5.14.1 General

The system must be properly initialized and the boot loader and BOF files successfully executed in order to access the CLI.

5.15   Configuring System Management with CLI

This section provides information about configuring system management features with CLI.

5.15.1   Saving Configurations

Whenever configuration changes are made, the modified configuration must be saved so the changes will not be lost when the system is rebooted. The system uses the configuration and image files, as well as other operational parameters necessary for system initialization, according to the locations specified in the boot option file (BOF) parameters. For more information about boot option files, see Boot Options.

Configuration files are saved by executing *implicit* or *explicit* command syntax.

- An *explicit* save writes the configuration to the location specified in the save command syntax (the *file-url* option).
- An *implicit* save writes the configuration to the file specified in the primary configuration location.

  If the *file-url* option is not specified in the save command syntax, the system attempts to save the current configuration to the current BOF primary configuration source. If the primary configuration source (path and/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.

5.15.2   Basic System Configuration

This section provides information to configure system parameters and provides configuration examples of common configuration tasks. The minimal system parameters that should be configured are:

- System Information Parameters
- System Time Elements

The following example shows a basic system configuration:

```
A:ALA-12>config>system# info
#----------------------------------------
echo "System Configuration "
#----------------------------------------
        name "ALA-12"
        coordinates "Unknown"
        snmp
        exit
        security
            snmp
                community "private" rwa version both
            exit
        exit
        time
            ntp
                server 192.168.15.221
                no shutdown
            exit
            sntp
                shutdown
            exit
            zone GMT
        exit
-----------------------------------------------
A:ALA-12>config>system#
```

5.15.3   Common Configuration Tasks

This section provides a brief overview of the tasks that must be performed to configure system parameters and provides the CLI commands.

5.15.3.1   System Information

This section covers the basic system information parameters to configure the physical location of the router, contact information, location information (the place the router is located such as an address, floor, room number), global positioning system (GPS) coordinates, and system name.

5.15.3.1.1   System Information Parameters

Name

Use the **system** command to configure a name for the device. The name is used in the prompt string. Only one system name can be configured, if multiple system names are configured the last one encountered overwrites the previous entry. Use the following CLI syntax to configure the system name:

CLI Syntax: config>system
                name *system-name*

Example: config>system# name ALA-12

The following example shows the system name:

```
sysName@domain>config>system# info
#----------------------------------------
echo "System Configuration "
#----------------------------------------
        name "ALA-12"
. . .
        exit
----------------------------------------------
sysName@domain>config>system#
```

Contact

Use the **contact** command to specify the name of a system administrator, IT staff member, or other administrative entity.

CLI Syntax: config>system
                contact *contact-name*

Example: config>system# contact "Fred Information Technology"

Location

Use the **location** command to specify the system location of the device. For example, enter the city, building address, floor, room number, and so on, where the router is located.

Use the following CLI syntax to configure the location:

CLI Syntax: `config>system`
        `location` *`location`*

Example: `config>system# location "Bldg.1-floor 2-Room 201"`

CLLI Code

The Common Language Location Code (CLLI code) is an 11-character standardized geographic identifier that is used to uniquely identify the geographic location of an SR-series router.

Use the following CLI command syntax to define the CLLI code:

CLI Syntax: `config>system`
             `clli-code` *`clli-code`*

Example: `config>system# clli-code abcdefg1234`

5.15.3.1.2   Coordinates

Use the optional **coordinates** command to specify the GPS location of the device. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

Use the following CLI syntax to configure the location:

CLI Syntax: `config>system`
        `coordinates` *`coordinates`*

Example: `config>system# coordinates "N 45 58 23, W 34 56 12"`

The following example shows the configuration output of the general system commands:

```
sysName@domain>config>system# info
#----------------------------------------
```

          3HE 14127 AAAB TQZZA 01   Issue: 01

```
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#
```

5.15.3.1.3   System Time Elements

The system clock maintains time according to Coordinated Universal Time (UTC). Configure information time zone and summer time (daylight savings time) parameters to correctly show time according to the local time zone.

Zone

The **zone** command sets the time zone and/or time zone offset for the router. The router supports system-defined and user-defined time zones. The system-defined time zones are listed in Table 43.

CLI Syntax: `config>system>time`

                                 `zone` *std-zone-name* | *non-std-zone-name* [*hh* [:*mm*]]

Example: `config>system>time#`
                  `config>system>time# zone GMT`

The following example shows the zone output:

```
A:ALA-12>config>system>time# info
----------------------------------------------
ntp
              server 192.168.15.221
              no shutdown
exit
sntp
              shutdown
exit
zone UTC
----------------------------------------------
A:ALA-12>config>system>time#
```

Table 43   **System-defined Time Zones**

Acronym	Time Zone Name	UTC Offset
Europe		
GMT	Greenwich Mean Time	UTC
WET	Western Europe Time	UTC
WEST	Western Europe Summer Time	UTC +1 hour
CET	Central Europe Time	UTC +1 hour
CEST	Central Europe Summer Time	UTC +2 hours
EET	Eastern Europe Time	UTC +2 hours
EEST	Eastern Europe Summer Time	UTC +3 hours
MSK	Moscow Time	UTC +3 hours
MSD	Moscow Summer Time	UTC +4 hours
US and Canada		
AST	Atlantic Standard Time	UTC -4 hours
ADT	Atlantic Daylight Time	UTC -3 hours
EST	Eastern Standard Time	UTC -5 hours
EDT	Eastern Daylight Saving Time	UTC -4 hours
CST	Central Standard Time	UTC -6 hours
CDT	Central Daylight Saving Time	UTC -5 hours
MST	Mountain Standard Time	UTC -7 hours
MDT	Mountain Daylight Saving Time	UTC -6 hours
PST	Pacific Standard Time	UTC -8 hours
PDT	Pacific Daylight Saving Time	UTC -7 hours
HST	Hawaiian Standard Time	UTC -10 hours
AKST	Alaska Standard Time	UTC -9 hours
AKDT	Alaska Standard Daylight Saving Time	UTC -8 hours
Australia and New Zealand		
AWST	Western Standard Time (e.g., Perth)	UTC +8 hours

Table 43   **System-defined Time Zones (Continued)**

Acronym	Time Zone Name	UTC Offset
ACST	Central Standard Time (e.g., Darwin)	UTC +9.5 hours
AEST	Eastern Standard/Summer Time (e.g., Canberra)	UTC +10 hours
NZT	New Zealand Standard Time	UTC +12 hours
NZDT	New Zealand Daylight Saving Time	UTC +13 hours

Summer Time Coordinates

The **config**>**system**>**time**>**dst-zone** context configures the start and end dates and offset for summer time or daylight savings time to override system defaults or for user defined time zones.

When configured, the time will be adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

CLI Syntax:
```
config>system>time
dst-zone zone-name
    end {end-week} {end-day} {end-month} [hours-
       minutes]
    offset offset
    start {start-week} {start-day} {start-month}
       [hours-minutes]
```

Example:
```
config>system# time
config>system>time# dst-zone pt
config>system>time>dst-zone# start second sunday april
 02:00
end first sunday october 02:00
config>system>time>dst-zone# offset 0
```

If the time zone configured is listed in Table 43, 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 43 or entered as optional parameters in this command.

The following example shows the configured parameters.

```
A:ALA-48>config>system>time>dst-zone# info
----------------------------------------------
```

```
                                start second sunday april 02:00
                                end first sunday october 02:00
                                offset 0
----------------------------------------------
A:ALA-48>config>system>time>dst-zone# offset 0
```

NTP

Network Time Protocol (NTP) is defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis* and RFC 5905, *Network Time Protocol Version 4: Protocol and Algorithms Specification*. It allows for participating network nodes to keep time more accurately and maintain time in a synchronized manner between all participating network nodes.

Authentication-check

NTP supports an authentication mechanism to provide some security and access control to servers and clients. The default behavior when any authentication keys are configured is to reject all NTP protocol PDUs that have a mismatch in either the authentication key-id, type, or key. The authentication-check command provides for the options to skip or maintain this rejection of NTP PDUs that do not match the authentication requirements.

When authentication-check is configured, NTP PDUs are authenticated on receipt. However, mismatches cause a counter to be increased, one counter for key-id, one for type, and one for key value mismatches.

CLI Syntax: config>system>time>ntp
                         authentication-check

Example: config>system>time>ntp#
                    config>system>time>ntp# authentication-check
                    config>system>time>ntp# no shutdown

Authentication-key

The **authentication-key** command configures an authentication key-id, key type, and key used to authenticate NTP PDUs sent to and received from other network elements participating in the NTP protocol. For authentication to work, the authentication key-id, authentication type and authentication key value must match.

CLI Syntax: config>system>time>ntp

```
                        authentication-key key-id {key key} [hash |
                          hash2] type
                        {des | message-digest}
```

Example: config>system>time>ntp#
                    config>system>time>ntp# authentication-key 1 key A type
                     des
                    config>system>time>ntp# no shutdown

The following example shows NTP disabled with the authentication-key parameter
enabled.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
                shutdown
                authentication-key 1 key "OAwgNUlbzgI" hash2 type des
----------------------------------------------
A:sim1>config>system>time>ntp#
```

Broadcast

The **broadcast** command is used to transmit broadcast packets on a given interface.
Interfaces in the base routing context or the management interface may be specified.
Due the relative ease of spoofing of broadcast messages, it is strongly
recommended to use authentication with broadcast mode. The messages are
transmitted using a destination address that is the NTP Broadcast address.

CLI Syntax: config>system>time>ntp
                            broadcast [router router-name] {interface
                                ip-int-name} [key-id key-id] [version
                                   version]
                                [ttl ttl]

Example: config>system>time>ntp#
                    config>system>time>ntp# broadcast interface int11
                     version 4
                    ttl 127
                    config>system>time>ntp# no shutdown

The following example in the **system>time** context shows NTP enabled with the
broadcast command configured.

```
A:sim1>config>system>time# info detail
----------------------------------------------
         ntp
             no shutdown
             authentication-check
             ntp-server
```

```
                    broadcast interface int11 version 4 ttl 127
            exit
A:sim1>config>system>time#
```

Broadcastclient

The **broadcastclient** command enables listening to NTP broadcast messages on
the specified interface. Interfaces in the base routing context or the management
interface may be specified.   Due the relative ease of spoofing of broadcast
messages, it is strongly recommended to use authentication with broadcast mode.
The messages must have a destination address of the NTP Broadcast address.

CLI Syntax: config>system>time>ntp
                                    broadcastclient [router *router-name*]
                                        {interface *ip-int-name*}
                                        [authenticate]

Example: config>system>time>ntp#
                config>system>time>ntp# broadcastclient interface int11
                config>system>time>ntp# no shutdown

The following example shows NTP enabled with the broadcastclient parameter
enabled.

```
A:ALA-12>config>system>time# info
----------------------------------------------
        ntp
            broadcastclient interface int11
            no shutdown
        exit
----------------------------------------------
A:ALA-12>config>system>time#
```

Multicast

When configuring NTP the node can be configured to transmit or receive multicast
packets on the CPM MGMT port (CPM applies to the 7450 ESS and 7750 SR).
Broadcast & Multicast messages can easily be spoofed, therefore, authentication is
strongly recommended. Multicast is used to configure the transmission of NTP
multicast messages. The **no** construct of this command removes the transmission of
multicast packets on the management port.

When transmitting multicast NTP messages the default address of 224.0.1.1 is used.

CLI Syntax: config>system>time>ntp
                        multicast [version *version*] [key-id *key-id*]

Example: config>system>time>ntp#
                 config>system>time>ntp# multicast
                 config>system>time>ntp# no shutdown

The following example shows NTP enabled with the multicast command configured.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            server 192.168.15.221
            multicast
            no shutdown
----------------------------------------------
A:ALA-12>config>system>time#
```

Multicastclient

The **multicastclient** command is used to configure an address to receive multicast NTP messages on the CPM MGMT port (7450 ESS and 7750 SR). Broadcast & Multicast messages can easily be spoofed, therefore, authentication is strongly recommended. The no construct of this command removes the multicast client. If multicastclient is not configured, all NTP multicast traffic will be ignored.

CLI Syntax: config>system>time>ntp
                         multicastclient [authenticate]

Example: config>system>time>ntp#
                 config>system>time>ntp# multicastclient authenticate
                 config>system>time>ntp# no shutdown

The following example shows NTP enabled with the multicastclient command configured.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            server 192.168.15.221
            multicastclient
            no shutdown
----------------------------------------------
A:ALA-12>config>system>time##
```

NTP-Server

The **ntp-server** command configures the node to assume the role of an NTP server. Unless the server command is used this node will function as an NTP client only and will not distribute the time to downstream network elements. If authentication is specified in this command, the NTP server requires client packets to be authenticated based on the key received in the client request.

CLI Syntax: `config>system>time>ntp`
                           `ntp-server [authenticate]`

Example: `config>system>time>ntp#`
               `config>system>time>ntp# ntp-server`
               `config>system>time>ntp# no shutdown`

The following example shows NTP enabled with the ntp-server command
configured.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
        no shutdown
        ntp-server
----------------------------------------------
A:sim1>config>system>time>ntp#
```


Peer

Configuration of an NTP peer configures symmetric active mode for the configured
peer. Although any system can be configured to peer with any other NTP node, it is
recommended to configure authentication and to configure known time servers as
their peers. Use the **no** form of the command to remove the configured peer.

CLI Syntax: `config>system>time>ntp`
                           `peer ip-address [version version] [key-id key-`
                             `id]`
                           `[prefer]`

Example: `config>system>time>ntp#`
               `config>system>time>ntp# peer 192.168.1.1 key-id 1`
               `config>system>time>ntp# no shutdown`

The following example shows NTP enabled with the peer command configured.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
        no shutdown
        peer 192.168.1.1 key-id 1
----------------------------------------------
A:sim1>config>system>time>ntp#
```


Server

The **server** command is used when the node should operate in client mode with the
NTP server specified in the address field. Use the **no** form of this command to
remove the server with the specified address from the configuration.

Up to ten NTP servers can be configured.

CLI Syntax: `config>system>time>ntp`
                    `server` *ip-address* `[key-id` *key-id*`] [version`
                    version`] [prefer]`

Example: `config>system>time>ntp#`
          `config>system>time>ntp# server 192.168.1.1 key-id 1`
          `config>system>time>ntp# no shutdown`

The following example shows NTP enabled with the server command configured.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
            no shutdown
            server 192.168.1.1 key 1
----------------------------------------------
A:sim1>config>system>time>ntp#
```

SNTP

SNTP is a compact, client-only version of the NTP. SNTP can only receive the time from SNTP/NTP servers; it cannot be used to provide time services to other systems. SNTP can be configured in either broadcast or unicast client mode.

CLI Syntax: `config>system`
          `time`
               `sntp`
                    `broadcast-client`
                    `server-address` *ip-address* `[version` *version-*
                      number`] [normal | preferred] [interval`
                      seconds`]`
                    `no shutdown`

Broadcast-client

The **broadcast-client** command enables listening at the global device level to SNTP broadcast messages on interfaces with broadcast client enabled.

CLI Syntax: `config>system>time>sntp`
              `broadcast-client`

Example: `config>system>time>sntp#`
          `config>system>time>sntp# broadcast-client`
          `config>system>time>sntp# no shutdown`

The following example shows SNTP enabled with the **broadcast-client** command enabled.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            sntp
                broadcast-client
                no shutdown
            exit
            dst-zone PT
                start second sunday april 02:00
                end first sunday october 02:00
                offset 0
            exit
            zone GMT
----------------------------------------------
A:ALA-12>config>system>time#
```

Server-address

The **server-address** command configures an SNTP server for SNTP unicast client mode.

CLI Syntax: config>system>time>sntp#
                    config>system>time>sntp# server-address *ip-address*
                     version *version-number*] [normal | preferred] [interval
                     seconds]

Example: config>system>time>sntp#
                 config>system>time# server-address 10.10.0.94 version 1
                  preferred interval 100

The following example shows SNTP enabled with the **server-address** command configured.

```
A:ALA-12>config>system>time# info
----------------------------------------------
            sntp
                server-address 10.10.0.94 version 1 preferred interval 100
                no shutdown
            exit
            dst-zone PT start-date 2006/04/04 12:00 end-date 2006/10/25 12:00
            zone GMT
----------------------------------------------
A:ALA-12>config>system>time#
```

CRON

CRON provides various time and date scheduling functions. Configuration notes for the CRON schedule are provided below.

Schedule

The schedule function configures the type of schedule to run, including one-time only (oneshot), periodic or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds). If end-time and interval are both configured, whichever condition is reached first is applied.

Example:
```
config>system>cron# schedule test2
config>system>cron>sched# day-of-month 17
config>system>cron>sched# end-time 2007/07/17 12:00
config>system>cron>sched# minute 0 15 30 45
config>system>cron>sched# weekday friday
config>system>cron>sched# shut
```

The following example schedules a script named "test2" to run every 15 minutes on the 17th of each month and every Friday until noon on July 17, 2007:

```
*A:SR-3>config>system>cron# info
----------------------------------------------
        schedule "test2"
            shutdown
            day-of-month 17
            minute 0 15 30 45
            weekday friday
            end-time 2007/07/17 12:00
        exit
----------------------------------------------
*A:SR-3>config>system>cron#
```

5.15.3.1.4   ANCP Enhancements

Persistency is available for subscriber's ANCP attributes and is stored on the on-board compact flash card. ANCP data will stay persistence during an ISSU as well as nodal reboots. During recovery, ANCP attributes are first restored fully from the persistence file, and incoming ANCP sessions are temporarily on hold. Afterwards, new ANCP data can overwrite any existing values. This new data is then stored into the compact flash in preparation for the next event.

5.15.3.2   Configuring Synchronization and Redundancy

5.15.3.2.1   Configuring Persistence

The following example shows subscriber management system persistence command usage for the 7450 ESS and 7750 SR:

Example:
```
config>system# persistence
config>system>persistence# subscriber-mgmt
config>system>persistence>sub-mgmt# description
 "cf3:SubMgmt-Test"
config>system>persistence>sub-mgmt# location cf3:
config>system>persistence>sub-mgmt# exit
```

```
A:ALA-12>config>system>persistence# info
----------------------------------------------
          subscriber-mgmt
              description "cf3:SubMgmt-Test"
              location cf1:
          exit
----------------------------------------------
A:ALA-12>config>system>persistence#
```

5.15.3.2.2   Configuring Synchronization

The **switchover-exec** command specifies the location and name of the CLI script file executed following a redundancy switchover from the previously active CPM card.

CLI Syntax:
```
admin>redundancy
synchronize {boot-env|config}
config>system
switchover-exec file-url
```

5.15.3.2.3   Configuring Manual Synchronization

Note that automatic synchronization can be configured in the **config>system> synchronization** context.

CLI Syntax:
```
admin
redundancy
    synchronize {boot-env|config}
```

Example: `admin>redundancy# synchronize config`

The following shows the output shown during a manual synchronization:

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

Syncing configuration......

Syncing configuration.....Completed.
A:ALA-12#
```

5.15.3.2.4   Forcing a Switchover

The **force-switchover now** command forces an immediate switchover to the standby CPM card.

CLI Syntax: `admin>redundancy`
`force-switchover [now]`

Example: `admin>redundancy# force-switchover now`

```
A:ALA-12# admin redundancy force-switchover now
A:ALA-12#
Resetting...
?
```

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the **admin reboot standby** command on the active or the standby CPM.

5.15.3.2.5   Configuring Synchronization Options

Network operators can specify the type of synchronization operation to perform between the primary and secondary CPMs after a change has been made to the configuration files or the boot environment information contained in the boot options file (BOF).

Use the following CLI to configure the boot-env option:

CLI Syntax: `config>system`
`synchronize {boot-env|config}`

Example: `config>system# synchronize boot-env`

The following example shows the configuration:

```
A:ALA-12>config>system# synchronize boot-env
A:ALA-12>config>system# show system synchronization
==================================================
Synchronization Information
==================================================
Synchronize Mode       : Boot Environment
Synchronize Status     : No synchronization
Last Config Sync Time  : 2006/06/27 06:19:47
Last Boot Env Sync Time : 2006/06/27 06:19:47
==================================================
A:ALA-12>config>system#
```

Use the following CLI to configure the config option:

CLI Syntax: config>system
                       synchronize {boot-env|config}

Example: config>system# synchronize config

The following example shows the configuration.

```
A:ALA-12>config>system# synchronize config
A:ALA-12>config>system# show system synchronization
==================================================
Synchronization Information
==================================================
Synchronize Mode       : Configuration
Synchronize Status     : No synchronization
Last Config Sync Time  : 2006/06/27 09:17:15
Last Boot Env Sync Time : 2006/06/24 07:16:37
==================================================
A:ALA-12>config>system#
```

5.15.3.3   Configuring Multi-Chassis Redundancy for LAG

When configuring associated LAG ID parameters, the LAG must be in access mode and LACP must be enabled.

Use the CLI syntax shown below to configure multi-chassis redundancy features.

CLI Syntax: config>redundancy
                       multi-chassis
                           peer *ip-address*
                               authentication-key [*authentication-key* | *hash-key*] [hash | hash2]
                               description *description-string*
                               mc-lag
                                   hold-on-neighbor-failure *duration*

```
                                        keep-alive-interval interval
                                        lag lag-id lacp-key admin-key system-id
                                           system-id [remote-lag lag-id] system-
                                           priority system-priority
                                        no shutdown
                                no shutdown
                                source-address ip-address
                                sync
                                        igmp
                                        igmp-snooping
                                        pim-snooping [sap]
                                        port [port-id | lag-id] [sync-tag sync-
                                           tag]
                                            range encap-range sync-tag sync-tag
                                        no shutdown
                                        srrp
                                        sub-mgmt
```

Example: config>redundancy#
                    config>redundancy# multi-chassis
                    config>redundancy>multi-chassis# peer 10.10.10.2 create
                    config>redundancy>multi-chassis>peer# description "Mc-
                     Lag peer 10.10.10.2"
                    config>redundancy>multi-chassis>peer# mc-lag
                    config>redundancy>mc>peer>mc-lag# lag 1 lacp-key 32666
                     system-id 00:00:00:33:33:33 system-priority 32888
                    config>redundancy>mc>peer>mc-lag# no shutdown
                    config>redundancy>mc>peer>mc-lag# exit
                    config>redundancy>multi-chassis>peer# no shutdown
                    config>redundancy>multi-chassis>peer# exit
                    config>redundancy>multi-chassis# exit
                    config>redundancy#

The following example shows the configuration:

```
A:ALA-48>config>redundancy# info
---------------------------------------------
      multi-chassis
          peer 10.10.10.2 create
              description "Mc-Lag peer 10.10.10.2"
              mc-lag
                   no shutdown
              exit
              no shutdown
          exit
      exit
---------------------------------------------
A:ALA-48>config>redundancy#
```

5.15.3.4   Configuring Mixed Mode

The 7450 mixed mode feature allows a 7450 ESS-7 or ESS-12 chassis to utilize 7750 IOMs, 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 IOMs, MDAs, and IMMs
- Network interface ports must be located 7750 IOMs or IMMs
- Only the 7750 SR IOMs, 7750 SR MDAs, or 7750 SR IMMs can be used in the 7450 ESS slots with SR capabilities enabled.

5.15.3.4.1   Enabling Mixed Mode on a 7450 System

To configure mixed mode support, 7750 SR IOMs, 7750 MDAs, or 7750 SR IMMs must be installed in a 7450 ESS-7 or ESS-12 router that is running SR OS Release 8.0 or later. All network interfaces must be migrated to ports on the 7750 SR 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 SR 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 SR 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 ESS 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 SR-capable cards will have to have 7750 SR capability enabled on all slots with 7750 SR IOMs and IMMs, as well as **mixed-mode** at the system level.

See Table 44 for a description of mixed-mode support.

Note: This table is not intended to be exhaustive, but to provide examples to illustrate the basic principle of mixed versus non-mixed mode operation.

Table 44   **Mixed-Mode Support**

Feature	7450 ESS Standard Mode	7450 ESS Mixed Mode (Limited to 7750 SR IOMs/ 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

5.15.3.5   Configuring Power Supply Parameters

The following is an example for the 7750 SR and 7950 XRS:

```
A:ALA-12>config>system# info
----------------------------------------------------------------
..
        name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        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
..
```

The following is an example for the 7450 ESS:

```
----------------------------------------------------------------
A:ALA-12>config>system# info
----------------------------------------------------------------
..
        name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        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
..
        ----------------------------------------------------------------
A:ALA-12>config>system#
```

5.15.3.6   Configuring ATM System Parameters

The ATM context configures system-wide ATM parameters for the 7750 SR.

CLI Syntax: config>system#
                atm
                      atm-location-id *location-id*
                      oam
                            loopback-period *period*
                            retry-down *retries*
                            retry-up *retries*

Example: config>system# atm
             config>system>atm# atm-location-id
              03:00:00:00:00:00:00:00:00:00: 00:00:00:00:00:00
             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
        oam
            retry-up 3
            retry-down 5
            loopback-period 30
        exit
----------------------------------------------
A:ALA-12>config>system>atm#
```

5.15.3.7   Configuring Backup Copies

The config-backup command allows you to specify the maximum number of backup versions of configuration and index files kept in the primary location.

For example, assume the **config-backup** *count* is set to **5** and the configuration file is called *xyz.cfg.* When a **save** command is executed, the file *xyz.cfg* is saved with a .1 extension. Each subsequent **config-backup** command increments the numeric extension until the maximum count is reached. The oldest file (**5**) is deleted as more recent files are saved.

xyz.cfg
xyz.cfg.1
xyz.cfg.2
xyz.cfg.3
xyz.cfg.4
xyz.cfg.**5**
xyz.ndx

Each persistent index file is updated at the same time as the associated configuration file. When the index file is updated, then the save is performed to *xyz .cfg* and the index file is created as *xyz.ndx*. Synchronization between the active and standby SF/CPMSF/CPM is performed for all configurations and their associated persistent index files.

CLI Syntax: config>system
                config-backup count

Example: config>system#
               config>system# config-backup 7

The following example shows the config-backup configuration.

```
A:ALA-12>config>system>time# info
#----------------------------------------
echo "System Configuration"
#----------------------------------------
        name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
        config-backup 7
...
----------------------------------------------
A:ALA-12>config>system>time#
```

5.15.3.8   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 shows the command output:

```
A:ALA-12>config>system# info
#----------------------------------------
echo "System Configuration"
#----------------------------------------
        name "ALA-12"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
        config-backup 7
        boot-good-exec "ftp://test:test@192.168.xx.xxx/./ok.cfg"
        boot-bad-exec "ftp://test:test@192.168.xx.xxx/./fail.cfg"
        power-supply 1 dc
        power-supply 2 dc
        lacp-system-priority 1
        sync-if-timing
            begin
            ref-order ref1 ref2 bits
..
----------------------------------------------
A:ALA-12>config>system#
```

5.15.3.8.1 Show Command Output and Console Messages

The **show**>**system**>**information** command shows the current value of the bad/good exec URLs and indicates whether a post-boot configuration extension file was executed when the system was booted. If an extension file was executed, the **show**>**system**>**information** command also indicates if it completed successfully or not.

The following is an example for the 7750 SR:

```
ALA-12>config>system#  show system information
===============================================================================
System Information
===============================================================================
System Name            : ALA-12
System Contact         : Fred Information Technology
System Location        : Bldg.1-floor 2-Room 201
System Coordinates     : N 45 58 23, W 34 56 12
System Up Time         : 1 days, 04:59:33.56 (hr:min:sec)

SNMP Port              : 161
SNMP Engine ID         : 0000197f000000000467ff00
SNMP Max Message Size  : 1500
SNMP Admin State       : Disabled
SNMP Oper State        : Disabled
SNMP Index Boot Status : Not Persistent

BOF Source             : 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-L-14.0.B1-217 boot/
i386 Nokia 7750 SR Copyright (c)
                       2000-2016 Nokia.
                      # All rights reserved. All use subject to applicable license
                       agreements.
                      # Built on Wed Jul 13 19:08:56 PDT 2016 by builder in /
                       rel14.0/b1/B1-217/panos/main
Last Boot Index Version: N/A
Last Boot Index Header : N/A
Last Saved Config      : N/A
Time Last Saved        : N/A
Changes Since Last Save: Yes
Time Last Modified     : 2004/03/06 03:30:45
Max Cfg/BOF Backup Rev : 7
Cfg-OK Script          : ftp://test:test@192.168.xx.xxx/./ok.cfg
Cfg-OK Script Status   : not used
Cfg-Fail Script        : ftp://test:test@192.168.xx.xxx/./fail.cfg
Cfg-Fail Script Status : not used

Management IP Addr     : 192.168.xx.xxx/20
DNS Server             : 192.168.1.254
DNS Domain             : eng.timetra.com
BOF Static Routes      :
  To                   Next Hop
  172.16.0.0/22        192.168.1.251
```

```
ICMP Vendor Enhancement: Disabled
ATM Location ID        : 01:00:00:00:00:11:00:00:00:00:00:00:00:00:00:00
===============================================================================
ALA-12>config>system#
```

When executing a post-boot configuration extension file, status messages are output to the CONSOLE screen prior to the "Login" prompt.

Following is an example of a failed 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-L-14.0.B1-217 boot/i386 Nokia 7750 SR Copyright (c) 2000-2016 Nokia.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Jul 13 19:08:56 PDT 2016 by builder in /rel14.0/b1/B1-217/panos/main


Login:
```

5.15.4   System Timing

In the event that network timing is required for the synchronous interfaces in the router, a timing subsystem is utilized to provide a clock to all synchronous interfaces within the system.

This section describes the commands used to configure and control the timing subsystem.

5.15.4.1   Edit Mode

To enter the mode to edit timing references, you must enter the **begin** keyword at the **config**>**system**>**sync-if-timing#** prompt.

Use the following CLI syntax to enter the edit mode:

CLI Syntax: `config>system>sync-if-timing`
                   `begin`

The following error message shows when the you try to modify **sync-if-timing** parameters without entering the keyword **begin**.

```
A:ALA-12>config>system>sync-if-timing>ref1# source-port 2/1/1
MINOR: CLI The sync-if-timing must be in edit mode by calling begin before any
changes can be made.
MINOR: CLI Unable to set source port for ref1 to 2/1/1
A:ALA-12>config>system>sync-if-timing>ref1#
```

5.15.4.2   Configuring Timing References

Use the following CLI syntax to configure timing reference parameters. The source port specified for **ref1** and **ref2** is dependent on the router model type and chassis slot. Refer to the details in the specific command descriptions.

The following shows a timing reference configuration example for the router:

```
ALA-12>config>system>sync-if-timing# info
----------------------------------------------
            ref-order ref2 ref1 bits
            ref1
                source-port 3/1/1
                no shutdown
            exit
            ref2
                source-port 6/1/2
                no shutdown
            exit
            bits
                interface-type ds1 esf
                no shutdown
            exit
----------------------------------------------
ALA-12>config>system>sync-if-timing#
```

5.15.4.3   Using the Revert Command

The **revert** command allows the clock to revert to a higher priority reference if the current reference goes offline or becomes unstable. When the failed reference becomes operational, it is eligible for selection.

When mode is non-revertive, a failed clock source is not selected again. If a node would enter holdover due to the references being in previous failed state, then the node will select one of the previously failed references rather than going into holdover.

CLI Syntax: `config>system>sync-if-timing`
                  `revert`

If the current reference goes offline or becomes unstable the revert command allows the clock to revert to a higher-priority reference.

When revertive switching enabled a valid timing reference of the highest priority is used. If a reference with a higher priority becomes valid, a reference switch over to that reference is initiated. If a failure on the current reference occurs, the next highest reference takes over.

If non-revertive switching is enabled, the valid active reference always remains selected even if a higher priority reference becomes available. If the active reference becomes invalid, a reference switch over to a valid reference with the highest priority is initiated. The failed reference is eligible for selection once it becomes operational.

CLI Syntax: `config>system>sync-if-timing`
                  `no revert`

5.15.4.4   Other Editing Commands

Other editing commands include:

- commit — This command saves changes made to the timing references during a session. Modifications are not persistent across system boots unless this command is entered.
- abort — This command discards changes that have been made to the timing references during a session.

CLI Syntax: `config>system>sync-if-timing`
           `abort`
           `commit`

5.15.4.5 Forcing a Specific Reference

The debug sync-if-timing force-reference command should only be used to test and debug problems. Network synchronization problems may appear if network elements are left with this manual override setting. Once the system timing reference input has been forced, it may be cleared using the **no force-reference** command.

You can force the CPM clock to use a specific input reference using the **force-reference** command.

When the command is executed, the CPM clock on the active CPM immediately switches its input reference to that specified by the command. If the specified input is not available (shutdown), or in a disqualified state, the CPM clock shall use the next qualified input reference based on the selection rules.

This command also affects the BITS output port. If the BITS output port selection is set to line-reference and the reference being forced is not the BITS input port, then the system uses the forced reference to generate the signal out the BITS output port. If the BITS output port selection is set to internal-clock, then the system uses the output of the CPM clock to generate the signal for the BITS output port.

On a CPM activity switch, the force command is cleared and normal reference selection is determined.

Debug configurations are not saved between reboots.

CLI Syntax: ```
debug>sync-if-timing
force-reference {ref1 | ref2 | bits}

debug>sync-if-timing# force-reference
```

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}
```

5.15.5 Configuring System Monitoring Thresholds

5.15.5.1 Creating Events

The **event** command controls the generation and notification of threshold crossing events configured with the **alarm** command. When a threshold crossing event is triggered, the **rmon event** configuration optionally specifies whether an entry in the RMON-MIB log table be created to record the occurrence of the event. It can also specify whether an SNMP notification (trap) be generated for the event. There are two notifications for threshold crossing events, a rising alarm and a falling alarm.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:

CLI Syntax: config>system>thresholds# cflash-cap-warn cf1-B: rising-
                   threshold 2000000 falling-threshold 1999900 interval
                   240 trap startup-alarm either

                   config>system>thresholds# memory-use-alarm rising-
                   threshold 50000000 falling-threshold 45999999 interval
                   500 both startup-alarm either

                   config>system>thresh# rmon

                   config>system>thresh>rmon# event 5 both description
                   "alarm testing" owner "Timos CLI"

The following example shows the command output:

```
A:ALA-49>config>system>thresholds# info
----------------------------------------------
            rmon
                event 5 description "alarm testing" owner "Timos CLI"
            exit
            cflash-cap-warn 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#
```

5.15.5.2   System Alarm Contact Inputs

Alarm contact inputs are physical input pins on the Alarms Interface Port of the CPM
that allow the operator to monitor and report changes in external environmental
conditions. In a remote or outdoor deployment, alarm inputs typically allow an
operator to detect conditions such as whether a door is open or closed, an air
conditioner fault has occurred, and so on.

There are four input pins, each of which can be configured with an associated
severity level and normally open/normally closed state. When an input pin changes
state, the router can generate log events and raise facility alarms.

There is a separate log event for each pin (for example, CHASSIS event 3003
tmnxSasAlarminput3StateChanged for input pin 3). The severity level of input pin 3
is controlled by configuring the severity level of the associated log event (using the
configure log event-control command).

There is also a single +24VDC power output pin on the Alarms Interface Port of the
CPM that can be used to supply power for the alarm inputs.

The alarm inputs can be powered in one of two ways:

- using the +24Vdc power output pin
- using an external power source

The power output pin provided on the CPM is monitored, and the router can report when the power source fails.

If using an external power source for the alarm inputs, then it is recommended that the **normal-state closed** configuration be used so that a failure of the external power source will trigger all the alarm pins to detect a change of state. If **normal-state open** is used, a failure of the external power source will not generate any notifications and the alarm input pins will no longer operate correctly.

5.15.6   Configuring LLDP

The following output shows LLDP defaults:

```
A:testSr1>config>system>lldp# info detail
----------------------------------------------
            no tx-interval
            no tx-hold-multiplier
            no reinit-delay
            no notification-interval
            no tx-credit-max
            no message-fast-tx
            no message-fast-tx-init
            no shutdown
----------------------------------------------
A:testSr1>config>system>lldp#
```

The following example shows an LLDP port configuration:

```
*A:ALA-48>config>port>ethernet>lldp# info
----------------------------------------------
            dest-mac nearest-bridge
                admin-status tx-rx
                tx-tlvs port-desc sys-cap
                tx-mgmt-address system
            exit
----------------------------------------------
*A:ALA-48>config>port>ethernet>lldp#
```

The following example shows a global system LLDP configuration:

```
A:ALA-48>config>system>lldp# info
----------------------------------------------
```

```
                    tx-interval 10
                    tx-hold-multiplier 2
                    reinit-delay 5
                    notification-interval 10
        ---------------------------------------------
        A:ALA-48>config>system>lldp#
```

5.16   System Command Reference

5.16.1   Command Hierarchies

5.16.1.1   Configuration Commands

- System Information Commands
- Satellite Commands
- System Alarm Contact Input Commands
- System Threshold Alarm Commands
- System Bluetooth Commands
- Mixed Mode Configuration Commands
- Persistence Commands
- PTP Commands
- System Time Commands
- Cron Commands
- Script Control Commands
- System Synchronization Commands
- System Administration (Admin) Commands
- High Availability (Redundancy) Commands
- LLDP System Commands
- LLDP Ethernet Port Commands
- System Router Instance Commands

5.16.1.2   System Information Commands

```
config
    — system
        — atm
            — atm-location-id location-id
            — no atm-location-id
            — oam
                — loopback-period period
                — no loopback-period
                — retry-down retries
```

— no **retry-down**
— **retry-up** *retries*
— no **retry-up**
— **boot-bad-exec** *file-url*
— no **boot-bad-exec**
— **boot-good-exec** *file-url*
— no **boot-good-exec**
— **chassis-mode** *chassis-mode* [**force**]
— **clli-code** *clli-code*
— no **clli-code**
— **config-backup** *count*
— no **config-backup**
— **contact** *contact-name*
— no **contact**
— **cpm-http-redirect**
— [no] **optimized-mode**
— **coordinates** *coordinates*
— no **coordinates**
— **dns**
— **address-pref** {**ipv4-only** | **ipv6-first**}
— no **address-pref**
— **dnssec**
— **ad-validation** {**fall-through** | **drop**}
— [no] **ad-validation**
— [no] **enable-icmp-vse**
— **ip**
— [no] **allow-qinq-network-interface**
— [no] **enforce-unique-if-index**
— **lacp-system-priority** *lacp-system-priority*
— no **lacp-system-priority**
— **load-balancing**
— [no] **l2tp-load-balancing**
— [no] **l4-load-balancing**
— **lsr-load-balancing** *hashing-algorithm*
— no **lsr-load-balancing**
— [no] **mc-enh-load-balancing**
— [no] **service-id-lag-hashing**
— [no] **system-ip-load-balancing**
— **location** *location*
— no **location**
— **name** *system-name*
— no **name**
— **port-topology**
— **port** *port-id* **to** *port-id* [**create**]
— no **port** *port-id*
— **power-supply** *power-supply-id type*
— **software-repository** *repository-name* [**create**]
— no **software-repository** *repository-name*
— **description** *description-string*
— no **description**
— **primary-location** *file-url*
— no **primary-location**
— **secondary-location** *file-url*
— no **secondary-location**

— **tertiary-location** *file-url*
— **no tertiary-location**

5.16.1.3   Satellite Commands

config
— **system**
— **satellite**
— **eth-sat** *sat-id* [**create**]
— **no eth-sat** *sat-id*
— **description** *description-string*
— **no description**
— [**no**] **feature** *feature-name*
— **mac-address** *mac-address*
— **no mac-address**
— **port-map** *client-port-id* **primary** *primary-uplink-port-id* [**secondary**
secondary-uplink-port-id]
— **port-map** *client-port-id* **system-default**
— [**no**] **ptp-tc**
— **sat-type** *sat-type* [**port-template** *template-name*]
— **no sat-type**
— [**no**] **shutdown**
— **software-repository** *repository-name*
— **no software-repository**
— [**no**] **sync-e**
— **local-forward** *local-forward-id* [**create**]
— **no local-forward** *local-forward-id*
— **description** *description-string*
— **no description**
— **sap** *sap-id* **create**]
— **no sap** *sap-id*
— **description** *description-string*
— **no description**
— [**no**] **shutdown**
— **port-template** *template-name* **sat-type** *sat-type* [**create**]
— **no port-template** *template-name*
— **description** *description-string*
— **port** *port-id*
— **role** *role-type*
— **uplink** *port-id*
— **uplink system-default**
— **uplink none**
— [**no**] **shutdown**
— **tdm-sat** *sat-id* [**create**]
— **no tdm-sat** *sat-id*
— **description** *description-string*
— **no description**
— **mac-address** *mac-address*
— **no mac-address**
— **sat-type** *sat-type*
— **no sat-type**

— [**no**] **software-repository** *repository-name*
— [**no**] **shutdown**

5.16.1.4 System Alarm Contact Input Commands

config
— **system**
— **alarm-contact-in-power** {**on** | **off**}
— **alarm-contact-input** *input-pin-number*
— **clear-alarm-msg** *message-string*
— **no clear-alarm-msg**
— **description** *description-string*
— **no description**
— **normal-state** {**open** | **closed**}
— [**no**] **shutdown**
— **trigger-alarm-msg** *message-string*
— **no trigger-alarm-msg**

5.16.1.5 System Threshold Alarm Commands

config
— **system**
— **thresholds**
— **cflash-cap-alarm** *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
— **no cflash-cap-alarm** *cflash-id*
— **cflash-cap-alarm-pct** *cflash-id* **rising-threshold** *percentage* [**falling-threshold** *percentage*] **interval** *seconds* [**rmon-event-type** *event-type*] [**startup-alarm** *alarm-type*]
— **no cflash-cap-alarm-pct** *cflash-id*
— **cflash-cap-warn** *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
— **no cflash-cap-warn** *cflash-id*
— **cflash-cap-warn-pct** *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [**rmon-event-type** *rmon-event-type*] [**startup-alarm** *alarm-type*]
— **no cflash-cap-warn-pct** *cflash-id*
— **kb-memory-use-alarm rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
— **no kb-memory-use-alarm**
— **kb-memory-use-warn rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
— **no kb-memory-use-warn**
— **memory-use-alarm rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]

— **no memory-use-alarm**
— **memory-use-warn rising-threshold** *threshold* [**falling-threshold** *threshold*]
    interval *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
— **no memory-use-warn**
— [**no**] **rmon**
    — **alarm** *rmon-alarm-id* **variable-oid** *oid-string* **interval** *seconds* [*sample-type*] [**startup-alarm** *alarm-type*] [**rising-event** *rmon-event-id* **rising-threshold** *threshold*] [**falling-event** *rmon-event-id* **falling-threshold** *threshold*] [**owner** *owner-string*]
    — **no alarm** *rmon-alarm-id*
    — **event** *rmon-event-id* [*event-type*] [**description** *description-string*] [**owner** *owner-string*]
    — **no event** *rmon-event-id*

5.16.1.6   System Bluetooth Commands

config
— **system**
    — **bluetooth**
        — **advertising-timeout** *seconds*
        — **no advertising-timeout**
        — **device** *ieee-address* [**create**]
        — **no device** *ieee-address*
            — **description** *description-string*
            — **no description**
        — **module** *cpm-slot*
            — **identifier** *identifier*
            — **no identifier**
        — **pairing-button** *admin-state*
        — **passkey** *pass-key*
        — **power** *power-state*

5.16.1.7   Mixed Mode Configuration Commands

Note: The commands listed in this section apply only to the 7450 ESS.

config
— **card**
    — **capability** {**sr** | **ess**} [**now**]

config
— **system**

    — [**no**] **mixed-mode**

5.16.1.8　Persistence Commands

➡ **Note:** The commands in this section only apply to the 7750 SR.

config
    — **system**
        — **persistence**
            — **ancp**
                — **description** *description-string*
                — **no description**
                — **location** *cflash-id*
                — **no location**
            — **application-assurance**
                — **description** *description-string*
                — **no description**
                — **location** *cflash-id*
                — **no location**
            — **dhcp-server**
                — **description** *description-string*
                — **no description**
                — **location** *cflash-id*
                — **no location**
            — **nat-port-forwarding**
                — **description** *description-string*
                — **no description**
                — **location** *cflash-id*
                — **no location**
            — **options**
                — **dhcp-leasetime-threshold** [**days** *days*] [**hrs** *hours*] [**min** *minutes*] [**sec** *seconds*]
                — **no dhcp-leasetime-threshold**
            — **python-policy-cache**
                — **description** *description-string*
                — **no description**
                — **location** *cflash-id*
                — **no location**
            — **subscriber-mgmt**
                — **description** *description-string*
                — **no description**
                — **location** *cflash-id*
                — **no location**

5.16.1.9   PTP Commands

Note: The commands in this section apply to the 7450 ESS and 7750 SR, except the 7750 SR-1e, 7750 SR-2e, and 7750 SR-3e.

```
config
    — system
        — ptp
            — anno-rx-timeout count
            — no anno-rx-timeout
            — clock-type boundary
            — clock-type ordinary {master | slave}
            — domain domain-value
            — no domain
            — local-priority priority
            — log-anno-interval log-interval
            — no log-anno-interval
            — network-type {sdh | sonet}
            — peer ip-address [create]
            — no peer ip-address
                — local-priority local-priority
                — log-sync-interval log-interval
                — no log-sync-interval
                — [no] shutdown
            — peer-limit limit
            — no peer-limit
            — port port-id [create]
            — no port port-id
                — address {01:1b:19:00:00:00 | 01:80:c2:00:00:0e}
                — local-priority priority
                — log-delay-interval log-interval
                — no log-delay-interval
                — log-sync-interval log-interval
                — no log-sync-interval
                — master-only {true | false}
                — [no] shutdown
            — priority1 priority-value
            — no priority1
            — priority2 priority-value
            — no priority2
            — profile {g8265dot1-2010 | ieee1588-2008 | g8275dot1-2014}
            — [no] shutdown
```

5.16.1.10   System Time Commands

```
    — admin
        — set-time date time
```

config
— **system**
— **time**
— [**no**] **dst-zone** {*std-zone-name* | *non-std-zone-name*}
— **end** *end-week end-day end-month hours-minutes*
— **offset** *offset*
— **start** *start-week start-day start-month hours-minutes*
— [**no**] **ntp**
— [**no**] **authentication-check**
— **authentication-key** *key-id* **key** *key* [**hash** | **hash2**] **type** {**des** | **message-digest**}
— **no authentication-key** *key-id*
— **broadcast** [**router** *router-name*] {**interface** *ip-int-name*} [**key-id** *key-id*] [**version** *version*] [**ttl** *ttl*]
— **no broadcast** [**router** *router-name*] {**interface** *ip-int-name*}
— **broadcastclient** [**router** *router-instance* | **service-name** *service-name*] {**interface** *ip-int-name*} [**authenticate**]
— **no broadcastclient** [**router** *router-instance* | **service-name** *service-name*] {**interface** *ip-int-name*}
— **multicast** [**key-id** *key-id*] [**version** *version*]
— **no multicast**
— **multicastclient** [**authenticate**]
— **no multicastclient**
— **ntp-server** [**authenticate**]
— **no ntp-server**
— **peer** [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | ipv6-address} [**key-id** *key-id*] [**version** *version*] [**prefer**]
— **no peer** [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | ipv6-address}
— **server** [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | *ipv6-address* | **ptp**} [**key-id** *key-id*] [**version** *version*] [**prefer**]
— **no server** [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | *ipv6-address* | **ptp**}
— [**no**] **shutdown**
— [**no**] **prefer-local-time**
— [**no**] **sntp**
— [**no**] **broadcast-client**
— **server-address** *ip-address* [**version** *version-number*] [**normal** | **preferred**] [**interval** *seconds*]
— **no server-address** *ip-address*
— [**no**] **shutdown**
— **zone** {*std-zone-name* | *non-std-zone-name*} [*hh* [*:mm*]]
— **no zone**

5.16.1.11 Cron Commands

config
— **system**
— **cron**
— [**no**] **schedule** *schedule-name* [**owner** *schedule-owner*]

— **count** *number*
— **no count**
— **day-of-month** {*day-number* [*..day-number*] | **all**}
— **no day-of-month**
— **description** *description-string*
— **no description**
— **end-time** [*date* | *day-name*] *time*
— **no end-time**
— **hour** {*hour-number* [*..hour-number*] | **all**}
— **no hour**
— **interval** *seconds*
— **no interval**
— **minute** {*minute-number* [*..minute-number*] | **all**}
— **no minute**
— **month** {*month-number* [*..month-number*] | *month-name* [*..month-name*] | **all**}
— **no month**
— **script-policy** *policy-name* [**owner** *policy-owner*]
— **no script-policy**
— [**no**] **shutdown**
— **type** *schedule-type*
— **weekday** {*weekday-number* [*..weekday-number*] | *day-name* [*..day-name*] | **all**}
— **no weekday**

5.16.1.12   Script Control Commands

config
— **system**
 — **script-control**
  — [**no**] **script** *script-name* [**owner** *script-owner*]
   — **description** *description-string*
   — **no description**
   — **location** *file-url*
   — **no location**
   — [**no**] **shutdown**
  — [**no**] **script-policy** *policy-name* [**owner** *policy-owner*]
   — **expire-time** {*seconds* | **forever**}
   — **lifetime** {*seconds* | **forever**}
   — **max-completed** *unsigned*
   — **results** *file-url*
   — **no results**
   — **script** *script-name* [**owner** *script-owner*]
   — **no script**
   — [**no**] **shutdown**

5.16.1.13   System Synchronization Commands

```
config
    — system
        — sync-if-timing
            — abort
            — begin
            — bits
                — input
                    — [no] shutdown
                — interface-type {ds1 [{esf | sf}] | e1 [{pcm30crc | pcm31crc}]}
                — no interface-type
                — output
                    — line-length {110 | 220 | 330 | 440 | 550 | 660}
                    — ql-minimum {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub
                          | sec | eec1 | eec2}
                    — no ql-minimum
                    — [no] shutdown
                    — source {line-ref | internal-clock}
                    — [no] squelch
                — ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec}
                — no ql-override
                — ssm-bit sa-bit
            — commit
            — ptp
                — ql-override {prs | stu | st2 | tnc |st3e | st3 | prc | ssua | ssub | sec}
                — no ql-override
                — [no] shutdown
            — ql-minimum {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec | eec1 |
                  eec2}
            — no ql-minimum
            — [no] ql-selection
            — ref-order first second [third [fourth]]
            — 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 | prc | ssua | ssub | sec |
                      eec1 | 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 | prc | ssua | ssub | sec |
                      eec1 | 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**] **revert**
— **wait-to-restore** *minutes*
— **no wait-to-restore**

5.16.1.14   System Administration (Admin) Commands

— **admin**
 — **application-assurance**
  — **group** *aa-group-id*
   — **url-list** *url-list-name* **upgrade**
  — **upgrade**
 — **debug-save** [*file-url*]
 — **disconnect** [**address** *ip-address* | **session-id** *session-id* | **username** *user-name* | {**console** | **bluetooth** | **telnet** | **ftp** | **ssh** | **netconf** | **grpc**}]
 — **display-config** [**detail** | **index**]
 — [**no**] **enable-tech**
 — **nat**
  — **save-deterministic-script**
 — **reboot** [**active** | **standby** | **upgrade**] [**hold**] [**now**]
 — **redundancy**
  — **force-switchover** [**now**] [**ignore-status**]
  — **rollback-sync**
  — **synchronize cert**
  — **synchronize** {**boot-env** | **config**}
 — **reset-policy-exclusive**
 — **satellite** [**eth-sat** *sat-id*] **reboot** [**upgrade**] [**now**]
 — **satellite** [**eth-sat** *sat-id*] [**sync-boot-env**]
 — **satellite** [**eth-sat** *sat-id*] [**tech-support** *file-url*]
 — **save** [*file-url*] [**detail**] [**index**]
 — **tech-support** [*file-url*]

admin
 — **system**
  — **license**
   — **activate** [*file-url*] [**now**]
   — **validate** [*file-url*]

config
 — **system**
  — **security**
   — **tech-support**
    — **ts-location** *file-url*

5.16.1.15 High Availability (Redundancy) Commands

- **admin**
    - **display-config** [**detail** |**index**]
    - **redundancy**
        - **force-switchover** [**now**] [**ignore-status**]
        - **rollback-sync**
        - **synchronize** **cert**
        - **synchronize** {**boot-env** | **config**}

config
- **system**
    - **switchover-exec** *file-url*
    - **no** **switchover-exec**
- **redundancy**
    - **bgp-evpn-multi-homing**
        - **boot-timer** *seconds*
        - **es-activation-timer** *seconds*
    - **bgp-multi-homing**
        - **boot-timer** *seconds*
        - **no** **boot-timer**
        - **site-activation-timer** *seconds*
        - **no** **site-activation-timer**
        - **site-min-down-timer** *min-down-time*
        - **no** **site-min-down-timer**
    - [**no**] **cert-sync**
    - **mgmt-ethernet** [**revert** *seconds*]
    - **no** **mgmt-ethernet**
    - **multi-chassis**
        - **peer** *ip-address* [**create**]
        - **no** **peer** *ip-address*
            - **authentication-key** [*authentication-key* | *hash-key*] [**hash** | **hash2**]
            - **no** **authentication-key**
            - **description** *description-string*
            - **no** **description**
            - [**no**] **mc-endpoint**
                - [**no**] **bfd-enable**
                - **boot-timer** *interval*
                - **no** **boot-timer**
                - **hold-on-neighbor-failure** *multiplier*
                - **no** **hold-on-neighbor-failure**
                - **keep-alive-interval** *interval*
                - **no** **keep-alive-interval**
                - [**no**] **passive-mode**
                - [**no**] **shutdown**
                - **system-priority** *value*
                - **no** **system-priority**
            - [**no**] **mc-lag**
                - **hold-on-neighbor-failure** *multiplier*
                - **no** **hold-on-neighbor-failure**
                - **keep-alive-interval** *interval*
                - **no** **keep-alive-interval**

— **lag** *lag-id* **lacp-key** *admin-key* **system-id** *system-id* [**remote-lag** *remote-lag-id*] **system-priority** *system-priority* **source-bmac-lsb use-lacp-key**
— **lag** *lag-id* **lacp-key** *admin-key* **system-id** *system-id* [**remote-lag** *remote-lag-id*] **system-priority** *system-priority* **source-bmac-lsb** *MAC-Lsb*
— **lag** *lag-id* **lacp-key** *admin-key* **system-id** *system-id* [**remote-lag** *remote-lag-id*] **system-priority** *system-priority*
— **lag** *lag-id* [**remote-lag** *remote-lag-id*]
— no **lag** *lag-id*
— [no] **shutdown**
— **peer-name** *name*
— no **peer-name**
— [no] **shutdown**
— **source-address** *ip-address*
— no **source-address**
— [no] **sync**
— [no] **diameter-proxy**
— [no] **igmp**
— [no] **igmp-snooping**
— [no] **ipsec**
— [no] **l2tp**
— [no] **local-dhcp-server**
— [no] **mc-ring**
— [no] **mld-snooping**
— **pim-snooping** [**sap**s] [**spoke-sdps**]
— [no] **pim-snooping**
— **port** *port-id* [**sync-tag** *sync-tag*] [**create**]
— no **port** *port-id*
— **range** *encap-range* **sync-tag** *sync-tag*
— no **range** *encap-range*
— [no] **python**
— **sdp** *sdp-id* [**sync-tag** *sync-tag*] [**create**]
— [no] **sdp** *sdp-id*
— **range** *vc-id-range* **sync-tag** *sync-tag*
— [no] **range** *vc-id-range*
— [no] **shutdown**
— [no] **srrp**
— [no] **sub-host-trk**
— **sub-mgmt** [**ipoe**] [**pppoe**]
— no **sub-mgmt**
— **warm-standby**
— [no] **rollback-sync**
— **synchronize** {**boot-env** | **config**}

5.16.1.16   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**

5.16.1.17   LLDP Ethernet Port Commands

configure
— **port** *port-id*
— **ethernet**
— **lldp**
— **dest-mac** {**nearest-bridge** | **nearest-non-tpmr** | **nearest-customer**}
— **admin-status** {**rx** | **tx** | **tx-rx** | **disabled**}
— [**no**] **notification**
— **port-id-subtype** {**tx-if-alias** | **tx-if-name** | **tx-local**}
— [**no**] **tunnel-nearest-bridge**
— **tx-mgmt-address** [**system**] [**system-ipv6**]
— no **tx-mgmt-address**
— **tx-tlvs** [**port-desc**] [**sys-name**] [**sys-desc**] [**sys-cap**]
— no **tx-tlvs**

5.16.1.18   System Router Instance Commands

config
— **router** [*router-instance*] [**create**]
— no **router** [*router-instance*]

5.16.2   System Command Reference

5.16.2.1   Generic Commands

shutdown

Syntax   [**no**] **shutdown**

Context   config>system>cron>sched
config>system>satellite>local-forward>sap
config>system>satellite>port-template
config>system>time>ntp
config>system>time>sntp
config>system>script-control>script-policy
config>system>script-control>script
config>system>sync-if-timing>ref1
config>system>sync-if-timing>ref2
config>system>sync-if-timing>ptp
config>system>sync-if-timing>bits>input
config>system>sync-if-timing>bits>output
config>system>persistence>app-assure
config>system>persistence>dhcp-server
config>system>persistence>nat-port-forward
config>system>persistence>python-policy-cache
config>system>persistence>subscriber-mgmt
config>redundancy>multi-chassis>peer
config>redundancy>multi-chassis>peer>mc-lag
config>redundancy>multi-chassis>peer>sync
config>redundancy>mc>peer>mcr>node>cv
config>system>lldp
config>redundancy>multi-chassis>peer>mc-ep

Description   This command administratively disables the entity. When disabled, an entity does not
change, reset, or remove any configuration settings or statistics.

The operational state of the entity is disabled as well as the operational state of any entities
contained within. Many objects must be shut down before they may be deleted.

The **no** form of this command places the entity into an administratively enabled state.

Default   shutdown

description

Syntax	**description** *description-string* **no description**
Context	config>redundancy>multi-chassis>peer config>system>cron>sched config>system>persistence>ancp config>system>persistence>app-assure config>system>persistence>dhcp-server config>system>persistence>nat-fwd config>system>persistence>python-policy-cache config>system>persistence>sub-mgmt config>system>script-control>script
Description	This command creates a text description stored in the configuration file for a configuration context. The **description** command associates a text string with a configuration context to help identify the content in the configuration file. The **no** form of this command removes the string from the configuration.
Default	no description
Parameters	*string* — Specifies the description character string. Allowed values are any string up to 80 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

5.16.2.2   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* **no atm-location-id**

Context	config>system>atm
Description	This command indicates the location ID for ATM OAM.
	Refer to the *7450 ESS, 7750 SR, 7950 XRS, and VSR Services Overview Guide* for information about ATM QoS policies and ATM-related service parameters.
Default	no atm-location-id
Parameters	*location-id* — Specifies the 16 octets that identifies the system loopback location ID as required by the ATM OAM Loopback capability. This textual convention is defined in ITU-T standard I.610. The loopback location ID should be entered in the following format: xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx.
	Invalid values include a location ID where the first octet is: 00, FF, 6A Acceptable *location-ids* include values where the first octet is: 01, 03 Other values are not accepted.

oam

Syntax	**oam**
Context	config>system>atm
Description	This command configures system-wide ATM parameters.

loopback-period

Syntax	**loopback-period** *period* **no loopback-period**
Context	config>system>atm>oam
Description	This command specifies the number of seconds between periodic loopback attempts on an ATM endpoint that has periodic loopback enabled.
Default	no loopback-period
Parameters	*period* — Specifies the time, in seconds, between periodic loopback attempts.
	Values 1 to 40
	Default 10

retry-down

Syntax	**retry-down** *retries* **no retry-down**

Context	config>system>atm>oam
Description	This command specifies the number of OAM loopback attempts that must fail after the periodic attempt before the endpoint will transition to AIS-LOC state.

The retry values are configured on a system wide basis and are affective on the next period cycle of any ATM VC SAP using **periodic-loopback**, if changed. The timeout for receiving a loopback response from the remote peer and declaring the loopack failed is 1 second and is not configurable.

Default	no retry-down	
Parameters	*retries* — Specifies the number of failed loopback attempts before an ATM VC goes down.	
	Values	0 to 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.	
Default	no retry-up	
Parameters	*retries* — Specifies the number of successful loopback replies before an ATM VC goes up.	
	Values	0 to 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**).

Related Commands

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

Default no boot-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.

Ipv6-address only applies to the 7750 SR and 7950 XRS.

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 to FFFF]H
		d - [0 to 255]D
		interface - 32 chars max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:	

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.

Related Commands

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

Default no boot-good-exec

Parameters   *file-url* — Specifies the location and name of the file executed following successful completion of the boot-up configuration file execution. When this parameter is not specified, no CLI script file is executed.

Ipv6-address only applies to the 7750 SR and 7950 XRS and ipv4-address applies to the 7450 ESS.

Values

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 to FFFF]H
		d - [0 to 255]D
		interface - 32 chars max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:	

chassis-mode

Syntax   **chassis-mode** *chassis-mode* [**force**]

Context   config>system

Description   This command is retained for historic reasons, and was used to control the set of features and scaling available based on the variants of IOMs present in the node. As of release 15.0, the set of supported IOMs no longer requires this differentiation using this command. The command still exists but the mode is fixed at **chassis mode d**.

Default   chassis-mode d

Parameters   *chassis-mode* — Specifies the chassis modes:

d: This mode corresponds to scaling and feature set associated with iom3-xp.

force — Forces an upgrade from a lesser scaling and feature set to a greater one.

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 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	no clli-code
Parameters	*clli-code* — Specifies the 11 character string CLLI code. Any printable, seven bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes. If more than 11 characters are entered, the string is truncated. If less than 11 characters are entered the string is padded with spaces.

config-backup

Syntax	**config-backup** *count* **no config-backup**
Context	config>system
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   no config-backup

Parameters   *count* — Specifies the maximum number of backup revisions.

        Values   1 to 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   no contact

Parameters   *contact-name* — Specifies the contact name character string. The string can be up to 80 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

cpm-http-redirect

Syntax   **cpm-http-redirect**

Context   config>system

Description   This command enables the context to configure **cpm-http-redirect** settings for enabling or disabling the **optimized-mode**.

optimized-mode

Syntax   [**no**] **optimized-mode**

Context   config>system>cpm-http-redirect

Description   This command enables the **cpm-http-redirect optimized-mode**. The **optimized-mode** improves the scale of HTTP redirect sessions supported system wide.

Default   optimized-mode

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.
Parameters	*coordinates* — Specifies the coordinates describing the device location character string. The string may be up to 80 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, 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. IPv6 applies only to the 7750 SR and 7950 XRS.
Default	address-pref ipv4-only

dnssec

Syntax   **dnssec**

Context   config>system>dns

Description   This command configures system Domain Name System Security Extensions (DNSSEC) settings.

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   no ad-validation

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.

Default   no enable-icmp-vse

ip

Syntax   **ip**

Context	config>system
Description	This command configures system-wide IP router parameters.

allow-qinq-network-interface

Syntax	[**no**] **allow-qinq-network-interface**
Context	config>system>ip
Description	This command is a system-wide option that allows the creation of network interfaces on a QinQ encapsulated VLAN.
	When enabled, the maximum number of allowed MPLS labels is reduced by 1 to allow for the additional VLAN tag at egress processing.
	The **no** form of this command reverts the option to the default value, which is to not allow network interfaces on QinQ encapsulated VLANs.
Default	no allow-qinq-network-interface

enforce-unique-if-index

Syntax	[**no**] **enforce-unique-if-index**
Context	config>system>ip
Description	This command enables the options to force the creation of IP interface indexes so that they are globally unique across all routing contexts. In addition, the command ensures that any interface created using SNMP also has a system-wide unique IP interface index.
	If this command is issued but the system has previously existing interface indexes that conflict, the command will be rejected until all the conflicts are removed. Pre-existing persistency tables should also be removed before enabling this system option.
	The **no** form of the command disables this option and returns the system to the default behavior.
Default	no enforce-unique-if-index

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   lacp-system-priority 32768

Parameters   *lacp-system-priority* — Specifies the LACP system priority.

      Values   1 to 65535

load-balancing

Syntax **load-balancing**

Context config>system

Description This command enables the load-balancing context to configure the interface per-flow load balancing options that will apply to traffic entering this interface and egressing over a LAG/ECMP on system-egress. This is a per interface setting. For load-balancing options that can also be enabled on the system level, the options enabled on the interface level overwrite system level configurations.

l2tp-load-balancing

Syntax [**no**] **l2tp-load-balancing**

Context config>system>load-balancing

Description This command enables the inclusion of the L2TPv2 session ID into the load-balancing hash algorithm to induce more variation and better load distribution over available links and next-hops.

The **no** form of this command disables the inclusion of the session-id.

l4-load-balancing

Syntax [**no**] **l4-load-balancing**

Context config>system>load-balancing

Description This command configures system-wide Layer 4 load balancing. The configuration at the system level can enable or disable load balancing based on Layer 4 fields. If enabled, the Layer 4 source and destination port fields will be included in hashing calculation for TCP/UDP packets.

The hashing algorithm addresses finer spraying granularity where many hosts are connected to the network.

To address more efficient traffic distribution between network links (forming a LAG group), a hashing algorithm extension takes into account L4 information (that is, src/dst L4-protocol port).

The hashing index can be calculated according to the following algorithm:

```
If [(TCP or UDP traffic) & enabled]
    hash (TCP/UDP ports, IP addresses)
else if (IP traffic)
    hash (IP addresses)
```

```
        else
            hash (MAC addresses)
        endif
```

This algorithm will be used in all cases where IP information in per-packet hashing is included (refer to "LAG and ECMP Hashing" in the *7450 ESS, 7750 SR, 7950 XRS, and VSR Interface Configuration Guide*). However, the Layer 4 information (TCP/UDP ports) will not be used for fragmented packets.

Default   no l4-load-balancing

lsr-load-balancing

Syntax   **lsr-load-balancing** *hashing-algorithm*
no lsr-load-balancing

Context   config>system>load-balancing

Description   This command configures system-wide LSR load balancing. Hashing can be enabled on the label stack and/or IP header at an LSR for spraying labeled IP packets over multiple equal cost paths and/or over multiple links of a LAG group.

The LSR hash routine operates on the label stack and the IP header if a packet is IPv4. An LSR will consider a packet to be IPv4 if the first nibble following the bottom of the label stack is 4. The hash on label and IPv4 and IPv6 headers can be enabled or disabled at the system level or incoming network IP interface level.

Default   no lsr-load-balancing

Parameters   **lbl-only** — Specifies that only the label is used in the hashing algorithm

lbl-ip — Specifies that the IP header is included in the hashing algorithm

ip-only — Specifies that the IP header is used exclusively in the hashing algorithm

eth-encap-ip — Specifies that the hash algorithm parses down the label stack (up to 3 labels supported) and once it hits the bottom, the stack assumes Ethernet II non-tagged header follows. At the expected Ethertype offset location, the algorithm checks whether the value present is IPv4/v6 (0x0800 or 0x86DD). If the check passes, the hash algorithm checks the first nibble at the expected IP header location for IPv4/IPv6 (0x0100/0x0110). If the secondary check passes, the hash is performed using IP SA/DA fields in the expected IP header; if any of the checks fail, the label-stack hash is performed.

lbl-ip-l4-teid — Specifies that this hashing algorithm hashes based on label, IP header, Layer 4 header and GTP header (TEID) in order. The algorithm uses all the supported headers that are found in the header fragment of incoming traffic.

mc-enh-load-balancing

Syntax   [no] **mc-enh-load-balancing**

Context   config>system>load-balancing

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. That is, an ingress LER or IP PE will spray traffic based on the IP hash criteria: SA/DA + optional Layer 4 port + optional system IP egress LER or LSR - will spray traffic based on label or IP hash criteria outlined above or both based on configuration of lsr-load-balancing, l4-load-balancing, and system-ip-load-balancing.

The **no** form of the command preserves the default behavior for per flow hashing of multicast traffic.

Default   no mc-enh-load-balancing

service-id-lag-hashing

Syntax   [no] **service-id-lag-hashing**

Context   config>system>load-balancing

Description   This command enables enhanced VLL LAG service ID hashing. This command improves the LAG spraying of VLL service packets and is applied only when both ECMP and LAG hashing are performed by the same router. By default, the ECMP interface and LAG link for all packets on the VLL service are selected based on a direct modulo operation of the service ID. This command enhances distribution and hashes the service ID prior to the LAG link modulo operation when an ECMP link modulo operation is performed.

The **no** form of the command preserves the default behavior of VLL LAG service ID hashing.

Default   no service-id-lag-hashing

system-ip-load-balancing

Syntax   [no] **system-ip-load-balancing**

Context   config>system>load-balancing

Description   This command enables the use of the system IP address in the ECMP hash algorithm to add a per system variable. This can help guard against cases where multiple routers, in series, will end up hashing traffic to the same ECMP/LAG path.

This command is set at a system wide basis, however if certain IOMs do not support the new load-balancing algorithm, they will continue to use the default algorithm. By default, the IPv4 system IP address is used in the hash algorithm. When no IPv4 system IP address is configured, the IPv6 system IP address, when configured, is used in the hash algorithm.

The **no** form of the command resets the system wide algorithm to default.

Default   no system-ip-load-balancing

location

Syntax   **location** *location*
no location

Context   config>system

Description   This command creates a text string that identifies the system location for the device.

Only one location can be configured. If multiple locations are configured, the last one entered overwrites the previous entry.

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

Parameters   *location* — Specifies the location as a character string. The string may be up to 80 characters. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, 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   no name

Parameters   *system-name* — Specifies the system name as a character string. The string may be up
to 32 characters. Any printable, seven-bit ASCII characters can be used within the
string. If the string contains special characters (#, $, spaces, etc.), the entire string
must be enclosed within double quotes.

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   no switch-over-exec

Parameters   *file-url* — Specifies the location and name of the CLI script file.

Values

*local-url	remote-url*	
local-url	[*cflash-id*/][*file-path*] 200 chars max, including cflash-id directory length 99 chars max each
remote-url	[{ftp://	tftp://}*login:pswd@remote-locn*/][*file-path*] 243 chars max directory length 99 chars max each
remote-locn	[*hostname	ipv4-address	ipv6-address*]
ipv4-address	a.b.c.d
ipv6-address	x:x:x:x:x:x:x:x[-*interface*]
	x:x:x:x:x:x:d.d.d.d[-*interface*]
	x - [0 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

port-topology

Syntax	**port-topology**
Context	config>system
Description	This parameter creates or edits the context to configure intra-node port connections.
Default	disabled

port

Syntax   **port** *port-id* **to** *port-id* [**create**]
         no port *port-id*

Context   config>system>port-topology

Description   This command is used for satellites. It identifies to the SR OS that there is an internal connection between two ports.

Permitted pairings of the two ports are:

First port	**Second port**
Router port	Satellite uplink port
Satellite uplink port	Router port

For satellites, this command configures the binding between a host port ID and the satellite uplink from the satellite chassis. The port topology can be configured with the host connected to a satellite uplink or the satellite uplink port connected to the specified host port. Both configurations are supported, as shown in the following examples:

```
*A:Dut-A# configure system port-topology port esat-1/1/u4 to 1/2/2 create
*A:Dut-A# configure system port-topology no port esat-1/1/u4
*A:Dut-A# configure system port-topology port 1/2/2 to esat-1/1/u4 create
*A:Dut-A# configure system port-topology no port 1/2/2
```

The **no** form of the command removes the internal connection.

Default   no port port-id

Parameters   *port-id* — Specifies one port of an internal port connection. These ports can be router ports or Ethernet satellite uplink ports. Acceptable pairings are defined in the command description.

> **Values**
>
> *port-id*   (Router port)
>   *slot*/*mda*/*port*

	slot	The slot number of the card in the chassis. The maximum slot number is platform dependent. Refer to the *Install* Guides for more information.
	mda	[1 to 2]
	port	[1 to 160] (depending on the MDA type)

(Ethernet satellite uplink port)

esat-*id*/*slot*/**u***port*

	esat	keyword
	id	[1 to 20]
	slot	[1]
	u	keyword for up-link port
	port	[1 to 4]

create — Specifies the keyword required to create the binding between the two ports.

power-supply

Syntax   **power-supply** *power-supply-id type*

Context   config>system

Description   This command configures information about the type of power supply used for each power feed connection on the router chassis. The information is used to populate queries made using the **show**>**chassis detail** and **show**>**chassis power-supply** commands.

Parameters   *power-supply-id* — Specifies the power feed connection.

    Values   1, 2

type — Specifies the type of power source that is connected to the power feed connection.

    Values   dc — Specifies that a single DC power source is connected to the power feed connector.

              ac single — Specifies that a single AC power source is connected to the power feed connector.

              ac multiple — Specifies that multiple AC power sources are connected to the power feed connector.

              default — Reverts the configured information to the default power source type for the chassis.

none — Specifies that no power source is connected to the power feed connector.

satellite

Syntax   **satellite**

Context   config>system

Description   This command enables the satellite configuration context. Within the satellite context, the administrator can specify the configuration details for a satellite chassis that is hosted by the associated local system.

eth-sat

Syntax   **eth-sat** *sat-id* [**create**]
no eth-sat *sat-id*

Context   config>system>satellite

Description   This command enables the specified Ethernet satellite configuration context.

The **no** form of the command deletes the specified Ethernet satellite.

Parameters   *sat-id* — Specifies the satellite ID for the associated Ethernet satellite.

   Values   1 to 20

   create — Creates a new Ethernet satellite context.

feature

Syntax   [**no**] **feature** *feature-name*

Context   config>system>satellite>eth-sat

Description   This command enables specific satellite functionality that may have specific satellite requirements, such as software version.

The **no** form of this command disables the specific satellite functionality.

Parameters   *feature-name* — Specifies the functionality to enable.

   Values   local-forward

   Values   transparent-clock-eth

local-forward

Syntax	**local-forward** *local-forward-id* [**create**] **no local-forward** *local-forward-id*
Context	config>system>satellite
Description	This command creates a local-forward instance.
	A local-forward instance creates a traffic bypass within the Ethernet satellite, which allows traffic to be forwarded between satellite client ports.
	The **no** form of this command deletes the specified local-forward instance.
Parameters	**local-forward-id** — Specifies the ID number for the local-forward instance.

> **Values**   1 to 10240

create — Creates a new local-forward instance.

sap

Syntax	**sap** *sap-id* [**create**] **no sap** *sap-id*
Context	config>system>satellite>local-forward
Description	This command configures a satellite access point in the local-forward instance.
	The **no** form of this command removes the satellite access point from the local-forward instance.
Parameters	*eth-sat-id* — esat-*id*/*slot*/*port*

> **Values**
>
> | | |
> |---|---|
> | esat | keyword |
> | id | 1 to 20 |

lag-id — **lag**-*id*

> **Values**
>
> | | |
> |---|---|
> | lag | keyword |
> | id | 1 to 800 |

qtag1 — Specifies the qtag value.

> **Values**   1 to 4094

port-template

Syntax	**port-template** *template-name* **sat-type** *sat-type* [**create**] **no port-template** *template-name*
Context	config>system>satellite
Description	This command creates a new port template context to define the port usage for a specific satellite type. A port template is specific to the specified satellite type. Port templates must be configured separately using different template names for each different satellite chassis type.
	The **no** form of this command deletes the specified port template.
Parameters	*template-name* — Specifies the name for the associated port template. This value must be unique in the network.
	sat-type — Specifies the type of satellite chassis associated with the port-template.

> **Values**   es24-1gb-sfp, es24-1gb-tx, es24-sass-1gb-sfp, es48-1gb-sfp, es48-1gb-tx, es48-sass-1gb-sfp, es64-10gb-sfpp+4-100gb-cfp4, es24-sasmxp-1gb-sfp

> **create** — Creates a new port template.

port

Syntax	**port** *port-id*
Context	config>system>satellite>port-template
Description	This command specifies the satellite port to be reconfigured.
	The **no** form of this command deletes the specified port configuration.
Parameters	*port-id* — Specifies the satellite physical port ID. This must use the format *slot*/*mda*/*port*. Currently, all satellites have a single slot and a single MDA, so these values will always be 1. For example, port 10 would be specified as 1/1/10.

role

Syntax	**role** *role-type*
Context	config>system>satellite>port-template>port
Description	This command configures the role that the associated port is to take on.
Parameters	**none** — Clears the role association for the associated port.
	uplink — Specifies that the associated satellite port is assigned the role of an uplink port.

       3HE 14127 AAAB TQZZA 01   Issue: 01

client — Specifies that the associated satellite port is assigned the role of a satellite client port.

system-default — Specifies that the associated satellite port is returned to the system default.

uplink

Syntax
uplink *port-id*
uplink system-default
uplink none

Context
config>system>satellite>port-template>port

Description
This command configures the uplink association to be used for the associated satellite port.

Parameters
port-id — Specifies the satellite physical port ID. This must use the format *slot*/*mda*/*port*. All satellites have a single slot and a single MDA, so these values will always be 1. For example, port 10 would be specified as 1/1/10.

system-default — Specifies that the uplink association is returned to the system default.

none — Clears the uplink association.

tdm-sat

Syntax
tdm-sat *sat-id* [**create**]
no tdm-sat *sat-id*

Context
config>system>satellite

Description
This command enters the specified TDM satellite configuration context.

The **no** form of the command deletes the specified TDM satellite.

Parameters
sat-id — Specifies the satellite ID for the associated TDM satellite.

    Values   1 to 20

create — Creates a new TDM satellite context.

description

Syntax
description *description-string*
no description

Context
config>system>satellite>eth-sat
config>system>satellite>local-forward

config>system>satellite>local-forward>sap
config>system>satellite>port-template
config>system>satellite>tdm-sat

Description This command defines a description string for the associated satellite.

The **no** form of the command deletes the associated description string.

Default no description

Parameters *description-string* — Specifies the satellite description, up to 80 characters.

mac-address

Syntax **mac-address** *mac-address*
no mac-address

Context config>system>satellite>eth-sat
config>system>satellite>tdm-sat

Description This command configures the MAC address for the associated satellite chassis. This MAC address is used to validate the identity of an satellite that attempts to associate with the local host.

The **no** form of the command deletes the MAC address for the associated satellite.

Parameters *mac-address* — Specifies the MAC address of the associated satellite chassis; do not use a broadcast or multicast MAC. Enter the MAC address in either of the following formats: xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx.

port-map

Syntax **port-map** *client-port-id* **primary** *primary-uplink-port-id* [**secondary** *secondary-uplink-port-id*]
port-map *client-port-id* **system-default**

Context config>system>satellite>eth-sat

Description This command configures the mapping between a satellite client port and its associated uplink. This command allows both a primary and an optional secondary uplink to be configured.

If a secondary uplink is configured, it is used to forward traffic if the primary uplink is down for any reason.

Before an uplink can be used as either a primary or secondary uplink, it must be configured using the **port-topology** configuration command.

To return the uplink association to its default the **port-map** *client-port-id* **system-default** command should be used.

Parameters   *client-port-id* — Specifies the satellite client port associated with the port mapping, in the format **esat**-*id*/*slot*/*port*.

primary-uplink-port-id — Specifies the primary satellite uplink to be associated with the associate client port, in the format **esat**-*id*/*slot*/**u**port* where *id* is 1 to 20.

secondary-uplink-port-id — Specifies the secondary satellite uplink to be associated with the associate client port, in the format **esat**-*id*/*slot*/**u**port* where *id* is 1 to 20.

system-default — Specifies to set the port map to the system default.

ptp-tc

Syntax   [**no**] **ptp-tc**

Context   config>system>satellite>eth-sat

Description   This command enables the ethernet satellite IEEE1588 transparent clock function. This provides increased accuracy on the PTP event messages transiting the satellite. When a IEEE1588 event message transits the ethernet satellite, the correction field of the message is updated with the residence time of that message. This is used in PTP time calculations. The ethernet satellite shall perform the transparent clock function on PTP messages with Ethernet and UDP/IP encapsulation. All ports of the satellite are enabled for this capability with the one setting. This feature must be enabled to allow the assignment of one of the satellite's client ports as a PTP port under **config>system>ptp>port**. Only PTP using Ethernet encapsulation is supported from the host.

To enable this command, the satellite must have first been configured to support the feature using the **config>system>satellite>eth-sat>feature transparent-clock-eth** and must have been enabled for synchronous ethernet with **config>system>satellite>eth-sat>sync-e**.

All host ports connecting to this satellite must support 1588 port-based timestamping.

The **no** version of this command disables the specific satellite functionality.

Default   no ptp-tc

sat-type

Syntax	**sat-type** *sat-type* [**port-template** *template-name*]
	no sat-type
Context	config>system>satellite>eth-sat
	config>system>satellite>tdm-sat
Description	This command configures the type of satellite variant for the associated satellite chassis.
	The **no** form of the command deletes the **sat-type** configuration.
Default	no sat-type
Parameters	*sat-type* — Specifies the satellite type. Configuration of the following variants is supported:

        es24-1gb-sfp — Specifies the 24xGE (SFP) + 4x10GE Ethernet satellite.

        es48-1gb-sfp — Specifies the 48xGE (SFP) + 4x10GE Ethernet satellite.

        es24-sass-1gb-sfp — Specifies the SAS-S 24xGE (SFP) + 4x10GE Ethernet satellite.

        es48-sass-1gb-sfp — Specifies the SAS-S 48xGE (SFP) + 4x10GE Ethernet satellite.

        es24-1gb-tx — Specifies the 24xGE (copper) + 4x10GE Ethernet satellite.

        es48-1gb-tx — Specifies the 48xGE (copper) + 4x10GE Ethernet satellite.

        es24-1gb-tx — Specifies the 24-port copper + PoE Ethernet satellite.

        es48-1gb-tx — Specifies the 48-port copper + PoE Ethernet satellite.

        es64-10gb-sfpp+4-100gb-cfp4 — Specifies the 64x10GE + 4x100GE Ethernet satellite.

        es64-10gb-sfpp+4-100gb-qsfp28 — Specifies the 64x10GE + 4xQSFP28 Ethernet satellite.

        es24-sasmxp-1gb-sfp — Specifies the 7210 SAS-Mxp as an ethernet satellite.

        ts4-choc3-sfp — Specifies the 4-port OC3 TDM satellite.

        ts4-chstm1-sfp — Specifies the 4-port STM1 TDM satellite.

        ts1-choc12-sfp — Specifies the 1-port OC12 TDM satellite.

        ts1-chstm4-sfp — Specifies the 1-port STM4 TDM satellite.

        template-name — Specifies the name for the associated port template.

shutdown

Syntax	[**no**] **shutdown**
Context	config>system>satellite>eth-sat
	config>system>satellite>tdm-sat

Description   This command disables the associated satellite.

If the associated satellite is active, the satellite will not be reset but all satellite client ports will be shut down.

If the satellite is not active but attempts to associate with the host, the satellite chassis will be brought up according to the satellite configuration but all client ports will be shut down.

The **no** form of this command removes the shutdown state and all client ports on active satellites will be brought back up.

Default   shutdown

software-repository

Syntax   **software-repository** *repository-name*
no software-repository

Context   config>system>satellite>eth-sat
config>system>satellite>tdm-sat

Description   This command binds the specified software repository to the associated satellite. The software repository is used to locate and serve the correct software image to the satellite at boot time.

The configured software repository is only used when the satellite boots. Changing the software repository for an active satellite does not have an effect until the next time a satellite boots.

A satellite cannot be booted if there is no software repository defined for it.

The **no** form of the command removes the software repository.

Default   no software-repository

Parameters   *repository-name* — Specifies a string of up to 32 characters that uniquely identifies the software repository.

sync-e

Syntax   [**no**] **sync-e**

Context   config>system>satellite>eth-sat

Description   This command enables the Ethernet satellite for synchronous Ethernet operation so that the transmit timing of the satellite access ports use the frequency of the host router's central clock.

To enable this functionality, both host ports on the router that connect to the U1 and U2 ports of the satellite must be synchronous Ethernet-capable ports.

When the Ethernet satellite is configured for synchronous Ethernet, ESMC frames are enabled on the host ports. The SSM code-type used between the host and the satellite should be manually configured on the host ports to match the code-type desired on the satellite client ports. The code-type setting on the host ports does not restrict the code-type used on the satellite client ports, as those may be configured on an individual port basis.

software-repository

Syntax	**software-repository** *repository-name* [**create**] **no software-repository** *repository-name*
Context	config>system
Description	This command creates or deletes an instance of a software repository. The instance is identified by a repository name.

A software repository is used to obtain files to upgrade software on certain subsystems of the router (for example, Ethernet satellites).

Up to three locations can be specified within a software repository for the router to access files in the repository. The router will first attempt to access the file at the primary location. If the primary location is not configured or the files are not found at the primary location, then the router will attempt to access the files at the secondary location. If the secondary location is not configured or the files are not found at the secondary location, then the router will attempt to access the files at the tertiary location. If the tertiary location is not configured or the files are not found at the tertiary location, then the software repository access will fail.

The **no** form of the command removes the software repository.

Parameters	*repository-name* — Specifies a string of up to 32 characters that uniquely identifies the software repository.
	create — Specifies the keyword required when the software-repository context is first created. Once the context is created, it can be accessed without the **create** keyword.

description

Syntax	**description** *description-string* **no description**
Context	config>system>software-repository
Description	This command defines a description string for the software repository.

The **no** form of the command deletes the associated description string.

Default no description

Parameters *description-string* — Specifies the software repository description string up to 80 characters.

primary-location

Syntax **primary-location** *file-url*
no primary-location

Context config>system>software-repository

Description This command configures the primary location for the files in the software repository. See the software-repository command description for more information.

The **no** form of the command removes the primary location.

Parameters *file-url* — Specifies the primary location to be used to access the files in the software repository.

Values

file url	*local-url* | *remote-url*	
local-url	[*cflash-id*/][*file-path*]	200 chars maximum, including cflash-id directory length 99 characters maximum each
remote-url	[{ftp://} *login:pswd@remote-locn*/][*file-path*]	
	243 characters maximum	
	directory length 99 characters maximum 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 to FFFF]H
		d - [0 to 255]D
		interface - 32 characters max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:	

secondary-location

Syntax **secondary-location** *file-url*
no secondary-location

Context   config>system>software-repository

Description   This command configures the secondary location for the files in the software repository. See the **software-repository** command description for more information.

The **no** form of the command removes the secondary location.

Parameters   *file-url* — Specifies the secondary location to be used to access the files in the software repository.

> **Values**

file url	*local-url	remote-url*	
local-url	[*cflash-id/*][*file-path*]	200 chars maximum, including cflash-id directory length 99 characters maximum each
remote-url	[{ftp://} *login:pswd@remote-locn/*][*file-path*]	
	243 characters maximum	
	directory length 99 characters maximum 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 to FFFF]H
		d - [0 to 255]D
		interface - 32 characters max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:	

tertiary-location

Syntax   **tertiary-location** *file-url*
             no tertiary-location

Context   config>system>software-repository

Description   This command configures the tertiary location for the files in the software repository. See the **software-repository** command description for more information.

The **no** form of the command removes the tertiary location.

Parameters   *file-url* — Specifies the tertiary location to be used to access the files in the software repository.

> **Values**

file url	*local-url	remote-url*

local-url	[*cflash-id*/][*file-path*]	200 chars maximum, including cflash-id directory length 99 characters maximum each
remote-url	[{ftp://} *login:pswd@remote-locn*/][*file-path*]	
	243 characters maximum	
	directory length 99 characters maximum 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 to FFFF]H
		d - [0 to 255]D
		interface - 32 characters max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:	

5.16.2.3   System Alarm Contact Input Commands

alarm-contact-in-power

Syntax	**alarm-contact-in-power** {**on**	**off**}
Context	config>system
Description	This command allows the user to enable a supply of +24V output power on the +24VDC pin of the Alarm Interface Port of the CPM. When enabled, the power supplied through the +24VDC output pin can be used as a source voltage for the alarm contact input pins. The +24VDC output can be used to supply power for monitoring external sensor devices such as cabinet door sensors instead of using an external power source. If users want to use a separate external power source, they should disable the supply of power to the +24VDC output pin by using this CLI command.
Default	alarm-contact-in-power off
Parameters	**on** — Specifies to turn on power to the +24VDC output pin of the Alarm Interface Port of the CPM.
	off — Specifies to turn off power to the +24VDC output pin of the Alarm Interface Port of the CPM.

alarm-contact-input

Syntax	**alarm-contact-input** *input-pin-number*
Context	config>system
Description	This command provides the context to configure one of four available alarm contact input pins.
Parameters	*input-pin-number* — Identifies the alarm contact input pin.

        Values   1 to 4

clear-alarm-msg

Syntax	**clear-alarm-msg** *message-string* **no clear-alarm-msg**
Context	config>system>alarm-contact-input
Description	This command allows the user to configure a text message for use along with SNMP trap and log event messages that are sent when the system clears an alarm. The system generates the default message "Alarm Input Cleared" if no message is configured. The **clear-alarm-msg** string is included in the log event when the pin changes to the normal state.
Parameters	*message-string* — Specifies a printable character string, up to 160 characters in length.

description

Syntax	**description** *description-string* **no description**
Context	config>system>alarm-contact-input
Description	This command describes an alarm contact input pin. The description provides an indication of the usage or attribute of the pin. It is stored in the CLI configuration file and helps the user in identifying the purpose of the pin. The description is included in the log event when the pin changes state (the string "Pin *x*" is used in the log events if no description is configured).
Parameters	*description-string* — Specifies a printable character string, up to 80 characters in length.

normal-state

Syntax	**normal-state** {**open** | **closed**}
Context	config>system>alarm-contact-input

Description   This command configures the normal state to be associated with the alarm contact input. When the system detects a transition from the normal state, an alarm is generated. The alarm is cleared when the system detects a transition back to the normal state.

Configure the normal state as closed if an external power source is used to power the inputs.

Default   normal-state open

Parameters   **open** — Specifies that the normal state is identified as open. When the system detects a transition to the closed state, an alarm is generated. The alarm is cleared when the system detects a transition back to the open state.

closed — Specifies that the normal state is identified as closed. When the system detects a transition to the open state, an alarm is generated. The alarm is cleared when the system detects a transition back to the closed state.

shutdown

Syntax   [**no**] **shutdown**

Context   config>system>alarm-contact-input

Description   This command stops tracking the state changes associated with the alarm contact input. The system does not generate or clear the alarms for the alarm contact input, but if an alarm is generated, the system clears the alarm when the **shutdown** command is executed. The **no** form of the command starts tracking the state changes associated with the alarm contact input.

Default   shutdown

trigger-alarm-msg

Syntax   **trigger-alarm-msg** *message-string*
no trigger-alarm-msg

Context   config>system>alarm-contact-input

Description   This command allows the user to configure a text message for use along with SNMP trap and log event messages that are sent when the system generates an alarm. The system generates the default message "Alarm Input Triggered" if no message is configured. The **trigger-alarm-msg** string is included in the log event when the pin changes from the normal state.

Parameters   *message-string* — Specifies a printable character string, up to 160 characters in length.

5.16.2.4 System Threshold Alarm Commands

thresholds

Syntax	**thresholds**
Context	config>system
Description	This command enables the context to configure monitoring thresholds.

cflash-cap-alarm

Syntax **cflash-cap-alarm** *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*]
    interval *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
  no cflash-cap-alarm *cflash-id*

Context config>system>thresholds

Description This command enables capacity monitoring of the compact flash specified in this command. The severity level is alarm. Both a rising and falling threshold can be specified.

The **no** form of this command removes the configured compact flash threshold alarm.

Parameters *cflash-id* — Specifies the name of the cflash device to be monitored.

    Values cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

rising-threshold *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated **startup-alarm** is equal to **rising** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal to the **falling-threshold** value.

The threshold value represents units of 512 bytes.

    Values -2147483648 to 2147483647

    Default 0

falling-threshold *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated **startup-alarm** is equal to **falling** or **either**.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal to the **rising-threshold** value.

The threshold value represents units of 512 bytes.

Values   -2147483648 to 2147483647

Default   0

seconds — Specifies the polling period, in seconds, over which the data is sampled and compared with the rising and falling thresholds.

Values   1 to 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values   log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations, which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default   both

alarm-type — Specifies the alarm that may be sent when this alarm is first created

If the first sample is greater than or equal to the rising threshold value and **startup-alarm** is equal to **rising** or **either**, a single rising threshold crossing event is generated.

If the first sample is less than or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values   rising, falling, either

Default   either

Configuration example

```
cflash-cap-alarm cf1-A: rising-threshold 50000000 falling-threshold 49999900
interval 120 rmon-event-type both start-alarm rising
```

cflash-cap-alarm-pct

Syntax **cflash-cap-alarm-pct** *cflash-id* **rising-threshold** *percentage* [**falling-threshold**
percentage] **interval** *seconds* [**rmon-event-type** *event-type*] [**startup-alarm** *alarm-type*]
no cflash-cap-alarm-pct *cflash-id*

Context config>system>thresholds

Description This command enables capacity monitoring of the compact flash specified in this command.
The usage is monitored as a percentage of the capacity of the compact flash. The severity
level is alarm. Both a rising and falling threshold can be specified.

The **no** form of this command removes the configured compact flash threshold alarm.

Parameters *cflash-id* — The cflash-id specifies the name of the cflash device to be monitored.

   Values   cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

   rising-threshold *percentage* — Specifies a threshold for the sampled statistic. When
   the current sampled value is greater than or equal to this threshold, and the value at
   the last sampling interval was less than this threshold, a single threshold crossing
   event will be generated. A single threshold crossing event will also be generated if
   the first sample taken is greater than or equal to this threshold and the associated
   startup-alarm is equal to **rising** or **either**.

   After a rising threshold crossing event is generated, another such event will not be
   generated until the sampled value falls below this threshold and reaches less than or
   equal to the **falling-threshold** value.

   The threshold value is the percentage of used space versus capacity for the specified
   compact flash.

   Values   0 to 100

   Default   0

   falling-threshold *percentage* — Specifies a threshold for the sampled statistic. When
   the current sampled value is less than or equal to this threshold, and the value at the
   last sampling interval was greater than this threshold, a single threshold crossing
   event will be generated. A single threshold crossing event will also be generated if
   the first sample taken is less than or equal to this threshold and the associated
   startup-alarm is equal to **falling** or **either**.

   After a falling threshold crossing event is generated, another such event will not be
   generated until the sampled value rises above this threshold and reaches greater
   than or equal to the **rising-threshold** value.

   The threshold value is the percentage of used space versus capacity for the specified
   compact flash.

   Values   0 to 100

   Default   0

seconds — Specifies the polling period, in seconds, over which the data is sampled and compared with the rising and falling thresholds.

Values   1 to 2147483647

event-type — Specifies the type of notification action to be taken when this event occurs.

Values   log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations, which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default   both

alarm-type — Specifies the alarm that may be sent when this alarm is first created.

If the first sample is greater than or equal to the rising threshold value and **startup-alarm** is equal to **rising** or **either**, a single rising threshold crossing event is generated.

If the first sample is less than or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values   rising, falling, either

Default   either

Configuration example

```
cflash-cap-alarm-pct cf1-A: rising-threshold 70 falling-
threshold 60 interval 120 rmon-event-type both start-alarm rising
```

cflash-cap-warn

Syntax   **cflash-cap-warn** *cflash-id* **rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
no cflash-cap-warn *cflash-id*

Context   config>system>thresholds

Description   This command enables capacity monitoring of the compact flash specified in this command.

The severity level is warning. Both a rising and falling threshold can be specified. The **no** form of this command removes the configured compact flash threshold warning.

Parameters   *cflash-id* — Specifies that the cflash-id specifies the name of the cflash device to be monitored.

   Values   cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

rising-threshold *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated **startup-alarm** is equal to **rising** or **either**.

   After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal to the **falling-threshold** value.

   The threshold value represents units of 512 bytes.

   Values   -2147483648 to 2147483647

   Default   0

falling-threshold *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated **startup-alarm** is equal to **falling** or **either**.

   After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal to the **rising-threshold** value.

   The threshold value represents units of 512 bytes.

   Values   -2147483648 to 2147483647

   Default   0

seconds — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

   Values   1 to 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

   Values   log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

      trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations, which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

      both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default   both

alarm-type — Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and **startup-alarm** is equal to **rising** or **either**, a single rising threshold crossing event is generated.

If the first sample is less than or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values   rising, falling, either

Default   either

Configuration example
```
cflash-cap-warn cf1-B: rising-threshold 2000000 falling-threshold 1999900
interval 240 rmon-event-type trap start-alarm either
```

cflash-cap-warn-pct

Syntax   **cflash-cap-warn-pct** *cflash-id* **rising-threshold** *percentage* [**falling-threshold** *percentage*] **interval** *seconds* [**rmon-event-type** *event-type*] [**startup-alarm** *alarm-type*]
no cflash-cap-warn-pct *cflash-id*

Context   config>system>thresholds

Description   This command enables capacity monitoring of the compact flash specified in this command. The usage is monitored as a percentage of the capacity of the compact flash.

The severity level is warning. Both a rising and falling threshold can be specified. The **no** form of this command removes the configured compact flash threshold warning.

Parameters   *cflash-id* — Specifies that the cflash-id specifies the name of the cflash device to be monitored.

Values   cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

rising-threshold *percentage* — Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated **startup-alarm** is equal to **rising** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal to the **falling-threshold** value.

The threshold value is the percentage of used space versus capacity for the specified compact flash.

Values   0 to 100

Default   0

falling-threshold *percentage* — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated **startup-alarm** is equal to **falling** or **either**.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal to the **rising-threshold** value.

The threshold value is the percentage of used space versus capacity for the specified compact flash.

Values   0 to 100

Default   0

seconds — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values   1 to 2147483647

event-type — Specifies the type of notification action to be taken when this event occurs.

Values   log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations, which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both —Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default   both

alarm-type — Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and **startup-alarm** is equal to **rising** or **either**, a single rising threshold crossing event is generated.

If the first sample is less than or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values   rising, falling, either

Default   either

Configuration example

```
cflash-cap-warn-pct cf1-B: rising-threshold 70 falling-threshold 60
interval 240 rmon-event-type trap start-alarm either
```

kb-memory-use-alarm

Syntax   **kb-memory-use-alarm rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
   no kb-memory-use-warn

Context   config>system>thresholds

Description   This command configures memory use, in kilobytes, alarm thresholds.

The **no** form of the command removes the parameters from the configuration.

Parameters   **rising-threshold** *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

The threshold value represents units of kilobytes.

Values   -2147483648 to 2147483647

Default   0

falling-threshold *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

The threshold value represents units of kilobytes.

Values   -2147483648 to 2147483647

Default   0

seconds — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values   1 to 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values   log — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default   both

startup-alarm *alarm-type* — Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

Values   rising, falling, either

Default   either

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

Parameters   **rising-threshold** *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

The threshold value represents units of kilobytes.

Values   -2147483648 to 2147483647

Default   0

falling-threshold *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

The threshold value represents units of kilobytes.

Values   -2147483648 to 2147483647

Default   0

seconds — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values   1 to 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values   log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the show>system>thresholds CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default   both

alarm-type — Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

Values   rising, falling, either

Default   either

memory-use-alarm

Syntax **memory-use-alarm rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval**
seconds [*rmon-event-type*] [**startup-alarm** *alarm-type*]

no memory-use-alarm

Context config>system>thresholds

Description The memory thresholds are based on monitoring the TIMETRA-SYSTEM-MIB
sgiMemoryUsed object. This object contains the amount of memory currently used by the
system. The severity level is Alarm. The absolute sample type method is used.

The **no** form of this command removes the configured memory threshold warning.

Parameters **rising-threshold** *threshold* — Specifies a threshold for the sampled statistic. When the
current sampled value is greater than or equal to this threshold, and the value at the
last sampling interval was less than this threshold, a single threshold crossing event
will be generated. A single threshold crossing event will also be generated if the first
sample taken is greater than or equal to this threshold and the associated startup-
alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be
generated until the sampled value falls below this threshold and reaches less than or
equal the falling-threshold value.

The threshold value represents units of bytes.

Values -2147483648 to 2147483647

Default 0

falling-threshold *threshold* — Specifies a threshold for the sampled statistic. When the
current sampled value is less than or equal to this threshold, and the value at the last
sampling interval was greater than this threshold, a single threshold crossing event
will be generated. A single threshold crossing event will also be generated if the first
sample taken is less than or equal to this threshold and the associated startup-alarm
is equal to falling or either.

After a falling threshold crossing event is generated, another such event will not be
generated until the sampled value rises above this threshold and reaches greater
than or equal the rising-threshold value.

The threshold value represents units of bytes.

Values -2147483648 to 2147483647

Default 0

seconds — Specifies the polling period over which the data is sampled and compared
with the rising and falling thresholds.

The threshold value represents units of bytes.

Values 1 to 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values   log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create an OS logger entry. The RMON-MIB log table entries can be viewed using the CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default   both

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* — Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

The threshold value represents units of bytes.

Values   -2147483648 to 2147483647

Default   0

falling-threshold *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

The threshold value represents units of bytes.

Values   -2147483648 to 2147483647

Default   0

seconds — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values   1 to 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values   log — An entry is made in the RMON-MIB log table for each event occurrence.

This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — No action is taken.

Default   both

startup-alarm *alarm-type* — Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

Default	either
Values	rising, falling, either

Configuration example

```
memory-use-warn rising-threshold 500000 falling-threshold 400000 interval 800 rmon-
event-type log start-alarm falling
```

rmon

Syntax	**rmon**
Context	config>system>thresholds
Description	This command creates the context to configure generic RMON alarms and events.

Generic RMON alarms can be created on any SNMP object-ID that is valid for RMON monitoring (for example, an integer-based datatype).

The configuration of an event controls the generation and notification of threshold crossing events configured with the alarm command.

alarm

Syntax	**alarm** *rmon-alarm-id* **variable-oid** *oid-string* **interval** *seconds* [*sample-type*] [**startup-alarm** *alarm-type*] [**rising-event** *rmon-event-id* **rising-threshold** *threshold*] [**falling-event** *rmon-event-id* **falling-threshold** *threshold*] [**owner** *owner-string*] **no alarm** *rmon-alarm-id*
Context	config>system>thresholds>rmon
Description	The alarm command configures an entry in the RMON-MIB alarmTable. The alarm command controls the monitoring and triggering of threshold crossing events. In order for notification or logging of a threshold crossing event to occur there must be at least one associated rmon>event configured.

The agent periodically takes statistical sample values from the MIB variable specified for monitoring and compares them to thresholds that have been configured with the alarm command. The alarm command configures the MIB variable to be monitored, the polling period (interval), sampling type (absolute or delta value), and rising and falling threshold parameters. If a sample has crossed a threshold value, the associated event is generated.

Use the **no** form of this command to remove an rmon-alarm-id from the configuration.

Parameters   *rmon-alarm-id* — Specifies a numerical identifier for the alarm being configured. The number of alarms that can be created is limited to 1200.

    Values   1 to 65535

    Default   none

oid-string — Specifies the SNMP object identifier of the particular variable to be sampled. Only SNMP variables that resolve to an ASN.1 primitive type of integer (integer, Integer32, Counter32, Counter64, Gauge, or TimeTicks) may be sampled. The oid-string 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

seconds — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds. When setting this interval value, care should be taken in the case of 'delta' type sampling - the interval should be set short enough that the sampled variable is very unlikely to increase or decrease by more than 2147483647 - 1 during a single sampling interval. Care should also be taken not to set the interval value too low to avoid creating unnecessary processing overhead.

    Values   1 to 2147483647

    Default   none

sample-type — Specifies the method of sampling the selected variable and calculating the value to be compared against the thresholds.

    Values   absolute — Specifies that the value of the selected variable will be compared directly with the thresholds at the end of the sampling interval.

        delta — Specifies that the value of the selected variable at the last sample will be subtracted from the current value, and the difference compared with the thresholds.

    Default   absolute

alarm-type — Specifies the alarm that may be sent when this alarm is first created.

If the first sample is greater than or equal to the rising threshold value and **startup-alarm** is equal to **rising** or **either**, then a single rising threshold crossing event is generated.

If the first sample is less than or equal to the falling threshold value and **startup-alarm** is equal to **falling** or **either**, a single falling threshold crossing event is generated.

Values   rising, falling, either

Default   either

rising-event *rmon-event-id* — Specifies the identifier of the **rmon>event** that specifies the action to be taken when a rising threshold crossing event occurs.

If there is no corresponding event configured for the specified rmon-event-id, then no association exists and no action is taken.

If the **rising-event** *rmon-event-id* has a value of zero (0), no associated event exists.

If a **rising-event** *rmon-event-id* is configured, the CLI requires a **rising-threshold** to also be configured.

Values   0 to 65535

Default   0

rising-threshold *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to **rising** or **either**.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the **falling-threshold** value.

Values   -2147483648 to 2147483647

Default   0

falling-event *rmon-event-id* — Specifies the identifier of the **rmon>event** that specifies the action to be taken when a falling threshold crossing event occurs. If there is no corresponding event configured for the specified rmon-event-id, then no association exists and no action is taken. If the **falling-event** has a value of zero (0), no associated event exists.

If a **falling-event** is configured, the CLI requires a **falling-threshold** to also be configured.

Values   0 to 65535

Default   0

falling-threshold *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated **startup-alarm** is equal to **falling** or **either**.

After a falling threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

Values   -2147483648 to 2147483647

Default   0

owner-string — Specifies the owner string; the owner identifies the creator of this alarm. It defaults to "TiMOS CLI". This parameter is defined primarily to allow entries that have been created in the RMON-MIB alarmTable by remote SNMP managers to be saved and reloaded in a CLI configuration file. The owner will not normally be configured by CLI users and can be a maximum of 80 characters long.

Default   TiMOS CLI

Configuration example

```
alarm 3 variable-oid ifInOctets.184582144 interval 20 sample-type delta
start-alarm either rising-event 5 rising-threshold 10000 falling-event 5
falling-threshold 9000 owner "TiMOS CLI"
```

event

Syntax   **event** *rmon-event-id* [*event-type*] [**description** *description-string*] [**owner** *owner-string*]
no event *rmon-event-id*

Context   config>system>thresholds>rmon

Description   The event command configures an entry in the RMON-MIB event table. The event command controls the generation and notification of threshold crossing events configured with the alarm command. When a threshold crossing event is triggered, the **rmon>event** configuration optionally specifies if an entry in the RMON-MIB log table should be created to record the occurrence of the event. It may also specify that an SNMP notification (trap) should be generated for the event. The RMON-MIB defines two notifications for threshold crossing events: Rising Alarm and Falling Alarm.

Creating an event entry in the RMON-MIB log table does not create a corresponding entry in the 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-id* — Specifies an identifier for this event.

    Values   1 to 65535

    rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

    Values   **log** — An entry is made in the RMON-MIB log table for each event occurrence.

    This does **not** create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

    trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

    both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

    none — No action is taken.

    Default   both

description-string — Specifies a user configurable string that can be used to identify the purpose of this event. This is an optional parameter and can be up to 80 characters long. If the string contains special characters (#, $, spaces, and so on), the entire string must be enclosed within double quotes.

owner-string — Specifies the owner string; the owner identifies the creator of this alarm. It defaults to "TiMOS CLI". This parameter is defined primarily to allow entries that have been created in the RMON-MIB alarmTable by remote SNMP managers to be saved and reloaded in a CLI configuration file. The owner will not normally be configured by CLI users and can be up 80 characters long.

    Default   TiMOS CLI

Configuration example:
```
event 5 rmon-event-type both description "alarm testing" owner "TiMOS CLI"
```

5.16.2.5   System Bluetooth Commands

bluetooth

Syntax   **thresholds**

Context   config>system

Description   This command enables the context for configuring Bluetooth console attributes.

advertising-timeout

Syntax	**advertising-timeout** *seconds* **no advertising-timeout**
Context	config>system>bluetooth
Description	When the power is enabled, this timer controls the amount of time the Bluetooth device will advertise that is ready to pair. If an external device does not complete the pairing within this time, then the pairing must be re-initiated. The **no** form of this command disables the timeout.
Default	advertising-timeout 30
Parameters	*seconds* — Specifies the paring timeout interval.
	Values 330 to 3600

device

Syntax	**device** *ieee-address* [**create**] **no device** *ieee-address*
Context	config>system>bluetooth
Description	This command is used to add and remove devices from the Bluetooth whitelist or to enter the context to configure the MAC. The router only accepts pairing requests with devices that are in the whitelist. The devices are identified through their IEEE 802 MAC addresses. There can be up to six devices defined in the whitelist. The **create** keyword must be used to add a new device. The **no** form of this command removes the indicated device from the whitelist.
Parameters	*ieee-address* — Specifies the MAC address of the external Bluetooth device.
	Values 6-byte unicast MAC address (*xx:xx:xx:xx:xx:xx* or *xx-xx-xx-xx-xx-xx*)

description

Syntax	**description** *description-string* **no description**
Context	config>system>bluetooth>device
Description	This command creates a text description for a configuration context to help identify the content in the configuration file.

The **no** form of this command removes any description string from the context.

Default   no description

Parameters *description-string* — Specifies the description character string. Strings can be up to 80
characters long composed of printable, 7-bit ASCII characters. If the string contains
special characters (#, $, spaces, and so on), the entire string must be enclosed within
double quotes.

module

Syntax   **module** *cpm-slot*

Context   config>system>bluetooth

Description This command enters the context to define Bluetooth parameters for the specific CPM slot.

Parameters *cpm-slot* — Specifies the CPM slot.

      Values   {A | B | C | D}

identifier

Syntax   **identifier** *identifier*
no identifier

Context   config>system>bluetooth>module

Description This command defines an identifier string to be used to advertise the Bluetooth module during
pairing operations.

If there is no identifier specified by the user, the default is derived from the platform type, the
CPM slot, and the serial number of the chassis.

For example, a device with a platform field of 7750, SR-12 chassis, and a CPM serial number
of NS23456 would have a Bluetooth identifier of "7750-SR-12-CPM-A-NS23456." for the
CPM in slot A.

The **no** form of the command resets the identifier back to the default.

Parameters *identifier* — Specifies string of up to 32 characters using the values in the range {0-9, a-
z, A-Z}.

pairing-button

Syntax   **pairing-button** *admin-state*

Context   config>system>bluetooth

Description   This command is used to allow or block the function of the pairing button. This can be used to block the accidental triggering of a pairing operation while there is already a paired device.

The actual behavior of the Bluetooth pairing is dependent on both this command and the **power** command.

If normal operation is to use the pairing button on the router and on the external device to initiate the Bluetooth connection, then set:

    config>**system**>**bluetooth**>**power enabled-manual**

    config>**system**>**bluetooth**>**pairing-button enable**

If normal operation is to only require the pairing to be initiated by the external device, then set:

    config>**system**>**bluetooth**>**power enabled-automatic**

    config>**system**>**bluetooth**>**pairing-button disable**

If normal operation is to not allow the local operator to connect without permission from the central management location, then set:

    config>**system**>**bluetooth**>**power enabled-manual**

    config>**system**>**bluetooth**>**pairing-button disable**

Then when a connection is desired, the central management station must change the configuration to one of the two options shown above for the time the local operator is connecting. The central management station can change the setting back to block local access after the operations is complete.

Default   pairing-button disable

Parameters   *admin-state* — Specifies the administrative state.

    Values   enable — pairing button can trigger a pairing operation

                disable — pairing button does not trigger a pairing operation

passkey

Syntax   **passkey** *passkey*

Context   config>system>bluetooth

Description   This command is used to define the Bluetooth pass key that is used during paring. This passkey must match in both devices attempting the pairing operation.

Default   passkey 123456

Parameters	*passkey* — Must be six digits.

	Values	000000 to 999999

power

Syntax	**power** *power-state*
Context	config>system>bluetooth
Description	This command sets the operating mode of the Bluetooth module. This can be powered off or powered on but requires the pairing button to initiate the pairing operation, or powered on and continuously pairing.
	The **pairing-button** setting also impacts how pairing operations work.
Default	power off
Parameters	*power-state* — Specifies the power state.

	Values	off — bluetooth radio disabled
		enabled-manual — bluetooth enabled (pairing requires the use of the pairing button)
		enabled-automatic — bluetooth is enabled and continuously attempts to pair whenever it is not actively paired to a device

5.16.2.6   Mixed Mode Configuration Commands

capability

Syntax	**capability** {**sr**	**ess**} [**now**]
Context	config>card
Description	This command sets the desired capability for the associated slot and card. The **capability** is used along with mixed-mode to enable additional features on certain cards and slots.
	By default, the **capability** will be set to that of the base chassis type. To set this to a non-default value, the **mixed-mode** command must be enabled at the system level.
	Changing the **capability** of a slot or card will result in the associated slot being reset. The card-type must first be configured before the capability command can be issued.
Default	capability ess (on a 7450 ESS chassis)

Parameters **now** — Forces the command to be executed immediately without further question. If this keyword is not present, then the user will be presented with a question to ensure they understand that as a result of this command, the associated slots will be reset immediately to enable **mixed-mode**.

mixed-mode

Syntax [**no**] **mixed-mode**

Context config>system

Description This command enables chassis support for features with a mixture of IOMs and IMMs.

The **no** form of the command disables mixed mode support.

Default no mixed-mode

5.16.2.7 Persistence Commands

persistence

Syntax **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 persistence

ancp

Syntax **ancp**

Context config>system>persistence

Description This command configures ANCP persistence parameters.

application-assurance

Syntax	**application-assurance**
Context	config>system>persistence
Description	This command configures application assurance persistence parameters.

dhcp-server

Syntax	**dhcp-server**
Context	config>system>persistence
Description	This command configures DHCP server persistence parameters.

nat-port-forwarding

Syntax	**nat-port-forwarding**
Context	config>system>persistence
Description	This command configures NAT port forwarding persistence parameters.

options

Syntax	**options**
Context	config>system>persistence
Description	This command enables the CLI context to configure persistence options parameters.

dhcp-leasetime-threshold

Syntax	**dhcp-leasetime-threshold** [**days** *days*] [**hrs** *hours*] [**min** *minutes*] [**sec** *seconds*] **no dhcp-leasetime-threshold**
Context	config>system>persistence>options
Description	This command configures Dynamic Data Persistence (DDP) compact flash access optimization for DHCP leases.

The DHCP lease-time threshold controls the eligibility of a DHCP lease for persistency updates when no data other than the lease expiry time is to be updated. When the offered lease time of the DHCP lease is less than the configured threshold, the lease is flagged to skip persistency updates and will be installed with its full lease time upon a persistency recovery after a reboot.

The **dhcp-leasetime-threshold** command controls persistency updates for DHCPv4 and DHCPv6 leases for a DHCP relay or proxy and DHCPv4 leases for DHCP snooping (enabled with **subscriber-mgmt**) and a DHCP server (enabled with **dhcp-server**).

The **no** form of the command disables the DHCP lease time threshold.

Default   no dhcp-leasetime-threshold

Parameters   *days* — Specifies the threshold in days.

Values   0 to 7305

hours — Specifies the threshold in hours.

Values   0 to 23

minutes — Specifies the threshold in minutes.

Values   0 to 59

seconds — Specifies the threshold in seconds.

Values   0 to 59

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** *cflash-id*
no location

Context config>system>persistence>ancp
config>system>persistence>app-assure
config>system>persistence>dhcp-server
config>system>persistence>nat-fwd
config>system>persistence>python
config>system>persistence>subscriber-mgmt

Description This command instructs the system where to write the persistency files for the corresponding application. Each application creates two files on the flash card, one with suffix .i<version>, referencing an index file, and the other with suffix .0<version>, where <version> is a 2-digit number reflecting the file version. These versions are not related to the SROS release running on the node. The <version> can remain the same over two major releases, for example, when no format change is made to the persistency file. On boot, the system scans the file systems looking for the corresponding persistency files, and the load begins.

For example, in the subscriber management context, the location specifies the flash device on a CPM card where the data for handling subscriber management persistency is stored.

The **no** form of this command returns the system to the default. If there is a change in file location while persistence is running, a new file will be written on the new flash, and then the old file will be removed.

Default no location

Parameters *cflash-id* — Specifies the compact flash device name.

Values cf1:, cf2:, cf3:

5.16.2.8   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.

anno-rx-timeout

Syntax **anno-rx-timeout** *count*
no anno-rx-timeout

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 shut down.
Default	anno-rx-timeout 3
Parameters	*count* — Specifies the announce packet interval, in log form.

        Values   2 to 10

        Default   3

clock-type

Syntax	**clock-type boundary** **clock-type ordinary** {**master** | **slave**}
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. The clock-type is restricted based on the profile. See the **profile** command description for the details of the restrictions.
Default	clock-type ordinary slave
Parameters	**boundary** — Specifies that the system is a boundary clock, which may be anywhere in the master-slave clock hierarchy. It can obtain timing from a master clock, and provide timing to multiple slave clocks concurrently.
	ordinary master — Specifies that the system is a grandmaster clock in the master-slave hierarchy. The system provides timing to multiple slave clocks in the network.
	ordinary slave — Specifies that the system is always a slave clock in the master-slave hierarchy. The system derives its timing from one or more master clocks in the network.

domain

Syntax	**domain** *domain* **no domain**
Context	config>system>ptp

Description   This command configures the PTP domain.

The **no** form of the command reverts to the default configuration. The default value is dependent upon the configured profile, as detailed below.

Note some profiles may require a domain number in a restricted range. It is up to the operator to ensure the value aligns with what is expected within the profile.

Domain cannot be changed unless PTP is shutdown. If the PTP profile is changed, the domain is changed to the default domain for the new PTP profile.

Default   domain 0 — profile ieee1588-2008

domain 4 — profile g8265dot1-2010

domain 24 — profile g8275dot1-2014

Parameters   *domain* — Specifies the PTP domain.

Values   0 to 255 for ieee1588-2008
0 to 255 for g8265dot1-2010
24 to 43 for g8275dot1-2014

local-priority

Syntax   **local-priority** *priority*

Context   config>system>ptp
config>system>ptp>peer
config>system>ptp>port

Description   This command configures the local priority used to choose between PTP masters in the best master clock algorithm (BMCA). This setting is relevant when the profile is set to either g8265dot1-2010 or g8275dot1-2014. The parameter is ignored when any other profile is selected.

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.

For g8265dot1-2010, this parameter configures the priority used to choose between master clocks with the same quality (refer to G.8265.1 for more details).

For g8275dot1-2014, this parameter sets the value of the **localPriority** associated with the Announce messages received from the external clocks (**ptp>peer** or **ptp>port**), or the local clock (**PTP**). Refer to G.8275.1 for detailed information.

Default   local-priority 128

Parameters   *priority* — Specifies the value of the local priority.

Values   1 to 255

log-anno-interval

Syntax	**log-anno-interval** *log-interval*
	no log-anno-interval
Context	config>system>ptp
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 shut down.

> **Note:** In order to minimize BMCA driven reconfigurations, the IEEE recommends that the announce-interval should be consistent across the entire 1588 network.

Default	log-anno-interval 1 (1 packet every 2 seconds) for ieee1588-2008
	log-anno-interval 1 (1 packet every 2 seconds) for g8265dot1-2010
	log-anno-interval -3 (8 packets per second) for g8275dot1-2014
Parameters	*log-interval* — Specifies the announce packet interval, in log form.
	Values -3 to 4

network-type

Syntax	**network-type** {**sdh** | **sonet**}
Context	config>system>ptp
Description	This command configures the codeset to be used for the encoding of QL values into PTP clockClass values when the profile is configured for G.8265.1. The codeset is defined in Table 1/G.8265.1. This setting only applies to the range of values observed in the clockClass values transmitted out of the node in Announce messages. The router will support the reception of any valid value in Table 1/G.8265.1

Default	network-type sdh
Parameters	**sdh** — Specifies the values used on a G.781 Option 1 compliant network.
	sonet — Specifies the values used on a G.781 Option 2 compliant network.

peer

Syntax	**peer** *ip-address* [**create**]
	no peer *ip-address*
Context	config>system>ptp
Description	This command configures a remote PTP peer. It provides the context to configure parameters for the remote PTP peer.

Up to 20 remote PTP peers may be configured.

The **no** form of the command deletes the specified peer.

If the **clock-type** is **ordinary slave** or **boundary**, and PTP is no shutdown, the last peer cannot be deleted. This prevents the user from having PTP enabled without any peer configured and enabled.

Peers are created within the routing instance associated with the context of this command. All configured PTP peers must use the same routing instance.

Parameters	*ip-address* — The ip address of the remote peer. The **no** form must include the specific address being deleted.
	create — Creates the remote PTP peer.
	Values ipv4 address: a.b.c.d.

log-sync-interval

Syntax	**log-sync-interval** *log-interval*
	no log-sync-interval
Context	config>system>ptp>peer
Description	This command configures the message interval used for unicast event messages. It defines the message interval for both Sync and Delay_Resp messages that are requested during unicast negotiation to the specific peer. This controls the Sync and Delay_Resp message rate sent from remote peers to the local node. It does not affect the Sync or Delay_Resp packet rate that may be sent from the local node to remote peers. Remote peers may request a Sync or Delay_Resp packet rate anywhere within the acceptable grant range.

The **log-sync-interval** cannot be changed unless the peer is shutdown.

Default	log-sync-interval -6 (64 packets per second) for 1588-2008
	log-sync-interval -6 (64 packets per second) for g8265dot1-2010
	log-sync-interval -4 (16 packets per second) for g8275dot1-2014
Parameters	*log-interval* — Specifies the sync message interval, in log form.
	Values -6 to 0

shutdown

Syntax	[**no**] **shutdown**
Context	config>system>ptp>peer
Description	This command disables or enables a specific PTP peer. Shutting down a peer sends cancel unicast negotiation messages on any established unicast sessions. When shutdown, all received packets from the peer are ignored.
	If the clock-type is ordinary slave or boundary, and PTP is no shutdown, the last enabled peer cannot be shutdown. This prevents the user from having PTP enabled without any peer configured & enabled
Default	no shutdown

peer-limit

Syntax	**peer-limit** *limit*
	no peer-limit
Context	config>system>ptp
Description	This command specifies an upper limit to the number of discovered peers permitted within the routing instance. This can be used to ensure that a routing instance does not consume all the possible discovered peers and blocking discovered peers in other routing instances.
	If it is desired to reserve a fixed number of discovered peers per router instance, then all router instances supporting PTP should have values specified with this command and the sum of all the peer-limit values must not exceed the maximum number of discovered peers supported by the system.
	If the user attempts to specify a peer-limit, and there are already more discovered peers in the routing instance than the new limit being specified, the configuration will not be accepted.
Default	no peer-limit

Parameters   *limit* — Specifies the maximum number of discovered peers allowed in the routing
instance.

    Values   0 to 512

    Default   1 (The maximum number of discovered peers supported by the
system.)

port

Syntax   **port** *port-id* [**create**]
no port *port-id*

Context   config>system>ptp

Description   This command configures PTP over Ethernet on the physical port. The PTP process shall
transmit and receive PTP messages through the port using Ethernet encapsulation (as
opposed to UDP/IPv4 encapsulation).

The frames are transmitted with no VLAN tags even if the port is configured for dot1q or qinq
modes for encap-type. In addition, the received frames from the external PTP clock must also
be untagged.

There are two reserved multicast addresses allocated for PTP messages (see *Annex F IEEE
Std 1588™-2008*). Either address can be configured for the PTP messages sent through this
port.

A PTP port may not be created if the PTP profile is set g8265dot1-2010.

If the port specified in the port-id supports 1588 port based timestamping, then a side effect
of enabling PTP over Ethernet on the port shall be the enabling of Synchronous Ethernet on
that port.

De-provisioning of the card or MDA containing the specified port is not permitted while the
port is configured within PTP.

Changing the encapsulation or the port type of the Ethernet port is not permitted when PTP
Ethernet Multicast operation is configured on the port.

To allocate an ethernet satellite client port as a PTP port, the ethernet satellite must first be
enabled for the transparent clock function. For more information, see the ptp-tc command.

Parameters   *port-id* — Specifies a specific physical port.

    Values   *slot/mda/port*

create — Creates the PTP port. This keyword is required when first creating the PTP
port, if the system is configured to require it (enabled in the environment create
command). Once the PTP port is created, it is possible to navigate into the context
without the create keyword.

address

Syntax **address {01:1b:19:00:00:00|01:80:c2:00:00:0e}**

Context config>system>ptp>port

Description This command allows for the specification of the mac-address to be used for the destination MAC address of the transmitted ptp messages.

IEEE Std 1588-2008 Annex F defines two reserved addresses for 1588 messages. These are:

- **01-1B-19-00-00-00** — all except the peer delay mechanism messages
- **01-80-C2-00-00-0E** — peer delay mechanism messages

Both addresses are supported for reception independent of the address configured by this command.

The **no** form of this command sets the address to the default address.

Default address 01-1B-19-00-00-00

log-delay-interval

Syntax **log-delay-interval** *log-interval*
no log-delay-interval

Context config>system>ptp>port

Description This command configures the minimum interval used for multicast Delay_Req messages. This parameter is applied on a per port basis. For ports in a slave state, it shall be the interval used, unless the parent port indicates a longer interval. For a port in master state, it shall be the interval advertised to external slave ports as the minimum acceptable interval for Delay_Req messages from those slave ports.

It is a requirement of the 1588 standard that a port in Slave state shall check the logMessageInterval field of received multicast Delay_Resp messages. If the value of the logMessageInterval field of those messages is greater than the value programmed locally for the generation of Delay_Req messages, then the Slave must change to use the greater value (i.e. longer interval) for the generation of Delay_Req messages. This requirement is supported in the router.

The parameter is only applicable to ports and not to peers.

Default log-delay-interval -6 for ieee1588-2008

log-delay-interval -6 for g8265dot1-2010

log-delay-interval -4 for g8275dot1-2014

Parameters *log-interval* — Specifies the Delay_Req message interval, in log form.

> **Values** -6 to 0
>
> **Default** -6

log-sync-interval

Syntax **log-sync-interval** *log-interval*
no log-sync-interval

Context config>system>ptp>port

Description This command configures the message interval used for transmission of multicast Sync messages.

For multicast messages used on PTP Ethernet ports, this configures the message interval used for Sync messages transmitted by the local node when the port is in Master state.

Default log-sync-interval -6 (64 packets per second) for ieee1588-2008 or

log-sync-interval -6 (64 packets per second) for g8265dot1-2010 or

log-sync-interval -4 (16 packets per second) for g8275dot1-2014

Parameters *log-interval* — Specifies the message interval, in log form.

> **Values** -6 to 0 (This corresponds to a maximum rate of 64 packets per second, and a minimum rate of 1 packet per second.)
>
> **Default** -6

master-only

Syntax **master-only** {**true** | **false**}

Context config>system>ptp>port

Description This command is used to restrict the local port to never enter the slave state. Use the command to ensure that the 7750 SR never draws synchronization from the attached external device.

This parameter is only effective when the profile is set to g8275dot1-2014.

➡ **Note:** The ITU-T G.8275.1 (07/2014) recommendation used the term 'notSlave' for this functionality; however, the IEEE has added this capability into the next edition of the 1588 standard using the term masterOnly. These are equivalent.

Default   master-only true

Parameters   **true** — Enables the **master-only** parameter of the PTP port.

false — Disables the **master-only** parameter of the PTP port.

shutdown

Syntax   [**no**] **shutdown**

Context   config>system>ptp>port

Description   This command disables or enables a specific PTP port. When shutdown, all PTP Ethernet messages are dropped on the IOM They will not be counted in the PTP message statistics. No PTP packets are transmitted by the node toward this port.

If the clock-type is ordinary slave or boundary, and PTP is no shutdown, the last enabled port or peer cannot be shutdown. This prevents the user from having PTP enabled without any means to synchronize the local clock to a parent clock.

Default   no shutdown

priority1

Syntax   **priority1** *priority-value*
no priority1

Context   config>system>ptp

Description   This command configures the priority1 value of the local clock. This parameter is only used when the profile is set to ieee1588-2008. This value is used by the Best Master Clock Algorithm to determine which clock should provide timing for the network.

This value is used for the value to advertise in the Announce messages and for the local clock value in data set comparisons.

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

Default   priority1 128

Parameters   *priority-value* — Specifies the value of the priority1 field.

Values   0 to 255

priority2

Syntax   **priority2** *priority-value*

no priority2

Context config>system>ptp

Description This command configures the priority2 value of the local clock. This parameter is only used when the profile is set to ieee1588-2008 or g8275dot1-2014. The parameter is ignored when any other profile is selected.

This value is used by the Best Master Clock algorithm to determine which clock should provide timing for the network.

> **Note:** This value is used for the value to advertise in the Announce messages and for local clock value in data set comparisons.

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

Default priority2 128

Parameters *priority-value* — Specifies the value of the priority2 field.

    Values 0 to 255

profile

Syntax **profile {g8265dot1-2010 | ieee1588-2008 | g8275dot1-2014}**

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. The **clock-type** is restricted based on the profile. If the profile is ieee1588-2008, then the **clock-type** is not restricted. If the profile is g8265dot1-2010, then the clock type may only be ordinary slave or ordinary master; boundary clock is not allowed. If the profile is g8275dot1-2014, then the **clock-type** may only be boundary clock or ordinary slave; ordinary master is not allowed.

When you change the profile, if any of the command parameters are set to default for the original profile, then the parameter will be changed to the default for the new profile. This applies to the following:

- **log-anno-interval** set for the clock
- **log-sync-interval** set for a peer or a port
- **log-delay-interval** set for a port

If the parameter is set to a value other than the default for the original profile, then its value will remain unchanged

Default profile g8265dot1-2010

Parameters **g8265dot1-2010** — Conforms to the ITU-T G.8265.1 specification.

ieee1588-2008 — Conforms to the 2008 version of the IEEE1588 standard.

g8275dot1-2014 — Conforms to the ITU-T G.8275.1 specification.

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

5.16.2.9 Date and Time Commands

set-time

Syntax **set-time** *date time*

Context admin

Description This command sets the local system time.

The time entered should be accurate for the time zone configured for the system. The system will convert the local time to UTC before saving to the system clock which is always set to UTC. This command does not take into account any daylight saving offset if defined.

If SNTP or NTP is enabled (no shutdown) then this command cannot be used.

Parameters   *date* — Specifies the local date and time accurate to the minute in the YYYY/MM/DD format.

Values   *YYYY* is the four-digit year
MM is the two-digit month
DD is the two-digit date

time — Specifies the time (accurate to the second) in the *hh*:*mm[:ss]* format. If no seconds value is entered, the seconds are reset to :00.

Values   *hh* is the two-digit hour in 24 hour format (00=midnight, 12=noon)
mm is the two-digit minute

Default   0

time

Syntax   **time**

Context   config>system

Description   This command enables the context to configure the system time zone and time synchronization parameters.

5.16.2.10   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   ntp

prefer-local-time

Syntax   [**no**] **prefer-local-time**

Context	config>system>time
Description	This command sets the preference to use local or UTC time in the system. This preference is applied to objects such as log file names, created and completed times reported in log files, and rollback times displayed in **show** routines.

> **Note:** The format used for the date-time strings may change when the **prefer-local-time** option is enabled. For example, when enabled, all date-time strings include a suffix of three to five characters that indicates the timezone used for the presentation. This suffix may not be present if the option in not enabled.

> **Note:** The time format for timestamps on log events is controlled on a per-log basis using the **config**>**log**>l**og-id**>**time-format {utc | local}** CLI command and not via **prefer-local-time**. Also an operator may force the timezone used for **show** outputs during a CLI session using an environment variable in the **environment**>**time-display {utc | local}** command.

	The **no** form of this command indicates preference for UTC time.
Default	no prefer-local-time

authentication-check

Syntax	[**no**] **authentication-check**
Context	config>system>time>ntp
Description	This command provides the option to skip the rejection of NTP PDUs that do not match the authentication key-id, type or key requirements. The default behavior when authentication is configured is to reject all NTP protocol PDUs that have a mismatch in either the authentication key-id, type or key.
	When **authentication-check** is enabled, NTP PDUs are authenticated on receipt. However, mismatches cause a counter to be increased, one counter for type and one for key-id, one for type, value mismatches. These counters are visible in a show command.
	The **no** form of this command allows authentication mismatches to be accepted; the counters however are maintained.
Default	authentication-check

authentication-key

Syntax	**authentication-key** *key-id* **key** *key* [**hash** | **hash2**] **type** {**des** | **message-digest**}
	no authentication-key *key-id*

Context	config>system>time>ntp

Description This command sets the authentication key-id, type and key used to authenticate NTP PDUs sent to or received by other network elements participating in the NTP protocol. For authentication to work, the authentication key-id, type and key value must match.

The **no** form of the command removes the authentication key.

Parameters *key-id* — Configures the authentication key-id that will be used by the node when transmitting or receiving Network Time Protocol packets

Entering the authentication-key command with a key-id value that matches an existing configuration key will result in overriding the existing entry.

Recipients of the NTP packets must have the same authentication key-id, type, and key value in order to use the data transmitted by this node. This is an optional parameter.

Values 1 to 255

Default None

key — Specifies the authentication key associated with the configured key-id, the value configured in this parameter is the actual value used by other network elements to authenticate the NTP packet.

The key can be any combination of ASCII characters up to 32 characters for message-digest (md5) or 8 characters for des (length limits are unencrypted lengths). If spaces are used in the string, enclose the entire string in quotation marks (".").

hash — Specifies the key is entered in an encrypted form. If the **hash** or **hash2** parameter is not used, the key is assumed to be in an unencrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the **hash** or **hash2** parameter specified

hash2 — Specifies the key is entered in a more complex encrypted form that involves more variables than the key value alone, meaning that the **hash2** encrypted variable cannot be copied and pasted. If the **hash** or **hash2** parameter is not used, the key is assumed to be in an unencrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the **hash** or **hash2** parameter specified.

type — Determines if DES or message-digest authentication is used.

This is a required parameter; either DES or message-digest must be configured.

des — Specifies that DES authentication is used for this key. The des option is not permitted in FIPS-140-2 mode.

message-digest — Specifies that MD5 authentication in accordance with RFC 2104 is used for this key.

broadcast

Syntax **broadcast** [**router** *router-name*] {**interface** *ip-int-name*} [**key-id** *key-id*] [**version** *version*] [**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-name* — Specifies the router name used to transmit NTP packets. Base is the default. Select management to use the management port (Ethernet port on the CPM). Note that broadcast server capability can also be enabled on an interface within a VPRN context. Refer to "NTP Within a VPRN Service" in the *7450 ESS, 7750 SR, 7950 XRS, and VSR Layer 3 Services Guide: IES and VPRN* for more information.

Values Base | Management

Default Base

ip-int-name — Specifies the local interface on which to transmit NTP broadcast packets. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes. The string may be a maximum of 32 characters.

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 to 255

Default none

version — Specifies the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode in which case all versions will be accepted.

Values 2 to 4

Default 4

ttl — Specifies the IP Time To Live (TTL) value.

Values 1 to 255

Default none

broadcastclient

Syntax **broadcastclient** [**router** *router-instance* | **service-name** *service-name*] {**interface** *ip-int-name*} [**authenticate**]

no broadcastclient [**router** *router-instance* | **service-name** *service-name*] {**interface** *ip-int-*

name}

Context   config>system>time>ntp

Description   When configuring NTP, the node can be configured to receive broadcast packets on a specified subnet. This command configures a specific interface to listen for broadcast NTP messages. The interface may exist within a VPRN service.

Broadcast and multicast messages can easily be spoofed, so authentication is strongly recommended. If broadcast is not configured, then any received NTP broadcast traffic will be ignored. Use the **show** command to view the state of the configuration.

The **no** form of this command removes the interface from the configuration.

Parameters   *router-instance* — Specifies the routing context that contains the interface in the form of *router-name* or *service-id*.

   Values   *router-name* — Base | Management
      service-id — 1 to 2147483647

   Default   Base

   service name — Specifies the service name for the VPRN. The name can be up to 64 characters in length. Note that CPM routing instances are not supported.

   ip-int-name — Specifies the VPRN interface on which to receive NTP broadcast packets. If the string contains special characters (such as #, $, or spaces) the entire string must be enclosed within double quotes.

   authenticate — Specifies whether or not to require authentication of NTP PDUs. When enabled, NTP PDUs are authenticated upon receipt.

multicast

Syntax   **multicast** [**key-id** *key-id*] [**version** *version*]
         no multicast

Context   config>system>time>ntp

Description   This command configures NTP the node to transmit multicast packets on the CPM/CCM MGMT port. Broadcast and multicast messages can easily be spoofed; authentication is strongly recommended.

The **no** form of this command removes the multicast address from the configuration.

Parameters   *key-id* — Specifies the configured authentication key and authentication type used by this version to transmit NTP packets. If this command is omitted from the configuration, packets are sent unencrypted.

   Values   1 to 255

   Default   None

version — Specifies the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode in which case all three versions are accepted.

Values   2 to 4

Default   4

multicastclient

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** — Specifies to make authentication a requirement (optional). If authentication is required, the authentication key-id received must have been configured in the **authentication-key** command, and that key-id 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** — Specifies to make authentication a requirement (optional). If authentication is required, the authentication key-id received in a message must have been configured in the **authentication-key** command, and that key-id type and key value must also match.
The authentication key from the received messages will be used for the transmitted messages.

peer

Syntax **peer** [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | *ipv6-address*} [**key-id** *key-id*] [**version** *version*] [**prefer**]
no peer [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | *ipv6-address*}

Context config>system>time>ntp

Description This command configures symmetric active mode for an NTP peer. It is recommended to configure authentication and to only configure known time servers as peers. Peers may exist within a VPRN service.

> **→** **Note:** For symmetric peering to operate correctly with a peer accessible through a VPRN, local NTP server functionality must be enabled within the VPRN using the **config**>**service**>**vprn**>**ntp** command.

The **no** form of the command removes the configured peer.

Parameters *router-instance* — Specifies the routing context that contains the interface in the form of *router-name* or *service-id*.

> **Values** *router-name* —Base | Management
> *service-id* — 1 to 2147483647

> **Default** Base

service name — Specifies the service name for the VPRN. The name can be up to 64 characters. CPM routing instances are not supported.

ip-address — Configures the IPv4 address of the peer that requires a peering relationship to be set up.

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

> **Default** None

ipv6-address — Configures the IPv6 address of the peer that requires a peering relationship to be set up.

> **Values** • x:x:x:x:x:x:x:x (eight 16-bit pieces)
> • x:x:x:x:x:x:d.d.d.d
> • x: [0 to FFFF] H
> • d: [0 to 255] D

> **Default** None

key-id — Specifies the key ID. Successful authentication requires that both peers must have the same authentication key-id, type, and key value.

Specify the *key-id* that identifies the configured authentication key and authentication type used by this node to transmit NTP packets to an NTP peer. If an NTP packet is received by these nodes, the authentication key-id, type, and key value must be valid, otherwise the packet will be rejected and an event or trap will be generated.

> **Values**   1 to 255
>
> **Default**   None

version — Specifies the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode, in which case all versions are accepted.

> **Values**   2 to 4
>
> **Default**   4

prefer — When configuring more than one peer, one remote system can be configured as the preferred peer. When a second peer is configured as preferred, then the new entry overrides the old entry.

server

Syntax   **server** [**router** *router-instance* | **service-name** *service-name*] {*ip-address* | *ipv6-address* | **ptp**} [**key-id** *key-id*] [**version** *version*] [**prefer**]
no server [**router** *router-instance* | **service-name** *service-name*] {*ip address* | *ipv6-address* | **ptp**}

Context   config>system>time>ntp

Description   This command configures the node to operate in client mode with the NTP server specified in the address field of this command.

If the internal PTP process is to be used as a source of time for System Time and OAM time then it must be specified as a server for NTP. If PTP is specified, then the prefer parameter must also be specified. After PTP has established a UTC traceable time from an external grandmaster then it will always be the source for time into NTP, even if PTP goes into time holdover. PTP applies only to the 7450 ESS and 7750 SR.

Use of the internal PTP time source for NTP will promote the internal NTP server to stratum 1 level, which may impact the NTP network topology.

The **no** form of this command removes the server with the specified address from the configuration.

Parameters   *router-instance* — Specifies the routing context that contains the interface in the form of *router-name* or *service-id*.

> **Values**   *router-name* — Base | Management
>
> *service-id* — 1 to 2147483647
>
> **Default**   Base

service name — Specifies the service name for the VPRN. The name can be up to 64 characters. CPM routing instances are not supported.

ip-address — Configures the IPv4 address of an external NTP server.

> **Values**   a.b.c.d
>
> **Default**   None

ipv6-address — Configures the IPv6 address of an external NTP server.

> **Values**
> - x:x:x:x:x:x:x:x (eight 16-bit pieces)
> - x:x:x:x:x:x:d.d.d.d
> - x: [0 to FFFF] H
> - d: [0 to 255] D
>
> **Default**   None

key-id — Specifies the key ID that identifies the configured authentication key and authentication type used by this node to transmit NTP packets to an NTP server. If an NTP packet is received by this node, the authentication key-id, type, and key value must be valid, otherwise the packet will be rejected and an event/trap generated. This is an optional parameter.

> **Values**   1 to 255

version — Configures the NTP version number that is expected by this node. This is an optional parameter.

> **Values**   2 to 4
>
> **Default**   4

ptp — Configures the internal PTP process as a time server into the NTP process. The prefer parameter is mandatory with this server option.

prefer — Specifies that, when configuring more than one peer, one remote system can be configured as the preferred peer. When a second peer is configured as preferred, then the new entry overrides the old entry.

5.16.2.10.1   SNTP Commands

sntp

> **Syntax**   [**no**] **sntp**
>
> **Context**   config>system>time
>
> **Description**   This command creates the context to edit the Simple Network Time Protocol (SNTP).

SNTP can be configured in either broadcast or unicast client mode. SNTP is a compact, client-only version of the NTP. SNTP can only receive the time from SNTP/NTP servers. It cannot be used to provide time services to other systems.

The system clock is automatically adjusted at system initialization time or when the protocol first starts up.

When the time differential between the SNTP/NTP server and the system is more than 2.5 seconds, the time on the system is gradually adjusted.

SNTP is created in an administratively enabled state (**no shutdown**).

The **no** form of the command removes the SNTP instance and configuration. SNTP does not need to be administratively disabled when removing the SNTP instance and configuration.

Default   sntp

broadcast-client

Syntax   [**no**] **broadcast-client**

Context   config>system>time>sntp

Description   This command enables listening to SNTP/NTP broadcast messages on interfaces with **broadcast client** enabled at global device level.

SNTP must be shutdown prior to changing either to or from broadcast mode.

The **no** form of the command disables broadcast client mode.

Default   no broadcast-client

server-address

Syntax   **server-address** *ip-address* [**version** *version-number*] [**normal** | **preferred**] [**interval** *seconds*]
no server-address *ip-address*

Context   config>system>time>sntp

Description   This command creates an SNTP server for unicast client mode.

Parameters   *ip-address* — Specifies the IP address of the SNTP server.

Values   a.b.c.d

version-number — Specifies the SNTP version supported by this server.

Values   1 to 3

Default   3

normal | preferred — Specifies the preference value for this SNTP server. When more than one time-server is configured, one server can have preference over others. The value for that server should be set to **preferred**. Only one server in the table can be a preferred server.

Default   normal

seconds — Specifies the frequency at which this server is queried.

Values   64 to 1024

Default   64

5.16.2.10.2   System Time Commands

dst-zone

Syntax   [**no**] **dst-zone** {*std-zone-name* | *non-std-zone-name*}

Context   config>system>time

Description   This command configures the start and end dates and offset for summer time or daylight savings time to override system defaults or for user defined time zones.

When configured, the time is adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

If the time zone configured is listed in the Time Zones section, then the starting and ending parameters and offset do not need to be configured with this command unless it is necessary to override the system defaults. The command returns an error if the start and ending dates and times are not available either the Time Zones section on or entered as optional parameters in this command.

Up to five summer time zones may be configured, for example, for five successive years or for five different time zones. Configuring a sixth entry will return an error message. If no summer (daylight savings) time is supplied, it is assumed no summer time adjustment is required.

The **no** form of the command removes a configured summer (daylight savings) time entry.

Parameters   *std-zone-name* — Specifies the standard time zone name. The standard name must be a system-defined zone in the Time Zones section. For zone names in the table that have an implicit summer time setting, for example MDT for Mountain Daylight Saving Time, the remaining **start-date**, **end-date** and **offset** parameters need to be provided unless it is necessary to override the system defaults for the time zone.

Values   ADT, NDT, AKDT, CDT, CEST, EDT, EEST, MDT, NZDT, PDT, WEST

non-std-zone-name — Specifies the non-standard time zone name. Create a user-defined name created using the zone. The name can be a maximum of 5 characters in length.

end

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.

Default   end first sunday january 00:00

Parameters   *end-week* — Specifies the starting week of the month when the summer time ends.

Values   first, second, third, fourth, last

Default   first

end-day — Specifies the starting day of the week when the summer time ends.

Values   sunday, monday, tuesday, wednesday, thursday, friday, saturday

Default   sunday

end-month — Specifies the starting month of the year when the summer time takes effect.

Values   january, february, march, april, may, june, july, august, september, october, november, december

Default   january

hours-minutes — Specifies the time at which the summer time ends, in hh:mm format.

Values   hours: 00 to 23
minutes: 00 to 59

Default   00:00

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.
Default	offset 60
Parameters	*offset* — Specifies the number of minutes added to the time at the beginning of summer time and subtracted at the end of summer time, expressed as an integer.

    Values   0 to 60

    Default   60

start

Syntax	**start** *start-week start-day start-month hours-minutes*
Context	config>system>time>dst-zone
Description	This command configures start of summer time settings.
Default	start first sunday january 00:00
Parameters	*start-week* — Specifies the starting week of the month when the summer time takes effect.

    Values   first, second, third, fourth, last

    Default   first

start-day — Specifies the starting day of the week when the summer time takes effect.

    Values   sunday, monday, tuesday, wednesday, thursday, friday, saturday

    Default   sunday

start-month — Specifies the starting month of the year when the summer time takes effect.

    Values   january, february, march, april, may, june, july, august, september, october, november, december

    Default   january

hours-minutes — Specifies the time at which the summer time takes effect, in hh:mm format.

    Values   hours: 00 to 23
                     minutes: 00 to 59

    Default   00:00

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.

The SR-series router OS supports system-defined and user-defined time zones. The system-defined time zones are listed in the Time Zones section.

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 00

Parameters *std-zone-name* — Specifies the standard time zone name. The standard name must be a system-defined zone in the Time Zones section. For zone names in the table that have an implicit summer time setting, for example MDT for Mountain Daylight Saving Time, the remaining **start-date**, **end-date** and **offset** parameters 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, WET, CET, EET, EEST, MSK, MSD, AST, NST, EST, CST, MST, PST, HST, AKST, AWST, ACST, AEST, NZST, UTC

non-std-zone-name — Specifies the non-standard time zone name. The name can be up to 5 characters.

hh [:mm] — Specifies the hours and minutes offset from UTC time, expressed as integers. Some time zones do not have an offset that is an integral number of hours. In these instances, the *minutes-offset* must be specified. For example, the time zone in Pirlanngimpi, Australia UTC + 9.5 hours.

Values   hours: -11 to 12
minutes: 0 to 59

Default   hours: 0
minutes: 0

5.16.2.11   Cron Commands

cron

Syntax	**cron**
Context	config
Description	This command creates the context to create scripts, script parameters and schedules which support the Service Assurance Agent (SAA) functions.

CRON features are saved to the configuration file on both primary and backup control modules. If a control module switchover occurs, CRON events are restored when the new configuration is loaded. If a control module switchover occurs during the execution of a cron script, the failover behavior will be determined by the contents of the script.

schedule

Syntax	[**no**] **schedule** *schedule-name* [**owner** *schedule-owner*]
Context	config>system>cron
Description	This command configures the type of schedule to run, including one-time only (oneshot), periodic or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds).

The **no** form of the command removes the context from the configuration.

Parameters   *schedule-name* — Specifies the name of the schedule. The name can be up to 32 characters.

schedule-owner — Specifies the owner name of the schedule. The name can be up to 32 characters.

Default   TiMOS CLI

count

Syntax	**count** *number* **no count**
Context	config>system>cron>sched
Description	This command configures the total number of times a CRON "interval" schedule is run. For example, if the interval is set to 600 and the count is set to 4, the schedule runs 4 times at 600 second intervals.

Default	no count
Parameters	*number* — Specifies the number of times the schedule is run.

Values	1 to 65535
Default	65535

day-of-month

Syntax	**day-of-month** {*day-number* [*..day-number*] **all**} **no day-of-month**
Context	config>system>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.
Default	no day-of-month
Parameters	*day-number* — Specifies the positive integers specify the day of the month counting from the first of the month. The negative integers specify the day of the month counting from the last day of the month. For example, configuring **day-of-month -5, 5** in a month that has 31 days will specify the schedule to occur on the 27th and 5th of that month.
	Integer values must map to a valid day for the month in question. For example, February 30 is not a valid date.

Values	1 to 31, -31 to -1 (maximum 62 day-numbers)

all — Specifies all days of the month.

end-time

Syntax	**end-time** [*date*	*day-name*] *time* **no end-time**
Context	config>system>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.

Default   no end-time

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

hour

Syntax   **hour** *hour-number* [*..hour-number*] | **all**}
no hour

Context   config>system>cron>sched

Description   This command specifies which hour to schedule a command. Multiple hours of the day can be specified. When multiple hours are configured, each of them will cause the schedule to trigger. **Day-of-month** or **weekday** must also be specified. All days of the month or weekdays can be specified. If an hour is configured without configuring month, weekday, day-of-month, and minute, the event will not execute.

The **no** form of this command removes the specified hour from the configuration.

Default   no hour

Parameters   *hour-number* — Specifies the hour to schedule a command.

Values   0 to 23 (maximum 24 hour-numbers)

all — Specifies all hours.

interval

Syntax   **interval** *seconds*
no interval

Context   config>system>cron>sched

Description   This command specifies the interval between runs of an event.

Default no interval

Parameters *seconds* — Specifies the interval, in seconds, between runs of an event.

  Values 30 to 42949672

minute

Syntax **minute** {*minute-number* [..*minute-number*] | **all**}
no minute

Context config>system>cron>sched

Description This command specifies the minute to schedule a command. Multiple minutes of the hour can be specified. When multiple minutes are configured, each of them will cause the schedule to occur. If a minute is configured, but no **hour** or day is configured, the event will not execute. If a minute is configured without configuring 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.

Default no minute

Parameters *minute-number* — Specifies the minute to schedule a command.

  Values 0 to 59 (maximum 60 minute-numbers)

all — Specifies all minutes.

month

Syntax **month** {*month-number* [..*month-number*] | *month-name* [..*month-name*] | **all**}
no month

Context config>system>cron>sched

Description This command specifies the month when the event should be executed. Multiple months can be specified. When multiple months are configured, each of them will cause the schedule to trigger. If a month is configured without configuring 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.

Default no month

Parameters **month-number** — Specifies a month number.

  Values 1 to 12 (maximum 12 month-numbers)

      month-name — Specifies a month by name.

          Values   january, february, march, april, may, june, july, august, september, october, november, december (maximum 12 month names)

      all — Specifies all months.

script-policy

Syntax	**script-policy** *policy-name* [**owner** *policy-owner*] **no script-policy**
Context	config>system>cron>schedule
Description	This command is used to configure the CLI script policy.
Parameters	*policy-name* — Specifies the name of the policy. Can be up to 32 characters.

        policy-owner — Specifies the name of the policy owner. Can be up to 32 characters.

          The owner is an arbitrary name and not necessarily a user name. Commands in the scripts are not authorized against the owner. The **configure system security cli-script authorization** *x* **cli-user** command determines the user context against which commands in the scripts are authorized.

          Default   "TiMOS CLI"

type

Syntax	**type** *schedule-type*
Context	config>system>cron>sched
Description	This command specifies how the system should interpret the commands contained within the schedule node.
Default	type periodic

Parameters   *schedule-type* — Specifies the type of schedule for the system to interpret the commands contained within the schedule node.

> **Values**   periodic — Specifies a schedule which runs at a given interval. interval must be specified for this feature to run successfully.
> calendar — Specifies a schedule which runs based on a calendar. The weekday, month, day-of-month, hour and minute parameters 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. The month, weekday, day-of-month, hour and minute parameters must be specified for this feature to run successfully.

> **Default**   periodic

weekday

Syntax   **weekday** {*weekday-number* [..*weekday-number*] | *day-name* [..*day-name*] | **all**}
no weekday

Context   config>system>cron>sched

Description   This command specifies which days of the week that the schedule will fire on. Multiple days of the week can be specified. When multiple days are configured, each of them will cause the schedule to occur. If a weekday is configured without configuring 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.

Default   no weekday

Parameters   *weekday-number* — Specifies a weekday number.

> **Values**   1 to 7 (maximum 7 weekday-numbers)

day-name — Specifies a day by name.

> **Values**   sunday, monday, tuesday, wednesday, thursday, friday, saturday (maximum 7 weekday names)

all — Specifies all days of the week.

5.16.2.12 Script Control Commands

script-control

Syntax	**script-control**
Context	config>system
Description	This command enables the context to configure command script parameters.

script-policy

Syntax	[**no**] **script-policy** *policy-name* [**owner** *policy-owner*]
Context	config>system>script-control
Description	This command is used to configure the CLI script policy.
Parameters	*policy-name* — Specifies the name of the policy. Can be up to 32 characters.
	policy-owner — Specifies the name of the policy owner. Can be up to 32 characters.

The owner is an arbitrary name and not necessarily a user name. Commands in the scripts are not authorized against the owner. The **configure system security cli-script authorization** *x* **cli-user** command determines the user context against which commands in the scripts are authorized.

Default "TiMOS CLI"

expire-time

Syntax	**expire-time** {*seconds* | **forever**}
Context	config>system>script-control>script-policy
Description	This command is used to configure the maximum amount of time to keep the run history status entry from a script run.
Default	expire-time 3600
Parameters	*seconds* — Specifies the time to keep the run history status entry, in seconds.

Values 0 to 21474836

Default 3600 (1 hour)

forever — Specifies to keep the run history status entry indefinitely.

lifetime

Syntax	**lifetime** {*seconds*	**forever**}
Context	config>system>script-control>script-policy
Description	This command is used to configure the maximum amount of time that a script may run.
Default	lifetime 3600
Parameters	*seconds* — Specifies the maximum amount of time that a script may run, in seconds.

> **Values** 0 to 21474836
>
> **Default** 3600 (1 hour)

forever — Specifies to allow a script to run indefinitely.

max-completed

Syntax	**max-completed** *unsigned*
Context	config>system>script-control>script-policy
Description	This command is used to configure the maximum number of script run history status entries to keep.
Default	max-completed 1
Parameters	*unsigned* — Specifies the maximum number of script run history status entries to keep.

> **Values** 1 to 1500
>
> **Default** 1

results

Syntax	**results** *file-url* **no results**
Context	config>system>script-control>script-policy
Description	This command is used to specify the location where the system writes the output of an event script's execution.

The **no** form of the command removes the file location from the configuration. Scripts will not execute if there is no result location defined.

Default	no results

Parameters   *file-url* — Specifies the location to send CLI output from script runs. The *file-url* is a
location, directory, and filename prefix to which a data and timestamp suffix is added
when the results files are created during a script run, as follows:
*file-url*_YYYYMMDD-hhmmss.uuuuuu.out
where:YYYYMMDD — date
hhmmss — hours, minutes, and seconds
uuuuuu — microseconds (padded to 6 characters with leading zeros)

  Values   *local-url | remote-url*

  local-url — [*cflash-id*/] [*file-path*]
  167 chars max, including *cflash-id*
  file-path 166 chars max

  remote url — [{ftp:// | tftp://}*login*:*password*@*remote-location*/][*file-path*]
  255 characters max
  directory length 99 characters max each

  remote-location — [*hostname | ipv4-address | ipv6-address*]

  ipv4-address — *a.b.c.d*

  ipv6-address — x:x:x:x:x:x:x:x[-*interface*]
  x:x:x:x:x:x:d.d.d.d[-*interface*]
  x — [0 to FFFF]H
  d — [0 to 255]D
  interface — 32 characters max, for link local addresses

  cflash-id — cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

script

Syntax   **script** *script-name* [**owner** *script-owner*]
no script

Context   config>system>script-control>script-policy
config>system>script-control

Description   This command is used to configure a script to be run.

The **no** form of the command removes the script.

Default   no script

Parameters   *script-name* — Specifies the name of the script. Can be up to 32 characters.

script-owner — Specifies the name of the script owner. Can be up to 32 characters.

The owner is an arbitrary name and not necessarily a user name. Commands in the
scripts are not authorized against the owner. The **configure system security cli-script authorization** *x* **cli-user** command determines the user context against which
commands in the scripts are authorized.

  Default   "TiMOS CLI"

location

Syntax	**location** *file-url* **no location**
Context	config>system>script-control>script
Description	This command is used to identify the location of a script to be scheduled. The **no** form of the command removes the location.
Default	no location
Parameters	*file-url* — Specifies the location to search for scripts.

	Values	*local-url | remote-url* local-url — [*cflash-id*/] [*file-path*] 200 chars max, including *cflash-id* directory length 99 characters max each remote url — [{ftp:// | tftp://}*login:password@remote-location*/][*file-path*] 255 characters max directory length 99 characters max each remote-location — [*hostname | ipv4-address | ipv6-address*] ipv4-address — *a.b.c.d* ipv6-address — x:x:x:x:x:x:x:x[-*interface*] x:x:x:x:x:x:d.d.d.d[-*interface*] x — [0 to FFFF]H d — [0 to 255]D interface — 32 characters max, for link local addresses cflash-id — cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

5.16.2.13 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.

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.

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.

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 the 7450 ESS-7, 7450 ESS-12, 7750 SR-7, 7750 SR-12, 7750 SR-12e, 7750 SR-c4, 7950 XRS-20, 7950 XRS-40, 7950 XRS-16c, 7750 SR-a4, 7750 SR-a8, 7750 SR-1e, 7750 SR-2e, and 7750 SR-3e.

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 central clock of the router. In redundant systems with BITS ports, there are two possible BITS-in interfaces, one for each CPM or CCM. In the 7750 SR-c4 system, there are two bits ports on the CFM. The two BITS-in interfaces are configured together, but they are displayed separately in the show command.

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.

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

Default interface-type 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.

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 central clock of the router. On redundant systems, there are two possible BITS-out interfaces, one for each CPM or CCM. On the 7750 SR-c4 system, there are two possible BITS-out interfaces on the chassis front panel. The two BITS-out interfaces are configured together, but they are displayed separately in the show command.

line-length

Syntax **line-length** {**110** | **220** | **330** | **440** | **550** | **660**}

Context config>system>sync-if-timing>bits>output

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   line-length 110

Parameters   **110** — Specifies that the distance is from 0 to 110 feet.

220 — Specifies that the distance is from 110 to 220 feet.

330 — Specifies that the distance is from 220 to 330 feet.

440 — Specifies that the distance is from 330 to 440 feet.

550 — Specifies that the distance is from 440 to 550 feet.

660 — Specifies that the distance is from 550 to 660 feet.

ql-minimum

Syntax   **ql-minimum {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec | eec1 | eec2}**
no ql-minimum

Context   config>system>sync-if-timing>bits>output

Description   This command configures the minimum acceptable QL value that a signal must have in order to be selected for the BITSout port. This ensures that the signal has traceability to a source with at least this quality level so that attached equipment can function properly.

The **no** form of this command disables this check.

Default   no ql-minimum

Parameters   **prs** — Specifies the SONET Primary Reference Source.

stu — Specifies the SONET Synchronous Traceability Unknown.

st2 — Specifies the SONET Stratum 2.

tnc — Specifies the SONET Transit Node Clock.

st3e — Specifies the SONET Stratum 3E.

st3 — Specifies the SONET Stratum 3.

prc — Specifies the SDH Primary Reference Clock.

ssua — Specifies the SDH Primary Level Synchronization Supply Unit.

ssub — Specifies the SDH Second Level Synchronization Supply Unit.

sec — Specifies the SDH Synchronous Equipment Clock.

eec1 — Specifies the Ethernet Equipment Clock Option 1 (sdh).

eec2 — Specifies the Ethernet Equipment Clock Option 2 (sonet).

ql-minimum

Syntax	**ql-minimum {prs	stu	st2	tnc	st3e	st3	prc	ssua	ssub	sec	eec1	eec2}** **no ql-minimum**
Context	config>system>sync-if-timing
Description	This command configures the minimum acceptable QL value that a signal must have in order to be considered for selection by the system timing module.
	The **no** form of this command disables this check.
Default	no ql-minimum
Parameters	**prs** — Specifies the SONET Primary Reference Source.
	stu — Specifies the SONET Synchronous Traceability Unknown.
	st2 — Specifies the SONET Stratum 2.
	tnc — Specifies the SONET Transit Node Clock.
	st3e — Specifies the SONET Stratum 3E.
	st3 — Specifies the SONET Stratum 3.
	prc — Specifies the SDH Primary Reference Clock.
	ssua — Specifies the SDH Primary Level Synchronization Supply Unit.
	ssub — Specifies the SDH Second Level Synchronization Supply Unit.
	sec — Specifies the SDH Synchronous Equipment Clock.
	eec1 — Specifies the Ethernet Equipment Clock Option 1 (sdh).
	eec2 — Specifies the Ethernet Equipment Clock Option 2 (sonet).

source

Syntax	**source {line-ref	internal-clock}**
Context	config>system>sync-if-timing>bits>output

Description   This command configures the values used to identify the source of the BITS (Building Integrated Timing Supply) output. This is either the signal recovered directly from ref1, ref2 or ptp, or it is the output of the node's central clock. The directly recovered signal would be used when the BITS output signal is feeding into an external 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   source 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.

squelch

Syntax   [**no**] **squelch**

Context   configure>system>sync-if-timing>bits>output

Description   This command configures the behavior of the BITSout port when there is no valid reference selected. When enabled with no valid reference, no signal is sent out the port. When disabled with no valid reference, an AIS signal is presented along with the QL-DNU/TL-DUS SSM code if the signal format supports SSM.

Default   no squelch

ssm-bit

Syntax   **ssm-bit** *sa-bit*

Context   config>system>sync-if-timing>bits
config>system>sync-if-timing>ref1   (7750 SR-c12 only)
config>system>sync-if-timing>ref2   (7750 SR-c12 only)

Description   This command configures which sa-bit to use for conveying SSM information when the interface-type is E1.

Default   ssm-bit 8

Parameters   *sa-bit* — Specifies the sa-bit value.

   Values   4 to 8

commit

Syntax **commit**

Context config>system>sync-if-timing

Description This command saves changes made to the system synchronous interface timing configuration.

ref-order

Syntax **ref-order** *first second* [*third* [*fourth*]]
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** (**ptp** applies only to the 7450 ESS and 7750 SR) command configuration. This command organizes the priority order of the timing references.

If a reference source is disabled, then the clock from the next reference source as defined by **ref-order** is used. If all reference sources are disabled, then clocking is derived from a local oscillator.

If a **sync-if-timing** reference is linked to a source port that is operationally down, the port is no longer qualified as a valid reference.

For 7450 ESS and 7750 SR systems with two 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**.

For 7950 XRS systems with two SF/CPMs and two CCMs, the system distinguishes between the BITS inputs on the CCMs associated with the active and standby CPMs. The active CPM will use the BITS input port on the associated CCM, provided that the port is qualified. If the local port is not qualified, then the active CPM will use the BITS input port from the CCM associated with the standby CPM as the next priority reference. For example, the normal ref-order of **bits ref1 ref2** will actually be **bits** (active CCM), followed by **bits** (standby CCM), followed by **ref1**, followed by **ref2**.

The **no** form of the command resets the reference order to the default values.

The **bits** option is not supported on the 7750 SR-c12 chassis.

Default   bits ref1 ref2 ptp (7750 SR and 7450 ESS)

bits ref1 ref2 (7950 XRS)

Parameters   *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

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 only applies to the 7450 ESS-7, 7450 ESS-12, and all 7750 SRs except for the 7750 SR-1e, 7750 SR-2e, and 7750 SR-3e.

ql-override

Syntax   **ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec}**
no ql-override

Context   config>system>sync-if-timing>bits
config>system>sync-if-timing>ptp

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-override

Parameters   **prs** — Specifies the SONET Primary Reference Source Traceable.

stu — Specifies the SONET Synchronous Traceability Unknown.

st2 — Specifies the SONET Stratum 2 Traceable.

tnc — Specifies the SONET Transit Node Clock Traceable.

st3e — Specifies the SONET Stratum 3E Traceable.

st3 — Specifies the SONET Stratum 3 Traceable.

prc — Specifies the SDH Primary Reference Clock Traceable.

ssua — Specifies the SDH Primary Level Synchronization Supply Unit Traceable.

ssub — Specifies the SDH Second Level Synchronization Supply Unit Traceable.

sec — Specifies the SDH Synchronous Equipment Clock Traceable.

ql-override

Syntax	**ql-override {prs | stu | st2 | tnc | st3e | st3 | prc | ssua | ssub | sec | eec1 | eec2}** **no ql-override**
Context	config>system>sync-if-timing>ref1 (7750 SR-c12 only) config>system>sync-if-timing>ref2 (7750 SR-c12 only)
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-override

Parameters   **prs** — Specifies the SONET Primary Reference Source Traceable.

stu — Specifies the SONET Synchronous Traceability Unknown.

st2 — Specifies the SONET Stratum 2 Traceable.

tnc — Specifies the SONET Transit Node Clock Traceable.

st3e — Specifies the SONET Stratum 3E Traceable.

st3 — Specifies the SONET Stratum 3 Traceable.

prc — Specifies the SDH Primary Reference Clock Traceable.

ssua — Specifies the SDH Primary Level Synchronization Supply Unit Traceable.

ssub — Specifies the SDH Second Level Synchronization Supply Unit Traceable.

sec — Specifies the SDH Synchronous Equipment Clock Traceable.

eec1 — Specifies the Ethernet Equipment Clock Option 1 Traceable (sdh).

eec2 — Specifies the Ethernet Equipment Clock Option 2 Traceable (sonet).

ql-selection

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. Quality level is conveyed via the SSM or forced using the **ql-override** command.
Default	no ql-selection

ref1

Syntax	**ref1**
Context	config>system>sync-if-timing
Description	This command enables the context to configure parameters for the first timing reference.
	The restrictions on the location for the source port or source bits for **ref1** and **ref2** are listed in Ref1 and Ref2 Timing References.

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

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 command configures the source bits for **ref1** or **ref2** timing reference. There are
             restrictions on the source-bits location for **ref1** and **ref2** based on platform. Refer to the
             description of the **ref1** command for details. 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 to 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 on the 7750 SR, T1 or E1 channels on a channelized OC3/OC12/
             STM1/STM4 Circuit Emulation Service port can be specified if they are using adaptive timing.

             There are restrictions on the source-port location for **ref1** and **ref2** based on platform. Refer
             to the description of the **ref1** command for details.

Default   no source-port

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

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

ref2

Syntax   **ref2**

Context   config>system>sync-if-timing

Description This command enables the context to configure parameters for the second timing reference.
             There are restrictions on the source-port and source-bits locations for **ref2** based on the
             platform. The restrictions on the location for the source-port or source-bits for **ref1** and **ref2**
             are listed in Revertive, non-Revertive Timing Reference Switching Operation.

revert

Syntax	[**no**] **revert**
Context	config>system>sync-if-timing
Description	This command allows the clock to revert to a higher priority reference if the current reference goes offline or becomes unstable. When the failed reference becomes operational, it is eligible for selection. When the mode is non-revertive, a failed clock source is not selected again.
Default	no revert

wait-to-restore

Syntax	**wait-to-restore** *minutes*
	no wait-to-restore
Context	config>system>sync-if-timing
Description	This command configures the time for the Wait to Restore timer. A previously failed input reference must be valid for the time specified before it is used for either the BITSout or the central clock input reference.
	The **no** form of this command disables the timer.
Default	no wait-to-restore
Parameters	*wtr-time* — Specifies a value representing the number of minutes for the wait to restore timeout.
	Values 1 to 12

5.16.2.14   System Administration Commands

admin

Syntax	**admin**
Context	<root>
Description	The context to configure administrative system commands. Only authorized users can execute the commands in the **admin** context.

application-assurance

Syntax **application-assurance**

Context admin

Description This command enables the context to perform application-assurance operations.

group

Syntax **group** *aa-group-id*

Context admin>application-assurance

Description This command enables the context to perform a group-specific upgrade.

Parameters *aa-group-id* — Specifies an AA ISA group ID.

Values 1 to 255

url-list

Syntax **url-list** *url-list-name* **upgrade**

Context admin>application-assurance>group

Description This command upgrades the URL list.

Parameters *url-list-name* — Specifies the application assurance URL list, up to 32 characters.

upgrade

Syntax **upgrade**

Context admin>app-assure

Description This command loads a new protocol list from the isa-aa.tim file into the CPM.

This command requires an ISA-AA reboot.

debug-save

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 saved by the **admin save** command and not preserved across a node reboot or CPM switchover. The **debug-save** command makes the debug configuration available for the operator to execute after a reboot by using the **exec** command or after a CPM switchover by using the **switchover-exec** command, if desired.

Parameters   *file-url* — Specifies the file URL location to save the debug configuration. If no file-url is specified then the debug configuration is saved at the same location as the standard configuration file (**bof>primary-config/bof>secondary-config**/**bof>tertiary-config**) with the same file name as the standard configuration file but with a .dbg suffix.

➡️   **Note:** IPv6-address applies only to 7750 SR and 7950 XRS.

   Values

file url	local-url | remote-url: 255 chars max
local-url	[*cflash-id*/][*file-path*] 200 chars max, including cflash-id *file-path* 199 chars max
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 to FFFF]H *d* - [0 to 255]D interface - 32 chars max, for link local addresses 255
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

disconnect

Syntax   **disconnect** [**address** *ip-address* \| **session-id** *session-id* \| **username** *user-name* \| {**console** \| **bluetooth** \| **telnet** \| **ftp** \| **ssh** \| **netconf** \| **grpc**}]

Context   admin

Description   This command disconnects a user from a session.

   Issuing the **disconnect** command without any parameters will disconnect the session in which the command was executed.

If any of the session type options (for example, **console, bluetooth, telnet, FTP, SSH**) are specified, then only the respective sessions are affected.

If no session type options are specified, then all sessions from the IP address or from the specified user are disconnected.

Any task that the user is executing is terminated. FTP files accessed by the user will not be removed.

A major severity security log event is created specifying what was terminated and by whom.

Parameters   *ip-address* — Specifies the IP address to disconnect, specified in dotted decimal notation.

➡️   **Note:** IPv6 is supported on the 7750 SR and 7950 XRS.

Values

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

session-id — The model-driven session ID. Can be obtained using the **show system management-interface datastore-locks** [**detail**] command.

user-name — Specifies the name of the user. The name can be up to 32 characters.

console — Disconnects the console session.

bluetooth — Disconnects the bluetooth session.

telnet — Disconnects the Telnet session.

ftp — Disconnects the FTP session.

ssh — Disconnects the SSH session.

netconf — Disconnects the NETCONF session.

grpc — Disconnects the GRPC session.

display-config

Syntax   **display-config** [**detail** | **index**]

Context   admin

Description	This command displays the system's running configuration.
	By default, only non-default settings are displayed.
	Specifying the **detail** option displays all default and non-default configuration parameters.
Parameters	**detail** — Displays default and non-default configuration parameters.
	index — Displays only persistent-indices.

enable-tech

Syntax	[**no**] **enable-tech**
Context	admin
Description	This command enables the shell and kernel commands.

> ➡ **Note:** This command should only be used with authorized direction from the Nokia Technical Assistance Center (TAC).

nat

Syntax	**nat**
Context	admin
Description	This command performs NAT operations.

save-deterministic-script

Syntax	**save-deterministic-script**
Context	admin>nat
Description	This command saves the script that calculates deterministic NAT map entries.

reboot

Syntax	**reboot** [**active** | **standby** | **upgrade**] [**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** — Reboots the active CPM.

> **Default** active

standby — Reboots the standby CPM.

> **Default** active

upgrade — Forces card firmware to be upgraded during chassis reboot. Normally, the SR-series router OS automatically performs firmware upgrades on CPMs and XCM/IOM cards without the need for the **upgrade** keyword. The automatic upgrade must be enabled in the SR OS7 Command Line Interface (CLI) when rebooting the system.

When the **upgrade** keyword is specified, a chassis flag is set for the BOOT Loader (boot.ldr) and on the subsequent boot of the OS on the chassis, firmware images on CPMs, XCMs, or IOMs will be upgraded automatically.

Any CPMs, XCMs, or IOMs that are installed in the chassis will be upgraded automatically. For example, if a card is inserted with down revision firmware as a result of a card hot swap with the latest OS version running, the firmware on the card will be automatically upgraded before the card is brought online.

If the card firmware is upgraded automatically, a chassis cardUpgraded (event 2032) log event is generated. The corresponding SNMP trap for this log event is tmnxEqCardFirmwareUpgraded.

During any firmware upgrade, automatic or manual, it is imperative that during the upgrade procedure:

- Power must not be switched off or interrupted.
- The system must not be reset.
- No cards are inserted or removed.

Any of the above conditions may render cards inoperable requiring a return of the card for resolution.

The time required to upgrade the firmware on the cards in the chassis depends on the number of cards to be upgraded. The progress of a firmware upgrade can be monitored at the console.

hold — Administratively holds a rebooted standby SF/CPM from coming back online. Both the control processor (CPM) and the switch fabric (SFM) of the standby SF/CPM are held out of service. This may be useful for troubleshooting purposes (e.g. standby SF/CPM is suspected of causing some system problems). The SF/CPM should not be left offline as the system does not have control or switch fabric redundancy while one SF/CPM is offline. The SF/CPM must be rebooted again

(without the **hold** keyword) to return it to service. This parameter applies only to the SF/CPM3 and SF/CPM4 on the 7450 ESS and 7750 SR platforms. Note that on platforms such as the 7750 SR-12e and 7950 XRS, and on the 7450/7750 SFM5/ CPM5, the SFMs are modeled as separate entities and can be administratively disabled by using the **configure sfm** *x* **shutdown** command.

now — Forces a reboot of the router immediately without an interactive confirmation.

reset-policy-exclusive

Syntax   **reset-policy-exclusive**

Context   admin

Description This command allows an authorized administrator to reset the exclusive policy editing lock. This will reset the lock flag and end the policy editing session in progress, discarding any policy edits.

satellite

Syntax   **satellite** [**eth-sat** *sat-id*] [**reboot**] [**upgrade**] [**now**]
            satellite [**eth-sat** *sat-id*] [**sync-boot-env**]
            satellite [**eth-sat** *sat-id*] [**tech-support** *file-url*]

Context   admin

Description This command can be used to perform administrative functions on the specified Ethernet-satellite chassis.

If the **reboot** keyword is specified, the command initiates an administrative reboot of the specified Ethernet-satellite chassis.

If the **sync-boot-env** keyword is specified, the command forces the specified Ethernet-satellite chassis to synchronize the boot image.

If the **tech-support** keyword is specified, the command creates a system core dump. If the *file-url* parameter is omitted and a ts-location is defined, the SR OS automatically generates a file name for the tech-support file based on the system name, date and time. The file is saved to the directory indicated by the configured ts-location. See the command description of for more information.

The format of the auto-generated filename is ts-XXXXX.YYYYMMDD.HHMMUTC.dat where:

- XXXXX: system name with special characters expanded to avoid problems with file systems (for example, a '.' is expanded to %2E.)
- YYYYMMDD: Date with leading zeros on year, month and day
- HHMM: Hours and Minutes in UTC time (24hr format, always 4 chars, with leading zeros on hours and minutes)

→ **Note:** The **satellite** [**eth-sat** *sat-id*] [**tech-support** *file-url*] command should only be used with authorized direction from the Nokia Technical Assistance Center (TAC).

Parameters   *sat-id* — Specifies the Ethernet-satellite chassis.

file-url — Specifies the file URL location to save the configuration file.

Values

local-url | remote-url

local-url	[*cflash-id*/][*file-path*] 200 chars max, including cflash-id directory length 99 chars max each
remote-url	[ftp://*login:pswd@remote-locn*/][*file-path*] 247 chars max directory length 99 chars max each

now — Causes the satellite to reboot immediately without further prompts or interactive confirmation.

reboot — Initiates a satellite reboot.

sync-boot-env — Causes the specified Ethernet-satellite chassis to synchronize the boot image.

upgrade — Causes the satellite to update its firmware image during chassis reboot.

save

Syntax   **save** [*file-url*] [**detail**] [**index**]

Context   admin

Description   This command saves the running configuration to a configuration file. For example:

```
A:ALA-1>admin# save ftp://test:test@192.168.x.xx/./100.cfg
Saving configuration .........Completed.
```

An **admin save** operation initiated by a user is aborted if another user initiates another **admin save** from another session.

By default, the running configuration is saved to the primary configuration file.

Parameters   *file-url* — Specifies the file URL location to save the configuration file.

Values

local-url | remote-url	
local-url	[*cflash-id*/][*file-path*] 200 chars max, including cflash-id directory length 99 chars max each
remote-url	[{ftp:// | tftp://}*login:pswd@remote-locn*/][*file-path*] 243 chars max directory length 99 chars max each
remote-locn	[*hostname* | *ipv4-address* | *ipv6-address*]
ipv4-address	*a.b.c.d*
ipv6-address	*x:x:x:x:x:x:x:x*[*-interface*] *x:x:x:x:x:x:d.d.d.d*[*-interface*] *x* - [0 to FFFF]H *d* - [0 to 255]D interface - 32 chars max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

Default the primary configuration file location

detail — Saves both default and non-default configuration parameters.

index — Forces a save of the persistent index file regardless of the persistent status in the BOF file. The index option can also be used to avoid an additional boot required while changing your system to use the persistence indices.

save

Syntax **save** [*file-url*] [**detail**] [**index**]

Context admin

Description This command saves the running configuration to a configuration file. For example:

```
A:ALA-1>admin# save ftp://test:test@192.168.x.xx/./100.cfg
Saving configuration .........Completed.
```

An **admin save** operation initiated by a user is aborted if another user initiates another **admin save** from another session.

By default, the running configuration is saved to the primary configuration file.

Parameters *file-url* — Specifies the file URL location to save the configuration file.

Values

local-url | remote-url	
local-url	[*cflash-id*/][*file-path*] 200 chars max, including cflash-id directory length 99 chars max each
remote-url	[ftp://*login:pswd@remote-locn*/][*file-path*] 247 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 to FFFF]H *d* - [0 to 255]D interface - 32 chars max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

Default the primary configuration file location

detail — Saves both default and non-default configuration parameters.

index — Forces a save of the persistent index file regardless of the persistent status in the BOF file. The index option can also be used to avoid an additional boot required while changing your system to use the persistence indices.

satellite

Syntax **satellite** [**eth-sat** *sat-id*] [**reboot**] [**upgrade**] [**now**]
satellite [**eth-sat** *sat-id*] [**sync-boot-env**]
satellite [**eth-sat** *sat-id*] [**tech-support** *file-url*]

Context admin

Description This command can be used to perform administrative functions on the specified Ethernet-satellite chassis.

If the **reboot** keyword is specified, the command initiates an administrative reboot of the specified Ethernet-satellite chassis.

If the **sync-boot-env** keyword is specified, the command forces the specified Ethernet-satellite chassis to synchronize the boot image.

If the **tech-support** keyword is specified, the command creates a system core dump. If the *file-url* parameter is omitted and a ts-location is defined, the SR OS automatically generates a file name for the tech-support file based on the system name, date and time. The file is saved to the directory indicated by the configured ts-location. See the command description of ts-location on page 494 for more information.

The format of the auto-generated filename is ts-XXXXX.YYYYMMDD.HHMMUTC.dat where:

- XXXXX: system name with special characters expanded to avoid problems with file systems (for example, a '.' is expanded to %2E.)
- YYYYMMDD: Date with leading zeros on year, month and day
- HHMM: Hours and Minutes in UTC time (24hr format, always 4 chars, with leading zeros on hours and minutes)

➡️ **Note:** The **satellite** [**eth-sat** *sat-id*] [**tech-support** *file-url*] command should only be used with authorized direction from the Nokia Technical Assistance Center (TAC).

Parameters   *sat-id* — Specifies the Ethernet-satellite chassis.

   Values   1 to 20

file-url — Specifies the file URL location to save the configuration file.

   Values

local-url | remote-url

local-url	[*cflash-id*/][*file-path*] 200 chars max, including cflash-id directory length 99 chars max each
remote-url	[ftp://*login:pswd@remote-locn*/][*file-path*] 247 chars max directory length 99 chars max each

now — Causes the satellite to reboot immediately without further prompts or interactive confirmation.

reboot — Initiates a satellite reboot.

sync-boot-env — Causes the specified Ethernet-satellite chassis to synchronize the boot image.

upgrade — Causes the satellite to update its firmware image during chassis reboot.

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 zeros on year, month and day
- HHMM: Hours and Minutes in UTC time (24hr format, always 4 chars, with leading zeros on hours and minutes)

→ **Note:** This command should only be used with authorized direction from the Nokia Technical Assistance Center (TAC).

Parameters   *file-url* — Specifies the file URL location to save the binary file.

Values

local-url | *remote-url*	
local-url	[*cflash-id*/][*file-path*] 200 chars max, including cflash-id directory length 99 chars max each
remote-url	[{ftp:// | tftp://}*login:pswd@remote-locn*/][*file-path*] 199 chars max
remote-locn	[*hostname* | *ipv4-address* | *ipv6-address*]
ipv4-address	*a.b.c.d*
ipv6-address	*x:x:x:x:x:x:x:x*[-*interface*]
	x:x:x:x:x:x:d.d.d.d[-*interface*]
	x - [0 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

license

Syntax   **license**

Context   admin>system

Description   Enters a context for administrative commands related to licensing.

activate

Syntax   **activate** [*file-url*] [**now**]

Context   admin>system>license

Description   This command performs an activation on the license file pointed to by the command line argument. The file is first validated as described in the **admin>system>license>validate** command and upon success, replaces the existing license attributes in the system with the information in the new license file.

The license attributes that are active on a system can be viewed with the **show>licensing>entitlements** command.

> ➡   **Note:** If the CLM tool is being used for license management, it shall perform the validation and activation and there is no need to enter these commands manually.

Parameters   *file-url* — Specifies the file URL location to read the license file.

        Values   local-url, remote-url

> ➡   **Note:** IPv6 address apply only to 7750 SR and 7950 XRS.

now — If the **now** keyword is not present, the operator is prompted to confirm the activation. With the **now** keyword the license file is activated without the additional prompt.

validate

Syntax   **validate** [*file-url*]

Context   admin>system>license

Description   This command performs a validation on the license file pointed to by the command line argument. A validation ensures that the license is compatible with the current state of the target system but it does not change the existing license. Aspects that can cause a failure in the validation include:

- The license file was created for a different target system. The UUID encoded into the file must match that defined by the specific hardware platform.
- The license file does not include license information for the release of software currently running on the system.
- The current date/time reported to system is outside the validity period encoded in the license.
- The system is currently using a hardware upgrade license that is not included in the new file being validated.

➡ **Note:** If the CLM tool is being used for license management, it shall perform the validation and activation and there is no need to enter these commands manually.

Parameters *file-url* — Specifies the file URL location to read the license file.

Values local-url, remote-url

➡ **Note:** IPv6 address apply only to 7750 SR and 7950 XRS.

ts-location

Syntax **ts-location** *file-url*
no ts-location

Context config>system>security>tech-support

Description The **ts-location** command is used (along with an automatic system generated file name) when no *file-url* parameter is provided for the **admin tech-support** command. If **no ts-location** is defined then the operator must provide a file-url with the **admin tech-support** command itself.

The directory specified for the ts-location is not auto-created by SR OS. The operator must ensure that it exists.

See the **admin tech-support** command for more details about the system generated file name.

Default no ts-location

Parameters *file-url* — Specifies the destination directory for auto-named tech-support files (when no *file-url* is specified with the 'admin tech-support' command). The *file-url* for the **ts-location** must be a directory (no filename or extension). The root directory (for example, cf1:\) is blocked for local compact flash destinations. A sub-directory (for example, cf2:\tech-support) must be used if local cf is the location.

Values

local-url | remote-url	
local-url	[*cflash-id*/][*file-path*] 200 chars max, including cflash-id directory length 99 chars max each
remote-url	[ftp://*login:pswd@remote-locn*/][*file-path*] 247 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 to FFFF]H
	d - [0 to 255]D
	interface - 32 chars max, for link local addresses
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

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.

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 to 9

rescue — Specifies a rescue checkpoint configuration.

5.16.2.15   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 configure>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

force-switchover

Syntax	**force-switchover** [**now**] [**ignore-status**]
Context	admin>redundancy
Description	This command forces a switchover to the standby CPM card. The primary CPM reloads its software image and becomes the secondary CPM.
Parameters	**now** — Forces the switchover to the redundant CPM card immediately.
	ignore-status — Forces a switchover despite any diagnostics or conditions on the standby. For the 7950 XRS, this is true even if the standby cannot reach the extension CPMs on the extension chassis of an XRS-40 via its local CPM interconnect ports).

rollback-sync

Syntax	**rollback-sync**
Context	admin>redundancy
Description	This command copies the entire set of rollback checkpoint files from the active CPM CF to the standby CPM CF.

synchronize

Syntax	**synchronize cert** **synchronize** {**boot-env** | **config**}
Context	admin>redundancy
Description	This command performs a synchronization of the standby CPM's images and/or configuration files to the active CPM. Either the **boot-env** or **config** parameter must be specified.

In the **admin>redundancy** context, this command performs a manually triggered standby CPM synchronization. When the standby CPM takes over operation following a failure or reset of the active CPM, it is important to ensure that the active and standby CPM have identical operational parameters. This includes the saved configuration, CPM, XCM, and IOM images.

The active CPM ensures that the active configuration is maintained on the standby CPM. However, to ensure smooth operation under all circumstances, runtime images and system initialization configurations must also be automatically synchronized between the active and standby CPM. If synchronization fails, alarms and log messages that indicate the type of error that caused the failure of the synchronization operation are generated. When the error condition ceases to exist, the alarm is cleared.

Only files stored on the router are synchronized. If a configuration file or image is stored in a location other than on a local compact flash, the file is not synchronized (for example, storing a configuration file on an FTP server).

The **no** form of the command removes the parameter from the configuration.

Default   no synchronize

Parameters   **cert** — Synchronizes the imported certificate/key/CRL files to the standby CPM.

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.

mgmt-ethernet

Syntax   **mgmt-ethernet** [**revert** *seconds*]
no mgmt-ethernet

Context   config>redundancy

Description   If the management Ethernet port on the active CPM goes down, this command allows the active CPM to be configured to use the management Ethernet port of the standby CPM.

The **revert** option allows the administrator to control when to revert back to the management Ethernet port of the primary CPM once it comes up again.

The **no** form of the command disables redundancy, so that connectivity to the active CPM is lost if its Ethernet port goes down.

This feature is not supported on the 7750 SR-a, 7750 SR-c, 7750-e, and the VSR platforms.

Default   no mgmt-ethernet

Parameters   *seconds* — Specifies the duration to wait (in seconds) before reverting back to the primary CPM's management Ethernet port.

        Values   1 to 300

multi-chassis

    Syntax   **multi-chassis**

    Context   config>redundancy

    Description   This command enables the context to configure multi-chassis parameters.

bgp-multi-homing

    Syntax   **bgp-multi-homing**

    Context   config>redundancy

    Description   This command configures BGP multi-homing parameters.

boot-timer

    Syntax   **boot-timer** *seconds*
                no boot-timer

    Context   config>redundancy>bgp-multi-homing

    Description   This command configures the time the service manager waits after a node reboot before running the DF election algorithm. The boot-timer value should be configured to allow for the BGP sessions to come up and for the NLRI information to be refreshed/exchanged.

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

    Default   no boot-timer

    Parameters   *seconds* — Specifies the BGP multi-homing boot-timer in seconds.

        Values   0 to 600

site-activation-timer

    Syntax   **site-activation-timer** *seconds*
                no site-activation-timer

    Context   config>redundancy>bgp-multi-homing

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**   0 to 100
>
>   **Default**   2

site-min-down-timer

Syntax   **site-min-down-timer** *seconds*
no site-min-down-timer

Context   config>redundancy>bgp-multi-homing

Description   This command configures the BGP multi-homing site minimum down time. When set to a non-zero value, if the site goes operationally down it will remain operationally down for at least the length of time configured for the **site-min-down-timer**, regardless of whether other state changes would have caused it to go operationally up. This timer is restarted every time that the site transitions from up to down.

The above operation is optimized in the following circumstances:

- If the site goes down on the designated forwarder but there are no BGP multi-homing peers with the same site in an UP state, then the **site-min-down-timer** is not started and is not used.
- If the site goes down on the designated forwarder but there are no active BGP multi-homing peers, then the **site-min-down-timer** is not started and is not used.
- If the **site-min-down-timer** is active and a BGP multi-homing update is received from the designated forwarder indicating its site has gone down, the **site-min-down-timer** is immediately terminated and this PE becomes the designated forwarder if the BGP multi-homing algorithm determines it should be the designated forwarder.

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

Default   no site-min-down-timer

Parameters   *seconds* — Specifies the time, in seconds, that a BGP multi-homing site remains
operationally down after a transition from up to down.

    Values   1 to 100

    Default   0

bgp-evpn-multi-homing

    Syntax   **bgp-evpn-multi-homing**

    Context   config>redundancy

    Description   This command configures BGP EVPN multi-homing parameters.

boot-timer

    Syntax   **boot-timer** *seconds*
    no boot-timer

    Context   config>redundancy>bgp-evpn-multi-homing

    Description   This command configures the time the service manager waits after a node reboot before
running the DF election algorithm. The boot-timer value should be configured to allow for the
BGP sessions to come up and for the NLRI information to be refreshed/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 to 600

    Default   10

es-activation-timer

    Syntax   **es-activation-timer** *seconds*

    Context   config>redundancy>bgp-evpn-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

Parameters   *seconds* — Specifies the standby status in seconds.

Values   0 to 100

Default   3

rollback-sync

Syntax   [**no**] **rollback-sync**

Context   config>redundancy

Description   The operator can enable automatic synchronization of rollback checkpoint files between the active CPM and standby CPM. When this automatic synchronization is enabled, a rollback save will cause the new checkpoint file to be saved on both the active and standby CPMs. The suffixes of the old checkpoint files on both active and standby CPMs are incremented. Note that automatic sync only causes the one new checkpoint file to be copied to both CFs (the other 9 checkpoints are not automatically copied from active to standby but that can be done manually with **admin red rollback-sync**).

Automatic synchronization of rollback checkpoint files across CPMs is only performed if the rollback-location is configured as a local file-url (for example, "cf3:/rollback-files/rollback). Synchronization is not done if the rollback-location is remote.

The **config red sync {boot-env | config}** and **admin red sync {boot-env | config}** do not apply to rollback checkpoint files. These commands do not manually or automatically sync rollback checkpoint files. The dedicated **rollback-sync** commands must be used to sync rollback checkpoint files.

Default   no rollback-sync

synchronize

Syntax   **synchronize** {**boot-env** | **config**}

Context   config>redundancy

Description   This command performs a synchronization of the standby CPMs images and/or config files to the active CPM. Either the **boot-env** or **config** parameter must be specified.
In the **config>redundancy** context, this command performs an automatically triggered standby CPM synchronization. When the standby CPM takes over operation following a failure or reset of the active CPM, it is important to ensure that the active and standby CPMs have identical operational parameters. This includes the saved configuration, CPM, XCM, and IOM images.

The active CPM ensures that the active configuration is maintained on the standby CPM. However, to ensure smooth operation under all circumstances, runtime images and system initialization configurations must also be automatically synchronized between the active and standby CPM.

If synchronization fails, alarms and log messages that indicate the type of error that caused the failure of the synchronization operation are generated. When the error condition ceases to exist, the alarm is cleared.

Only files stored on the router are synchronized. If a configuration file or image is stored in a location other than on a local compact flash, the file is not synchronized (for example, storing a configuration file on an FTP server).

Default   no synchronize

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.

        Default   config

5.16.2.15.1   Peer Commands

peer

Syntax   **peer** *ip-address* [**create**]
    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 addresses are not allowed.

        Values   ipv4-address: a.b.c.d
                ipv6-address:

                • x:x:x:x:x:x:x:x (eight 16-bit pieces)
                • x:x:x:x:x:x:d.d.d.d
                • x: [0 to FFFF] H
                • d: [0 to 255] D

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.

Default no authentication-key

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 — Specifies 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 an unencrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the **hash** or **hash2** parameter specified

hash2 — Specifies the key is entered in a more complex encrypted form that involves more variables than the key value alone, meaning that the **hash2** encrypted variable cannot be copied and pasted. If the **hash** or **hash2** parameter is not used, the key is assumed to be in an unencrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the **hash** or **hash2** parameter specified.

diameter-proxy

Syntax [**no**] **diameter-proxy**

Context config>redundancy>multi-chassis>peer>sync

Description This command synchronizes diameter proxy.

Default no diameter-proxy

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

ipsec

Syntax [**no**] **ipsec**

Context config>redundancy>multi-chassis>peer>sync

Description This command synchronizes IPsec information.

Default no ipsec

l2tp

Syntax [**no**] **l2tp**

Context config>redundancy>multi-chassis>peer>sync

Description This command synchronizes L2TP.

Default no l2tp

local-dhcp-server

Syntax [**no**] **local-dhcp-server**

Context config>redundancy>multi-chassis>peer>sync

Description This command synchronizes DHCP server information.

Default no local-dhcp-server

mc-ring

Syntax [**no**] **mc-ring**

Context config>redundancy>multi-chassis>peer>sync

Description   This command synchronizes multi-chassis ring information.

Default   no mc-ring

mld-snooping

Syntax   [**no**] **mld-snooping**

Context   config>redundancy>multi-chassis>peer>sync

Description   This command is not supported. It is not blocked for backwards-compatibility reasons but has no effect on the system if configured.

Default   no mld-snooping

peer-name

Syntax   **peer-name** *name*
          no peer-name

Context   config>redundancy>multi-chassis>peer

Description   This command specifies a peer name.

Default   no peer-name

Parameters   *name* — Specifies 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.

pim-snooping

Syntax   **pim-snooping** [**saps**] [**spoke-sdps**]
          no pim-snooping

Context   config>redundancy>multi-chassis>peer>sync

Description   This command specifies whether PIM snooping for IPv4 information should be synchronized with the multi-chassis peer. Entering only **pim-snooping** (without any parameter) results in the synchronization being applicable only to SAPs.

Default   no pim-snooping

Parameters   **saps** — Specifies that SAPs are to be synchronized with the multi-chassis peer relating to *sync-tags* configured on ports. This is the default when no parameters are included.

spoke-sdps — Specifies that spoke SDPs are to be synchronized with the multi-chassis peer according to the synchronization tags configured on spoke SDPs.

port

Syntax	**port** *port-id* [**sync-tag** *sync-tag*] [**create**] **no port** *port-id*]
Context	config>redundancy>multi-chassis>peer>sync
Description	This command specifies the port to be synchronized with the multi-chassis peer and a synchronization tag to be used while synchronizing this port with the multi-chassis peer.
Parameters	*port-id* — Specifies the port to be synchronized with the multi-chassis peer.

Values

port-id	slot/mda/port		
lag-id	lag-id		
		lag	keyword
		id	1 to 200
pw-id	pw-*id*		
		pw	keyword
		id	1 to 10239

sync-tag — Specifies a synchronization tag, up to 32 characters in length, to be used while synchronizing this port with the multi-chassis peer.

create — Creates an entry; mandatory while creating an entry.

range

Syntax	**range** *encap-range* **sync-tag** *sync-tag* **no range** *encap-range*
Context	config>redundancy>multi-chassis>peer>sync>port
Description	This command configures a range of encapsulation values.
Parameters	*encap-range* — Specifies a range of encapsulation values on a port to be synchronized with a multi-chassis peer.

Values

Dot1Q	*start-qtag-end-qtag*	
	start-qtag	0 to 4094
	end-qtag	0 to 4094
QinQ	*qtag1.start-qtag2.end-qtag2-start-qtag1.*-end-qtag1.**	
	qtag1	1 to 4094
	start-qtag1	1 to 4094
	end-qtag1	1 to 4094
	start-qtag2	0 to 4094
	end-qtag2	0 to 4094

sync-tag — Specifies a synchronization tag up to 32 characters in length to be used while synchronizing this encapsulation value range with the multi-chassis peer.

python

Syntax   **python**

Context   config>redundancy>multi-chassis>peer>sync

Description   This command enables syncing of python-policy cached entries to the peer.

Use the **mcs-peer** command in the python-policy to enable syncing for a specific python-policy.

Default   no python

sdp

Syntax   **sdp** *sdp-id* [**sync-tag** *sync-tag*] [**create**]
no sdp *sdp-id*

Context   config>redundancy>multi-chassis>peer>sync

Description   This command specifies the SDP to be synchronized with multi-chassis peer.

Parameters   *sdp-id* — Specifies the SDP of the spoke SDPs to be synchronized with the multi-chassis peer.

Values   1 to 17407

sync-tag — Specifies a synchronization tag, up to 32 characters in length, to be used when synchronizing with the multi-chassis peer.

create — Creates an entry; mandatory while creating an entry.

range

Syntax	**range** *vc-id-range* **sync-tag** *sync-tag* **no range** *vc-id-range*
Context	config>redundancy>multi-chassis>peer>sync>sdp
Description	This command configures a range of VC-ID values.
Parameters	*vc-id-range* — Specifies a range of VC-ID values on an to be synchronized with a multi-chassis peer.

Values

vc-id-range	start-vc-id-end-vc-id	
	start-vc-id	1 to 4294967295
	end-vc-id	1 to 4294967295

sync-tag — Specifies a synchronization tag up to 32 characters in length to be used while synchronizing this encapsulation value range with the multi-chassis peer.

source-address

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.
Default	no source-address
Parameters	*ip-address* — Specifies the source address used to communicate with the multi-chassis peer.

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

ipv6-address:

- x:x:x:x:x:x:x:x (eight 16-bit pieces)
- x:x:x:x:x:x:d.d.d.d
- x - [0 to FFFF] H
- d - [0 to 255] D

sync

Syntax	[**no**] **sync**
Context	config>redundancy>multi-chassis>peer
Description	This command enables the context to configure synchronization parameters.

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	**sub-mgmt** [**ipoe**] [**pppoe**] **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
Parameters	**ipoe** — Specifies to synchronize IPoE subscribers. The use of the keyword must match on both nodes, otherwise the subscriber synchronization fails. **pppoe** — Specifies to synchronize PPPoE subscribers. The use of the keyword must match on both nodes, otherwise the subscriber synchronization fails.

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-host-trk

warm-standby

Syntax   **warm-standby**

Context   config>redundancy>multi-chassis>peer

Description   This command enables Oversubscribed Multi-Chassis Redundancy (OMCR). Subscriber hosts are synchronized between two chassis only in the control plane and are kept there (as part of the Multi-Chassis Synchronization (MCS) state) until the switchover occurs. Link or nodal failure will trigger the switchover at which point the subscriber hosts are being fully instantiated in the control and the forwarding plane. This approach allows oversubscription of the resources in the central standby (or protecting) node that is backing-up a number of other active nodes. The total number of protected subscribers in the OMCR cluster exceeds the forwarding capacity of the protecting node. This is achievable by not fully occupying the resources for the subscriber hosts until the failure occurs.

The restoration times depend on the amount of the subscriber hosts that are affected by the switchover and it is related to the time needed for the full instantiation of the subscribers in the forwarding plane.

Although this command is configured on a peer level, the warm-standby property is a nodal characteristic. In other words, mixing of N:1 and 1:1 (hot standby) mode in the central standby node is not supported. Consequently all peers on the central standby node must be configured for warm-standby (N:1), or all peers must be configured for hot-standby (1:1) by omitting the **warm-standby** keyword from the configuration.

The peer of the central-backup node is not aware of the redundancy model supported. In in other words, the peer of the central-backup node does not know whether it peers with a warm-standby peer or host-standby-peer. All nodes participating in this protection model must run SR OS 12.0 or higher.

This command applies only to the 7450 ESS and 7750 SR.

Default   no warm-standby

5.16.2.15.2   Multi-Chassis Endpoint Commands

mc-endpoint

Syntax   [**no**] **mc-endpoint**

Context   config>redundancy>multi-chassis>peer

Description   This command specifies that the endpoint is multi-chassis. This value should be the same on both MC-EP peers for the pseudowires that must be part of the same group.

The **no** form of this command removes the endpoint from the MC-EP. Single chassis behavior applies.

Default   no mc-endpoint

bfd-enable

Syntax	[**no**] **bfd-enable**
Context	config>redundancy>multi-chassis>peer>mc-ep config>router>rsvp config>router>bgp config>router>bgp>group config>router>bgp>group>neighbor config>redundancy>multi-chassis>peer>mc-ep
Description	This command enables the use of bi-directional forwarding (BFD) to control the state of the associated protocol interface. By enabling BFD on a given protocol interface, the state of the protocol interface is tied to the state of the BFD session between the local node and the remote node. The parameters used for the BFD are set via the BFD command under the IP interface. The **no** form of this command disables BFD.
Default	no bfd-enable

boot-timer

Syntax	**boot-timer** *interval* **no boot-timer**
Context	config>redundancy>multi-chassis>peer>mc-ep
Description	This command configures the boot timer interval. This command applies only when the node reboots. It specifies the time the MC-EP protocol keeps trying to establish a connection before assuming a failure of the remote peer. This is different from the keep-alives mechanism which is used just after the peer-peer communication was established. After this time interval passed all the mc-endpoints configured under services will revert to single chassis behavior, activating the best local PW. The **no** form of this command sets the interval to default.
Default	no boot-timer
Parameters	*interval* — Specifies the boot timer interval. **Values** 1 to 600

hold-on-neighbor-failure

Syntax	**hold-on-neighbor-failure** *multiplier* **no hold-on-neighbor-failure**
Context	config>redundancy>multi-chassis>peer>mc-ep
Description	This command specifies the number of keep-alive intervals that the local node will wait for packets from the MC-EP peer before assuming failure. After this time interval passed the all the mc-endpoints configured under services will revert to single chassis behavior, activating the best local pseudowire. The **no** form of this command sets the multiplier to default value.
Default	no hold-on-neighbor-failure
Parameters	*multiplier* — Specifies the hold time applied on neighbor failure. **Values** 2 to 25

keep-alive-interval

Syntax	**keep-alive-interval** *interval* **no keep-alive-interval**
Context	config>redundancy>multi-chassis>peer>mc-ep
Description	This command sets the interval at which keep-alive messages are exchanged between two systems participating in MC-EP when bfd is not enabled or is down. These fast keep-alive messages are used to determine remote-node failure and the interval is set in deci-seconds. The **no** form of this command sets the interval to default value
Default	no keep-alive-interval
Parameters	*interval* — Specifies the time interval expressed in deciseconds. **Values** 5 to 500 (tenths of a second)

passive-mode

Syntax	[**no**] **passive-mode**
Context	config>redundancy>multi-chassis>peer>mc-ep

Description   This command configures the passive mode behavior for the MC-EP protocol. When in passive mode the MC-EP pair will be dormant until two of the pseudowires in a MC-EP will be signaled as active by the remote PEs, being assumed that the remote pair is configured with regular MC-EP. As soon as more than one pseudowire is active, dormant MC-EP pair will activate. It will use the regular exchange to select the best pseudowire between the active ones and it will block the Rx and Tx directions of the other pseudowires.

The **no** form of this command will disable the passive mode behavior.

Default   no passive-mode

system-priority

Syntax   **system-priority** *value*
no system-priority

Context   config>redundancy>multi-chassis>peer>mc-ep

Description   This command allows the operator to set the system priority. The peer configured with the lowest value is chosen to be the master. If system-priority are equal then the one with the highest system-id (chassis MAC address) is chosen as the master.

The **no** form of this command sets the system priority to default.

Default   no system-priority

Parameters   *value* — Specifies the priority assigned to the local MC-EP peer.

Values   1 to 255

5.16.2.15.3   MC-LAG Commands

mc-lag

Syntax   [**no**] **mc-lag**

Context   config>redundancy>multi-chassis>peer>mc-lag

Description   This command enables the context to configure multi-chassis LAG operations and related parameters.

The **no** form of this command administratively disables multi-chassis LAG. MC-LAG can only be issued only when mc-lag is shutdown.

Default   no mc-lag

hold-on-neighbor-failure

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	hold-on-neighbor-failure 3
Parameters	*multiplier* — Specifies the time interval that the standby node will wait for packets from the active node before assuming a redundant-neighbor node failure. **Values** 2 to 25

keep-alive-interval

Syntax	**keep-alive-interval** *interval* **no keep-alive-interval**
Context	config>redundancy>multi-chassis>peer>mc-lag
Description	This command sets the interval at which keep-alive messages are exchanged between two systems participating in MC-LAG. These keep-alive messages are used to determine remote-node failure and the interval is set in deciseconds. The **no** form of this command sets the interval to default value
Default	keep-alive-interval 1s (10 hundreds of milliseconds means interval value of 10)
Parameters	*interval* — Specifies the time interval expressed in deciseconds. **Values** 5 to 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.

Parameters *lag-id* — Specifies 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 to 800

admin-key — Specifies a 16 bit key that needs to be configured in the same manner on both sides of the MC-LAG in order for the MC-LAG to come up.

   Values   1 to 65535

system-id — Specifies a 6 byte value expressed in the same notation as MAC address.

   Values   xx:xx:xx:xx:xx:xx   - xx [00 to FF]

remote-lag-id — Specifies the LAG ID on the remote system.

   Values   1 to 800

system-priority — Specifies the system priority to be used in the context of the MC-LAG. The partner system will consider all ports using the same **lacp-key**, **system-id**, and **system-priority** as part of the same LAG.

   Values   1 to 65535

MAC-Lsb — Configures the last 16 bit of the MAC address to be used for all traffic ingressing the MC-LAG link(s) or if use-lacp-key option is used, it only copies the value of lacp-key (redundancy multi-chassis mc-lag lag lacp-key adminkey).

   The command will fail if the value is the same with any of the following configured attributes:

   • source-bmac-lsb assigned to other MC-LAG ports
   • lsb 16 bits value for the source-bmac configured at chassis or BVPLS level

The first 32 bits are copied from the source BMAC of the BVPLS associated with the IVPLS for a specific IVPLS SAP mapped to the MC-LAG. The BVPLS source BMAC can be provisioned for each BVPLS or can be inherited from the chassis PBB configuration.

Values   1 to 65535 or xx-xx or xx:xx

5.16.2.16   LLDP System Commands

lldp

Syntax	**lldp**
Context	config>system
Description	This command enables the context to configure system-wide Link Layer Discovery Protocol parameters.

message-fast-tx

Syntax	**message-fast-tx** *time*
	no message-fast-tx
Context	config>system>lldp
Description	This command configures the duration of the fast transmission period.
Default	no message-fast-tx
Parameters	*time* — Specifies the fast transmission period in seconds.

Values   1 to 3600

Default   1

message-fast-tx-init

Syntax	**message-fast-tx-init** *count*
	no message-fast-tx-init
Context	config>system>lldp
Description	This command configures the number of LLDPDUs to send during the fast transmission period.
Default	no message-fast-tx-init

Parameters   *count* — Specifies the number of LLDPDUs to send during the fast transmission period.

      Values   1 to 8

      Default   4

notification-interval

Syntax   **notification-interval** *time*
no notification-interval

Context   config>system>lldp

Description   This command configures the minimum time between change notifications.

Default   no notification-interval

Parameters   *time* — Specifies the minimum time, in seconds, between change notifications.

      Values   5 to 3600

      Default   5

reinit-delay

Syntax   **reinit-delay** *time*
no reinit-delay

Context   config>system>lldp

Description   This command configures the time before re-initializing LLDP on a port.

Default   no reinit-delay

Parameters   *time* — Specifies the time, in seconds, before re-initializing LLDP on a port.

      Values   1 to 10

      Default   2

tx-credit-max

Syntax   **tx-credit-max** *count*
no tx-credit-max

Context   config>system>lldp

Description   This command configures the maximum consecutive LLDPDUs transmitted.

Default   no tx-credit-max

Parameters   *count* — Specifies the maximum consecutive LLDPDUs transmitted.

    Values   1 to 100

    Default   5

tx-hold-multiplier

Syntax   **tx-hold-multiplier** *multiplier*
no tx-hold-multiplier

Context   config>system>lldp

Description   This command configures the multiplier of the tx-interval.

Default   no tx-hold-multiplier

Parameters   *multiplier* — Specifies the multiplier of the tx-interval.

    Values   2 to 10

    Default   4

tx-interval

Syntax   **tx-interval** *interval*
no tx-interval

Context   config>system>lldp

Description   This command configures the LLDP transmit interval time.

Default   no tx-interval

Parameters   *interval* — Specifies the LLDP transmit interval time.

    Values   5 to 32768

    Default   30

5.16.2.17   LLDP Ethernet Port Commands

lldp

Syntax   **lldp**

Context   config>port>ethernet

Description   This command enables the context to configure Link Layer Discovery Protocol (LLDP) parameters on the specified port.

dest-mac

Syntax   **dest-mac {nearest-bridge | nearest-non-tpmr | nearest-customer}**

Context   config>port>ethernet>lldp

Description   This command configures destination MAC address parameters.

Default   dest-mac nearest-bridge

Parameters   **nearest-bridge** — Specifies to use the nearest bridge.

    nearest-non-tpmr — Specifies to use the nearest non-Two-Port MAC Relay (TPMR).

    nearest-customer — Specifies to use the nearest customer.

admin-status

Syntax   **admin-status {rx | tx | tx-rx | disabled}**

Context   config>port>ethernet>lldp>dstmac

Description   This command specifies the administratively desired status of the local LLDP agent.

Default   admin-status disabled

Parameters   **rx** — Specifies the LLDP agent will receive, but will not transmit LLDP frames on this port.

    tx — Specifies that the LLDP agent will transmit LLDP frames on this port and will not store any information about the remote systems connected.

    tx-rx — Specifies that the LLDP agent will transmit and receive LLDP frames on this port.

    disabled — Specifies that the LLDP agent will not transmit or receive LLDP frames on this port. If there is remote systems information which is received on this port and stored in other tables, before the port's admin status becomes disabled, then the information will naturally age out.

notification

Syntax   [**no**] **notification**

Context   config>port>ethernet>lldp>dstmac

Description   This command enables LLDP notifications.

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

Default   no notification

port-id-subtype

Syntax   **pot-id-subtype** {**tx-if-alias** | **tx-if-name** | **tx-local**}

Context   config>port>ethernet>lldp>dstmac

Description   This command configures the encoding of the port identifier TLVs transmitted to the peer.

Default   port-id-subtype tx-local

Parameters   **tx-if-alias** — (1) Transmits the ifAlias IF-MIB string.

tx-if-name — (5) Transmits the ifName IF-MIB string.

tx-local — (7) Transmits the interface ifIndex value.

tunnel-nearest-bridge

Syntax   [**no**] **tunnel-nearest-bridge**

Context   config>port>ethernet>lldp>dest-mac

Description   The command allows LLDP packets received on the port with the destination address of the nearest bridge to be tunneled without being intercepted on the local port. The dest-mac nearest-bridge must be disable for tunneling to occur. This is applicable to NULL SAP Epipe and VPLS services only.

Default   no tunnel-nearest-bridge

tx-mgmt-address

Syntax   **tx-mgmt-address** [**system**] [**system-ipv6**]
no tx-mgmt-address

Context   config>port>ethernet>lldp>dstmac

Description   This command specifies which management address to transmit.

The **no** form of the command resets value to the default.

Default   no tx-mgmt-address

Parameters   **system** — Specifies to use the system IP address. The system address will only be transmitted once it has been configured if this parameter is specified.

system-ipv6 — Specifies to use the system IPv6 address. The system address will only be transmitted once it has been configured if this parameter is specified.

tx-tlvs

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.

5.16.2.18   System Router Instance Commands

router

Syntax	**router** [*router-instance*] [**create**] **no router** [*router-instance*]
Context	config
Description	This command enables the context in which to configure router parameters including interfaces, route policies and protocols. This command is also used to create CPM router instances. For CPM router instances, this command enters or creates a user-created CPM router instance. A CPM router instance is not a VPRN router instance. VPRN router instances are configured under **configure service vprn**. CPM router instances are the only type of non-VPRN router instances that can be created by a user, and have a user-defined name. CPM router instances only use CPM/CFM/CCM ethernet ports as interfaces.
Parameters	*router-instance* — Specifies the router name or CPM router instance. **Values**

router-instance: *router name*

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

        cpm-vr-name   [32 characters maximum]

Default   Base

create — Keyword used to create the router instance.

5.17   Show, Clear, Debug, and Tools Command Reference

5.17.1   Command Hierarchies

- Show Commands
- Clear Commands
- Debug Commands
- Tools Commands

5.17.1.1   Show Commands

show
- — **redundancy**
  - — **mgmt-ethernet**
  - — **multi-chassis**
    - — **all**
    - — **mc-endpoint statistics**
    - — **mc-endpoint peer** [*ip-address*] **statistics**
    - — **mc-endpoint endpoint** [*mcep-id*] **statistics**
    - — **mc-endpoint peer** [*ip-address*]
    - — **mc-lag peer** *ip-address* [**lag** *lag-id*]
    - — **mc-lag** [**peer** *ip-address* [**lag** *lag-id*]] **statistics**
    - — **mc-ring peer** *ip-address* **statistics**
    - — **mc-ring peer** *ip-address* [**ring** *sync-tag* [**detail** | **statistics**]]
    - — **mc-ring peer** *ip-address* **ring** *sync-tag* **ring-node** [*ring-node-name* [**detail** | **statistics**]]
    - — **mc-ring global-statistics**
    - — **sync** [**peer** *ip-address*]
    - — **sync peer** *ip-address* **detail**
    - — **sync** [**peer** *ip-address*] **statistics**
  - — **synchronization**
- — **time**
- — **system**
  - — **alarm-contact-input** {*alarm-contact-input-id* | **all**} [**detail**]
  - — **bluetooth** [**device-mac** [*ieee-address*] | **module** [*cpm-slot*]]
  - — **card**
    - — **cpu** [**sample-period** *seconds*]
    - — **memory-pools**
  - — **connections** [**detail**] [**address** *ip-address*] [**port** *port-number*]
  - — **cpu** [**sample-period** *seconds*]
  - — **cron**
    - — **schedule** [*schedule-name*] [**owner** *owner-name*]
  - — **information**

— **lldp** [**neighbor**]
— **load-balancing-alg** [**detail**]
— **memory-pools**
— **ntp** [{**peers** | **peer** [**router** *router-instance* | **service-name** *service-name*] *peer-address*} | {**servers** | **server** [**router** *router-instance* | **service-name** *service-name*] *server-address*} | [**all**]] [**detail**]
— **port-topology** [**uni-dir**]
— **ptp**
  — **peer** *ip-address* [**router** *router-instance* | **service-name** *service-name*] [**detail**]
  — **peers** [**router** *router-instance* | **service-name** *service-name*] [**detail**]
  — **port** *port-id* [**detail**]
  — **standby**
  — **statistics**
  — **unicast** [**router** *router-instance* | **service-name** *service-name*]
— **rollback** [**rescue**]
— **satellite**
  — **eth-sat** [*sat-id*]
    — **port-map** [*client-port-id*]
    — **sync-if-timing**
  — **tdm-sat** [*sat-id*]
    — **port-map** [*client-port-id*]
    — **sync-if-timing**
— **script-control**
  — **script** [*script-name*] [**owner** *script-owner*]
  — **script-policy** *script-policy-name* [**owner** *owner-name*]
  — **script-policy** **run-history** [*run-state*]
— **sntp**
— **switch-fabric** **high-bandwidth-multicast**
— **switch-fabric** [**exclude-sfm** *sfm-list*]
— **sync-if-timing** [*cpm-slot*]
— **thresholds**
— **time**
— **uptime**

5.17.1.2 Clear Commands

clear
— **application-assurance**
  — **group** *aa-group-id* [**:***partition-id*]
    — **statistics**
    — **status**
— **redundancy**
  — **multi-chassis**
    — **mc-endpoint** **endpoint** [*mcep-id*] **statistics**
    — **mc-endpoint** **statistics**
    — **mc-endpoint** **peer** [*ip-address*] **statistics**
    — **mc-lag** [**peer** *ip-address* [**lag** *lag-id*]]
    — **mc-ring**
      — **debounce** **peer** *ip-address* **ring** *sync-tag*
      — **ring-nodes** **peer** *ip-address* **ring** *sync-tag*
      — **statistics**

— **global**
— **peer** *ip-address*
— **ring** **peer** *ip-address* **ring** *sync-tag*
— **ring-node** **peer** *ip-address* **ring** *sync-tag* **node** *ring-node-name*
— **sync-database** **peer** *ip-address* **all application** *application*
— **sync-database** **peer** *ip-address* **port** {*port-id* | *lag-id*} [**sync-tag** *sync-tag*]
application *application*
— **sync-database** **peer** *ip-address* **sdp** *sdp-id* [**sync-tag** *sync-tag*] **application**
application
— **sync-database** **peer** *ip-address* **sync-tag** *sync-tag* **application** *application*
— **screen**
— **system**
— **ptp**
— **inactive-peers**
— **peer** *ip-address* [**router** *router-instance* | **service-name** *service-name*]
statistics
— **port** *port-id* **statistics**
— **statistics**
— **script-control**
— **script-policy**
— **completed** [*script-policy-name*] [**owner** *owner-name*]
— **statistics**
— **xmpp** **server** *xmpp-server-name*
— **sync-if-timing** {**ref1** | **ref2** | **bits**}

5.17.1.3   Debug Commands

debug
— **sync-if-timing**
— **force-reference** {**ref1** | **ref2** | **bits** | **bits1** | **bits2** | **bitsa** | **bitsb** | **ptp**}
— **no force-reference**
— [**no**] **system**
— **http-connections** [*ip-address/prefix-length*]
— **http-connections** **any**
— **http-connections** [*ipv6-address/prefix-length*]
— **no http-connections**
— **ntp** [**router** *router-instance*] [**interface** *ip-int-name*]
— **persistence** [*persistence-client*]
— **no persistence**

5.17.1.4   Tools Commands

tools
— **dump**
— **redundancy**
— **multi-chassis**
— **mc-endpoint** **peer** *ip-address*
— **mc-ring**

— **mc-ring** **peer** *ip-address* [**ring** *sync-tag*]
— **srrp-sync-database** [**instance** *instance-id*] [**peer** *ip-address*]
— **sync-database** [**peer** *ip-address*] [**port** *port-id* | *lag-id*] [**sdp** *sdp-id*]
[**sync-tag** *sync-tag*] [**application** *application*] [**detail**] [**type** *type*]
— **src-bmac-lsb**
— **resource-usage**
— **card** [*slot-num*]
— **card** [*slot-num*] **all**
— **fp** [*fp-number*]
— **mda** [*mda-slot*]
— **system** [**all**]
— **system-resources** [*slot-number*]
— **perform**
— **chassis** [*phys-chassis-id*]
— **check-bp-eprom**
— **set-role** {**extension** | **master** | **standalone**}
— **redundancy**
— [**no**] **forced-single-sfm-overload**
— **issu-post-process**
— **mgmt-ethernet**
— **satellite**
— **force-uplink-switch** *client-port-id*
— **system**
— **auto-node-provisioning**
— **ipv4** [**timeout** *seconds*] [**dhcp-client-identifier** {**string** *ascii-string* | **hex**
hex-string |**serial-number**}] [**reboot-on-success**] [**save-provision-
file-destination** *file-url*]
— **bluetooth**
— **module** *cpm-slot* **action** {**reboot** | **disconnect**}
— **inter-chassis**
— **sfm-interco-test**
— **mixed-mode-upgrade** [*slot-list*] [**now**]
— **script-control**
— **script-policy**
— **stop** [*script-policy-name*] [**owner** *script-policy-owner*] [**all**]
— **set-fabric-speed** *speed*
— **snmp**
— **walk** [**start-oid** *start-oid* [*start-oid*]] [**skip-oid** *skip-oid* [*skip-oid*]] [**output**
file-url] [**syntax** *syntax*]
— **xmpp**
— **vsd-refresh**
— **system**
— **cpm-http-redirect** **redirect statistics**
— **cpm-http-redirect** **redirect summary**
— **cpm-http-redirect** **tcp sessions**
— **cpm-http-redirect** **tcp settings**
— **cpm-http-redirect** **tcp statistics**

5.17.2   Command Descriptions

5.17.2.1   Show Commands

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

alarm-contact-input

Syntax	**alarm-contact-input** {*alarm-contact-input-id* | **all**} [**detail**]
Context	show>system
Description	This command displays the alarm contact input information.
Parameters	*alarm-contact-input-id* — Displays the alarm contact input information for a specific pin.

                Values   1 to 4

            all — Displays the alarm contact input information for all pins.

            detail — Displays detailed alarm contact input information for one or all of the pins.

Output   The following output is an example of alarm contact input information, and Table 45 describes the output fields.

Sample Output

```
A:bkvm3# show system alarm-contact-input 1
===============================================================================
Alarm Contact Input
===============================================================================
Alarm Contact Input Power            : on
Alarm Input Pin Number               : 1
    Alarm Input Pin Current State    : Disabled
    Alarm Output Pin Used            : major
    Alarm Raised                     : No
===============================================================================

A:bkvm3# show system alarm-contact-input 1 detail
===============================================================================
Alarm Contact Input
===============================================================================
Alarm Contact Input Power            : on
Alarm Input Pin Number               : 2
    Description                      : (Not Specified)
    Alarm Input Pin Current State    : Enabled
    Alarm Output Pin Used            : major
    Alarm Raised                     : No
    Last State Change                : 12/15/2014 13:11:32
```

```
A:bkvm3# show system alarm-contact-input all
===============================================================================
Alarm Contact Input
===============================================================================
Alarm Contact Input Power             : on
Alarm Input Pin Number                : 1
    Description                       : cabinet door
    Alarm Input Pin Current State     : Enabled
    Alarm Output Pin Used             : major
    Alarm Raised                      : Yes
    Last State Change                 : 12/17/2014 20:12:02
Alarm Input Pin Number                : 2
    Description                       : (Not Specified)
    Alarm Input Pin Current State     : Disabled
    Alarm Output Pin Used             : minor
    Alarm Raised                      : No
    Last State Change                 : 12/17/2014 20:12:02
Alarm Input Pin Number                : 3
    Description                       : (Not Specified)
    Alarm Input Pin Current State     : Disabled
    Alarm Output Pin Used             : major
    Alarm Raised                      : No
    Last State Change                 : 12/17/2014 20:12:02
Alarm Input Pin Number                : 4
    Description                       : (Not Specified)
    Alarm Input Pin Current State     : Disabled
    Alarm Output Pin Used             : critical
    Alarm Raised                      : No
    Last State Change                 : 12/17/2014 20:12:02
```

Table 45   **Alarm Contact Input Field Descriptions**

Label	Description
Alarm Contact Input Power	Indicates if the +24VDC output pin (optionally used to provide power for the alarm inputs) is enabled
Current State	Indicate the configured administrative state of the input Disabled — the alarm-contact-input is disabled (**shutdown**) and log events will not be generated for changes to the input pin status Enabled — the alarm-contact-input is enabled (**no shutdown**) and log events will be generated for changes to the input pin status (as long as the log events are not suppressed in event-control configuration)
Alarm Output Pin Used	Indicates the configured severity of the associated CHASSIS log event (for example, for pin 3: "configure log event-control" chassis" tmnxSasAlarminput3StateChanged)
Alarm Raised	Indicates if the input pin is 'triggered' or not
Last State Change	Indicates when the input pin last changed state

bluetooth

Syntax	**bluetooth** [**device-mac** [*ieee-address*] | **module** [*cpm-slot*]]
Context	show>system
Description	This command displays detailed information about the Bluetooth configuration on the CPM or chassis.
Parameters	*ieee-address* — Specifies the source MAC address.
	cpm-slot — Specifies the CPM slot.

	Values	{A | B | C | D}

Output   The following output is an example of detailed Bluetooth configuration information; Table 46 describes the output fields.

Sample Output

```
*A:bkvm18>show>system# bluetooth
===============================================================================
System-wide Bluetooth Configuration
===============================================================================
Passkey          : 123456             Advertising Timeout: 30
Power State       : off                Pairing Button     : Disabled
===============================================================================
*A:bkvm18>show>system# bluetooth device
===============================================================================
System-wide Bluetooth Configuration
===============================================================================
Passkey          : 123456             Advertising Timeout: 30
Power State       : off                Pairing Button     : Disabled
===============================================================================
====================================
Bluetooth Devices
====================================
Device           : 00:22:33:44:55:66
Description      : peter's ipad
Device           : 11:22:33:44:55:66
Description      : (Not Specified)
Device           : 22:22:33:44:55:66
Description      : description
-------------------------------------------------------------------------------
Number of Devices : 3
====================================
*A:bkvm18>show>system# bluetooth device  00:22:33:44:55:66
===============================================================================
System-wide Bluetooth Configuration
===============================================================================
Passkey          : 123456             Advertising Timeout: 30
Power State       : off                Pairing Button     : Disabled
===============================================================================
====================================
Bluetooth Devices
====================================
Device           : 00:22:33:44:55:66
```

```
Description       : peter's ipad
====================================
*A:bkvm18>show>system# bluetooth module
===============================================================================
System-wide Bluetooth Configuration
===============================================================================
Passkey         : 123456             Advertising Timeout: 30
Power State     : off                Pairing Button     : Disabled
===============================================================================
===============================================================================
Bluetooth Modules
===============================================================================
Module            : A
Connected Device  : Yes
Device Mac        : 00:22:33:44:55:66
Device Description : peter's ipad
Configured Identifier : (Not Configured)
Operational Identifier: 7750-SR-14s-CPM-A-NS123456
Module            : B
Connected Device  : No
Device Mac        :
Device Description :
Configured Identifier : (Not Configured)
Operational Identifier: 7750-SR-14s-CPM-B-NS654321
===============================================================================
*A:bkvm18>show>system# bluetooth module "A"
===============================================================================
System-wide Bluetooth Configuration
===============================================================================
Passkey         : 123456             Advertising Timeout: 30
Power State     : off                Pairing Button    : Disabled
===============================================================================
===============================================================================
Bluetooth Modules
===============================================================================
Module            : A
Connected Device  : Yes
Device Mac        : 00:22:33:44:55:66
Device Description : peter's ipad
Configured Identifier : (Not Configured)
Operational Identifier: 7750-SR-14s-CPM-A-NS123456
=============================================================================*
```

Table 46   **System Bluetooth Field Descriptions**

Label	Description
Passkey	The Bluetooth passkey in use by the system.
Advertising Timeout	The amount of time the Bluetooth will advertise that it is ready to pair.
Power State	The operating mode for Bluetooth.
Pairing Button	Displays whether the pairing button is enabled for use.
Device	The MAC address of the Bluetooth device.

Table 46   **System Bluetooth Field Descriptions (Continued)**

Label	Description (Continued)
Description	The customer-entered description for the Bluetooth device.
Module	Displays which CPM module contains the Bluetooth device.
Connected Device	Displays if there is a device actively paired to the module.
Device MAC	The MAC address of the Bluetooth device connected to the module.
Device Description	The description associated with the connected Bluetooth device.
Configured Identifier	The customer-defined Bluetooth identifier for the module.
Operational Identifier	The Bluetooth identifier in use for the module.

card

Syntax   **card**

Context   show>system

Description   This command enables the context to display card information.

cpu

Syntax   **cpu** [**sample-period** *seconds*]

Context   show>system
show>card

Description   This command displays CPU utilization per task over a sample period.

Parameters   *seconds* — Specifies the number of seconds over which to sample CPU task utilization.

Default   1

Values   1 to 300

Output   The following output is an example of CPU information, and Table 47 describes the output fields.

Sample Output

```
*A:cses-E11# show system cpu sample-period 2
===============================================================================
CPU Utilization (Sample period: 2 seconds)
```

```
===============================================================================
Name                            CPU Time      CPU Usage        Capacity
                                (uSec)                            Usage
-------------------------------------------------------------------------------
BFD                                    10        ~0.00%          ~0.00%
BGP                                     0         0.00%           0.00%
CFLOWD                                 61        ~0.00%          ~0.00%
Cards & Ports                       8,332         0.41%           0.08%
DHCP Server                            79        ~0.00%          ~0.00%
ICC                                   408         0.02%           0.01%
IGMP/MLD                            1,768         0.08%           0.08%
IOM                                17,197         0.85%           0.31%
IP Stack                            4,080         0.20%           0.09%
IS-IS                               1,213         0.06%           0.06%
ISA                                 2,496         0.12%           0.07%
LDP                                     0         0.00%           0.00%
Logging                                32        ~0.00%          ~0.00%
MPLS/RSVP                           2,380         0.11%           0.08%
MSDP                                    0         0.00%           0.00%
Management                          5,969         0.29%           0.15%
OAM                                   907         0.04%           0.02%
OSPF                                   25        ~0.00%          ~0.00%
PIM                                 5,600         0.27%           0.27%
RIP                                     0         0.00%           0.00%
RTM/Policies                            0         0.00%           0.00%
Redundancy                          3,635         0.18%           0.13%
SIM                                 1,462         0.07%           0.04%
SNMP Daemon                             0         0.00%           0.00%
Services                            2,241         0.11%           0.05%
Stats                                   0         0.00%           0.00%
Subscriber Mgmt                     2,129         0.10%           0.04%
System                              8,802         0.43%           0.17%
Traffic Eng                             0         0.00%           0.00%
VRRP                                  697         0.03%           0.02%
WEB Redirect                          125        ~0.00%          ~0.00%
-------------------------------------------------------------------------------
Total                           2,014,761       100.00%
   Idle                         1,945,113        96.54%
   Usage                           69,648         3.45%
Busiest Core Utilization           69,648         3.45%
===============================================================================
*A:cses-E11#


*A:ALA-1# show card 4 cpu

===============================================================================
Card 4 CPU Utilization (Sample period: 1 second)
===============================================================================
Name                            CPU Time      CPU Usage        Capacity
                                (uSec)                            Usage
-------------------------------------------------------------------------------
HQoS Algorithm                         70        ~0.00%          ~0.00%
HQoS Statistics                       124        ~0.00%           0.83%
IOM                                15,904         0.79%           0.94%
-------------------------------------------------------------------------------
Total                           2,003,678       100.00%
   Idle                         1,987,580        99.19%
   Usage                           16,098         0.80%
```

```
Busiest Core Utilization                        8,192          0.81%
==============================================================================
```

Table 47   **System CPU Field Descriptions**

Label	Description
CPU Utilization	The total amount of CPU time.
Name	The process or protocol name.
CPU Time (uSec)	The CPU time each process or protocol has used in the specified time.
CPU Usage	The sum of CPU usage of all the processes and protocols.
Capacity Usage	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.

connections

Syntax   **connections** [**detail**] [**address** *ip-address*] [**port** *port-number*]

Context   show>system

Description   This command displays UDP and TCP connection information.

If no command line options are specified, a summary of the TCP and UDP connections displays.

Parameters   *ip-address* — Displays only the connection information for the specified IP address.

Values

ipv4-address: a.b.c.d (host bits must be 0)

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

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

x: [0 to FFFF]H

d: [0 to 255]D

interface: 32 characters maximum, mandatory for link local addresses

port-number — Displays only the connection information for the specified port number.

> **Values**   0 to 65535

detail — Appends TCP statistics to the display output.

Output   The following output is an example of system connections information, and Table 48 describes the output fields.

Sample Output

```
A:ALA-12# show system connections
===============================================================================
Connections
===============================================================================
Prot RecvQ  TxmtQ  Local Address                             State
            MSS    Remote Address                            vRtrID
-------------------------------------------------------------------------------
TCP    0        0 0.0.0.0.21                                 LISTEN
            1024  0.0.0.0.0                                         0
TCP    0        0 0.0.0.0.22                                 LISTEN
            1024  0.0.0.0.0                                         0
TCP    0        0 0.0.0.0.23                                 LISTEN
            1024  0.0.0.0.0                                         0
TCP    0        0 0.0.0.0.830                                LISTEN
            1024  0.0.0.0.0                                         0
TCP    0        0 0.0.0.0.6068                               LISTEN
            1024  0.0.0.0.0                                         0
TCP    0        0 0.0.0.0.47806                              LISTEN
            1024  0.0.0.0.0                                         0
TCP    0        0 ::.21                                      LISTEN
            1024  ::.0                                              0
TCP    0        0 ::.22                                      LISTEN
            1024  ::.0                                              0
TCP    0        0 ::.830                                     LISTEN
            1024  ::.0                                              0
TCP    0        0 ::.47806                                   LISTEN
            1024  ::.0                                              0
TCP    0        0 192.168.0.11.21                            LISTEN
            1024  0.0.0.0.0                                      4095
TCP    0        0 192.168.0.11.21059                         LISTEN
            1024  0.0.0.0.0                                      4095
TCP    0        0 172.31.129.98.22                           LISTEN
            1024  0.0.0.0.0                                      4095
TCP    0        0 172.31.129.98.23                           ESTABLISH
            1024  192.168.140.149.59042                         4095
TCP    0     1149 172.31.129.98.23                           ESTABLISH
            1024  192.168.140.244.58579                         4095
TCP    0        0 172.31.129.98.830                          LISTEN
            1024  0.0.0.0.0                                      4095
TCP    0        0 2001:db8::8779:8163.22                     LISTEN
            1024  ::.0                                           4095
TCP    0        0 2001:db8::8779:8163.830                    LISTEN
            1024  ::.0                                           4095
UDP    0        0 0.0.0.0.67                                 ---
                  0.0.0.0.0                                         0
UDP    0        0 0.0.0.0.68                                 ---
                  0.0.0.0.0                                         0
```

```
UDP         0       0 0.0.0.0.123                                        ---
                      0.0.0.0.0                                                       0
UDP         0       0 0.0.0.0.319                                        ---
                      0.0.0.0.0                                                       0
UDP         0       0 0.0.0.0.320                                        ---
                      0.0.0.0.0                                                       0
UDP         0       0 0.0.0.0.514                                        ---
                      0.0.0.0.0                                                       0
UDP         0       0 0.0.0.0.50055                                      ---
                      0.0.0.0.0                                                       0
UDP         0       0 ::.123                                             ---
                      ::.0                                                            0
UDP         0       0 ::.50056                                           ---
                      ::.0                                                            0
UDP         0       0 0.0.0.0.1025                                       ---
                      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#
```

Table 48   **System Connections Field Descriptions**

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. 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.

cpu

Syntax   **cpu** [**sample-period** *seconds*]

Context   show>system

Description This command displays CPU utilization per task over a sample period.

Parameters   *seconds* — Specifies the number of seconds over which to sample CPU task utilization.

> **Values**   1 to 300
>
> **Default**   1

Output   The following output is an example of system CPU information, and Table 49 describes the output fields.

Sample Output

```
*A:cses-E11# show system cpu sample-period 2
===============================================================================
CPU Utilization (Sample period: 2 seconds)
===============================================================================
Name                               CPU Time       CPU Usage       Capacity
                                     (uSec)                          Usage
-------------------------------------------------------------------------------
BFD                                      10         ~0.00%         ~0.00%
BGP                                       0          0.00%          0.00%
CFLOWD                                   61         ~0.00%         ~0.00%
Cards & Ports                         8,332          0.41%          0.08%
DHCP Server                              79         ~0.00%         ~0.00%
ICC                                     408          0.02%          0.01%
IGMP/MLD                              1,768          0.08%          0.08%
IOM                                  17,197          0.85%          0.31%
IP Stack                              4,080          0.20%          0.09%
IS-IS                                 1,213          0.06%          0.06%
ISA                                   2,496          0.12%          0.07%
LDP                                       0          0.00%          0.00%
Logging                                  32         ~0.00%         ~0.00%
MPLS/RSVP                             2,380          0.11%          0.08%
MSDP                                      0          0.00%          0.00%
Management                            5,969          0.29%          0.15%
OAM                                     907          0.04%          0.02%
OSPF                                     25         ~0.00%         ~0.00%
PIM                                   5,600          0.27%          0.27%
RIP                                       0          0.00%          0.00%
RTM/Policies                              0          0.00%          0.00%
Redundancy                            3,635          0.18%          0.13%
SIM                                   1,462          0.07%          0.04%
SNMP Daemon                               0          0.00%          0.00%
Services                              2,241          0.11%          0.05%
Stats                                     0          0.00%          0.00%
Subscriber Mgmt                       2,129          0.10%          0.04%
System                                8,802          0.43%          0.17%
Traffic Eng                               0          0.00%          0.00%
VRRP                                    697          0.03%          0.02%
WEB Redirect                            125         ~0.00%         ~0.00%
-------------------------------------------------------------------------------
Total                             2,014,761        100.00%
   Idle                           1,945,113         96.54%
   Usage                             69,648          3.45%
Busiest Core Utilization             69,648          3.45%
===============================================================================
*A:cses-E11#
```

```
*A:ALA-1# show card 4 cpu

===============================================================================
Card 4 CPU Utilization (Sample period: 1 second)
===============================================================================
Name                                 CPU Time    CPU Usage     Capacity
                                       (uSec)                     Usage
-------------------------------------------------------------------------------
HQoS Algorithm                             70      ~0.00%       ~0.00%
HQoS Statistics                           124      ~0.00%        0.83%
IOM                                    15,904       0.79%        0.94%
-------------------------------------------------------------------------------
Total                               2,003,678     100.00%
  Idle                              1,987,580      99.19%
  Usage                                16,098       0.80%
Busiest Core Utilization                8,192       0.81%
===============================================================================
```

Table 49   **System CPU Field Descriptions**

Label	Description
CPU Utilization	The total amount of CPU time.
Name	The process or protocol name.
CPU Time (uSec)	The CPU time each process or protocol has used in the specified time.
CPU Usage	The sum of CPU usage of all the processes and protocols.
Capacity Usage	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.

memory-pools

Syntax   **memory-pools**

Context   show>system>card

Description   This command displays the memory pools for the card.

cron

Syntax **cron**

Context show>system

Description This command enters the show CRON context.

schedule

Syntax **schedule** [*schedule-name*] [**owner** *owner-name*]

Context show>system>cron

Description This command displays cron schedule parameters.

Parameters *schedule-name* — Specifies the scheduler name, up to 32 characters.

owner-name — Specifies the scheduler owner name, up to 32 characters.

Output The following output is an example of cron schedule information, and Table 50 describes the output fields.

Sample Output

```
A:sim1>show>cron schedule test
===============================================================================
CRON Schedule Information
===============================================================================
Schedule                  : test
Schedule owner            : TiMOS CLI
Description               : none
Administrative status     : enabled
Operational status        : enabled
Action                    : test
Action owner              : TiMOS CLI
Script                    : test
Script Owner              : TiMOS CLI
Script source location    : ftp://*****:******@192.168.15.1/home/testlab_bgp
                             /cron/test1.cfg
Script results location   : ftp://*****:******@192.168.15.1/home/testlab_bgp
                             /cron/res
Schedule type             : periodic
Interval                  : 0d 00:01:00 (60 seconds)
Next scheduled run        : 0d 00:00:42
Weekday                   : tuesday
Month                     : none
Day of month              : none
Hour                      : none
Minute                    : none
Number of schedule runs   : 10
Last schedule run         : 2008/01/01 17:20:52
Number of schedule failures : 0
Last schedule failure     : no error
```

```
Last failure time          : never
===============================================================================
A:sim1>show>cron
```

Table 50   **Cron Schedule Field Descriptions**

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.

Table 50　　**Cron Schedule Field Descriptions (Continued)**

Label	Description (Continued)
Number of scheduled runs	Displays the number of scheduled sessions.
Last scheduled run	Displays the last scheduled session.
Number of scheduled failures	Displays the number of scheduled sessions that failed to execute.
Last scheduled failure	Displays the last scheduled session that failed to execute.
Last failure time	Displays the system time of the last failure.

information

Syntax　　**information**

Context　　show>system

Description　　This command displays general system information including basic system, SNMP server, last boot and DNS client information.

Output　　The following output is an example of system information, and Table 51 describes the output fields.

Sample Output

```
A:Dut-F>show system information
...
Primary DNS Server     : 192.168.252.56
Secondary DNS Server   : 192.168.252.48
Tertiary DNS Server    : 192.168.252.49
DNS Domain             : labs.ca.nokia.com
DNS Resolve Preference : ipv4-only
DNSSEC          AD Validated    : False
DNSSEC Response Control: drop
BOF Static Routes      :
```

The following is an example of the 7750 SR:

```
A:Dut-F# show system information
===============================================================================
System Information
===============================================================================
System Name          : Dut-F
System Type          : 7750 SR-7 7450 ESS-7
System Version       : B-6.0.B1-6
System Contact       :
```

```
System Location       :
System Coordinates    :
System Active Slot    : A
System Up Time        : 0 days, 03:42:01.29 (hr:min:sec)

SNMP Port             : 161
SNMP Engine ID        : 0000197f00008c6cff000000
SNMP Max Message Size : 1500
SNMP Admin State      : Enabled
SNMP Oper State       : Enabled
SNMP Index Boot Status : Not Persistent
SNMP Sync State       : OK

Tel/Tel6/SSH/FTP Admin : Enabled/Disabled/Enabled/Enabled
Tel/Tel6/SSH/FTP Oper  : Up/Down/Up/Up

BOF Source            : ftp://test:test@xxx.xxx.xx.xxx/./images
Image Source          : primary
Config Source         : primary
Last Booted Config File: ftp://*:*@xxx.xxx.xx.xxx/./images/dut-f.cfg
Last Boot Cfg Version  : N/A
Last Boot Index Version: N/A
Last Saved Config     : N/A
Time Last Saved       : N/A
Changes Since Last Save: No
Max Cfg/BOF Backup Rev : 5
Cfg-OK Script         : ftp://*:*@[2001:db8::8acb:466d]/./images/env.cfg
Cfg-OK Script Status  : failed
Cfg-Fail Script       : N/A
Cfg-Fail Script Status : not used
Management IP Addr    : xxx.xxx.xx.xxx/23
Primary DNS Server    : xxx.xxx.xx.xxx
Secondary DNS Server  : xxx.xxx.xx.xxx
Tertiary DNS Server   : N/A
DNS Domain            : sh.bel.nokia.be
DNS Resolve Preference : ipv4-only
BOF Static Routes     :
  To                  Next Hop
  192.168.0.0/16      xxx.xxx.xx.xxx
  172.16.0.0/8        xxx.xxx.xx.xxx
ICMP Vendor Enhancement: Disabled
ATM Location ID       : 01:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
ATM OAM Retry Up      : 2
ATM OAM Retry Down    : 4
ATM OAM Loopback Period: 10
===============================================================================
A:Dut-F#
```

Table 51   **System Information Field Descriptions**

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.

Table 51   **System Information Field Descriptions (Continued)**

Label	Description (Continued)
System Coordinates	A text string that describes the system coordinates.
System Up Time	The time since the last boot.
SNMP Port	The port number used by this node to receive SNMP request messages and to send replies.
SNMP Engine ID	The SNMP engineID to uniquely identify the SNMPv3 node.
SNMP Max Message Size	The maximum SNMP packet size generated by this node.
SNMP Admin State	Enabled — SNMP is administratively enabled and running. 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.
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.

Table 51   **System Information Field Descriptions (Continued)**

Label	Description (Continued)
Last Booted Config File	The URL and filename of the last loaded configuration file.
Last Boot Cfg Version	The date and time of the last boot.
Last Boot Config Header	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.

3HE 14127 AAAB TQZZA 01

Table 51   **System Information Field Descriptions (Continued)**

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.

lldp

Syntax   **lldp** [**neighbor**]

Context   show>system

Description   This command displays neighbor information for all configured ports without having to specify each individual port ID.

Parameters   **neighbor** — Displays LLDP neighbor information.

Output   The following output is an example of LLDP neighbor information.

Sample Output

```
*A:Dut-C# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information
===============================================================================
NB = nearest-bridge   NTMPR = nearest-non-tpmr   NC = nearest-customer
===============================================================================
Port      Scope  Chassis ID          Index    Port ID     System Name
-------------------------------------------------------------------------------
1/1/1     NB     16:2f:ff:00:00:00   1        35717120    Dut-A
2/1/2     NB     16:34:ff:00:00:00   1        35782656    Dut-D
2/1/1     NB     16:36:ff:00:00:00   2        35684352    Dut-E
1/1/2     NB     16:30:ff:00:00:00   2        35749888    Dut-B
1/1/3     NB     16:30:ff:00:00:00   3        35782656    Dut-B
2/1/3     NB     16:30:ff:00:00:00   3        35815424    Dut-B
===============================================================================
Number of neighbors : 6
*A:Dut-C#


A:GHR-API# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information
===============================================================================
NB = nearest-bridge   NTMPR = nearest-non-tpmr   NC = nearest-customer
===============================================================================
Port      Scope  Chassis ID          Index    Port ID     System Name
-------------------------------------------------------------------------------
1/1/6     NTPMR  00:21:05:1b:bc:17   1        36044800    RXI-AMI
1/1/8     NTPMR  00:21:06:6d:bd:53   2        36110336    YOY-WOW
1/1/9     NTPMR  00:21:08:2b:ab:81   3        36143104    FRI-MON
```

```
================================================================================
Number of neighbors : 3
```

load-balancing-alg

Syntax **load-balancing-alg** [**detail**]

Context show>system

Description This command displays system load balancing settings.

Parameters **detail** — Displays port settings.

Output The following output is an example of load balancing information.

Sample Output

```
*A:bkvm15# show system load-balancing-alg
================================================================================
System-wide Load Balancing Algorithms
================================================================================
L4 Load Balancing                     : exclude-L4
LSR Load Balancing                    : lbl-ip-l4-teid
System IP Load Balancing              : disabled
Multicast Enhanced Load Balancing     : disabled
Service ID LAG Hashing                : disabled
================================================================================
*A:bkvm15#
```

memory-pools

Syntax **memory-pools**

Context show>system

Description This command displays system memory status.

Output The following output is an example of memory pool information, and Table 52 describes the output fields.

Sample Output

```
A:ALA-1# show system memory-pools
================================================================================
Memory Pools
================================================================================
Name            Max Allowed    Current Size    Max So Far      In Use
--------------------------------------------------------------------------------
System           No limit      24,117,248      24,117,248    16,974,832
Icc             8,388,608       1,048,576       1,048,576        85,200
RTM/Policies     No limit       5,242,912       5,242,912     3,944,104
```

```
          OSPF                No limit     3,145,728     3,145,728     2,617,384
          MPLS/RSVP           No limit     9,769,480     9,769,480     8,173,760
          LDP                 No limit             0             0             0
          IS-IS               No limit             0             0             0
          RIP                 No limit             0             0             0
          VRRP                No limit     1,048,576     1,048,576            96
          BGP                 No limit     2,097,152     2,097,152     1,624,800
          BGP                 No limit     2,097,152     2,097,152     1,624,800
          Services            No limit     2,097,152     2,097,152     1,589,824
          IOM                 No limit   205,226,800   205,226,800   202,962,744
          SIM                 No limit     1,048,576     1,048,576           392
          CFLOWD              No limit             0     1,048,576             0
          CFLOWD              No limit             0     1,048,576             0
          IGMP                No limit             0             0             0
          PIM                 No limit             0             0             0
          ATM                 No limit     2,872,648     2,872,648     2,790,104
          PIM                 No limit             0             0             0
          MMPI                No limit             0             0             0
          MFIB                No limit             0             0             0
          PIP                 No limit    79,943,024    79,943,024    78,895,248
          MBUF             67,108,864      5,837,328     5,837,328     4,834,280
-------------------------------------------------------------------------------
Current Total Size :    343,495,200 bytes
Total In Use       :    324,492,768 bytes
Available Memory   :    640,178,652 bytes
===============================================================================
A:ALA-1#
```

Table 52   **System Memory-Pools Field Descriptions**

Label	Description
Name	The name of the system or process.
Max Allowed	Integer — The maximum allocated memory size. No Limit — No size limit.
Current Size	The current size of the memory pool.
Max So Far	The largest amount of memory pool used.
In Use	The current amount of the memory pool currently in use.
Current Total Size	The sum of the Current Size column.
Total In Use	The sum of the In Use column.
Available Memory	The amount of available memory.

ntp

Syntax   **ntp** [{**peers** | **peer** [**router** *router-instance* | **service-name** *service-name*] *peer-address*} |
{**servers** | **server** [**router** *router-instance* | **service-name** *service-name*] *server-address*}
| [**all**]] [**detail**]

Context show>system

Description This command displays NTP protocol configuration and state.

Parameters **peers** — Generates a list of known peers.

peer-address — Specifies the address of a specific peer.

> **Values** ipv4-address: a.b.c.d
> ipv6-address:
> - x:x:x:x:x:x:x:x
> - x:x:x:x:x:x:d.d.d.d
> - x – [0 to FFFF] H
> - d – [0 to 255] D

servers — Generates a list of known servers.

server-address — Specifies the address of a specific server.

> **Values** ipv4-address: a.b.c.d
> ipv6-address:
> - x:x:x:x:x:x:x:x
> - x:x:x:x:x:x:d.d.d.d
> - x – [0 to FFFF] H
> - d – [0 to 255] D
>
> **ptp**: shows information about the internal PTP server.

router-instance — Specifies the routing context that contains the interface in the form of *router-name* or *service-id*.

> **Values** *router-name* — Base | Management
> *service-id* — 1 to 2147483647

> **Default** Base

service name — Specifies the service name for the VPRN. The name can be up to 64 characters in length. Note that CPM routing instances are not supported.

all — Generates information for all clients, servers, and peers.

detail — Provides detailed information.

Output The following output is an example of NTP information, and Table 53 describes the output fields.

Sample Output

```
*A:Dut-A# show system ntp
===============================================================================
NTP Status
===============================================================================
Configured       : Yes              Stratum           : 4
```

```
Admin Status       : up                Oper Status        : up
Server Enabled     : No                Server Authenticate : No
Clock Source       : 2001:db8:3333:4444:5555:10:100:2
Auth Check         : Yes
Current Date & Time: 2015/07/10 12:46:30 UTC
===============================================================================

*A:Dut-A# show system ntp all
===============================================================================
NTP Status
===============================================================================
Configured         : Yes               Stratum            : 4
Admin Status       : up                Oper Status        : up
Server Enabled     : No                Server Authenticate : No
Clock Source       : 2001:db8:3333:4444:5555:10:100:2
Auth Check         : Yes
Current Date & Time: 2015/07/10 12:46:32 UTC
===============================================================================
===============================================================================
NTP Active Associations
===============================================================================
State               Reference ID   St Type  A  Poll Reach     Offset(ms)
    Router          Remote
-------------------------------------------------------------------------------
invalid                 192.168.193.198 2  srvr  y  8    YYYYYYYY  -35.396
    Base            2001:db8:3333:4444:5555:40:1:3
invalid                 192.168.193.198 2  srvr  y  8    YYYYYYYY  -30.850
    Base            2001:db8:3333:4444:5555:40:2:3
invalid                 192.168.193.198 2  srvr  y  8    YYYYYYYY  -35.654
    Base            2001:db8:3333:4444:5555:40:3:3
invalid                 192.168.193.198 2  srvr  y  8    YYYYYYYY  -30.939
    Base            2001:db8:3333:4444:5555:40:4:3
invalid                 192.168.193.198 2  srvr  y  8    YYYYYYYY  -35.206
    67890           2001:db8:3333:4444:5555:40:5:3
chosen                  192.168.193.198 2  srvr  y  8    YYYYYYYY  -49.405
    67890           2001:db8:3333:4444:5555:70:1:4
candidate               192.168.193.198 2  srvr  y  8    YYYYYYYY  -49.054
    67890           2001:db8:3333:4444:5555:70:2:4
outlyer                 192.168.193.198 2  srvr  y  8    YYYYYYYY  -48.682
    Base            2001:db8:3333:4444:5555:70:3:4
candidate               192.168.193.198 2  srvr  y  8    YYYYYYYY  -49.897
    Base            2001:db8:3333:4444:5555:70:4:4
candidate               192.168.193.198 2  srvr  y  8    YYYYYYYY  -48.991
    Base            2001:db8:3333:4444:5555:70:5:4
candidate               192.168.193.198 2  bclnt y  8    YYYYYYYY  -48.991
    67890           2001:db8:3333:4444:5555:70:5:4

===============================================================================
===============================================================================
NTP Clients
===============================================================================
vRouter                                         Time Last Request Rx
    Address
-------------------------------------------------------------------------------
Base
    10.10.100.1                                 03/06/2013 21:32:35
    2001:db8:3333:4444:5555:10:100:1            03/06/2013 21:32:30
===============================================================================
```

```
*A:Dut-A# show system ntp detail
===============================================================================
NTP Status
===============================================================================
Configured        : Yes               Stratum            : 4
Admin Status      : up                Oper Status        : up
Server Enabled    : No                Server Authenticate : No
Clock Source      : 2001:db8:3333:4444:5555:10:100:2
Auth Check        : Yes
Auth Errors       : 0                 Auth Errors Ignored  : 0
Auth Key Id Errors : 0               Auth Key Type Errors : 0
Current Date & Time: 2015/07/10 12:46:34 UTC
===============================================================================


===============================================================================
NTP Configured Broadcast/Multicast Interfaces
===============================================================================
vRouter         Interface         Address           Type   Auth   Poll
-------------------------------------------------------------------------------
===============================================================================


===============================================================================
NTP Active Associations
===============================================================================
State               Reference ID   St Type  A  Poll Reach    Offset(ms)
     Router         Remote
-------------------------------------------------------------------------------
invalid              192.168.193.198 2  srvr  y  8     YYYYYYYY  -30.563
     Base           2001:db8:3333:4444:5555:40:1:3
invalid              192.168.193.198 2  srvr  y  8     YYYYYYYY  -35.233
     Base           2001:db8:3333:4444:5555:40:2:3
invalid              192.168.193.198 2  srvr  y  8     YYYYYYYY  -35.808
     Base           2001:db8:3333:4444:5555:40:3:3
invalid              192.168.193.198 2  srvr  y  8     YYYYYYYY  -34.563
     Base           2001:db8:3333:4444:5555:40:4:3
invalid              192.168.193.198 2  srvr  y  8     YYYYYYYY  -35.507
     Base           2001:db8:3333:4444:5555:40:5:3
candidate            192.168.193.198 2  srvr  y  8     YYYYYYYY  -49.990
     Base           2001:db8:3333:4444:5555:70:1:4
candidate            192.168.193.198 2  srvr  y  8     YYYYYYYY  -49.926
     Base           2001:db8:3333:4444:5555:70:2:4
chosen               192.168.193.198 2  srvr  y  8     YYYYYYYY  -49.803
     Base           2001:db8:3333:4444:5555:70:3:4
candidate            192.168.193.198 2  srvr  y  8     YYYYYYYY  -49.897
     Base           2001:db8:3333:4444:5555:70:4:4
outlyer              192.168.193.198 2  srvr  y  8     YYYYYYYY  -50.180
     Base           2001:db8:3333:4444:5555:70:5:4
===============================================================================
===============================================================================
NTP Clients
===============================================================================
vRouter                                           Time Last Request Rx
     Address
-------------------------------------------------------------------------------
Base
     10.10.100.1                                  03/06/2013 21:33:31
     2001:db8:3333:4444:5555:10:100:1             03/06/2013 21:33:32
===============================================================================
```

```
*A:Dut-B# show system ntp all detail
===============================================================================
NTP Status
===============================================================================
Configured       : Yes              Stratum             : 4
Admin Status     : up               Oper Status         : up
Server Enabled   : No               Server Authenticate : No
Clock Source     : 2001:db8:3333:4444:5555:10:100:2
Auth Check       : Yes
Auth Errors      : 0                Auth Errors Ignored  : 0
Auth Key Id Errors : 0              Auth Key Type Errors : 0
Current Date & Time: 2015/07/10 12:46:36 UTC
===============================================================================

===============================================================================
NTP Configured Broadcast/Multicast Interfaces
===============================================================================
vRouter          Interface           Address          Type   Auth   Poll
-------------------------------------------------------------------------------
vprn16           ies-16-10.60.1.3                      bcast  yes    8
vprn16           ies-16-10.60.2.3                      bcast  yes    8
vprn16           ies-16-10.60.3.3                      bcast  yes    8
vprn16           ies-16-10.60.4.3                      bcast  yes    8
vprn16           ies-16-10.60.5.3                      bcast  yes    8
vprn16           ies-16-10.60.6.3                      bcast  yes    8
vprn16           ies-16-10.60.7.3                      bcast  yes    8
vprn16           ies-16-10.60.8.3                      bcast  yes    8
vprn16           ies-16-10.60.9.3                      bcast  yes    8
vprn16           ies-16-10.60.10.3                     bcast  yes    8
vprn17           ies-10.40.17.3                        bcast  no     8
vprn18           ies-10.40.18.3                        bcast  no     8
vprn19           ies-10.40.19.3                        bcast  no     8
vprn20           ies-10.40.20.3                        bcast  no     8
........
vprn996          ies-10.43.228.3                       bcast  no     8
vprn997          ies-10.43.229.3                       bcast  no     8
vprn998          ies-10.43.230.3                       bcast  no     8
vprn999          ies-10.43.231.3                       bcast  no     8
vprn1000         ies-10.43.232.3                       bcast  no     8
management       management          192.0.2.1        mcast  yes    8
Base             ip-10.60.1.5        Host-ones        bclnt  yes    n/a
Base             ip-10.60.2.5        Host-ones        bclnt  yes    n/a
Base             ip-10.60.3.5        Host-ones        bclnt  yes    n/a
Base             ip-10.60.4.5        Host-ones        bclnt  yes    n/a
67890            ip-10.60.5.5        Host-ones        bclnt  yes    n/a
67890            ip-10.60.6.5        Host-ones        bclnt  yes    n/a
67890            ip-10.60.7.5        Host-ones        bclnt  yes    n/a
67890            ip-10.60.8.5        Host-ones        bclnt  yes    n/a
67890            ip-10.60.9.5        Host-ones        bclnt  yes    n/a
67890            ip-10.60.10.5       Host-ones        bclnt  yes    n/a
===============================================================================

===============================================================================
NTP Active Associations
===============================================================================
State               Reference ID   St Type  A  Poll Reach    Offset(ms)
    Remote
-------------------------------------------------------------------------------
invalid             192.168.193.198 2  srvr  y  8    YYYYYYYY -30.563
    Base        2001:db8:3333:4444:5555:40:1:3
invalid             192.168.193.198 2  srvr  y  8    YYYYYYYY -35.233
```

```
    Base              2001:db8:3333:4444:5555:40:2:3
invalid                  192.168.193.198 2  srvr  y  8    YYYYYYYY  -35.808
    Base              2001:db8:3333:4444:5555:40:3:3
invalid                  192.168.193.198 2  srvr  y  8    YYYYYYYY  -34.563
    Base              2001:db8:3333:4444:5555:40:4:3
invalid                  192.168.193.198 2  srvr  y  8    YYYYYYYY  -35.507
    Base              2001:db8:3333:4444:5555:40:5:3
candidate                192.168.193.198 2  srvr  y  8    YYYYYYYY  -49.990
    Base              2001:db8:3333:4444:5555:70:1:4
candidate                192.168.193.198 2  srvr  y  8    YYYYYYYY  -49.926
    Base              2001:db8:3333:4444:5555:70:2:4
chosen                   192.168.193.198 2  srvr  y  8    YYYYYYYY  -49.803
    Base              2001:db8:3333:4444:5555:70:3:4
candidate                192.168.193.198 2  srvr  y  8    YYYYYYYY  -49.897
    Base              2001:db8:3333:4444:5555:70:4:4
outlyer                  192.168.193.198 2  srvr  y  8    YYYYYYYY  -50.180
    Base              2001:db8:3333:4444:5555:70:5:4
===============================================================================
===============================================================================
NTP Clients
===============================================================================
vRouter                                             Time Last Request Rx
    Address
-------------------------------------------------------------------------------
Base
    10.10.100.1                                     03/06/2013 21:33:31
    2001:db8:3333:4444:5555:10:100:1                03/06/2013 21:33:32
===============================================================================

*A:Dut-C# show system ntp peers
===============================================================================
NTP Active Associations
===============================================================================
State               Reference ID    St Type  A  Poll Reach     Offset(ms)
    Router          Remote
-------------------------------------------------------------------------------
candidate                192.168.193.198 2  actpr y  8    YYYYYYYY  -20.918
    Base              2001:db8:3333:4444:5555:50:1:4
candidate                192.168.193.198 2  actpr y  8    YYYYYYY.  -19.940
    Base              2001:db8:3333:4444:5555:50:2:4
candidate                192.168.193.198 2  actpr y  8    YYYYYYYY  -19.970
    Base              2001:db8:3333:4444:5555:50:3:4
candidate                192.168.193.198 2  actpr y  8    YYYYYYYY  -20.505
    Base              2001:db8:3333:4444:5555:50:4:4
candidate                192.168.193.198 2  actpr y  8    YYYYYYY.  -21.143
    Base              2001:db8:3333:4444:5555:50:5:4
candidate                192.168.193.198 2  paspr y  8    YYYYYYY.  -19.598
    Base              2001:db8:3333:4444:5555:50:8:4
candidate                192.168.193.198 2  paspr y  8    YYYYYYY.  -19.038
    Base              2001:db8:3333:4444:5555:50:7:4
candidate                192.168.193.198 2  paspr y  8    YYYYYYY.  -20.427
    Base              2001:db8:3333:4444:5555:50:9:4
candidate                192.168.193.198 2  paspr y  8    YYYYYYYY  -20.709
    Base              2001:db8:3333:4444:5555:50:10:4
candidate                192.168.193.198 2  paspr y  8    YYYYYYY.  -19.729
    Base              2001:db8:3333:4444:5555:50:6:4
===============================================================================
===============================================================================
NTP Clients
```

```
===============================================================================
vRouter                                               Time Last Request Rx
    Address
-------------------------------------------------------------------------------
vprn1
    2001:db8:3333:4444:5555:40:1:2                     03/06/2013 21:35:22
vprn2
    2001:db8:3333:4444:5555:40:2:2                     03/06/2013 21:35:27
vprn3
    2001:db8:3333:4444:5555:40:3:2                     03/06/2013 21:35:30
vprn4
    2001:db8:3333:4444:5555:40:4:2                     03/06/2013 21:35:24
===============================================================================

*B:SR_ORDINARY_MASTER# show system ntp peers detail
===============================================================================
NTP Active Associations
===============================================================================
State                 Reference ID    St Type  A  Poll Reach     Offset(ms)
    Router        Remote
-------------------------------------------------------------------------------
candidate            192.168.193.198 2  actpr y  8    YYYYYYYY   -20.918
    Base         2001:db8:3333:4444:5555:50:1:4
candidate            192.168.193.198 2  actpr y  8    YYYYYYY.   -19.940
    Base         2001:db8:3333:4444:5555:50:2:4
candidate            192.168.193.198 2  actpr y  8    YYYYYYYY   -19.970
    Base         2001:db8:3333:4444:5555:50:3:4
candidate            192.168.193.198 2  actpr y  8    YYYYYYYY   -20.505
    Base         2001:db8:3333:4444:5555:50:4:4
candidate            192.168.193.198 2  actpr y  8    YYYYYYY.   -21.143
    Base         2001:db8:3333:4444:5555:50:5:4
candidate            192.168.193.198 2  paspr y  8    YYYYYYY.   -19.598
    Base         2001:db8:3333:4444:5555:50:8:4
candidate            192.168.193.198 2  paspr y  8    YYYYYYY.   -19.038
    Base         2001:db8:3333:4444:5555:50:7:4
candidate            192.168.193.198 2  paspr y  8    YYYYYYY.   -20.427
    Base         2001:db8:3333:4444:5555:50:9:4
candidate            192.168.193.198 2  paspr y  8    YYYYYYYY   -20.709
    Base         2001:db8:3333:4444:5555:50:10:4
candidate            192.168.193.198 2  paspr y  8    YYYYYYY.   -19.729
    Base         2001:db8:3333:4444:5555:50:6:4
===============================================================================
===============================================================================
NTP Clients
===============================================================================
vRouter                                               Time Last Request Rx
    Address
-------------------------------------------------------------------------------
vprn1
    2001:db8:3333:4444:5555:40:1:2                     03/06/2013 21:35:22
vprn2
    2001:db8:3333:4444:5555:40:2:2                     03/06/2013 21:35:27
vprn3
    2001:db8:3333:4444:5555:40:3:2                     03/06/2013 21:35:30
vprn4
    2001:db8:3333:4444:5555:40:4:2                     03/06/2013 21:35:24
===============================================================================

*A:Dut-C# show system ntp peer router Base 2001:db8:3333:4444:5555:50:1:4
```

```
===============================================================================
NTP Peer
===============================================================================
State                     Reference ID   St Type A  Poll Reach     Offset(ms)
   Router        Remote
-------------------------------------------------------------------------------
candidate                 192.168.193.198 2  actpr y  8    YYYYYYYY -24.164
   Base          2001:db8:3333:4444:5555:50:1:4
===============================================================================

*B:SR_ORDINARY_MASTER# show system ntp peer router Base 2001:db8:3333:4444:5555:50:1
:4 detail
===============================================================================
NTP Peer
===============================================================================
State                     Reference ID   St Type A  Poll Reach     Offset(ms)
   Router        Remote
-------------------------------------------------------------------------------
candidate                 192.168.193.198 2  actpr y  8    YYYYYYYY -24.164
   Base          2001:db8:3333:4444:5555:50:1:4
===============================================================================

*A:Dut-B# show system ntp servers
===============================================================================
NTP Active Associations
===============================================================================
State                     Reference ID   St Type A  Poll Reach     Offset(ms)
   Router        Remote
-------------------------------------------------------------------------------
invalid                   192.168.193.198 2  srvr  y  8    YYYYYYYY -25.124
   Base          2001:db8:3333:4444:5555:40:1:3
invalid                   192.168.193.198 2  srvr  y  8    YYYYYYYY -19.409
   vprn20        2001:db8:3333:4444:5555:40:2:3
invalid                   192.168.193.198 2  srvr  y  8    YYYYYYYY -26.174
   vprn20        2001:db8:3333:4444:5555:40:3:3
invalid                   192.168.193.198 2  srvr  y  8    YYYYYYYY -25.193
   vprn20        2001:db8:3333:4444:5555:40:4:3
invalid                   192.168.193.198 2  srvr  y  8    YYYYYYYY -19.499
   vprn20        2001:db8:3333:4444:5555:40:5:3
candidate                 192.168.193.198 2  srvr  y  8    YYYYYYYY -49.050
   vprn20        2001:db8:3333:4444:5555:70:1:4
chosen                    192.168.193.198 2  srvr  y  8    YYYYYYYY -48.754
   vprn20        2001:db8:3333:4444:5555:70:2:4
candidate                 192.168.193.198 2  srvr  y  8    YYYYYYYY -48.891
   vprn20        2001:db8:3333:4444:5555:70:3:4
candidate                 192.168.193.198 2  srvr  y  8    YYYYYYYY -48.562
   vprn20        2001:db8:3333:4444:5555:70:4:4
candidate                 192.168.193.198 2  srvr  y  8    YYYYYYYY -48.687
   vprn20        2001:db8:3333:4444:5555:70:5:4
===============================================================================
===============================================================================
NTP Clients
===============================================================================
vRouter                                            Time Last Request Rx
   Address
-------------------------------------------------------------------------------
Base
   10.10.100.1                                     03/06/2013 21:39:27
   2001:db8:3333:4444:5555:10:100:1                03/06/2013 21:39:21
```

```
===============================================================================
*A:Dut-B# show system ntp servers detail
===============================================================================
NTP Active Associations
===============================================================================
State                 Reference ID    St Type  A  Poll Reach    Offset(ms)
    Router        Remote
-------------------------------------------------------------------------------
invalid               192.168.193.198 2  srvr  y  8    YYYYYYYY  -25.124
    Base          2001:db8:3333:4444:5555:40:1:3
invalid               192.168.193.198 2  srvr  y  8    YYYYYYYY  -19.409
    vprn20        2001:db8:3333:4444:5555:40:2:3
invalid               192.168.193.198 2  srvr  y  8    YYYYYYYY  -26.174
    vprn20        2001:db8:3333:4444:5555:40:3:3
invalid               192.168.193.198 2  srvr  y  8    YYYYYYYY  -25.193
    vprn20        2001:db8:3333:4444:5555:40:4:3
invalid               192.168.193.198 2  srvr  y  8    YYYYYYYY  -19.499
    vprn20        2001:db8:3333:4444:5555:40:5:3
candidate             192.168.193.198 2  srvr  y  8    YYYYYYYY  -49.050
    vprn20        2001:db8:3333:4444:5555:70:1:4
chosen                192.168.193.198 2  srvr  y  8    YYYYYYYY  -48.754
    vprn20        2001:db8:3333:4444:5555:70:2:4
candidate             192.168.193.198 2  srvr  y  8    YYYYYYYY  -48.891
    vprn20        2001:db8:3333:4444:5555:70:3:4
candidate             192.168.193.198 2  srvr  y  8    YYYYYYYY  -48.562
    vprn20        2001:db8:3333:4444:5555:70:4:4
candidate             192.168.193.198 2  srvr  y  8    YYYYYYYY  -48.687
    vprn20        2001:db8:3333:4444:5555:70:5:4
===============================================================================
===============================================================================
NTP Clients
===============================================================================
vRouter                                            Time Last Request Rx
    Address
-------------------------------------------------------------------------------
Base
    10.10.100.1                                    03/06/2013 21:39:27
    2001:db8:3333:4444:5555:10:100:1               03/06/2013 21:39:21
===============================================================================

*A:Dut-B# show system ntp server service-name vprn20 2001:db8:3333:4444:5555:40:1:3
===============================================================================
NTP Server
===============================================================================
State                 Reference ID    St Type  A  Poll Reach    Offset(ms)
    Router        Remote
-------------------------------------------------------------------------------
invalid               192.168.193.198 2  srvr  y  8   YYYYYYYY  -19.679
    vprn20        2001:db8:3333:4444:5555:40:1:3
===============================================================================
*

A:Dut B# show system ntp server servicename vprn20 2001:db8:3333:4444:5555:40:1:3
detail
===============================================================================
NTP Server
===============================================================================
State                 Reference ID    St Type  A  Poll Reach    Offset(ms)
```

```
     Router          Remote
-------------------------------------------------------------------------------
invalid                   192.168.193.198 2  srvr  y  8    YYYYYYYY  -19.679
    vprn20          2001:db8:3333:4444:5555:40:1:3
===============================================================================

*A:Dut-C# show system ntp peer router 20 2001:db8:3333:4444:5555:50:1:4
===============================================================================
NTP Peer
===============================================================================
State                     Reference ID    St Type  A  Poll Reach    Offset(ms)
    Router          Remote
-------------------------------------------------------------------------------
candidate                 192.168.193.198 2  actpr y  8    YYYYYYYY  -24.164
    vprn20          2001:db8:3333:4444:5555:50:1:4
===============================================================================

*B:SR_ORDINARY_MASTER# show system ntp peer router 20 2001:db8:3333:4444:5555:50:1:4
 detail
===============================================================================
NTP Peer
===============================================================================
State                     Reference ID    St Type  A  Poll Reach    Offset(ms)
    Router          Remote
-------------------------------------------------------------------------------
candidate                 192.168.193.198 2  actpr y  8    YYYYYYYY  -24.164
    vprn20          2001:db8:3333:4444:5555:50:1:4
===============================================================================

*A:Dut-B# show system ntp server router 20 2001:db8:3333:4444:5555:40:1:3
===============================================================================
NTP Server
===============================================================================
State                     Reference ID    St Type  A  Poll Reach    Offset(ms)
    Router          Remote
-------------------------------------------------------------------------------
invalid                   192.168.193.198 2  srvr  y  8    YYYYYYYY  -19.679
    vprn20          2001:db8:3333:4444:5555:40:1:3
===============================================================================

A:Dut-B# show system ntp server router 20 2001:db8:3333:4444:5555:40:1:3 detail
===============================================================================
NTP Server
===============================================================================
State                     Reference ID    St Type  A  Poll Reach    Offset(ms)
    Router          Remote
-------------------------------------------------------------------------------
invalid                   192.168.193.198 2  srvr  y  8    YYYYYYYY  -19.679
    vprn20          2001:db8:3333:4444:5555:40:1:3
===============================================================================
```

Table 53   **Show NTP Field Description**

Label	Description
Configured	yes — NTP is configured.
	no — NTP is not configured.

Table 53   **Show NTP Field Description (Continued)**

Label	Description (Continued)
Admin Status	yes — Administrative state is enabled. no — Administrative state is disabled.
Server Enabled	yes — This node is configured to serve external clients. no — This node is not configured to server external clients.
Stratum	Displays stratum level of this node.
Oper Status	yes — The operational state is enabled. no — The operational state is disabled.
Auth Check	Displays the authentication requirement.
Server Authenticate	Yes — Authentication is mandatory on received requests. No — Authentication is not mandatory on received requests.
Clock Source	Address of the chosen server.
Auth Errors	Displays the number of authentication errors.
Auth Errors Ignored	Displays the number of authentication errors ignored.
Auth key Id Errors	Displays the number of key identification errors.
Auth Key Type Errors	Displays the number of authentication key type errors.
Current Date & Time	Current date and time as determined by the NTP process in the node.
vRouter	The router instance containing the interface.
Router	The router instance containing the address.
Interface	The interface configured in NTP.
Address	The address used for transmitted messages.
Type	bcast — broadcast interface mcast — multicast interface bclnt — broadcast client srvr — server actpr — active peer paspr — passive peer
Auth	Yes — Authentication in use. No — Authentication not in use.
Poll	# — Current poll interval used on the interface.

Table 53   **Show NTP Field Description (Continued)**

Label	Description (Continued)
State	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.
	Outlier — The peer is discarded as an outlier. This peer will not be used for synchronization.
	Candidate — The peer is accepted as a possible source of synchronization.
	Selected — The peer is an acceptable source of synchronization, but its synchronization distance is greater than six other peers.
	Chosen — The peer is chosen as the source of synchronization.
	ChosenPPS — The peer is chosen as the source of synchronization, but the actual synchronization is occurring from a pulse-per-second (PPS) signal.
Remote	The IP address of the remote NTP server or peer with which this local host is exchanging NTP packets.

Table 53   **Show NTP Field Description (Continued)**

Label	Description (Continued)
Reference ID	When stratum is between 0 and 15 this field shows the IP address of the remote NTP server or peer with which the remote is exchanging NTP packets. For reference clocks, this field shows the identification assigned to the clock, such as, ".GPS." For an NTP server or peer, if the client has not yet synchronized to a server/peer, the status cannot be determined and displays the following codes: Peer Codes: ACST — The association belongs to any cast server. AUTH — Server authentication failed. Wait while the association is restarted. AUTO — Autokey sequence failed. Wait while the association is restarted. BCST — The association belongs to a broadcast server. CRPT— Cryptographic authentication or identification failed. The details should be in the system log file or the cryptostats statistics file, if configured. No further messages will be sent to the server. DENY — Access denied by remote server. No further messages will be sent to the server. DROP — Lost peer in symmetric mode. Wait while the association is restarted. 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.

Table 53   **Show NTP Field Description (Continued)**

Label	Description (Continued)
A	y — Authentication is enabled. n — Authentication is disabled.
Poll	Polling interval.
Reach	Shows the reachability for the most recent polls (up to 8): Y — The NTP peer or server did respond in the indicated poll. No — The NTP peer or server did not respond in the indicated poll.
Offset	The time between the local and remote UTC time, in milliseconds.
Time Last Request Rx	The time at which the last request was received from the client.

port-topology

Syntax   **port-topology** [**uni-dir**]

Context   show>system

Description   This command generates a listing of the internal connections within the router. These include connections to satellite ports.

Use of the **uni-dir** keyword will list each connection twice; once for each direction.

Parameters   **uni-dir** — Specifies to list each direction as a separate row.

Output   The following output is an example of port topology information.

Sample Output

```
*A:Dut-A# show system port-topology
===============================================================================
Port Topology
===============================================================================
Port Far-end
Id Port Id
-------------------------------------------------------------------------------
esat-1/1/u1 1/1/1
esat-1/1/u2 1/1/2
esat-1/1/u3 1/2/1
esat-1/1/u4 1/2/2
esat-20/1/u1 1/1/3
esat-20/1/u2 1/2/3
esat-20/1/u3 2/1/3
esat-20/1/u4 2/2/3
-------------------------------------------------------------------------------
No. of Number of port-topology associations: 8
```

==

ptp

Syntax   **ptp**

Context   show>system

Description 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.

Output   The following output is an example of PTP information, and Table 54 describes the output fields.

Sample Output

```
B:NS082761964# show system ptp
===============================================================================
IEEE 1588/PTP Clock Information
===============================================================================
-------------------------------------------------------------------------------
Local Clock
-------------------------------------------------------------------------------
Clock Type        : boundary        PTP Profile        : ITU-T G.8275.1
Domain            : 0               Network Type       : sdh
Admin State       : up              Oper State         : up
Announce Interval : 1 pkt/2 s       Announce Rx Timeout : 3 intervals
Peer Limit        : none (Base Router) G.8275.1 Priority : 128
Clock Id          : 001af0fffeb2fead  Clock Class      : 255 (slave-only)
Clock Accuracy    : 0xfe (unknown)  Clock Variance     : ffff (not computed)
Clock Priority1   : 128             Clock Priority2    : 128
PTP Recovery State: locked          Last Changed       : 08/24/2010 13:17:37
Frequency Offset  : +231.920 ppb
-------------------------------------------------------------------------------
Parent Clock
-------------------------------------------------------------------------------
IP Address        : 10.1.1.1        Router         : Base
Port              : 1/2/8           Remote MAC Address: 01:02:03:04:05:06
Local Clock is Parent Clock
Parent Clock Id   : 001af0fffeab36ad  Parent Port Number: 2
GM Clock Id       : 00b0aefffe011ca6  GM Clock Class   : 13
GM Clock Accuracy : 0xfe (unknown)  GM Clock Variance : 0x6400 (3.7E-09)
GM Clock Priority1: 128             GM Clock Priority2: 128
-------------------------------------------------------------------------------
Time Information
-------------------------------------------------------------------------------
Timescale         : PTP
Current Time      : 2011-08-30 15:31:42.99 UTC
Frequency Traceable : yes
Time Traceable    : yes
Time Source       : gps
===============================================================================
```

Table 54   **System PTP Field Descriptions**

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.

peer

Syntax **peer** *ip-address* [**router** *router-instance* | **service-name** *service-name*] [**detail**]

Context show>system>ptp

Description This command displays information for a specific peer.

Parameters *ip-address* — Specifies the IP address of the peer.

   Values a.b.c.d

router-instance — Shows only the information for a specific router instance.

   Values router-name – Base
   vprn-svc-id – 1 to 2147483647

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

detail — Displays detailed information.

Output The following output is an example of PTP information for a single peer.

Sample Output

```
A:bksim1620# show system ptp peer 10.1.1.2 router 5
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router          : 5
IP Address      : 10.1.1.2          Announce Direction : rx+tx
Admin State     : up                G.8275.1 Priority  : 128
Local PTP Port  : 2                 PTP Port State     : passive
```

```
Clock Id         : ac5dfffffe000000   Remote PTP Port   : 2
GM Clock Id      : ac5cfffffe000000   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 10.1.1.2 router 5 detail
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router Instance  : 5
IP Address       : 10.1.1.2           Announce Direction : rx+tx
Admin State      : up                 G.8275.1 Priority  : 128
Local PTP Port   : 2                  PTP Port State     : passive
Clock Id         : ac5dfffffe000000   Remote PTP Port   : 2
GM Clock Id      : ac5cfffffe000000   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
-------------------------------------------------------------------------------
10.1.1.2         Rx  Announce   1 pkt/2 s  300      Granted  09/01/2010 17:23:04
10.1.1.2         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
         ===============================================================================
```

peers

Syntax **peers** [**router** *router-instance* | **service-name** *service-name*] [**detail**]

Context show>system>ptp

Description This command displays summary information for all the PTP peers.

Parameters *router-instance* — Shows only the information for a specific router instance.

Values router-name – Base
vprn-svc-id – 1 to 2147483647

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

detail — Displays detailed information.

Output The following output is an example of PTP information for all peers.

Sample Output

```
*A:bksim1618# show system ptp peers
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address              Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
Base
  10.4.1.21               tx        n/a         master         no
1
  10.2.1.20               rx+tx     up          master         no
  10.3.1.19               rx        up          slave          yes
2
  10.1.1.21               tx        n/a         master         no
-------------------------------------------------------------------------------
No. of PTP Peers: 4
===============================================================================
```

```
*A:bksim1618# show system ptp peers router Base
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address               Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
Base
  10.4.1.21                tx        n/a         master         no
-------------------------------------------------------------------------------
No. of PTP Peers: 1
===============================================================================


*A:bksim1618# show system ptp peers router 1
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router
  IP Address               Anno Flow Admin State PTP Port State Parent Clock
-------------------------------------------------------------------------------
1
  10.2.1.20                rx+tx     up          master         no
  10.3.1.19                rx        up          slave          yes
-------------------------------------------------------------------------------
No. of PTP Peers: 2
===============================================================================


*A:bksim1618# show system ptp peers detail
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router          : Base
IP Address       : 10.4.1.21         Announce Direction : tx
Admin State      : n/a               G.8275.1 Priority  : 128
Local PTP Port   : 3                 PTP Port State     : master
Clock Id         : ac65fffffe000000  Remote PTP Port    : 1
-------------------------------------------------------------------------------
Router          : 1
IP Address       : 10.2.1.20         Announce Direction : rx+tx
Admin State      : up                G.8275.1 Priority  : 128
Local PTP Port   : 2                 PTP Port State     : master
Clock Id         : ac5efffffe000000  Remote PTP Port    : 1
Locked Out       : no                Time Remaining     : n/a
-------------------------------------------------------------------------------
Router          : 1
IP Address       : 10.3.1.19         Announce Direction : rx
Admin State      : up                G.8275.1 Priority  : 128
Local PTP Port   : 1                 PTP Port State     : slave
Clock Id         : ac5dfffffe000000  Remote PTP Port    : 1
GM Clock Id      : ac5dfffffe000000  GM Clock Class     : 13
GM Clock Accuracy : unknown          GM Clock Variance  : ffff (not computed)
GM Clock Priority1: 0                GM Clock Priority2 : 128
Steps Removed    : 0                 Parent Clock       : yes
Locked Out       : no                Time Remaining     : n/a
-------------------------------------------------------------------------------
Router          : 2
IP Address       : 10.1.1.21         Announce Direction : tx
```

```
Admin State      : n/a              G.8275.1 Priority  : 128
Local PTP Port   : 4                PTP Port State     : master
Clock Id         : ac65fffffe000000 Remote PTP Port    : 1
===============================================================================


*A:bksim1618# show system ptp peers router 1 detail
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router           : 1
IP Address       : 10.2.1.20        Announce Direction : rx+tx
Admin State      : up               G.8275.1 Priority  : 128
Local PTP Port   : 2                PTP Port State     : master
Clock Id         : ac5effffe000000  Remote PTP Port    : 1
-------------------------------------------------------------------------------
Router           : 1
IP Address       : 10.3.1.19        Announce Direction : rx
Admin State      : up               G.8275.1 Priority  : 128
Local PTP Port   : 1                PTP Port State     : slave
Clock Id         : ac5dffffe000000  Remote PTP Port    : 1
GM Clock Id      : ac5dffffe000000  GM Clock Class     : 13
GM Clock Accuracy : unknown         GM Clock Variance  : ffff (not computed)
GM Clock Priority1: 0               GM Clock Priority2 : 128
Steps Removed    : 0                Parent Clock       : yes
===============================================================================
```

port

Syntax **port** *port-id* [**detail**]

Context show>system>ptp

Description This command displays port information.

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

Values slot/mda/port

detail — Displays detailed information.

Output The following output is an example of PTP port information.

Sample Output

```
A:bksim1618# show system ptp port 1/1/1 detail
===============================================================================
IEEE 1588/PTP Ethernet Port Information
===============================================================================
Port             : 1/1/2
Local MAC Addr   : 02:43:BA:01:00:03 Multicast MAC Addr : 01:1b:19:00:00:00
PTP Admin State  : up               PTP Oper State     : up
PTP Port Number  : 3                PTP Port State     : Slave
Tx Sync/Delay Rate : 64 pkt/s       Tx Anno Rate       : 1 pkt/2 s
Neighbor Clocks  : 4                Timestamp Point    : port
```

```
Asym Factor        : 456 ns



A:bksim1620# show system ptp peer 10.1.1.2 router 5 detail
===============================================================================
IEEE 1588/PTP Peer Information
===============================================================================
Router Instance  : 5
IP Address       : 10.1.1.2          Announce Direction : rx+tx
Admin State      : up                G.8265.1 Priority  : n/a
Sync Interval    : 64 pkt/s
Local PTP Port   : 2                 PTP Port State     : passive
Clock Id         : ac5dfffffe000000  Remote PTP Port    : 2
GM Clock Id      : ac5cfffffe000000  GM Clock Class     : 13
GM Clock Accuracy : 0xfe (unknown)   GM Clock Variance  : ffff (not computed)
GM Clock Priority1: 128              GM Clock Priority2 : 128
Steps Removed    : 1                 Parent Clock       : no
Tx Timestamp Point: port             Rx Timestamp Point : port
Last Tx Port     : 1/1/2            Last Rx Port        : 1/1/2
Asym Factor Tx   : 456 ns            Asym Factor Rx     : 456 ns
===============================================================================


A:bksim1618# show system ptp port 1/1/2 detail
===============================================================================
IEEE 1588/PTP Ethernet Port Information
===============================================================================
Port             : 1/1/2
PTP Admin State  : up                PTP Oper State     : up
Local MAC Addr   : a0:f3:e4:33:ee:a3 Multicast MAC Addr : 01:1b:19:00:00:00
PTP Port Number  : 1                 PTP Port State     : slave
Cfg Anno Rate    : 1 pkt/2 s         Cfg Sync/Delay Rate: 64 pkt/s
Neighbors        : 1                 Timestamp Point    : cpm
===============================================================================
IEEE 1588/PTP Ethernet Port Neighbor Clocks
=========================================================
MAC Address       Clock Id        Port #  Rx Packet Rate
---------------------------------------------------------
8c:90:d3:c4:3d:f9 a0f3e4fffe637e30    1            128
8c:90:d3:c4:3d:fa a0f3e4fffe637e30    2             64
---------------------------------------------------------
No. of Neighbor Clocks: 2
=========================================================


===============================================================================
IEEE 1588/PTP Ethernet Port Packet Statistics
===============================================================================
                                                     Input      Output
-------------------------------------------------------------------------------
PTP Packets                                           3584        1785
  Announce                                              14           0
  Sync                                                1785           0
  Follow Up                                              0           0
  Delay Request                                          0        1785
  Delay Response                                      1785           0
  Signaling                                              0           0
  Other                                                  0           0
Discards                                                 0           0
  Bad PTP domain                                         0           0
  Alternate Master                                       0           0
```

```
   Out Of Sequence                                             0           0
   Other                                                       0           0
===============================================================================


===============================================================================
IEEE 1588/PTP Ethernet Port Neighbor Clocks
===============================================================================
  MAC Address          Clock Id          Port Num   Rx Packet Rate
-------------------------------------------------------------------------------
  01:02:03:04:05:06    ac65fffffe000001     65535           64
  01:02:03:04:05:07    ac65fffffe000002         1            0
  01:02:03:04:05:08    ac65fffffe000003         2           64
  01:02:03:04:05:09    ac65fffffe000004        99            0
===============================================================================


===============================================================================
IEEE 1588/PTP Ethernet Port Packet Statistics
===============================================================================
                                                     Input          Output
-------------------------------------------------------------------------------
PTP Packets                                            253              11
  Announce                                             243               1
  Sync                                                   0               0
  Follow Up                                              0               0
  Delay Request                                          0               0
  Delay Response                                         0               0
  Signaling                                             10              10
  Other                                                  0               0
Discards                                                 0               0
  Bad PTP domain                                         0               0
  Alternate Master                                       0               0
  Out Of Sequence                                        0               0
  Other                                                  0               0
===============================================================================


A:bksim1618# show system ptp port
===============================================================================
IEEE 1588/PTP Ethernet Port Summary Information
===============================================================================
Port         PTP Adm/Opr   PTP State    Neighbors   Tx Rate    Rx Rate
-------------------------------------------------------------------------------
10/2/16      up/up         passive          5        12312       4400
1/1/1        up/up         slave            1        12312       4400
1/1/2        up/up         master          61        12312       4400
1/1/3        up/down       disabled         0            0          0
1/1/4        up/up         listening        0            0          0
-------------------------------------------------------------------------------
No. of PTP Ports : 5                             Total  99999     999999
```

standby

Syntax   **standby**

Context   show>system>ptp

Description   This command displays information for PTP on the standby control module.

Output   The following output is an example of PTP standby information.

Sample Output

```
B:NS082761964# show system ptp standby
===============================================================================
IEEE 1588/PTP Clock Information
===============================================================================
-------------------------------------------------------------------------------
Local Clock
-------------------------------------------------------------------------------
Clock Type       : ordinary,slave   PTP Profile        : ieee1588-2008
Domain           : 0
Admin State      : up               Oper State         : up
Announce Interval : 1 pkt/2 s       Announce Rx Timeout : 3 intervals
Clock Id         : 001af0fffeb2fead  Clock Class        : 255 (slave-only)
Clock Accuracy   : 0xfe (unknown)   Clock Variance     : ffff (not computed)
Clock Priority1  : 128              Clock Priority2    : 128
PTP Port State   : listening        Last Changed       : 02/11/2013 18:09:58
PTP Recovery State: locked          Last Changed       : 08/24/2010 13:17:37
Frequency Offset : +231.920 ppb
-------------------------------------------------------------------------------
Parent Clock
-------------------------------------------------------------------------------
IP Address       : 10.1.1.1
Parent Clock Id  : 001af0fffeab36ad  Remote PTP Port Number: 2
GM Clock Id      : 00b0aefffe011ca6  GM Clock Class     : 13
GM Clock Accuracy : 0xfe (unknown)  GM Clock Variance : 0x6400 (3.7E-09)
GM Clock Priority1: 128             GM Clock Priority2: 128
-------------------------------------------------------------------------------
Time Information
-------------------------------------------------------------------------------
Timescale        : PTP
Current Time     : 2011-08-30 15:31:42.99 UTC
Frequency Traceable : yes
Time Traceable   : yes
Time Source      : gps
===============================================================================
```

statistics

Syntax   **statistics**

Context   show>system>ptp

Description   This command displays the message and error statistics for the node.

Output   The following output is an example of PTP statistics information.

Sample Output

```
A:bksim1619# show system ptp statistics
===============================================================================
IEEE 1588/PTP Packet Statistics
===============================================================================
                                               Input              Output
-------------------------------------------------------------------------------
PTP Packets                                  2910253             2393354
 Announce                                       9015               22682
 Sync                                         1153275              622585
 Follow Up                                          0                   0
 Delay Request                                594036             1153568
 Delay Response                              1153044              593614
 Signaling                                       883                 905
  Request TLVs                                   428                 598
   Announce                                      304                 350
   Sync                                           62                 124
   Delay Response                                 62                 124
  Grant TLVs (Granted)                           514                 428
   Announce                                      272                 304
   Sync                                          121                  62
   Delay Response                               121                  62
  Grant TLVs (Rejected)                            0                   0
   Announce                                        0                   0
   Sync                                            0                   0
   Delay Response                                  0                   0
  Cancel TLVs                                      3                   0
   Announce                                        1                   0
   Sync                                            1                   0
   Delay Response                                  1                   0
  Ack Cancel TLVs                                  0                   3
   Announce                                        0                   1
   Sync                                            0                   1
   Delay Response                                  0                   1
  Other TLVs                                       0                   0
 Other                                            0                   0
 Event Packets timestamped at port            215523              215371
 Event Packets timestamped 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
===============================================================================
===============================================================================
===============================================================================
IEEE 1588/PTP Message Rates Per Second
===============================================================================
                                        UDP/IP            Ethernet
Packet Type                          Input   Output    Input    Output
-------------------------------------------------------------------------------
Announce                                 0        0       16         0
Sync                                     0        0       32         0
Follow Up                                0        0       32         0
Delay Request                            0        0        0         4
Delay Response                           0        0        4         0
Other                                    0        0        0         0
-------------------------------------------------------------------------------
Total                                    0        0       84         4
===============================================================================
===============================================================================
```

unicast

Syntax   **unicast** [**router** *router-instance* | **service-name** *service-name*]

Context   show>system>ptp

Description   This command displays unicast negotiation information.

Parameters   *router-instance* — Shows only the information for a specific router instance.

> **Values**   router-name – Base
> vprn-svc-id – 1 to 2147483647

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

Output   The following output is an example of PTP unicast information.

Sample Output

```
*A:bksim1618# show system ptp unicast
===============================================================================
IEEE 1588/PTP Unicast Negotiation Information
===============================================================================
Router
  IP Address      Dir Type      Rate       Duration State    Time
-------------------------------------------------------------------------------
Base
  10.4.1.21       Tx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:14:09
1
  10.2.1.20       Rx  Announce 1 pkt/2 s  300      Granted  04/21/2013 19:14:19
```

```
   10.2.1.20        Tx  Announce 1 pkt/2 s   300      Granted  04/21/2013 19:13:25
   10.2.1.20        Tx  Sync     64 pkt/s    300      Granted  04/21/2013 19:13:30
   10.2.1.20        Rx  DelayReq 64 pkt/s    300      Granted  04/21/2013 19:13:30
   10.2.1.20        Tx  DelayRsp 64 pkt/s    300      Granted  04/21/2013 19:13:30
   10.3.1.19        Rx  Announce 1 pkt/2 s   300      Granted  04/21/2013 19:13:16
   10.3.1.19        Rx  Sync     64 pkt/s    300      Granted  04/21/2013 19:13:21
   10.3.1.19        Tx  DelayReq 64 pkt/s    300      Granted  04/21/2013 19:13:21
   10.3.1.19        Rx  DelayRsp 64 pkt/s    300      Granted  04/21/2013 19:13:21
2
   10.1.1.21        Tx  Announce 1 pkt/2 s   300      Granted  04/21/2013 19:14:08
   10.1.1.21        Tx  Sync     64 pkt/s    300      Granted  04/21/2013 19:14:15
   10.1.1.21        Rx  DelayReq 64 pkt/s    300      Granted  04/21/2013 19:14:15
   10.1.1.21        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
   10.2.1.20        Rx  Announce 1 pkt/2 s   300      Granted  04/21/2013 19:14:19
   10.2.1.20        Tx  Announce 1 pkt/2 s   300      Granted  04/21/2013 19:13:25
   10.2.1.20        Tx  Sync     64 pkt/s    300      Granted  04/21/2013 19:13:30
   10.2.1.20        Rx  DelayReq 64 pkt/s    300      Granted  04/21/2013 19:13:30
   10.2.1.20        Tx  DelayRsp 64 pkt/s    300      Granted  04/21/2013 19:13:30
   10.3.1.19        Rx  Announce 1 pkt/2 s   300      Granted  04/21/2013 19:13:16
   10.3.1.19        Rx  Sync     64 pkt/s    300      Granted  04/21/2013 19:13:21
   10.3.1.19        Tx  DelayReq 64 pkt/s    300      Granted  04/21/2013 19:13:21
   10.3.1.19        Rx  DelayRsp 64 pkt/s    300      Granted  04/21/2013 19:13:21
-------------------------------------------------------------------------------
PTP Peers             : 2
Total Packet Rate     : 385 packets/second
===============================================================================
*A:bksim1618#
```

rollback

Syntax   **rollback** [**rescue**]

Context   show>system

Description   This command displays rollback configuration and state.

Parameters   **rescue** — Specifies the rescue configuration.

Output   The following output is an example of system rollback information.

Sample Output

```
A:dut-a_a># show system rollback
===============================================================================
Rollback Information
===============================================================================
Rollback Location           : cf1:/Rollback
Save
  Last Rollback Save Result   : In Progress, Successful or Failed
  Last Save Completion Time   : 10/15/2010 21:24:06
Revert
  In Progress                 : Yes, No
  Last Revert Initiated Time  : 10/15/2010 21:26:23
  Last Revert Initiated User  : xyz
  Last Initiated Checkpoint   : cf1:/Rollback.rb.3
  Last Completed Revert Result : Successful or Failed
  Last Revert Completion  Time : 10/15/2010 21:27:19
===============================================================================
Rollback Files
===============================================================================
Idx     Suffix  Creation time      Release  User
          Comment
-------------------------------------------------------------------------------
latest  .rb     2010/10/15 21:24:02  9.0.R4   fred
          This checkpoint was saved after the 3 VPLS services were created
1       .rb.1   2010/10/15 21:23:58  9.0.R4   John
          John's checkpoint on Sunday
2       .rb.2   2010/10/15 21:23:52  9.0.R4   admin
          A long checkpoint comment that an operator is using to summarize
          various some of the changes that were made.   They may even have so
          much to say that they use the maximum comment size.   Notice that
          words are not chopped.
…
9       .rb.9   2010/10/14 22:00:01  9.0.R4   admin
          VPLS services 1000-2000 created
…
53      .rb.53  2010/10/14 22:10:10  9.0.R4   admin
-------------------------------------------------------------------------------
No. of Rollback Files: 10
===============================================================================
```

satellite

Syntax	**satellite**
Context	show>system
Description	This command displays a list of configured satellites including information about the satellite's esat-ID or tsat-ID, satellite type, and state.
Output	The following output is an example of satellite information.

Sample Output

```
A:Dut-A# show system satellite
```

```
================================================================================
Satellite Information
================================================================================
SatID     Provisioned Type                           Admin        Oper
            Equipped Type (if different)             State        State
--------------------------------------------------------------------------------
esat-1    es48-1gb-sfp                                up           provisioned
            (not equipped)
esat-20   es48-1gb-sfp                                up           up
tsat-2    ts4-choc3-sfp                               up           up
tsat-3    ts4-choc3-sfp                               up           up
--------------------------------------------------------------------------------
No. of Satellites: 4
================================================================================
```

eth-sat

Syntax   **eth-sat** [*sat-id*]

Context   show>system>satellite

Description   This command displays information about configured Ethernet satellites. If a sat-id is specified, this command displays information only about the specified Ethernet satellite.

Parameters   *sat-id* — Specifies the Ethernet satellite chassis.

Output   The following output is an example of Ethernet satellite information.

Sample Output

```
A:Dut-A# show system satellite eth-sat 1
================================================================================
Satellite Information
================================================================================
SatID     Provisioned Type                           Admin        Oper
            Equipped Type (if different)             State        State
--------------------------------------------------------------------------------
esat-1    es48-1gb-sfp                                up           up
Description        : (Not Specified)
MAC Address        : e4:81:84:24:2e:e5
Software Repository : rep1
SyncE              : Disabled
Hardware Data
    Platform type              : N/A
    Part number                : 82-0825-01
    CLEI code                  :
    Serial number              : 01154100020
    Manufacture date           :
    Manufacturing deviations   : (Not Specified)
    Manufacturing assembly number :
    Administrative state       : up
    Operational state          : up
    Temperature                : 51C
    Temperature threshold      : 85C
```

```
                     Software boot (rom) version : X-9.0.S222 on Thu Feb 16 03:29:00 IST 2017
                                                   by builder
                     Software version            : TiMOS-B-8.0.R9 both/hops Nokia SAS-Sx
                                                   46F2C4SFP+ 7210 Copyright (c) 2000-2016
                                                   Nokia.
                                                   All rights reserved. All use subject to
                                                   applicable license agreements.
                                                   Built on Mon Oct 31 10:10:30 IST 2016 by
                                                   builder in /home/builder/8.0B1/R9/panos/
                                                   main
                     Time of last boot           : 2017/02/28 13:02:41
                     Current alarm state         : alarm cleared
                     Base MAC address            : e4:81:84:24:2e:e5
===============================================================================
```

tdm-sat

Syntax   **tdm-sat** [*sat-id*]

Context   show>system>satellite

Description   This command displays information about configured TDM satellites. If a sat-id is specified, this command displays information only about the specified TDM satellite.

Parameters   *sat-id* — Specifies the TDM satellite chassis.

Output   The following output is an example of TDM satellite information.

Sample Output

```
*A:Dut-A# show system satellite tdm-sat 1
===============================================================================
Satellite Information
===============================================================================
SatID     Provisioned Type                        Admin       Oper
          Equipped Type (if different)            State       State
-------------------------------------------------------------------------------
tsat-1    ts4-choc3-sfp                           up          up
Description        : (Not Specified)
MAC Address        : 90:3a:a0:f0:71:97
Software Repository : tsat-1
SyncE              : Enabled
Hardware Data
    Platform type                : N/A
    Part number                  : 3HE10328AARC0103
    CLEI code                    : INMAT00FRA
    Serial number                : NS16361M001
    Manufacture date             : 09082016
    Manufacturing deviations     : (Not Specified)
    Manufacturing assembly number :
    Administrative state         : up
    Operational state            : up
    Software boot (rom) version  : X-8.0.B1-105 on Tue Feb 14 22:51:10 EST
                                   2017 by builder
    Software version             : TiMOS-B-0.0.I3066 both/hops NOKIA SAR 7705
```

```
                                        Copyright (c) 2000-2017 Nokia.
                                        All rights reserved. All use subject to
                                        applicable license agreements.
                                        Built on Sat Feb 25 00:03:24 EST 2017 by
                                        builder in /rel0.0/I3066/panos/main
                    Time of last boot   : 2017/02/27 14:43:46
                    Current alarm state : alarm cleared
                    Base MAC address    : 90:3a:a0:f0:71:97
===============================================================================
```

port-map

Syntax   **port-map** [*client-map-id*]

Context   show>system>satellite>eth-sat
show>system>satellite>tdm-sat

Description   This command displays information about configured satellites port maps.

Parameters   *client-map-id* — Specifies the client map to display.

Output   The following output is an example of TDM satellite port map information.

Sample Output

```
A:Dut-A# show system satellite tdm-sat 1 port-map
===============================================================================
Satellite Port Mapping Information
===============================================================================
Client Port    Adm  State   Uplink Port    Adm  State   Host Port  Adm  State
-------------------------------------------------------------------------------
tsat-1/1/1     Down Down    tsat-1/1/u1    Up   Up      1/1/4      Up   Up
tsat-1/1/2     Down Down    tsat-1/1/u1    Up   Up      1/1/4      Up   Up
tsat-1/1/3     Down Down    tsat-1/1/u1    Up   Up      1/1/4      Up   Up
tsat-1/1/4     Down Down    tsat-1/1/u1    Up   Up      1/1/4      Up   Up
===============================================================================
```

sync-if-timing

Syntax   **sync-if-timing**

Context   show>system>satellite>eth-sat
show>system>satellite>tdm-sat

Description   This command displays synchronous interface timing operational information.

Output   The following output is an example of TDM satellite synchronous interface timing information.

Sample Output

```
A:Dut-A# show system satellite tdm-sat 1 sync-if-timing
```

```
================================================================================
Satellite tsat-1 Synchronous Interface Timing Operational Information
================================================================================
System Status                  : Master Locked
System Quality Level           : eec2
Current Frequency Offset (ppm) : +0
Reference Input 1
    Admin Status               : up
    Rx Quality Level           : eec2
    Qualified For Use          : yes
    Selected For Use           : yes
    Source Port                : tsat-1/1/u1
Reference Input 2
    Admin Status               : down
    Rx Quality Level           : unknown
    Qualified For Use          : no
        Not Qualified Due To   : disabled
    Selected For Use           : no
        Not Selected Due To    : disabled
    Source Port                : none
================================================================================
```

sntp

Syntax **sntp**

Context show>system

Description This command displays SNTP protocol configuration and state.

Output The following output is an example of SNTP information, and Table 55 describes the output fields.

Sample Output

```
A:ALA-1# show system sntp
================================================================================
SNTP
================================================================================
SNTP Server          Version          Preference          Interval
--------------------------------------------------------------------------------
10.10.20.253         3                Preferred            64
================================================================================
A:ALA-1#
```

Table 55   **System SNTP Field Descriptions**

Label	Description
SNTP Server	The SNTP server address for SNTP unicast client mode.
Version	The SNTP version number, expressed as an integer.

Table 55   **System SNTP Field Descriptions (Continued)**

Label	Description
Preference	Normal — When more than one time server is configured, one server can be configured to have preference over another. Preferred — Indicates that this server has preference over another.
Interval	The frequency, in seconds, that the server is queried.

thresholds

Syntax   **thresholds**

Context   show>system

Description   This command displays system monitoring thresholds. The Threshold Events Log table will keep only the last 201 entries.

Output   The following output is an example of system threshold information, and Table 56 describes the output fields.

Sample Output

```
A:bkvm3# show system thresholds
===================================================================
Threshold Alarms
===================================================================
Variable: tmnxCpmFlashUsed.1.10.1
Alarm Id        : 1        Last Value : 3192120
Rising Event Id  : 1        Threshold  : 10
Falling Event Id : 0        Threshold  : 0
Sample Interval  : 1        SampleType : absolute
Startup Alarm    : either   Owner      : TiMOS CLI

Variable: tmnxCpmFlashUsed.1.10.2
Alarm Id        : 2        Last Value : 0
Rising Event Id  : 2        Threshold  : 20
Falling Event Id : 3        Threshold  : 30
Sample Interval  : 2        SampleType : absolute
Startup Alarm    : either   Owner      : TiMOS CLI

Variable: tmnxCpmFlashPercentageUsed.1.10.1
Alarm Id        : 3        Last Value : 19
Rising Event Id  : 4        Threshold  : 30
Falling Event Id : 0        Threshold  : 0
Sample Interval  : 3        SampleType : absolute
Startup Alarm    : either   Owner      : TiMOS CLI

Variable: tmnxCpmFlashPercentageUsed.1.10.2
Alarm Id        : 4        Last Value : 0
Rising Event Id  : 5        Threshold  : 40
Falling Event Id : 6        Threshold  : 50
```

```
Sample Interval  : 4        SampleType : absolute
Startup Alarm    : either   Owner      : TiMOS CLI


===============================================================
===============================================================
Threshold Events
===============================================================
Description: TiMOS CLI - cflash capacity alarm rising event
             using percentages
Event Id         : 1         Last Sent  : 07/23/2015 18:15:46
Action Type      : both      Owner      : TiMOS CLI

Description: TiMOS CLI - cflash capacity warning rising event
Event Id         : 2         Last Sent  : never
Action Type      : both      Owner      : TiMOS CLI

Description: TiMOS CLI - cflash capacity warning falling event
Event Id         : 3         Last Sent  : 07/23/2015 18:15:46
Action Type      : both      Owner      : TiMOS CLI

Description: TiMOS CLI - cflash capacity warning rising event
             using percentages
Event Id         : 4         Last Sent  : never
Action Type      : both      Owner      : TiMOS CLI

Description: TiMOS CLI - cflash capacity alarm rising event
             using percentages
Event Id         : 5         Last Sent  : never
Action Type      : both      Owner      : TiMOS CLI

Description: TiMOS CLI - cflash capacity alarm falling event
             using percentages
Event Id         : 6         Last Sent  : 07/23/2015 18:15:46
Action Type      : both      Owner      : TiMOS CLI


===============================================================
===============================================================
Threshold Events Log
===============================================================
Description      : TiMOS CLI - cflash capacity alarm rising
                   event using percentages : value=3192120,
                   >=10 : alarm-index 1, event-index 1 alarm-
                   variable OID tmnxCpmFlashUsed.1.10.1
Event Id         : 1         Time Sent  : 07/23/2015 18:15:46

Description      : TiMOS CLI - cflash capacity warning falling
                   event : value=0, <=30 : alarm-index 2, event-
                   index 3 alarm-variable OID tmnxCpmFlashUsed.
                   1.10.2
Event Id         : 3         Time Sent  : 07/23/2015 18:15:46

Description      : TiMOS CLI - cflash capacity alarm falling
                   event using percentages : value=0, <=50 :
                   alarm-index 4, event-index 6 alarm-variable
                   OID tmnxCpmFlashPercentageUsed.1.10.2
Event Id         : 6         Time Sent  : 07/23/2015 18:15:46


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

Table 56   **System Thresholds Field Descriptions**

Label	Description
Variable	Displays the variable OID.
Alarm Id	Displays the numerical identifier for the alarm.
Last Value	Displays the last threshold value.
Rising Event Id	Displays the identifier of the RMON rising event.
Threshold	Displays the identifier of the RMON rising threshold.
Falling Event Id	Displays the identifier of the RMON falling event.
Threshold	Displays the identifier of the RMON falling threshold.
Sample Interval	Displays the polling interval, in seconds, over which the data is sampled and compared with the rising and falling thresholds.
SampleType	Displays the method of sampling the selected variable and calculating the value to be compared against the thresholds.
Startup Alarm	Displays the alarm that may be sent when this alarm is first created.
Owner	Displays the owner of this alarm.
Description	Displays the event cause.
Event Id	Displays the identifier of the threshold event.
Last Sent	Displays the date and time the alarm was sent.
Action Type	log — An entry is made in the RMON-MIB log table for each event occurrence. trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations, which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs. both — Both an entry in the RMON-MIB logTable and a TiMOS logger event are generated. none — No action is taken
Owner	Displays the owner of the event.

time

Syntax   **time**

Context   show>system

Description   This command displays the system time and zone configuration parameters.

Output   The following output is an example of system time information, and Table 57 describes the output fields.

Sample Output

```
A:ALA-1# show system time
===============================================================================
Date & Time
===============================================================================
Current Date & Time : 2006/05/05 23:03:13    DST Active          : yes
Current Zone       : PDT                     Offset from UTC      : -7:00
-------------------------------------------------------------------------------
Non-DST Zone       : PST                     Offset from UTC      : -8:00
Zone type          : standard
-------------------------------------------------------------------------------
DST Zone           : PDT                     Offset from Non-DST  : 01:00
Starts             : first sunday in april 02:00
Ends               : last sunday in october 02:00
===============================================================================
A:ALA-1#


A:ALA-1# show system time (with no DST zone configured)
===============================================================================
Date & Time
===============================================================================
Current Date & Time : 2006/05/12 11:12:05      DST Active      :     no
Current Zone    : APA     Offset from UTC :   -8:00
-------------------------------------------------------------------------------
Non-DST Zone    : APA     Offset from UTC :   -8:00
Zone Type          : non-standard
-------------------------------------------------------------------------------
No DST zone configured
===============================================================================
A:ALA-1#
```

Table 57   **System Time Field Descriptions**

Label	Description
Date & Time	The system date and time using the current time zone.
DST Active	Yes — Daylight Savings Time is currently in effect. 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.

Table 57   **System Time Field Descriptions (Continued)**

Label	Description (Continued)
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 to 1) and minutes (0 to 59) added to the time at the beginning of Daylight Saving Time and subtracted at the end Daylight Saving Time.
Starts	The date and time Daylight Saving Time begins.
Ends	The date and time Daylight Saving Time ends.

time

Syntax   **time**

Context   show

Description   This command displays the current day, date, time and time zone.

The time is displayed either in the local time zone or in UTC depending on the setting of the root level **time-display** command for the console session.

Output   The following output is an example of time information.

Sample Output

```
A:ALA-49# show time
Tue Oct 31 12:17:15 GMT 2006
```

redundancy

Syntax   **redundancy**

Context   show

Description   This command enables the context to show redundancy information.

mgmt-ethernet

Syntax   **mgmt-ethernet**

Context   show>redundancy

Description   This command shows the management Ethernet port redundancy status. The show router "management" interface command also shows the CPM Ethernet port used by the management interface. If the primary CPM's port is active, then it shows "A/1" under the Port field,. If the secondary CPM's port is active, then it shows "B/1 -> A/1"in the Port field.

Output   The following output is an example of redundancy mgmt-Ethernet information, and Table 58 describes the output fields.

Sample Output

```
A:SR12# show redundancy mgmt-ethernet

===============================================================================
Management Ethernet Redundancy
===============================================================================
Admin Status  : Enabled
Oper Status   : Management port operating on active CPM
Revert Time   : 5 seconds
===============================================================================
```

Show Router "Management" Interface Detail Output

The following is a sample output that shows "A/1" when the primary CPM's Ethernet port is active and "B/1 ->A/1" if the secondary CPM's port is active.

```
*B:Dut-A# show router "management" interface

============================================================================
Interface Table (Router: management)
============================================================================
Interface-Name                   Adm         Opr(v4/v6)  Mode    Port/SapId
   IP-Address                                                    PfxState
----------------------------------------------------------------------------
management                       Up          Up/Up       Network B/1 -> A/1
   192.168.186.219/24                                            n/a
   2001:db8::8a78:badb/96                                        PREFERRED
   fe80::221:5ff:fece:df49/64                                    PREFERRED
----------------------------------------------------------------------------
Interfaces : 1
============================================================================


*B:Dut-A# show router "management" interface detail

============================================================================
Interface Table (Router: management)
============================================================================

----------------------------------------------------------------------------
Interface
----------------------------------------------------------------------------
If Name         : management
Admin State     : Up                  Oper (v4/v6)    : Up/Up
Protocols       : None
IP Addr/mask    : 192.168.186.219/24  Address Type    : Primary
IGP Inhibit     : Disabled            Broadcast Address : Host-ones
```

```
HoldUp-Time     : 0                    Track Srrp Inst   : 0
IPv6 Address    : 2001:db8::8a78:badb/96
IPv6 Addr State : PREFERRED
CGA modifier    : (Not Specified)
HoldUp-Time     : 0                    Track Srrp Inst   : 0
Link Lcl Address : fe80::221:5ff:fece:df49/64
Link Lcl State  : PREFERRED
-------------------------------------------------------------------------------
Details
-------------------------------------------------------------------------------
Description     : (Not Specified)
If Index        : 1280                 Virt. If Index    : 1280
Last Oper Chg   : 06/16/2015 21:01:07  Global If Index   : 16384
Lag Link Map Prof: none
Port Id         : B/1 -> A/1
TOS Marking     : Trusted              If Type           : Network
Egress Filter   : none                 Ingress Filter    : none
Egr IPv6 Flt    : none                 Ingr IPv6 Flt     : none
BGP IP FlowSpec : Disabled
BGP IPv6 FlowSpec: Disabled
SNTP B.Cast     : True                 Network QoS Policy: 1
MAC Address     : 00:21:05:ce:df:49    Mac Accounting    : Disabled
```

Table 58   **Redundancy Mgmt-ethernet Field Descriptions**

Label	Description
Admin Status	Enabled — Administrative status is enabled. Disabled — Administratively disabled.
Oper Status	Displays the CPM on which the management Ethernet port is operating.
Revert Time	Displays the revert time.

multi-chassis

Syntax   **multi-chassis**

Context   show>redundancy

Description This command enables the context to show multi-chassis redundancy information.

all

Syntax   **all**

Context   show>redundancy>multi-chassis

Description This command displays brief multi-chassis redundancy information.

Output The following output is an example of multi-chassis all information, and Table 59 describes the output fields.

Sample Output

```
B:Dut-B# show redundancy multi-chassis all
===============================================================================
Multi-chassis Peer Table
===============================================================================
Peer
-------------------------------------------------------------------------------
Peer IP Address          : 10.10.10.2
Description              : Mc-Lag peer 10.10.10.2
Authentication          : Disabled
Source IP Address        : 0.0.0.0
Admin State             : Enabled
===============================================================================
B:Dut-B#


B:Dut-B# show lag detail
===============================================================================
LAG Details
===============================================================================
LAG 1
-------------------------------------------------------------------------------
Description: Description For LAG Number 1
-------------------------------------------------------------------------------
Details
-------------------------------------------------------------------------------
Lag-id              : 1                     Mode                  : access
Adm                 : up                    Opr                   : up
Thres. Exceeded Cnt : 9                     Port Threshold        : 0
Thres. Last Cleared : 05/20/2006 00:12:35   Threshold Action      : down
Dynamic Cost        : false                 Encap Type            : null
Configured Address  : 1c:71:ff:00:01:41     Lag-IfIndex           : 1342177281
Hardware Address    : 1c:71:ff:00:01:41     Adapt Qos             : distribute
Hold-time Down      : 0.0 sec
LACP                : enabled               Mode                  : active
LACP Transmit Intvl : fast                  LACP xmit stdby       : enabled
Selection Criteria  : highest-count         Slave-to-partner      : disabled
Number of sub-groups: 1                     Forced                : -
System Id           : 1c:71:ff:00:00:00     System Priority       : 32768
Admin Key           : 32768                 Oper Key              : 32666
Prtr System Id      : 20:f4:ff:00:00:00     Prtr System Priority  : 32768
Prtr Oper Key       : 32768

MC Peer Address     : 10.10.10.2            MC Peer Lag-id        : 1
MC System Id        : 00:00:00:33:33:33     MC System Priority    : 32888
MC Admin Key        : 32666                 MC Active/Standby     : active
MC Lacp ID in use   : true                  MC extended timeout   : false
MC Selection Logic  : peer decided
MC Config Mismatch  : no mismatch
-------------------------------------------------------------------------------
Port-id        Adm     Act/Stdby Opr    Primary  Sub-group    Forced   Prio
-------------------------------------------------------------------------------
331/2/1        up      active    up     yes      1            -        32768
331/2/2        up      active    up              1            -        32768
```

```
331/2/3         up      active    up                1           -         32768
331/2/4         up      active    up                1           -         32768
--------------------------------------------------------------------------------
Port-id         Role      Exp   Def   Dist   Col   Syn   Aggr  Timeout  Activity
--------------------------------------------------------------------------------
331/2/1         actor     No    No    Yes    Yes   Yes   Yes   Yes       Yes
331/2/1         partner   No    No    Yes    Yes   Yes   Yes   Yes       Yes
331/2/2         actor     No    No    Yes    Yes   Yes   Yes   Yes       Yes
331/2/2         partner   No    No    Yes    Yes   Yes   Yes   Yes       Yes
331/2/3         actor     No    No    Yes    Yes   Yes   Yes   Yes       Yes
331/2/3         partner   No    No    Yes    Yes   Yes   Yes   Yes       Yes
331/2/4         actor     No    No    Yes    Yes   Yes   Yes   Yes       Yes
331/2/4         partner   No    No    Yes    Yes   Yes   Yes   Yes       Yes
================================================================================
B:Dut-B#
```

Table 59   **Redundancy multi-chassis all Field Descriptions**

Label	Description
Peer IP Address	Displays the multi-chassis redundancy peer.
Description	The text string describing the peer.
Authentication	If configured, displays the authentication key used between this node and the 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.

mc-endpoint

Syntax   **mc-endpoint statistics**
mc-endpoint peer [*ip-address*] **statistics**
mc-endpoint endpoint [*mcep-id*] **statistics**
mc-endpoint peer [*ip-address*]

Context   show>redundancy>multi-chassis

Description   This command displays multi-chassis endpoint information.

Parameters   **statistics** — Displays the global statistics for the MC endpoint.

peer — Displays information for a single peer.

ip-address — Specifies the IP address of multi-chassis end-point peer.

Values   ipv4-address: a.b.c.d
ipv6-address:
• x:x:x:x:x:x:x:x (eight 16-bit pieces)

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

endpoint — Displays multi-chassis endpoint information.

mcep-id — Specifies the multi-chassis endpoint.

        Values   1 to 4294967295

Output   The following output is an example of multi-chassis endpoint information.

Sample Output

```
*A:Dut-B# show redundancy multi-chassis mc-endpoint statistics
===============================================================================
Multi-Chassis Endpoint Global Statistics
===============================================================================
Packets Rx                                 : 533
Packets Rx Keepalive                       : 522
Packets Rx Config                          : 3
Packets Rx Peer Config                     : 1
Packets Rx State                           : 7
Packets Dropped Keep-Alive Task            : 7
Packets Dropped Too Short                  : 0
Packets Dropped Verify Failed              : 0
Packets Dropped Tlv Invalid Size           : 0
Packets Dropped Out Of Seq                 : 0
Packets Dropped Unknown Tlv                : 0
Packets Dropped Tlv Invalid MC-Endpoint Id : 0
Packets Dropped MD5                        : 0
Packets Dropped Unknown Peer               : 0
Packets Dropped MC Endpoint No Peer        : 0
Packets Tx                                 : 26099
Packets Tx Keepalive                       : 8221
Packets Tx Config                          : 2
Packets Tx Peer Config                     : 17872
Packets Tx State                           : 4
Packets Tx Failed                          : 0
===============================================================================
*A:Dut-B#

*A:Dut-B# show redundancy multi-chassis mc-endpoint peer 10.1.1.3 statistics
===============================================================================
Multi-Chassis MC-Endpoint Statistics
===============================================================================
Peer Addr                       : 10.1.1.3
-------------------------------------------------------------------------------
Packets Rx                      : 597
Packets Rx Keepalive            : 586
Packets Rx Config               : 3
Packets Rx Peer Config          : 1
Packets Rx State                : 7
Packets Dropped State Disabled    : 0
Packets Dropped Packets Too Short : 0
Packets Dropped Tlv Invalid Size  : 0
Packets Dropped Tlv Invalid LagId : 0
Packets Dropped Out of Seq        : 0
```

```
Packets Dropped Unknown Tlv     : 0
Packets Dropped MD5             : 0
Packets Tx                      : 636
Packets Tx Keepalive            : 600
Packets Tx Peer Config          : 30
Packets Tx Failed               : 0
Packets Dropped No Peer         : 0
===============================================================================
*A:Dut-B#

*A:Dut-B# show redundancy multi-chassis mc-endpoint  endpoint 1 statistics
===============================================================================
Multi-Chassis Endpoint Statistics
===============================================================================
===============================================================================
MC-Endpoint Id 1
===============================================================================
Packets Rx Config               : 3
Packets Rx State                : 7
Packets Tx Config               : 2
Packets Tx State                : 4
Packets Tx Failed               : 0
===============================================================================
Number of Entries 1
===============================================================================
```

mc-lag

Syntax	**mc-lag peer** *ip-address* [**lag** *lag-id*] **mc-lag** [**peer** *ip-address* [**lag** *lag-id*]] **statistics**
Context	show>redundancy>multi-chassis
Description	This command displays multi-chassis LAG information.
Parameters	*lag-id* — Shows information for the specified LAG identifier.

    Values   1 to 800

    ip-address — Shows peer information about the specified IP address.

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

    statistics — Displays multi-chassis statistics.

Output	See the following sections for show command output:

- MC-Lag Peer Sample Output

The following output is an example of mc-lag peer information, and Table 60 describes the output fields.

MC-Lag Peer Sample Output

```
A:subscr_mgt# show redundancy multi-chassis mc-lag peer 10.10.10.30
===============================================================================
Multi-Chassis MC-Lag Peer 10.10.10.30
===============================================================================
Last Changed    : 01/23/2007 18:20:13
Admin State     : Up                    Oper State          : Up
KeepAlive       : 10 deci-seconds     Hold On Ngbr Failure : 3
-------------------------------------------------------------------------------
Lag Id Lacp Key Remote Lag Id System Id        Sys Prio Last Changed
-------------------------------------------------------------------------------
1      1        1              00:00:00:00:00:01  1        01/23/2007 18:20:13
2      2        2              00:00:00:00:00:02  2        01/24/2007 08:53:48
-------------------------------------------------------------------------------
Number of LAGs : 2
===============================================================================
A:subscr_mgt#


A:subscr_mgt# show redundancy multi-chassis mc-lag peer 10.10.10.30 lag 1
===============================================================================
Multi-Chassis MC-Lag Peer 10.10.10.30
===============================================================================
Last Changed    : 01/23/2007 18:20:13
Admin State     : Up                    Oper State          : Up
KeepAlive       : 10 deci-seconds     Hold On Ngbr Failure : 3
-------------------------------------------------------------------------------
Lag Id Lacp Key Remote Lag Id System Id        Sys Prio Last Changed
-------------------------------------------------------------------------------
1      1        1              00:00:00:00:00:01  1        01/23/2007 18:20:13
-------------------------------------------------------------------------------
Number of LAGs : 1
===============================================================================
A:subscr_mgt#
```

Table 60   **Redundancy Multi-chassis MC-Lag Peer Field Descriptions**

Label	Description
Last Changed	Displays date and time of the last mc-lag peer.
Admin State	Displays the administrative state of the mc-lag peer.
Oper State	Displays the operation state of the mc-lag peer.
KeepAlive	Displays the length of time to keep alive the 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.

The following output is an example of multi-chassis mc-lag peer statistics information, and Table 61 describes the output fields.

MC-Lag Peer Statistics Sample Output

```
A:subscr_mgt# show redundancy multi-chassis mc-lag statistics
===============================================================================
Multi-Chassis Statistics
===============================================================================
Packets Rx                      : 52535
Packets Rx Keepalive            : 52518
Packets Rx Config               : 2
Packets Rx Peer Config          : 4
Packets Rx State                : 6
Packets Dropped KeepaliveTask   : 0
Packets Dropped Packet Too Short : 0
Packets Dropped Verify Failed   : 0
Packets Dropped Tlv Invalid Size : 0
Packets Dropped Out of Seq      : 0
Packets Dropped Unknown Tlv     : 0
Packets Dropped Tlv Invalid LagId : 0
Packets Dropped MD5             : 0
Packets Dropped Unknown Peer    : 0
Packets Tx                      : 52583
Packets Tx Keepalive            : 52519
Packets Tx Config               : 2
Packets Tx Peer Config          : 54
Packets Tx State                : 8
Packets Tx Failed               : 0
===============================================================================
A:subscr_mgt#

B:Dut-B# show redundancy multi-chassis mc-lag peer 10.10.10.2 statistics
===============================================================================
Multi-Chassis Statistics, Peer 10.10.10.2
===============================================================================
Packets Rx                      : 231
Packets Rx Keepalive            : 216
Packets Rx Config               : 1
Packets Rx Peer Config          : 2
Packets Rx State                : 12
Packets Dropped State Disabled  : 0
Packets Dropped Packets Too Short : 0
Packets Dropped Tlv Invalid Size : 0
Packets Dropped Tlv Invalid LagId : 0
Packets Dropped Out of Seq      : 0
Packets Dropped Unknown Tlv     : 0
Packets Dropped MD5             : 0
Packets Tx                      : 235
Packets Tx Keepalive            : 216
Packets Tx Peer Config          : 3
Packets Tx Failed               : 0
===============================================================================
B:Dut-B#
```

Table 61   **Redundancy Multi-chassis MC-Lag Peer Statistics Field Descriptions**

Label	Description
Packets Rx	Indicates the number of MC-Lag packets received from the peer.
Packets Rx Keepalive	Indicates the number of MC-Lag keepalive packets received from the peer.
Packets Rx Config	Indicates the number of received MC-Lag configured packets from the peer.
Packets Rx Peer Config	Indicates the number of received MC-Lag packets configured by the peer.
Packets Rx State	Indicates the number of MC-Lag "lag" state packets received from the peer.
Packets Dropped State Disabled	Indicates the number of packets that were dropped because the peer was administratively disabled.
Packets Dropped Packets Too Short	Indicates the number of packets that were dropped because the packet was too short.
Packets Dropped Tlv Invalid Size	Indicates the number of packets that were dropped because the packet size was invalid.
Packets Dropped Tlv Invalid LagId	Indicates the number of packets that were dropped because the packet referred to an invalid or non multi-chassis lag.
Packets Dropped Out of Seq	Indicates the number of packets that were dropped because the packet size was out of sequence.
Packets Dropped Unknown Tlv	Indicates the number of packets that were dropped because the packet contained an unknown TLV.
Packets Dropped MD5	Indicates the number of packets that were dropped because the packet failed MD5 authentication.
Packets Tx	Indicates the number of packets transmitted from this system to the peer.
Packets Tx Keepalive	Indicates the number of keepalive packets transmitted from this system to the peer.
Packets Tx Peer Config	Indicates the number of configured packets transmitted from this system to the peer.
Packets Tx Failed	Indicates the number of packets that failed to be transmitted from this system to the peer.

mc-ring

Syntax	**mc-ring peer** *ip-address* **statistics**
	mc-ring peer *ip-address* [**ring** *sync-tag* [**detail** | **statistics**]]
	mc-ring peer *ip-address* **ring** *sync-tag* **ring-node** [*ring-node-name* [**detail** | **statistics**]]
	mc-ring global-statistics

Context show>redundancy>multi-chassis

Description This command displays multi-chassis ring information.

Parameters *ip-address* — Specifies the address of the multi-chassis peer to display.

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

statistics — Displays statistics for the multi-chassis ring.

sync-tag — Specifies a synchronization tag to be displayed that was used while synchronizing this port with the multi-chassis peer. 32 characters maximum.

ring-node-name — Specifies a ring-node name. 32 characters maximum.

global-statistics — Displays global statistics for the multi-chassis ring.

detail — Displays detailed peer information for the multi-chassis ring.

Output See the following sections for show command output:

The following output is an example of ip-address ring information, and Table 62 describes the output fields.

Mc-ring peer IP-address Ring Sample Output

```
*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2 ring ring11 detail
===============================================================================
Multi-Chassis MC-Ring Detailed Information
===============================================================================
Peer          : 10.0.0.2
Sync Tag      : ring11
Port ID       : 1/1/3
Admin State   : inService
Oper State    : connected
Admin Change  : 01/07/2008 21:40:07
Oper Change   : 01/07/2008 21:40:24
Failure Reason : None
-------------------------------------------------------------------------------
In Band Control Path
-------------------------------------------------------------------------------
Service ID    : 10
```

```
Interface Name : to_an1
Oper State     : connected
Dest IP        : 10.10.0.2
Src  IP        : 10.10.0.1
-------------------------------------------------------------------------------
VLAN Map B Path Provisioned
-------------------------------------------------------------------------------
range 13-13
range 17-17
-------------------------------------------------------------------------------
VLAN Map Excluded Path Provisioned
-------------------------------------------------------------------------------
range 18-18
-------------------------------------------------------------------------------
VLAN Map B Path Operational
-------------------------------------------------------------------------------
range 13-13
range 17-17
-------------------------------------------------------------------------------
VLAN Map Excluded Path Operational
-------------------------------------------------------------------------------
range 18-18
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#


*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 192.168.10.104
===============================================================================
MC Ring entries
===============================================================================
Sync Tag                         Oper State     Failure Reason
-------------------------------------------------------------------------------
No. of MC Ring entries: 0
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#


*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2
===============================================================================
MC Ring entries
===============================================================================
Sync Tag                         Oper State     Failure Reason
-------------------------------------------------------------------------------
ring11                           connected      None
ring12                           shutdown       None
-------------------------------------------------------------------------------
No. of MC Ring entries: 4
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#


*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2 ring ring11 ring-
node an1 detail
===============================================================================
Multi-Chassis MC-Ring Node Detailed Information
===============================================================================
Peer          : 10.0.0.2
Sync Tag      : ring11
Node Name     : an1
```

```
Oper State Loc : connected
Oper State Rem : notTested
In Use        : True
Admin Change  : 01/07/2008 21:40:07
Oper Change   : 01/07/2008 21:40:25
Failure Reason : None
-------------------------------------------------------------------------------
Ring Node Connectivity Verification
-------------------------------------------------------------------------------
Admin State   : inService
Service ID    : 11
VLAN Tag      : 11
Dest IP       : 10.11.3.1
Src  IP       : None
Interval      : 1 minutes
Src MAC       : None
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#


*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2 ring ring11 ring-node
===============================================================================
MC Ring Node entries
===============================================================================
Name                            Loc Oper St.     Failure Reason
  In Use                          Rem Oper St.
-------------------------------------------------------------------------------
an1                             connected        None
  Yes                             notTested
an2                             connected        None
  Yes                             notTested
-------------------------------------------------------------------------------
No. of MC Ring Node entries: 2
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#
```

Table 62　　**Mc-ring peer ip-address Ring Field Descriptions**

Label	Description
Sync Tag	Displays the synchronization tag that was used while synchronizing this port with the multi-chassis peer.

Table 62   **Mc-ring peer ip-address Ring Field Descriptions (Continued)**

Label	Description
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.
	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.
Oper state	shutdown — The ring is shutdown.
Failure Reason	Displays the reason of the failure of the operational state of a MC ring.
No. of MC Ring entries	Displays the number of MC ring entries.

The following output is an example of multi-chassis ring peer statistics information, and describes the output fields.

Redundancy Multi-Chassis Ring Peer Statistics Sample Output

```
*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 192.168.10.104 statistics
===============================================================================
MC Ring statistics for peer 192.168.10.104
===============================================================================
Message                                            Received      Transmitted
-------------------------------------------------------------------------------
MCS ID Request                                     0             0
MCS ID Response                                    0             0
Ring Exists Request                                0             0
Ring Exists Response                               0             0
Keepalive                                          0             0
```

```
-------------------------------------------------------------------------------
Total                                                        0              0
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#
```

Table 63   **Redundancy Multi-Chassis Ring Peer Statistics Field Descriptions**

Label	Description
Message	Displays the message type.
Received	Indicates the number of valid MC-ring signaling messages received from the peer.
Transmitted	Indicates the number of valid MC-ring signaling messages transmitted from the peer.
MCS ID Request	Displays the number of valid MCS ID requests were received from the peer.
MCS ID Response	Displays the number of valid MCS ID responses were received from the peer.
Ring Exists Request	Displays the number of valid 'ring exists' requests were received from the peer.
Ring Exists Response	Displays the number of valid ring exists' responses were received from the peer.
Keepalive	Displays the number of valid MC-ring control packets of type 'keepalive' were received from the peer.

The following output is an example of MC-ring information, and Table 64 and Table 65 describe the output fields.

Show mc-ring fields

```
*A:ALA-48>show>redundancy>multi-chassis# mc-ring global-statistics
===============================================================================
Global MC Ring statistics
===============================================================================
Rx                         : 0
Rx Too Short               : 0
Rx Wrong Authentication    : 0
Rx Invalid TLV             : 0
Rx Incomplete              : 0
Rx Unknown Type            : 0
Rx Unknown Peer            : 0
Rx Unknown Ring            : 0
Rx Unknown Ring Node       : 0
Tx                         : 36763
Tx No Buffer               : 0
```

```
Tx Transmission Failed      : 0
Tx Unknown Destination      : 0
Missed Configuration Events : 0
Missed BFD Events           : 0
===============================================================================
*A:ALA-48>show>redundancy>multi-chassis#
```

Table 64   **Mc-ring ring-node Command Field Descriptions**

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.

Table 65   **Mc-ring global-statistics Command Field Descriptions**

Label	Description
Rx	Displays the number of MC-ring signaling packets were received by this system.
Rx Too Short	Displays the number of MC-ring signaling packets were received by this system that were too short.
Rx Wrong Authentication	Displays the number of MC-ring signaling packets were received by this system with invalid authentication.
Rx Invalid TLV	Displays the number of MC-ring signaling packets were received by this system with invalid TLV.
Rx Incomplete	Displays the number of MC-ring signaling packets were received by this system that were incomplete.
Rx Unknown Type	Displays the number of MC-ring signaling packets were received by this system that were of unknown type.

Table 65   **Mc-ring global-statistics Command Field Descriptions**

Label	Description
Rx Unknown Peer	Displays the number of MC-ring signaling packets were received by this system that were related to an unknown peer.
Rx Unknown Ring	Displays the number of MC-ring signaling packets were received by this system that were related to an unknown ring.
Rx Unknown Ring Node	Displays the number of MC-ring signaling packets were received by this system that were related to an unknown ring node.
Tx	Displays the number of MC-ring signaling packets were transmitted by this system.
Tx No Buffer	Displays the number of MC-ring signaling packets could not be transmitted by this system due to a lack of packet buffers.
Tx Transmission Failed	Displays the number of MC-ring signaling packets could not be transmitted by this system due to a transmission failure.
Tx Unknown Destination	Displays the number of MC-ring 'unknown destination' signaling packets were transmitted by this system.
Missed Configuration Events	Displays the number of missed configuration events on this system.
Missed BFD Events	Displays the number of missed BFD events on this system.

sync

Syntax   **sync** [**peer** *ip-address*]
sync peer *ip-address* **detail**
sync [**peer** *ip-address*] **statistics**

Context   show>redundancy>multi-chassis

Description   This command displays synchronization information.

Parameters   *ip-address* — Shows peer information about the specified IP address.

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

detail — Displays detailed peer information.

statistics — Displays peer statistics.

Output   See the following sections for sample output:

The following output is an example of multi-chassis sync information, and Table 66 describes the output fields.

Multi-Chassis Sync Sample Output

```
*A:subscr_mgt_2# show redundancy multi-chassis sync
===============================================================================
Multi-chassis Peer Table
===============================================================================
Peer
-------------------------------------------------------------------------------
Peer IP Address       : 10.10.10.20
Description           : Mc-Lag peer 10.10.10.20
Authentication        : Disabled
Source IP Address     : 0.0.0.0
Admin State           : Enabled
-------------------------------------------------------------------------------
Sync-status
-------------------------------------------------------------------------------
Client Applications   : SUBMGMT
Sync Admin State      : Up
Sync Oper State       : Up
DB Sync State         : inSync
Num Entries           : 1
Lcl Deleted Entries   : 0
Alarm Entries         : 0
Rem Num Entries       : 1
Rem Lcl Deleted Entries : 0
Rem Alarm Entries     : 0
===============================================================================
A:subscr_mgt_2#
```

Table 66   **Redundancy Multi-chassis Sync Field Descriptions**

Label	Description
Peer IP Address	Displays the multi-chassis redundancy peer.
Description	The text string describing the peer.
Authentication	If configured, displays the authentication key used between this node and the multi-chassis peer.

Table 66   **Redundancy Multi-chassis Sync Field Descriptions (Continued)**

Label	Description
Source IP Address	Displays the source address used to communicate with the multi-chassis peer.
Admin State	Displays the administrative state of the peer.
Client Applications	Displays the list of client applications synchronized between SRs.
Sync Admin State	Displays the administrative state of the synchronization.
Sync Oper State	Displays the operation state of the synchronization.
DB Sync State	Displays the database state of the synchronization.
Num Entries	Displays the number of entries on local router.
Lcl Deleted Entries	Displays the number of deleted entries made at the local router.
Alarm Entries	Displays the alarm entries on the local router.
Rem Num Entries	Displays the number of entries on the remote router.
Rem Lcl Deleted Entries	Displays the number of locally deleting entries made by the remote router.
Rem Alarm Entries	Displays alarm entries on the remote router.

The following output is an example of multi-chassis sync peer information, and Table 67 describes the output fields.

Redundancy Multi-Chassis Sync Peer Sample Output

```
*A:subscr_mgt_2# show redundancy multi-chassis sync peer 10.10.10.20
===============================================================================
Multi-chassis Peer Table
===============================================================================
Peer
-------------------------------------------------------------------------------
Peer IP Address        : 10.10.10.20
Description            : Mc-Lag peer 10.10.10.20
Authentication        : Disabled
Source IP Address      : 0.0.0.0
Admin State            : Enabled
-------------------------------------------------------------------------------
Sync-status
-------------------------------------------------------------------------------
Client Applications    : SUBMGMT
Sync Admin State       : Up
Sync Oper State        : Up
DB Sync State          : inSync
Num Entries            : 1
Lcl Deleted Entries    : 0
Alarm Entries          : 0
```

```
                  Rem Num Entries        : 1
                  Rem Lcl Deleted Entries : 0
                  Rem Alarm Entries      : 0
                  ===============================================================================
                  MCS Application Stats
                  ===============================================================================
                  Application            : igmp
                  Num Entries            : 0
                  Lcl Deleted Entries    : 0
                  Alarm Entries          : 0
                  -------------------------------------------------------------------------------
                  Rem Num Entries        : 0
                  Rem Lcl Deleted Entries : 0
                  Rem Alarm Entries      : 0
                  -------------------------------------------------------------------------------
                  Application            : igmpSnooping
                  Num Entries            : 0
                  Lcl Deleted Entries    : 0
                  Alarm Entries          : 0
                  -------------------------------------------------------------------------------
                  Rem Num Entries        : 0
                  Rem Lcl Deleted Entries : 0
                  Rem Alarm Entries      : 0
                  -------------------------------------------------------------------------------
                  Application            : subMgmt
                  Num Entries            : 1
                  Lcl Deleted Entries    : 0
                  Alarm Entries          : 0
                  -------------------------------------------------------------------------------
                  Rem Num Entries        : 1
                  Rem Lcl Deleted Entries : 0
                  Rem Alarm Entries      : 0
                  -------------------------------------------------------------------------------
                  Application            : srrp
                  Num Entries            : 0
                  Lcl Deleted Entries    : 0
                  Alarm Entries          : 0
                  -------------------------------------------------------------------------------
                  Rem Num Entries        : 0
                  Rem Lcl Deleted Entries : 0
                  Rem Alarm Entries      : 0
                  ===============================================================================
                  *A:subscr_mgt_2#
```

Table 67   **Redundancy Multi-chassis Sync Peer Field Descriptions**

Label	Description
Peer IP Address	Displays the multi-chassis redundancy peer.
Description	The text string describing the peer.
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.

Table 67　　**Redundancy Multi-chassis Sync Peer Field Descriptions**

Label	Description
Admin State	Displays the administrative state of the peer.
Client Applications	Displays the list of client applications synchronized between SRs.
Sync Admin State	Displays the administrative state of the synchronization.
Sync Oper State	Displays the operation state of the synchronization.
DB Sync State	Displays the database state of the synchronization.
Num Entries	Displays the number of entries on local router.
Lcl Deleted Entries	Displays the number of deleted entries made at the local router.
Alarm Entries	Displays the alarm entries on the local router.
Rem Num Entries	Displays the number of entries on the remote router.
Rem Lcl Deleted Entries	Displays the number of locally deleting entries made by the remote router.
Rem Alarm Entries	Displays alarm entries on the remote router.

The following output is an example of multi-chassis sync detail information, and Table 68 describes the output fields.

Redundancy Multi-Chassis Sync Peer Detail Sample Output

```
*A:subscr_mgt_2# show redundancy multi-chassis sync peer 10.10.10.20 detail
===============================================================================
Multi-chassis Peer Table
===============================================================================
Peer
-------------------------------------------------------------------------------
Peer IP Address       : 10.10.10.20
Description           : Mc-Lag peer 10.10.10.20
Authentication        : Disabled
Source IP Address     : 0.0.0.0
Admin State           : Enabled
-------------------------------------------------------------------------------
Sync-status
-------------------------------------------------------------------------------
Client Applications   : SUBMGMT
Sync Admin State      : Up
Sync Oper State       : Up
DB Sync State         : inSync
Num Entries           : 1
Lcl Deleted Entries   : 0
Alarm Entries         : 0
Rem Num Entries       : 1
Rem Lcl Deleted Entries : 0
Rem Alarm Entries     : 0
```

```
===============================================================================
MCS Application Stats
===============================================================================
Application            : igmp
Num Entries            : 0
Lcl Deleted Entries    : 0
Alarm Entries          : 0
-------------------------------------------------------------------------------
Rem Num Entries        : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries      : 0
-------------------------------------------------------------------------------
Application            : igmpSnooping
Num Entries            : 0
Lcl Deleted Entries    : 0
Alarm Entries          : 0
-------------------------------------------------------------------------------
Rem Num Entries        : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries      : 0
-------------------------------------------------------------------------------
Application            : subMgmt
Num Entries            : 1
Lcl Deleted Entries    : 0
Alarm Entries          : 0
-------------------------------------------------------------------------------
Rem Num Entries        : 1
Rem Lcl Deleted Entries : 0
Rem Alarm Entries      : 0
-------------------------------------------------------------------------------
Application            : srrp
Num Entries            : 0
Lcl Deleted Entries    : 0
Alarm Entries          : 0
-------------------------------------------------------------------------------
Rem Num Entries        : 0
Rem Lcl Deleted Entries : 0
Rem Alarm Entries      : 0
===============================================================================
Ports synced on peer 10.10.10.20
===============================================================================
Port/Encap                 Tag
-------------------------------------------------------------------------------
lag-1                      test123
===============================================================================
*A:subscr_mgt_2#
```

Table 68   **Redundancy Multi-chassis Sync Peer Detail Field Descriptions**

Label	Description
Peer IP Address	Displays the multi-chassis redundancy peer.
Description	The text string describing the peer.
Authentication	If configured, displays the authentication key used between this node and the multi-chassis peer.

Table 68   **Redundancy Multi-chassis Sync Peer Detail Field Descriptions**

Label	Description (Continued)
Source IP Address	Displays the source address used to communicate with the multi-chassis peer.
Admin State	Displays the administrative state of the peer.
Client Applications	Displays the list of client applications synchronized between routers.
Sync Admin State	Displays the administrative state of the synchronization.
Sync Oper State	Displays the operation state of the synchronization.
DB Sync State	Displays the database state of the synchronization.
Num Entries	Displays the number of entries on local router.
Lcl Deleted Entries	Displays the number of deleted entries made at the local router.
Alarm Entries	Displays the alarm entries on the local router.
Rem Num Entries	Displays the number of entries on the remote router.
Rem Lcl Deleted Entries	Displays the number of locally deleting entries made by the remote router.
Rem Alarm Entries	Displays alarm entries on the remote router.

synchronization

Syntax   **synchronization**

Context   show>redundancy

Description   This command displays redundancy synchronization times.

Output   The following output is an example of redundancy synchronization information.

Sample Output

```
A:ALA-48>show>redundancy# synchronization
===============================================================================
Synchronization Information
===============================================================================
Standby Status             : disabled
Last Standby Failure       : N/A
Standby Up Time            : N/A
Failover Time              : N/A
Failover Reason            : N/A
Boot/Config Sync Mode      : None
Boot/Config Sync Status    : No synchronization
```

```
Last Config File Sync Time   : Never
Last Boot Env Sync Time      : Never
===============================================================================
A:ALA-48>show>redundancy#
```

script-control

Syntax   **script-control**

Context   show>system

Description   This command enables the context to display script information.

script

Syntax   **script** [*script-name*] [**owner** *script-owner*]

Context   show>system>script-control

Description   This command displays script parameters.

Parameters   *script-name* — Displays information for the specified script. 32 characters maximum.

script-owner — Displays information for the specified script owner. 32 characters maximum.

Output   The following output is an example of show script command information, and Table 69 describes the output fields.

Sample Output

```
A:sim1>show>system>script-control# script
===============================================================================
Script Information
===============================================================================
Script                    : test
Owner name                : TiMOS CLI
Description               : asd
Administrative status     : enabled
Operational status        : enabled
Script source location    : ftp://*****:******@192.168.100.1/home/testlab_bgp
                             /test1.cfg
Last script error         : none
Last change               : 2015/01/07 17:10:03
===============================================================================
A:sim1>show>cron#
```

Table 69   **Show Script Output**

Label	Description
Script	Displays the name of the script.
Script owner	Displays the owner name of script.
Administrative status	Enabled — Administrative status is enabled. Disabled — Administratively disabled.
Operational status	Enabled — Operational status is enabled. Disabled — Operationally disabled.
Script source location	Displays the location of scheduled script.
Last script error	Displays the system time of the last error.
Last change	Displays the system time of the last change.

script-policy

Syntax   **script-policy** *script-policy-name* [**owner** *owner-name*]
                 script-policy run-history [*run-state*]

Context   show>system>script-control

Description This command displays script policy information.

Parameters *script-policy-name* — Displays policy information for the specified script. 32 characters maximum.

   owner-name — Displays information for the specified script owner. 32 characters maximum.

   Default   TiMOS CLI

   run-state — Displays information for script policies in the specified state.

   Values   executing, initializing, terminated

Output   The following output is an example of script policy information, and Table 70 describes the output fields.

Sample Output

```
*A:Redundancy# show system script-control script-policy run-history terminated
===============================================================================
Script-policy Run History
===============================================================================
Script policy "test"
```

```
                    Owner "TiMOS CLI"
                    -------------------------------------------------------------------------------
                    Script Run #17
                    -------------------------------------------------------------------------------
                    Start time : 2006/11/06 20:30:09 End time : 2006/11/06 20:35:24
                    Elapsed time : 0d 00:05:15 Lifetime : 0d 00:00:00
                    State : terminated Run exit code : noError
                    Result time : 2006/11/06 20:35:24 Keep history : 0d 00:49:57
                    Error time : never
                    Results file : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-203008.
                    out
                    Run exit : Success
                    -------------------------------------------------------------------------------
                    Script Run #18
                    -------------------------------------------------------------------------------
                    Start time : 2006/11/06 20:35:24 End time : 2006/11/06 20:40:40
                    Elapsed time : 0d 00:05:16 Lifetime : 0d 00:00:00
                    State : terminated Run exit code : noError
                    Result time : 2006/11/06 20:40:40 Keep history : 0d 00:55:13
                    Error time : never
                    Results file : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-203523.
                    out
                    Run exit : Success
                    -------------------------------------------------------------------------------
                    *A:Redundancy#

                    *A:Redundancy# show system script-control script-policy run-history executing
                    ===============================================================================
                    Script-policy Run History
                    ===============================================================================
                    Script policy "test"
                    Owner "TiMOS CLI"
                    -------------------------------------------------------------------------------
                    Script Run #20
                    -------------------------------------------------------------------------------
                    Start time : 2006/11/06 20:46:00 End time : never
                    Elapsed time : 0d 00:00:56 Lifetime : 0d 00:59:04
                    State : executing Run exit code : noError
                    Result time : never Keep history : 0d 01:00:00
                    Error time : never
                    Results file : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-204559.
                    out
                    ===============================================================================
                    *A:Redundancy#

                    *A:Redundancy# show system script-control script-policy run-history initializing
                    ===============================================================================
                    Script-policy Run History
                    ===============================================================================
                    Script policy "test"
                    Owner "TiMOS CLI"
                    -------------------------------------------------------------------------------
                    Script Run #21
                    -------------------------------------------------------------------------------
                    Start time : never End time : never
                    Elapsed time : 0d 00:00:00 Lifetime : 0d 01:00:00
                    State : initializing Run exit code : noError
                    Result time : never Keep history : 0d 01:00:00
                    Error time : never
```

```
Results file : none
-------------------------------------------------------------------------------
Script Run #22
-------------------------------------------------------------------------------
Start time : never End time : never
Elapsed time : 0d 00:00:00 Lifetime : 0d 01:00:00
State : initializing Run exit code : noError
Result time : never Keep history : 0d 01:00:00
Error time : never
Results file : none
-------------------------------------------------------------------------------
Script Run #23
-------------------------------------------------------------------------------
Start time : never End time : never
Elapsed time : 0d 00:00:00 Lifetime : 0d 01:00:00
State : initializing Run exit code : noError
Result time : never Keep history : 0d 01:00:00
Error time : never
Results file : none
===============================================================================
*A:Redundancy#
```

Table 70   **Script Policy Output**

Label	Description
Script policy	Displays the name of the script policy.
Script policy owner	Displays the name of the script policy owner.
Administrative status	Enabled — Administrative status is enabled. Disabled — Administrative status is disabled.
Script	Displays the name of the script.
Script owner	Displays the name of the script owner.
Script source location	Displays the location of scheduled script.
Max running allowed	Displays the maximum number of allowed sessions.
Max completed run histories	Displays the maximum number of sessions previously run.
Max lifetime allowed	Displays the maximum amount of time the script may run.
Completed run histories	Displays the number of completed sessions.
Executing run histories	Displays the number of sessions in the process of executing.

Table 70   **Script Policy Output (Continued)**

Label	Description (Continued)
Initializing run histories	Displays the number of sessions ready to run/queued but not executed.
Max time tun history saved	Displays the maximum amount of time to keep the results from a script run.
Last change	Displays the system time a change was made to the configuration.

uptime

Syntax   **uptime**

Context   show

Description   This command displays the time since the system started.

Output   The following output is an example of uptime information, and Table 71 describes the output field.

Sample Output

```
A:ALA-1# show uptime
System Up Time          : 11 days, 18:32:02.22 (hr:min:sec)

A:ALA-1#
```

Table 71   **Uptime Output**

Label	Description
System Up Time	Displays the length of time the system has been up in days, hr:min:sec format.

switch-fabric

Syntax   **switch-fabric** [**exclude-sfm** *sfm-list*]
                  switch-fabric high-bandwidth-multicast

Context   show>system

Description   This command displays switch fabric information. When an MDA is not provisioned in an XCM, no information will be displayed relating to that MDA. In order to display the forwarding capacity and multicast planes corresponding to that MDA, regardless of whether an XMA is equipped, an **mda-type** must be provisioned for that MDA.

Parameters   *sfm-list* — Specifies which SFMs to exclude from the displayed information.

     Values   "A", "B", "A,B", "1", "2", and "1,2"

    high-bandwidth-multicast — Displays MDA information about the switch-fabric plane's high bandwidth multicast traffic tap allocation.

Output   The following output is an example of switch fabric information for 12-slot and 7-slot chassis models, and Table 72 describes the output fields.

Sample Output

The following is an example for the 7750 SR:

```
A:ALA-7# show system switch-fabric
===============================================================================
Switch Fabric
===============================================================================
Slot/Mda       Min. Forwarding Capacity    Max. Forwarding Capacity
-------------------------------------------------------------------------------
1/1            100%                         100%
1/2            100%                         100%
2/1            100%                         100%
2/2            100%                         100%
3/1            100%                         100%
3/2            100%                         100%
4/1            100%                         100%
4/2            100%                         100%
5/1            100%                         100%
5/2            100%                         100%
A              100%                         100%
B              100%                         100%
===============================================================================
A:ALA-7#

A:ALA-12# show system switch-fabric
```

Table 72   **Switch Fabric Output**

Label	Description
Slot/MDA	Displays the fabric slot within a chassis in the system. The CPM cards and XCM/IOM cards cannot be physically inserted into the switch fabric card slots.
Min. Forwarding Capacity	Displays the minimum forwarding capacity of the slot and XMA/MDA as a percentage.
Max. Forwarding Capacity	Displays the maximum forwarding capacity of the slot and XMA/MDA as a percentage.

sync-if-timing

Syntax	**sync-if-timing** [*cpm-slot*]
Context	show>system
Description	This command displays synchronous interface timing operational information.
Parameters	*cpm-slot* — Specifies the system CPM slot.
	Values standby, A, B
Output	The following output is an example of sync-if-timing information, and Table 73 describes the output fields.

Sample Output

The following system example shows:

- **sync-if timing**, or
- **sync-if-timing** "A" when the SETS reference on the active CPM-A locks to BITS A, or
- **sync-if-timing** "B" when the SETS reference on the active CPM-B locks to BITS A

→ **Note:** The following output applies only to the 7750 SR-1e/2e/3e and 7950 XRS-16/20/40 platforms.

```
*A:Dut-B# show system sync-if-timing or show system sync-if-timing "A"
===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM A               : Master Locked
    Reference Input Mode          : Revertive
    Quality Level Selection       : Disabled
    Reference Selected            : BITS A
    System Quality Level          : prc
    Current Frequency Offset (ppm) : +0
    Input Minimum Quality Level   : st3
    Wait to Restore Timer         : Disabled

Reference Order                   : bits ref1 ref2

Reference Input 1
    Admin Status                  : up
    Rx Quality Level              : prc
    Quality Level Override        : none
    Qualified For Use             : Yes
    Selected For Use              : No
        Not Selected Due To       :      on standby
    Source Port                   : 1/1/5
```

```
Reference Input 2
    Admin Status                    : up
    Rx Quality Level                : prc
    Quality Level Override          : none
    Qualified For Use               : Yes
    Selected For Use                : No
        Not Selected Due To         :      on standby
    Source Port                     : 3/1/5

Reference BITS A
    Input Admin Status              : up
    Rx Quality Level                : prc
    Quality Level Override          : none
    Qualified For Use               : Yes
    Selected For Use                : Yes
    Interface Type                  : E1
    Framing                         : PCM31 CRC
    Line Coding                     : HDB3
    SSM Bit                         : 8
    Output Admin Status             : up
    Output Minimum Quality Level    : st2
    Output Source                   : line reference
    Output Reference Selected       : ref1
    Output Squelch                  : Disabled
    Tx Quality Level                : prc

Reference BITS B
    Input Admin Status              : up
    Rx Quality Level                : prc
    Quality Level Override          : none
    Qualified For Use               : Yes
    Selected For Use                : No
        Not Selected Due To         :      on standby
    Interface Type                  : E1
    Framing                         : PCM31 CRC
    Line Coding                     : HDB3
    SSM Bit                         : 8
    Output Admin Status             : up
    Output Minimum Quality Level    : st2
    Output Source                   : line reference
    Output Reference Selected       : ref1
    Output Squelch                  : Disabled
    Tx Quality Level                : prc
===============================================================================
```

The following system example shows:

- **sync-if timing** standby, or
- **sync-if-timing** "B" when the SETS reference on the standby CPM-B locks to Mate CPM (BITS A), or
- **sync-if-timing** "A" when the SETS reference on the standby CPM-A locks to Mate CPM (BITS A)

Note: The following output applies only to the 7750 SR-1e/2e/3e and 7950 XRS-16/20/40 platforms.

```
-------------------------------------------------------------------------------
*A:Dut-B# show system sync-if-timing standby or show system sync-if-timing "B"
===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM B               : Master Locked
    Reference Input Mode          : Revertive
    Quality Level Selection       : Disabled
    Reference Selected            : Mate CPM (BITS A)
    System Quality Level          : prc
    Current Frequency Offset (ppm) : +0sync-if-timing "A
    Input Minimum Quality Level   : st3
    Wait to Restore Timer         : Disabled

Reference Order                   : bits ref1 ref2

Reference Mate CPM
    Qualified For Use             : Yes
    Selected For Use              : Yes

Reference Input 1
    Admin Status                  : up
    Rx Quality Level              : prc
    Quality Level Override        : none
    Qualified For Use             : Yes
    Selected For Use              : No
        Not Selected Due To       :     on standby
    Source Port                   : 1/1/5

Reference Input 2
    Admin Status                  : up
    Rx Quality Level              : prc
    Quality Level Override        : none
    Qualified For Use             : Yes
    Selected For Use              : No
        Not Selected Due To       :     on standby
    Source Port                   : 3/1/5

Reference BITS A
    Input Admin Status            : up
    Rx Quality Level              : prc
    Quality Level Override        : none
    Qualified For Use             : Yes
    Selected For Use              : No
        Not Selected Due To       :     on standby
    Interface Type                : E1
    Framing                       : PCM31 CRC
    Line Coding                   : HDB3
    SSM Bit                       : 8
    Output Admin Status           : up
    Output Minimum Quality Level  : st2
    Output Source                 : line reference
```

```
     Output Reference Selected    : ref1
     Output Squelch               : Disabled
     Tx Quality Level             : prc

Reference BITS B
     Input Admin Status           : up
     Rx Quality Level             : prc
     Quality Level Override       : none
     Qualified For Use            : Yes
     Selected For Use             : No
         Not Selected Due To      :     on standby
     Interface Type               : E1
     Framing                      : PCM31 CRC
     Line Coding                  : HDB3
     SSM Bit                      : 8
     Output Admin Status          : up
     Output Minimum Quality Level : st2
     Output Source                : line reference
     Output Reference Selected    : ref1
     Output Squelch               : Disabled
     Tx Quality Level             : prc
===============================================================================
```

The following system example shows:

- **sync-if timing**, or
- **sync-if-timing** "A" when the SETS reference on the active CPM-A locks to BITS B, or
- **sync-if-timing** "B" when the SETS reference on the active CPM-B locks to BITS B

→ **Note:** The following output applies only to the 7750 SR-1e/2e/3e and 7950 XRS-16/20/40 platforms.

```
     -------------------------------------------------------------------
*A:Dut-B# show system sync-if-timing or show system sync-if-timing "A"
===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM A              : Master Locked
     Reference Input Mode         : Non-revertive
     Quality Level Selection      : Disabled
     Reference Selected           : BITS B
     System Quality Level         : prc
     Current Frequency Offset (ppm) : +0
     Input Minimum Quality Level  : st3
     Wait to Restore Timer        : Disabled

Reference Order                  : bits ref1 ref2

Reference Input 1
     Admin Status                 : up
     Rx Quality Level             : prc
     Quality Level Override       : none
```

```
            Qualified For Use            : Yes
            Selected For Use             : No
                Not Selected Due To      :     on standby
            Source Port                  : 1/1/5

        Reference Input 2
            Admin Status                 : up
            Rx Quality Level             : prc
            Quality Level Override        : none
            Qualified For Use            : Yes
            Selected For Use             : No
                Not Selected Due To      :     on standby
            Source Port                  : 3/1/5

        Reference BITS A
            Input Admin Status           : up
            Rx Quality Level             : prc
            Quality Level Override        : none
            Qualified For Use            : Yes
            Selected For Use             : No
                Not Selected Due To      :     previous failure
            Interface Type               : E1
            Framing                      : PCM31 CRC
            Line Coding                  : HDB3
            SSM Bit                      : 8
            Output Admin Status          : up
            Output Minimum Quality Level : st2
            Output Source                : line reference
            Output Reference Selected    : ref1
            Output Squelch               : Disabled
            Tx Quality Level             : prc

        Reference BITS B
            Input Admin Status           : up
            Rx Quality Level             : prc
            Quality Level Override        : none
            Qualified For Use            : Yes
            Selected For Use             : Yes
            Interface Type               : E1
            Framing                      : PCM31 CRC
            Line Coding                  : HDB3
            SSM Bit                      : 8
            Output Admin Status          : up
            Output Minimum Quality Level : st2
            Output Source                : line reference
            Output Reference Selected    : ref1
            Output Squelch               : Disabled
            Tx Quality Level             : prc
===============================================================================
```

The following system example shows:

- **sync-if timing** standby, or
- **sync-if-timing** "B" when the SETS reference on the standby CPM-B locks to Mate CPM (BITS B), or
- **sync-if-timing** "A" when the SETS reference on the standby CPM-A locks to Mate CPM (BITS B)

Note: The following output applies only to the 7750 SR-1e/2e/3e and 7950 XRS-16/20/40 platforms.

```
-----------------------------------------------------------------------
*A:Dut-B# show system sync-if-timing standby or show system sync-if-timing "B"
===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CPM B              : Master Locked
    Reference Input Mode         : Non-revertive
    Quality Level Selection      : Disabled
    Reference Selected           : Mate CPM (BITS B)
    System Quality Level         : prc
    Current Frequency Offset (ppm) : +0
    Input Minimum Quality Level  : st3
    Wait to Restore Timer        : Disabled

Reference Order                  : bits ref1 ref2

Reference Mate CPM
    Qualified For Use            : Yes
    Selected For Use             : Yes

Reference Input 1
    Admin Status                 : up
    Rx Quality Level             : prc
    Quality Level Override       : none
    Qualified For Use            : Yes
    Selected For Use             : No
        Not Selected Due To      :     on standby
    Source Port                  : 1/1/5

Reference Input 2
    Admin Status                 : up
    Rx Quality Level             : prc
    Quality Level Override       : none
    Qualified For Use            : Yes
    Selected For Use             : No
        Not Selected Due To      :     on standby
    Source Port                  : 3/1/5

Reference BITS A
    Input Admin Status           : up
    Rx Quality Level             : prc
    Quality Level Override       : none
    Qualified For Use            : Yes
    Selected For Use             : No
        Not Selected Due To      :     previous failure
    Interface Type               : E1
    Framing                      : PCM31 CRC
    Line Coding                  : HDB3
    SSM Bit                      : 8
```

```
    Output Admin Status           : up
    Output Minimum Quality Level  : st2
    Output Source                 : line reference
    Output Reference Selected     : ref1
    Output Squelch                : Disabled
    Tx Quality Level              : prc

Reference BITS B
    Input Admin Status            : up
    Rx Quality Level              : prc
    Quality Level Override        : none
    Qualified For Use             : Yes
    Selected For Use              : No
        Not Selected Due To       :     on standby
    Interface Type                : E1
    Framing                       : PCM31 CRC
    Line Coding                   : HDB3
    SSM Bit                       : 8
    Output Admin Status           : up
    Output Minimum Quality Level  : st2
    Output Source                 : line reference
    Output Reference Selected     : ref1
    Output Squelch                : Disabled
    Tx Quality Level              : prc
===============================================================================
```

Table 73   **System Timing Output**

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 (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.

Table 73   **System Timing Output (Continued)**

Label	Description (Continued)

Reference Selected	Indicates which reference has been selected:
	• ref1, ref2 — (for all chassis)
	• BITS A, BITS B:
	   − 7450 ESS-7/12
	   − 7750 SR-7/12
	   − 7750 SR-12e
	   − 7750 SR-1e/2e/3e
	   − 7750 SR-a4/8
	   − 7950 XRS-16/20
	   − 7950 XRS-40
	• BITS C, BITS D - (7950 XRS-40)

Table 73   **System Timing Output (Continued)**

Label	Description (Continued)

	• Mate CPM (BITS A), Mate CPM (BITS B) — **show>system>sync-if-timing>standby**:
	   − 7450 ESS-7/12
	   − 7750 SR-7/12
	   − 7750 SR-12e
	   − 7750 SR-1e/2e/3e
	   − 7750 SR-a4/8
	   − 7950 XRS-16/20
	   − 7950 XRS-40
	• Mate CPM (BITS A), Mate CPM (BITS B) — **show>system>sync-if-timing**:
	   − 7450 ESS-7/12
	   − 7750 SR-7/12
	   − 7750 SR-12e
	   − 7750 SR-a4/8
	• Mate CPM (none) - **show>system>sync-if-timing>standby** when standby locked to active which is freerun or holdover - (for all chassis)
	• 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
	   − 7450 ESS-7/12
	   − 7750 SR-12e
	   − 7750 SR-1e/2e/3e
	   − 7750 SR-a4/8
	   − 7950 XRS-16/20/40
	• BITS 1, BITS2 - (7750 SR-c4 only)

System Quality Level	Indicates the quality level being generated by the system clock.
Current Frequency Offset	This value indicates the offset that is applied within the central clock to align the local oscillator to the frequency of the selected input reference. The units for this value are parts per million (ppm). This value should not be misinterpreted as an indicator of the frequency accuracy of the output of the central clock. If the central clock is locked to a true Primary Reference Clock or Stratum 1 frequency reference, this value should report a number within the range [-5, +5] ppm.

Table 73   **System Timing Output (Continued)**

Label	Description (Continued)
Input Minimum Quality Level	The configured minimum acceptable QL to consider for use by the central clock.
Wait to Restore Timer	The configured timeout to use for the Wait to Restore timer.
Reference Order	ref1, ref2, bits — Indicates that the priority order of the timing references.
Reference Mate CPM	Data within this block represents the status of the timing reference provided by the Mate CPM. This will be the BITS input from the standby CPM.
Admin Status	down — The **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
Selected for Use	Indicates whether the method is presently selected.

Table 73   **System Timing Output (Continued)**

Label	Description (Continued)
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.
Output Minimum Quality Level	The configured minimum acceptable QL to use for the BITSout signal.
Output Source	The source to be used to provide the signal on the BITS output port. 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, ref2, or PTP).
Output Squelch	Indicates whether the squelch function for BITSout is enabled or disabled.
TX Quality Level	QL value for BITS output signal.

synchronization

Syntax   **synchronization**

Context   show>redundancy>synchronization

Description   This command displays redundancy synchronization times.

Output   The following output is an example of redundancy synchronization information, and Table 74 describes the output fields.

Sample Output

```
A:ALA-1>show>redundancy# synchronization
===============================================================================
Synchronization Information
===============================================================================
Standby Status             : disabled
Last Standby Failure       : N/A
Standby Up Time            : N/A
Failover Time              : N/A
Failover Reason            : N/A
Boot/Config Sync Mode      : None
Boot/Config Sync Status    : No synchronization
Last Config File Sync Time : Never
Last Boot Env Sync Time    : Never
===============================================================================
A:ALA-1>show>redundancy#
```

Table 74   **Synchronization Output**

Label	Description
Standby Status	Displays the status of the standby CPM.
Last Standby Failure	Displays the timestamp of the last standby failure.
Standby Up Time	Displays the length of time the standby CPM has been up.
Failover Time	Displays the timestamp when the last redundancy failover occurred causing a switchover from active to standby CPM. If there is no redundant CPM card in this system or no failover has occurred since the system last booted, the value will be 0.
Failover Reason	Displays a text string giving an explanation of the cause of the last redundancy failover. If no failover has occurred, an empty string displays.
Boot/Config Sync Mode	Displays the type of synchronization operation to perform between the primary and secondary CPMs after a change has been made to the configuration files or the boot environment information contained in the boot options file (BOF).
Boot/Config Sync Status	Displays the results of the last synchronization operation between the primary and secondary CPMs.
Last Config File Sync Time	Displays the timestamp of the last successful synchronization of the configuration files.

Table 74   **Synchronization Output (Continued)**

Label	Description
Last Boot Env Sync Time	Displays the timestamp of the last successful synchronization of the boot environment files.

5.17.2.2   Debug Commands

sync-if-timing

Syntax	**sync-if-timing**
Context	debug
Description	The context to debug synchronous interface timing references.

force-reference

Syntax	**force-reference** {**ref1** | **ref2** | **bits** | **bits1** | **bits2** | **bitsa** | **bitsb** | **ptp**} **no force-reference**
Context	debug>sync-if-timing
Description	This command allows an operator to force the system synchronous timing output to use a specific reference.

The **debug sync-if-timing force-reference** command should only be used to test and debug problems. Network synchronization problems may appear if network elements are left with this manual override setting. Once the system timing reference input has been forced, it may be cleared using the **no force-reference** command.

This command also clears the Wait-to-Restore state of the reference so that the reference can be selected.

The CPM clock can be forced to use a specific input reference using the force-reference command.

When the command is executed, the CPM clock on the active CPM immediately switches its input reference to that specified by the command. If the specified input is not available (shutdown), or in a disqualified state, the CPM clock shall use the next qualified input reference based on the selection rules.

This command also affects the BITS output port on the active CPM. If the BITS output port selection is set to line-reference and the reference being forced is not the BITS input port, then the system uses the forced reference to generate the signal out the BITS output port. If the BITS output port selection is set to internal-clock, then the system uses the output of the CPM clock to generate the signal for the BITS output port.

On a CPM activity switch, the force command is cleared and normal reference selection is determined.

Debug configurations are not saved between reboots.

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** | **bits** | **bits1** | **bits a** | **bits b**}

Parameters

ref1 — Specifies that the clock will use the first timing reference.

ref2 — Specifies that the clock will use the second timing reference.

bits — Specifies that the clock will use the external network interface on the active CPM to be the highest priority input.

bits1 — (7750 SR-c4) Specifies that the clock will use the bits1 timing reference.

bits2 — (7750 SR-c4) Specifies that the clock will use the bits2 timing reference.

bitsa — Specifies that the clock will use the bitsa timing reference.

bitsb — Specifies that the clock will use the bitsb timing reference.

ptp — Specifies that the clock will use the PTP slave as the timing reference (applies to the 7450 ESS and 7750 SR).

system

Syntax   [**no**] **system**

Context   debug

Description   This command displays system debug information.

http-connections

Syntax   **http-connections** [*ip-address/prefix-length*]
http-connections any
http-connections [*ipv6-address/prefix-length*]
no http-connections

Context   debug>system

Description This command displays HTTP connections debug information.

Parameters *ip-address/prefix-length* — Displays information for the specified host IP address and prefix length.

> **Values** ip-address: a.b.c.d
> prefix-length: 0 to 32

any — Specifies that any address can be used.

ipv6-address/prefix-length — Displays information for the specified host IPv6 address and prefix length.

> **Values** ipv6-address:
> - x:x:x:x:x:x:x:x: (eight 16-bit pieces)
> - x:x:x:x:x:x:d.d.d.d
> - x [0 to FFFFF] H
> - d [0 to 255] D
>
> prefix-length: 0 to 128

ntp

Syntax **ntp** [**router** *router-instance*] [**interface** *ip-int-name*]

Context debug>system

Description This command enables and configures debugging for NTP.

The **no** form of the command disables debugging for NTP.

Parameters *router-instance* — Specifies the router name or CPM router instance.

> **Values** *router-name | vprn-svc-id*
> router-name – "Base", "management"
> vprn-svc-id – 1 to 2147483647
>
> **Default** Base

ip-int-name — Specifies the name of the IP interface. The name can be up to 32 characters and must begin with a letter. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

persistence

Syntax **persistence** [*persistence-client*]
no persistence

Context debug>system

Description   This command displays persistence debug information.

Parameters   *persistence-client* — Displays persistence debug information.

Values

ancp	ANCP
application-as	application-assurance
dhcp-server	local DHCP server
nat-fwds	NAT port forwarding
python-policy	Python Cache
submgt	subscriber management

5.17.2.3   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   *ip-address* — Specifies the peer's IP address.

Output   The following output is an example of multi-chassis peer endpoint information.

Sample Output

```
*A:Dut-B# tools dump redundancy multi-chassis mc-endpoint peer 10.1.1.3
MC Endpoint Peer Info
    peer addr                 : 10.1.1.3
    peer name                 : Dut-C
    peer name refs            : 1
    src addr conf             : Yes
    source addr               : 10.1.1.2
    num of mcep               : 1
    num of non-mcep           : 0
    own sess num              : 58ba0d39
    mc admin state            : Up
    tlv own mc admin state    : Up
    tlv peer mc admin state   : Up
    reachable                 : Yes

    own sys priority          : 50
    own sys id                : 00:03:fa:72:c3:c0
    peer sys priority         : 21
    peer sys id               : 00:03:fa:c6:31:f8
    master                    : No

    conf boot timer           : 300
    boot timer active         : No
    conf ka intv              : 10
    conf hold on num of fail  : 3
    tlv own ka intv           : 10
    tlv peer ka intv          : 10
    ka timeout tmr active     : Yes
    ka timeout tmr intvl      : 20
    ka timeout tmr time left  : 4
    peer ka intv              : 10
    mc peer timed out         : No

    initial peer conf rx      : Yes
    peer-mc disabled          : No
    initial peer conf sync    : Yes
    peer conf sync            : Yes

    own passive mode          : Disable
    peer passive mode         : No

    retransmit pending        : No
    non-mcep retransmit pending : No
    retransmit intvl          : 5
    last tx time              : 1437130
    last rx time              : 1437156

    own bfd                   : Enable
    peer bfd                  : Enable
    bfd vrtr if               : 2
    bfd handle                : 1
    bfd state                 : 3
    bfd code                  : 0

*A:Dut-B#
```

mc-ring

Syntax	**mc-ring** **mc-ring peer** *ip-address* [**ring** *sync-tag*]
Context	tools>dump>redundancy>multi-chassis
Description	This command dumps multi-chassis ring information.
Parameters	*ip-address* — Specifies the peer IP address.
	sync-tag — Specifies the ring's synchronization tag created in the **config>redundancy>mc>peer>mcr> ring** context. The tag can be up to 32 characters.

srrp-sync-database

Syntax	**srrp-sync-database** [**instance** *instance-id*] [**peer** *ip-address*]
Context	tools>dump>redundancy>multi-chassis
Description	This command dumps SRRP database information and applies to the 7450 ESS.
Parameters	*ip-address* — Specifies the peer's IP address.

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

instance-id — Dumps information for the specified Subscriber Router Redundancy Protocol instance configured on this system.

> **Values** 1 to 4294967295

sync-database

Syntax	**sync-database** [**peer** *ip-address*] [**port** *port-id* | *lag-id*] [**sdp** *sdp-id*] [**sync-tag** *sync-tag*] [**application** *application*] [**detail**] [**type** *type*]
Context	tools>dump>redundancy>multi-chassis
Description	This command dumps MCS database information.
Parameters	*ip-address* — Specifies the peer's IP address.

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

ipv6-address:

- x:x:x:x:x:x:x:x (eight 16-bit pieces)
- x:x:x:x:x:x:d.d.d.d
- x – [0 to FFFF] H
- d – [0 to 255] D

port-id | lag-id — Indicates the port or LAG ID to be synchronized with the multi-chassis peer.

Values   port-id: *slot*/*mda*/*port*

lag-id: lag-*id*

- lag: keyword
- id: 1 to 800
- pw-id: pw-*id*
- pw: keyword
- id: 1 to 32767

sdp-id — Specifies the SDP identifier.

Values   1 to 32767

sync-tag — Specifies a synchronization tag to be used while synchronizing this port with the multi-chassis peer, up to 32 characters.

application — Specifies a particular multi-chassis peer synchronization protocol application.

Values

dhcp-server:	local dhcp server
igmp:	Internet group management protocol
igmp-snooping:	igmp-snooping
mc-ring	multi-chassis ring
12tp	L2TP
mld	multicast listener discovery
mld-snooping:	multicast listener discovery-snooping
srrp:	simple router redundancy protocol
sub-host-trk:	subscriber host tracking
sub-mgmt-ipoe:	subscriber management for IPoE
sub-mgmt-pppoe	subscriber management for PPPoE
mc-ipsec	multi-chassis IPsec
python	Python cache
diameter-proxy	diameter proxy
pim-snpg-sap	protocol independent multicast snooping for SAP
pim-snpg-sdp	protocol independent multicast snooping for SDP

type — Indicates the locally deleted or alarmed deleted entries in the MCS database per multi-chassis peer.

    Values   alarm-deleted, local-deleted, global-deleted, omcr-standby, omcr-alarmed

detail — Displays detailed information.

src-bmac-lsb

Syntax	**src-bmac-lsb**
Context	tools>dump>redundancy
Description	This command dumps PBB source Backbone MAC address LSB information.

resource-usage

Syntax	**resource-usage**
Context	tools>dump
Description	This command enables the context to display system resource information, such as policers, including data for total, available, and free numbers for each resource.

card

Syntax	**card** [*slot-num*] **card** [*slot-num*] **all**
Context	tools>dump>resource-usage
Description	This command displays resource information for cards.
Parameters	*slot-num* — Specifies a card slot.

    Values   1 to 10

    all — Displays all available information for the card, including resource usage information for all child objects of the card such as FPs and MDAs.

fp

Syntax	**fp** [*fp-number*]
Context	tools>dump>resource-usage>card

Description   This command displays resource information for FPs.

Parameters   *fp-number* — Specifies an FP.

> **Values**   1 to 8

mda

Syntax   **mda** [*mda-slot*]

Context   tools>dump>resource-usage>card

Description   This command displays resource information for MDAs.

Parameters   *mda-slot* — Specifies an MDA slot.

> **Values**   1 to 2

system

Syntax   **system** [**all**]

Context   tools>dump>resource-usage

Description   This command displays resource information for resources that are managed at the system level.

Parameters   **all** — Displays all system resource usage information, as well as resource usage information for all cards, FPs, and MDAs in the system.

system-resources

Syntax   **system-resources** [*slot-number*]

Context   tools>dump

Description   The **system-resources** command has been deprecated and replaced by the **tools**>**dump**>**resource-usage** command. The **system-resources** command continues to be supported, but it is recommended to use the **resource-usage** command instead.

This command displays system resource information.

Parameters   *slot-number* — Specifies a specific slot to view system resources information.

> **Values**   1 to 10

chassis

Syntax **chassis** [*phys-chassis-id*]

Context tools>perform

Description The following command performs chassis maintenance operations.

Parameters *phys-chassis-id* — The identifier of the physical chassis for the tools perform context.

> **Values** 1

check-bp-eprom

Syntax **check-bp-eprom**

Context tools>perform>chassis

Description This command checks the chassis BP EPROM. The function reads the EPROM and is corrected with one of the following:

- for each SEEP that is found to be acceptable or can be corrected:
  "BP eprom X: ok" with X = seep number
- for each SEEP that is found to be unacceptable and cannot be corrected:
  "BP eprom X: not ok"

set-role

Syntax **set-role** {**extension** | **master** | **standalone**}

Context tools>perform>chassis

Description This command sets the role of the 7950 XRS chassis from which the command is invoked.

- When run on a standalone chassis this will update the EEPROM on the (one) Chassis backplane.
- Master and Extension chassis are blocked if any SFMs are configured as type **sfm-x20** (must be **sfm-x20-b**). The following message displays:
- When the **extension** option is specified, the chassis will immediately reboot as part of the command. The following warning and prompt will be provided:

```
WARNING: You are about to provision the chassis as an XRS-40 Extension chassis.
This chassis will immediately reboot after the command is executed. No CLI shell is
available directly on an Extension chassis. An Extension chassis will not completely
 boot up unless it is properly cabled to and controlled by an XRS-40 Master
chassis. Do you wish to proceed (yes/no) ?
```

- When the **master** option is specified, the chassis will immediately reboot as part of the command. The Operational mode is not changed until a reboot is performed. The following warning and prompt will be provided:

```
WARNING: You are about to provision the chassis as an XRS-
40 Master chassis. This chassis will immediately reboot after the command is
execute

Do you wish to proceed (yes/no) ?
```

- When the **master** or **extension** options are specified and the chassis has any SFM slots with a configured type of sfm-x20, then the command will fail with the following message:

```
Configured sfm-type of sfm-x20 is not compatible with XRS-40 mode operation.
```

If you want to change the role of the chassis anyways, you can deconfigure the SFMs and then change the role.

redundancy

Syntax	**redundancy**
Context	tools>perform
Description	This command enables the context to display redundancy information.

forced-single-sfm-overload

Syntax	[**no**] **forced-single-sfm-overload**
Context	tools>perform>redundancy
Description	This command forces the single-sfm-overload state on or off.

issu-post-process

Syntax	**issu-post-process**
Context	tools>perform>redundancy
Description	This command allows requests for new LSPs.

mgmt-ethernet

Syntax	**mgmt-ethernet**

Context	tools>perform>redundancy
Description	This command triggers redundancy mode, just as if the management Ethernet port of the primary CPM has gone down. The router will revert if the management Ethernet port of the primary CPM has been up for the revert duration.

force-uplink-switch

Syntax	**force-uplink-switch** *client-port-id*
Context	tools>perform>satellite
Description	This command forces traffic associated with the specified satellite client port to be switched away from the current uplink depending on which uplink is currently active.
Parameters	*client-port-id* — Specifies the satellite client port associated with the port mapping, in the format **esat**-*id/slot/port* **force**.

mixed-mode-upgrade

Syntax	**mixed-mode-upgrade** [*slot-list*] [**now**]
Context	tools>perform>system
Description	This command initiates the upgrade process to enable mixed-mode in a 7450 ESS-7 or ESS-12.
	Executing this command will (as one action), enable the system state of **mixed-mode** and enable SR capabilities on the IOMs or IMMs located in the slots specified in the slot list. This will result in rebooting of the IOMs and IMMs located in the specified slots.
	If any of the slots contain 7450 ESS IOMs, this command will fail.
	This command can only be used to enable the mixed-mode state. It can not be used to reverse the state.
Parameters	*slot-list* — Specifies a list of slots to be upgraded to 7750 IOM/IMM functionality. This parameter is required to modify the mode in which the IOM/IMMs function and will require a reboot of the IOM/IMMs in the designated slot.
	now — Forces the command to be executed immediately without further question (optional). If this keyword is not present, then the user will be presented with a question to ensure they understand that as a result of this command, the associated slots will be reset immediately to enable mixed mode.

system

Syntax	**system**
Context	tools>perform
Description	This command is a tool for controlling the system.

auto-node-provisioning

Syntax	**auto-node-provisioning**
Context	tools>perform>system
Description	This command initiates auto-provisioning of the node on all ports that are operationally up but do not have an IP address.

bluetooth

Syntax	**bluetooth**
Context	tools>perform>system
Description	This command enters the context for tools commands related to the Bluetooth interface.

module

Syntax	**module** *cpm-slot* **action** {**reboot**	**disconnect**}
Context	tools>perform>system>bluetooth
Description	This command performs reboots or disconnects on the Bluetooth module on the specified CPM.
Parameters	*cpm-slot* — Specifies the CPM slot

> **Values** {A | B | C | D}

reboot — triggers a reboot of the Bluetooth subsystem on the module.

disconnect — forces a disconnect of any active Bluetooth session.

ipv4

Syntax	**ipv4** [**timeout** *seconds*] [**dhcp-client-identifier** {**string** *ascii-string*	**hex** *hex-string*	**serial-number**}] [**reboot-on-success**] [**save-provision-file-destination** *file-url*]

Context   tools>perform>system>auto-node-provisioning

Description   This command initiates the IPv4 auto-provisioning of the node on all the ports that have an operationally up port but no IP address.

Parameters   *seconds* — DHCP request timeout period, before the system tries the next interface. Within this timeout, the DHCP client tries to retransmit the DHCP request with randomized exponential backoff (RFC 2131). This randomized exponential backoff begins at 2 s and goes to 64 s (2,4,8,32,64,64,64,64). After 64 seconds, the system will retry every 64 s.

  Values   1 to 65535 seconds

  Default   10

ascii-string — DHCP client identifier in ASCII format, up to 127 characters long.

hex-string — DHCP client identifier in hexadecimal format, up to 254 hexadecimal nibbles long.

  Values   0x0 to 0xFFFFFFFF

file-url — The file URL as a *local-url.* The local file or folder name should not exceed 99 characters).

local-url	[*cflash-id/*][*file-path*]
cflash-id	cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

sfm-interco-test

Syntax   **sfm-interco-test** [**sfm x**]

Context   tools>perform>system>inter-chassis>

Description   Use this command to run inter-chassis SFM loopback tests for the 7950 XRS.

Run on an out-of-service standalone chassis that will later become the Extension chassis of an XRS-40 system. The out of service chassis (Chassis 1 – future Master chassis) must be connected by means of SFM interconnect links (cable bundles) before this test is run. This test operates without requiring any XCMs in either chassis, but they can be present.

The test should not be initiated from Chassis 1.

The following conditions must be satisfied for the test to be permitted:

  • The system must be in standalone mode; error message:

```
The test can only be performed on a standalone system
```

  • The system must have only XRS-40 compatible SFMs provisioned; error message:

```
The chassis can not have SFMs with a configured type of sfm-x20s-b
```

```
                      when performing the test
```

- All provisioned SFMs must be operational; error message:

```
All provisioned SFMs must be operational before performing the test
```

- The same test cannot be running in another session (i.e. only one test can be executed at a time); error message:

```
    The test is already in-progress in another session
```

Other notes (which are also relayed to the operator when the test is attempted):

- All provisioned XCMs will be reset at the start of the test and will be held in the *booting* state until the test has completed.
- All SFMs will be cleared when the operator exits the test. This will trigger a reset of the XCMs and the standby CPM.

Output   The following output is an example of SFM interconnection test information.

Sample Output

```
*A:Dut-A# tools perform system inter-chassis sfm-interco-test
WARNING: This test is intended for an out-of-service standalone chassis that is
going to later become the extension chassis of an XRS-40 system.

At the start of the test, all provisioned IOMs will be reset and will be held
in the 'booting' state until the test has completed.

While the test is running avoid altering this system or the attached system
(e.g. do not shutdown, clear, or remove the CPMs/SFMs/IOMs and do not issue
CPM switchovers)

Once testing has completed all SFMs in this system will be cleared.

Do you wish to proceed (y/n)? y
Clearing provisioned IOMs ...
Test executing ...
Displaying results

===============================================================================
SFM Interconnect Port Summary
===============================================================================
SFM   SFM            IcPort  IcPort       Module    Degrade   Miscon Info
      Oper State     Num     Oper State   Inserted  State     SFM   IcPort
-------------------------------------------------------------------------------
1     up             1       up           yes       none
1     up             2       up           yes       none
1     up             3       up           yes       none
1     up             4       up           yes       none
1     up             5       up           yes       none
1     up             6       up           yes       none
1     up             7       up           yes       none
1     up             8       up           yes       none
```

```
1    up        9     up        yes    none
1    up        10    up        yes    none
1    up        11    up        yes    none
1    up        12    up        yes    none
1    up        13    up        yes    none
1    up        14    up        yes    none
2    up        1     up        yes    none
2    up        2     up        yes    none
2    up        3     up        yes    none
2    up        4     up        yes    none
2    up        5     up        yes    none
2    up        6     up        yes    none
2    up        7     up        yes    none
2    up        8     up        yes    none
2    up        9     up        yes    none
2    up        10    up        yes    none
2    up        11    up        yes    none
2    up        12    up        yes    none
2    up        13    up        yes    none
2    up        14    up        yes    none
3    up        1     up        yes    none
3    up        2     up        yes    none
3    up        3     up        yes    none
3    up        4     up        yes    none
3    up        5     up        yes    none
3    up        6     up        yes    none
3    up        7     up        yes    none
3    up        8     up        yes    none
3    up        9     up        yes    none
3    up        10    up        yes    none
3    up        11    up        yes    none
3    up        12    up        yes    none
3    up        13    up        yes    none
3    up        14    up        yes    none
4    up        1     up        yes    none
4    up        2     up        yes    none
4    up        3     up        yes    none
4    up        4     up        yes    none
4    up        5     up        yes    none
4    up        6     up        yes    none
4    up        7     up        yes    none
4    up        8     up        yes    none
4    up        9     up        yes    none
4    up        10    up        yes    none
4    up        11    up        yes    none
4    up        12    up        yes    none
4    up        13    up        yes    none
4    up        14    up        yes    none
5    up        1     up        yes    none
5    up        2     up        yes    none
5    up        3     up        yes    none
5    up        4     up        yes    none
5    up        5     up        yes    none
5    up        6     up        yes    none
5    up        7     up        yes    none
5    up        8     up        yes    none
5    up        9     up        yes    none
5    up        10    up        yes    none
5    up        11    up        yes    none
```

```
5      up           12       up            yes       none
5      up           13       up            yes       none
5      up           14       up            yes       none
6      up           1        up            yes       none
6      up           2        up            yes       none
6      up           3        up            yes       none
6      up           4        up            yes       none
6      up           5        up            yes       none
6      up           6        up            yes       none
6      up           7        up            yes       none
6      up           8        up            yes       none
6      up           9        up            yes       none
6      up           10       up            yes       none
6      up           11       up            yes       none
6      up           12       up            yes       none
6      up           13       up            yes       none
6      up           14       up            yes       none
7      up           1        up            yes       none
7      up           2        up            yes       none
7      up           3        up            yes       none
7      up           4        up            yes       none
7      up           5        up            yes       none
7      up           6        up            yes       none
7      up           7        up            yes       none
7      up           8        up            yes       none
7      up           9        up            yes       none
7      up           10       up            yes       none
7      up           11       up            yes       none
7      up           12       up            yes       none
7      up           13       up            yes       none
7      up           14       up            yes       none
8      up           1        up            yes       none
8      up           2        up            yes       none
8      up           3        up            yes       none
8      up           4        up            yes       none
8      up           5        up            yes       none
8      up           6        up            yes       none
8      up           7        up            yes       none
8      up           8        up            yes       none
8      up           9        up            yes       none
8      up           10       up            yes       none
8      up           11       up            yes       none
8      up           12       up            yes       none
8      up           13       up            yes       none
8      up           14       up            yes       none
===============================================================================
```

Correct any mis-cabling and replace any suspected faulty equipment. Press Q to
quit the test or any other key to run the test again. q
Test complete, clearing the SFMs to return them to normal operational state.
Done. Exiting test.

script-control

Syntax   **script-control**

Context   tools>perform>system

Description   This command performs script-control operations.

script-policy

Syntax   **script-policy**

Context   tools>perform>system>script-control

Description   This command performs script-policy operations.

stop

Syntax   **stop** [*script-policy-name*] [**owner** *script-policy-owner*] [**all**]

Context   tools>perform>system>script-control>script-policy

Description   This command stops the execution of scripts.

Parameters   *script-policy-name* — Specifies to only stop scripts with the specified script-policy, up to 32 characters.

script-policy-owner — Specifies to only stop scripts that are associated with script-policies with the specified owner, up to 32 characters.

Default   TiMOS CLI

all — Specifies to stop all running scripts.

set-fabric-speed

Syntax   **set-fabric-speed** *speed*

Context   tools>perform>system

Description   This command sets fabric speed for the 7750 SR-7/12/12e, 7450 ESS-7/12 or 7950 XRS-20/20e. With the introduction of the T3 and T4 generations of fabric switching, this command is necessary to define the mode of operation of the system.

Default   set-fabric-speed fabric-speed-a (for the 7750 SR and 7450 ESS systems)

set-fabric-speed none (for the 7950 XRS systems)

Parameters   *speed* — Specifies the system fabric-speed.

        Values   fabric-speed-a — The 7750 SR-7/12/12e and 7450 ESS-7/12 chassis default is **fabric-speed-a** when initially deployed. The chassis operates as: 100 Gb/s per slot for ESS/SR-7/12 and 200 Gb/s per slot for SR-12e. This permits a mixture of FP2 and FP3-based cards to co-exist.

                fabric-speed-b — Enables the 7750 SR-7/12 and 7450 ESS-7/12 to operate at up to 200 Gb/s, and the 7750 SR-12e to operate up to 400 Gb/s. All cards in the system are required to be T3-based (FP3 IMM, IOM3-XP-C, or newer). The system does not support any FP2-based cards when the chassis is set to **fabric-speed-b**.

                Note: For the 7750 SR-7/12 and 7450 ESS-7/12, the chassis must have a manufacturing date of 2008 or later (**show chassis detail**).

                none — The 7950 XRS-20/20e chassis defaults to none when initially deployed. This permits the operation of FP3-based cards only.

                fabric-speed-c — Enables the 7950 XRS-20/20e to use both FP3-based and FP4-based cards. This speed is mandatory if FP4 cards are used.

snmp

    Syntax   **snmp**

    Context   tools>perform>system

Description   This command displays SNMP information.

walk

    Syntax   **walk** [**start-oid** *start-oid* [*start-oid*]] [**skip-oid** *skip-oid* [*skip-oid*]] [**output** *file-url*] [**syntax** *syntax*]

    Context   tools>perform>system>snmp

Description   This command performs SNMP MIB walk.

Parameters   *start-oid* — Specifies the starting SNMP MIB object identifier for the MIB walk, up to 256 characters, and up to twenty MIB objects can be specified in a single statement.

        Default   1.3

    skip-oid — Specifies the MIB object identifier to be skipped during MIB walk, up to 256 characters, and up to twenty MIB objects can be specified in a single statement.

    file-url — Specifies the URL for the local file.

        Values   file-url: local-url | remote-url

local-url: [cflash-id/] [file-path] 200 characters max, including cflash-id directory length 99 characters max each

remote-url: [{ftp:// | tftp://}login:pswd@remote-locn/] [filepath]

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

ipv4-address: a.b.c.d

ipv6-address:

- x:x:x:x:x:x:x:x [-interface]
- x:x:x:x:x:x:d.d.d.d [-interface]
- x – [0 to FFFFF] H
- d – [0 to 255] D

• interface: 32 characters max, for link local addresses

cflash-id: cf1: | cf1-A: | cf1-B: | cf2: | cf2-A: | cf2-B: | cf3: | cf3-A: | cf3-B:

syntax — Specifies the syntax for the addresses.

Values   hexString, inetAddress

xmpp

Syntax   **xmpp**

Context   tools>perform>system

Description   This command displays XMPP information.

vsd-refresh

Syntax   **vsd-refresh**

Context   tools>perform>system>xmpp

Description   This command performs VSD refresh operations.

cpm-http-redirect

Syntax   **cpm-http-redirect redirect statistics**

Context   tools>dump>system

Description   This command displays system level statistics for all redirected TCP sessions in **optimized-mode**. These include the following:

• Close requests to TCP: TCP layer requested to send a FIN

- Abort requests to TCP: error in the received packet and the TCP layer needs to send a RST
- Data requests to TCP: number of redirects sent to the TCP layer
- Connections deleted: number of connections closed without a successful redirect performed
- HTTP GET parse errors: formatting error in the HTTP request
- HTTP GET process errors: HTTP GET is formatted properly but the redirect still fails. Example: system unable to find a corresponding host
- HTTP Response dropped: communication error; the redirect failed to be sent to the TCP layer

Parameters **redirect statistics** — Specifies system level statistics for all redirected TCP sessions.

Output The following output shows an example:

Sample Output

```
A# tools dump system cpm-http-redirect redirect statistics
===============================================================================
CPM HTTP Redirect statistics
===============================================================================
Close requests to TCP                                     : 2
Abort requests to TCP                                     : 0
Data requests to TCP                                      : 2
Requests rejected - out of memory                         : 0
Connections deleted                                       : 0
HTTP GET parse errors                                     : 0
HTTP GET process errors                                   : 0
HTTP Response dropped                                      : 0
```

cpm-http-redirect

Syntax **cpm-http-redirect redirect summary**

Context tools>dump>system

Description This command displays the summary statistics of **cpm-http-redirect optimized-mode** for the total number of hosts and connections currently in use. This output, can, also, be used to compare the current system utilization with the maximum system scale.

Parameters **redirect summary** — Specifies summary statistics of **cpm-http-redirect optimized-mode** for the total number of host and connections currently in use.

Output The following output shows an example:

Sample Output

```
A# tools dump system cpm-http-redirect summary
===============================================================================
CPM HTTP Redirect summary
```

```
================================================================================
Actual number of hosts                                     : 0
Actual number of connections                               : 0
Number of hosts created in the last second                 : 0
Number of connections created in the last second           : 0
================================================================================
```

cpm-http-redirect

Syntax **cpm-http-redirect tcp sessions**

Context tools>dump>system

Description This command displays the system level TCP session state information of the **cpm-http-redirect optimized-mode** for currently opened sessions. Specifically, the following are displayed:

- New: Syn received and Syn-Ack not sent
- SYN: Syn-Ack sent and waiting for Ack
- ESTABLISHED: Ack received and waiting for data
- FIN: FIN sent and waiting for Fin-Ack
- Delete: Sum of all currently open connections at this time, representing the connections to be deleted
- HTTP Response dropped: communication error; the redirect failed to be sent to the TCP layer

All current sessions are counted both in the state where they belong, such as 'New', 'Syn', 'Established', 'Fin', and in the sum 'Delete' count.

Parameters **tcp** — Specifies system level TCP information of the **cpm-http-redirect** in **optimized-mode**.

sessions — Specifies system level TCP session state information of the **cpm-http-redirect** in **optimized-mode**.

Output The following output shows an example:

Sample Output

```
A# tools dump system cpm-http-redirect tcp sessions
================================================================================
CPM HTTP Redirect TCP session information
================================================================================
TCP sessions in new state                                  : 0
TCP sessions in state SYN                                   : 0
TCP sessions in state ESTABLISHED                           : 0
TCP sessions in state FIN                                   : 0
TCP sessions in delete state                               : 0

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

cpm-http-redirect

Syntax   **cpm-http-redirect tcp settings**

Context   tools>dump>system

Description   This command displays the system level TCP settings of the **cpm-http-redirect optimized-mode.** These settings can be further controlled using **tools perform** commands.

Parameters   **tcp** — Specifies system level TCP information of the **cpm-http-redirect** in **optimized-mode**.

settings — Specifies system level TCP session settings.

Output   The following output shows an example:

Sample Output

```
Dut-A# tools dump system cpm-http-redirect tcp settings
    data-retransmissions 1
    data-timeout 20
    established-timeout 100
    fin-ack-retransmissions 1
    fin-ack-timeout 15
    max-connections 500
    max-connections-per-host 20
    max-hosts 500
    syn-ack-retransmissions 1
    syn-ack-timeout 20
```

cpm-http-redirect

Syntax   **cpm-http-redirect tcp statistics**

Context   tools>dump>system

Description   This command displays the system level TCP statistics of the **cpm-http-redirect optimized-mode** for all sessions.

Parameters   **tcp** — Specifies system level TCP information of the **cpm-http-redirect** in **optimized-mode**.

statistics — Specifies system level TCP statistics of the **cpm-http-redirect optimized-mode** for all sessions.

Output   The following output shows an example:

Sample Output

```
A# tools dump system cpm-http-redirect tcp statistics
===============================================================================
CPM HTTP Redirect TCP statistics (only nonzero values shown)
```

```
================================================================================
Packets forwarded                                       : 25
TCP segments received                                   : 8
Not a TCP segment                                       : 17
Packets offered to redirect                             : 2
SYN received                                            : 2
FIN,ACK received                                        : 2
ACK received                                            : 4
Valid TCP packets received                              : 8
Received packets                                        : 25
Received packets with a connection                      : 8
Connection creations                                    : 2
Connection deletions                                    : 2
SYN processed                                           : 2
SYN,ACK processed                                       : 2
SYN,ACK with data processed                             : 2
FIN,ACK processed                                       : 2
FIN,ACK with wrong sequence number                      : 2
================================================================================
```

5.17.2.4   Clear Commands

application-assurance

Syntax	**application-assurance**
Context	clear
Description	This command clears application assurance commands.

group

Syntax	**group** *aa-group-id* [**:***partition-id*]
Context	clear>application-assurance
Description	This command clears application assurance group data.
Parameters	*aa-group-id* — Specifies a group of ISA MDAs.

    Values   1 to 255

    partition-id — Specifies a partition within a group.

    Values   1 to 65535

statistics

Syntax	**statistics**
Context	clear>application-assurance>group
Description	This command clears application assurance statistics.

status

Syntax	**status**
Context	clear>application-assurance>group
Description	This command clears application assurance system statistics.

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-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.
Parameters	*mcep-id* — Clears information for the specified multi-chassis endpoint ID.
	Values 1 to 4294967295

ip-address — Clears information for the specified peer IP address.

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

     ipv6-address:

       • x:x:x:x:x:x:x:x (eight 16-bit pieces)

       • x:x:x:x:x:x:d.d.d.d

       • x – [0 to FFFF] H

       • d – [0 to 255] D

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 *ip-address* — Clears the specified address of the multi-chassis peer.

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

         ipv6-address:

           • x:x:x:x:x:x:x:x (eight 16-bit pieces)

           • x:x:x:x:x:x:d.d.d.d

           • x – [0 to FFFF] H

           • d – [0 to 255] D

     lag-id — Clears the specified LAG on this system.

     Values 1 to 200

mc-ring

Syntax **mc-ring**

Context clear>redundancy>multi-chassis

Description This command clears multi-chassis ring data.

debounce

Syntax **debounce peer** *ip-address* **ring** *sync-tag*

Context clear>redundancy>multi-chassis

Description This command clears multi-chassis ring operational state debounce history.

Parameters *ip-address* — Clears debounce history for the specified IP address.

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

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.

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

sync-tag — Clears ring statistics for the specified sync tag.

statistics

Syntax **statistics**

Context clear>redundancy>multi-chassis>mc-ring

Description This command clears multi-chassis ring

global

Syntax **global**

Context clear>redundancy>multi-chassis>mc-ring>statistics

Description   This command clears multi-chassis ring global statistics.

peer

Syntax   **peer** *ip-address*

Context   clear>redundancy>multi-chassis>mc-ring>statistics

Description   This command clears multi-chassis ring peer statistics.

Parameters   *ip-address* — Clears ring peer statistics for the specified IP address.

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

ring

Syntax   **ring peer** *ip-address* **ring** *sync-tag*

Context   clear>redundancy>multi-chassis>mc-ring>statistics

Description   This command clears multi-chassis ring statistics.

Parameters   *ip-address* — Clears ring statistics for the specified IP address.

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

sync-tag — Clears ring statistics for the specified sync tag. 32 characters maximum.

ring-node

Syntax   **ring-node peer** *ip-address* **ring** *sync-tag* **node** *ring-node-name*

Context   clear>redundancy>multi-chassis>mc-ring>statistics

Description   This command clears multi-chassis ring statistics.

Parameters   *ip-address* — Clears ring-node peer statistics for the specified IP address.

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

                        ipv6-address:

                        • x:x:x:x:x:x:x:x (eight 16-bit pieces)

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

                        • x – [0 to FFFF] H

                        • d – [0 to 255] D

    sync-tag — Clears ring-node peer statistics for the specified synchronization tag. The tag can be up to 32 characters.

    ring-node-name — Clears ring-node peer statistics for the specified ring node name. The ring node name can be up to 32 characters.

sync-database

Syntax   **sync-database peer** *ip-address* **all application** *application*

        sync-database peer *ip-address* **port** {*port-id* | *lag-id*} [**sync-tag** *sync-tag*] **application** *application*

        sync-database peer *ip-address* **sdp** *sdp-id* [**sync-tag** s*ync-tag*] **application** *application*

        sync-database peer *ip-address* **sync-tag** *sync-tag* **application** *application*

Context   clear>redundancy>multi-chassis

Description   This command clears multi-chassis sync database information.

Parameters   *ip-address* — Clears the specified address of the multi-chassis peer.

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

                        ipv6-address:

                        • x:x:x:x:x:x:x:x (eight 16-bit pieces)

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

                        • x – [0 to FFFF] H

                        • d – [0 to 255] D

    port-id — Clears the specified port ID of the multi-chassis peer.

        Values   *slot*/*mda*/*port*

    lag-id — Clears the specified Link Aggregation Group (LAG) on this system.

        Values   lag-*lag-id*

    all — Clears all ports and synchronization tags.

    sync-tag — Clears the synchronization tag used while synchronizing this port with the multi-chassis peer. The synchronization tag can be up to 32 characters.

sdp-id — Specifies the SDP identifier.

Values   1 to 32767

application — Clears the specified application information that was synchronized with the multi-chassis peer.

Values   The following are values for the 7750 SR and 7950 XRS:

all:	All supported applications
dhcp-server:	local dhcp server
igmp:	internet group management protocol
igmp-snooping:	igmp-snooping
mc-ring:	multi-chassis ring
mld-snooping:	multicast listener discovery-snooping
srrp:	simple router redundancy protocol
sub-host-trk	subscriber host tracking
sub-mgmt:	subscriber management

Values   The following are values for the 7450 ESS:

all	All supported applications
igmp-snooping	igmp-snooping
mc-ring	multi-chassis ring
mld-snooping	multicast listener discovery-snooping
sub-host-trk	subscriber host tracking
sub-mgmt	subscriber management

screen

Syntax   **screen**

Context   clear

Description   This command allows an operator to clear the Telnet or console screen.

system

Syntax   **system**

Context   clear

Description   This command allows an operator to clear system information.

ptp

Syntax	**ptp**
Context	clear>system
Description	This command enables the context to clear Precision Timing Protocol (PTP) information.

inactive-peers

Syntax	**inactive-peers**
Context	clear>system>ptp
Description	This command clears inactive peer information.

peer

Syntax	**peer** *ip-address* [**router** *router-instance*	**service name** *service-name*] **statistics**
Context	clear>system>ptp
Description	This command clears PTP peer information.
Parameters	*ip-address* — Clears information specific to the address of the PTP 1588 peer.

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

router-instance — Clears information that is specific to a virtual router instance. The router instance can be up to 32 characters.

service-name — Clears information that is specific to a service name. The service name can be up to 64 characters.

statistics — Clears statistics information of the specified IP address.

port

Syntax	**port** *port-id* **statistics**
Context	clear>system>ptp
Description	This command clears PTP port information.
Parameters	*port-id* — Clears the specified port ID.

> **Values** *slot*/*mda*/*port*

statistics — Clears statistics information of the specified port ID.

statistics

Syntax	**statistics**
Context	clear>system>ptp
Description	This command clears all PTP statistics.

script-control

Syntax	**script-control**
Context	clear>system
Description	This command enables the context to clear script information.

script-policy

Syntax	**script-policy**
Context	clear>system>script-control
Description	This command enables the context to clear script policy information.

completed

Syntax	**completed** [*script-policy-name*] [**owner** *owner-name*]
Context	clear>system>script-control>script-policy
Description	This command clears completed script run history entries.
Parameters	*script-policy-name* — Specifies to only clear history entries for the specified script-policy. 32 characters maximum.
	owner-name — Specifies to only clear history entries for script-policies with the specified owner. 32 characters maximum.
	Default TiMOS CLI

statistics

Syntax	**statistics**
Context	clear>system
Description	This command clears system specific statistics.

xmpp

Syntax	**xmpp server** *xmpp-server-name*
Context	clear>system>statistics
Description	This command clears XMPP server statistics.
Parameters	*xmpp-server-name* — Specifies the XMPP server, up to 32 characters in length.

sync-if-timing

Syntax	**sync-if-timing** {**ref1**	**ref2**	**bits**}
Context	clear>system
Description	This command allows an operator to individually clear (re-enable) a previously failed reference. As long as the reference is one of the valid options, this command is always executed. An inherent behavior enables the revertive mode which causes a re-evaluation of all available references.
	This command also clears the Wait-to-Restore state of the reference so that it can be selected.
Parameters	**ref1** — Clears the first timing reference.
	ref2 — Clears the second timing reference.
	bits — Clears the bits timing reference.

trace

Syntax	**trace**
Context	clear
Description	This command clears commands for traces.

6 Standards and Protocol Support

Note: The information presented is subject to change without notice.

Nokia assumes no responsibility for inaccuracies contained herein.

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