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About This Guide

This guide describes system concepts and provides configuration explanations and examples to configure 7450 ESS-Series boot option file (BOF), file system and system management functions.

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

Audience

This manual is intended for network administrators who are responsible for configuring the 7450 ESS-Series routers. It is assumed that the network administrators have an understanding of networking principles and configurations. Protocols, standards, and processes described in this manual include the following:

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

The 7450 ESS documentation set is composed of the following books:

- 7450 ESS OS Basic System Configuration Guide
  This guide describes basic system configurations and operations.
- 7450 ESS OS System Management Guide
  This guide describes system security and access configurations as well as event logging and accounting logs.
- 7450 ESS OS Interface Configuration Guide
  This guide describes card, Media Dependent Adapter (MDA), and port provisioning.
- 7450 ESS OS Router Configuration Guide
  This guide describes logical IP routing interfaces and associated attributes such as an IP address, port, link aggregation group (LAG) as well as IP and MAC-based filtering, and VRRP.
- 7450 ESS OS Routing Protocols Guide
  This guide provides an overview of routing concepts and provides configuration examples for RIP, OSPF, IS-IS, and route policies.
- 7450 ESS OS MPLS Guide
  This guide describes how to configure Multiprotocol Label Switching (MPLS) and Label Distribution Protocol (LDP).
- 7450 ESS OS Services Guide
  This guide describes how to configure service parameters such as service distribution points (SDPs), customer information, and user services.
- 7450 ESS OS OAM and Diagnostic Guide
  This guide describes how to configure features such as service mirroring and Operations, Administration and Management (OAM) tools.
- 7450 ESS OS Triple Play Guide
  This guide describes Triple Play services and support provided by the 7450 ESS and presents examples to configure and implement various protocols and services.
- 7450 ESS OS Quality of Service Guide
  This guide describes how to configure Quality of Service (QoS) policy management.
- OS Multi-Service ISA Guide
  This guide describes services provided by integrated service adapters such as Application Assurance, IPSec, ad insertion (ADI) and Network Address Translation (NAT).
Technical Support

If you purchased a service agreement for your 7450 ESS router and related products from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance. If you purchased an Alcatel-Lucent service agreement, contact your welcome center:

Web: http://www1.alcatel-lucent.com/comps/pages/carrier_support.jhtml
In This Chapter

This chapter provides process flow information to configure basic router and system parameters, perform operational functions with directory and file management, and boot option tasks.

Alcatel-Lucent 7450 ESS-Series System Configuration Process

Table 1 lists the tasks necessary to configure boot option files (BOF) and system and file management functions. Each chapter in this book is presented in an overall logical configuration flow. Each section describes a software area and provides CLI syntax and command usage to configure parameters for a functional area. After the hardware installation has been properly completed, proceed with the 7450 ESS-Series router configuration tasks in the following order:

Table 1: Configuration Process

<table>
<thead>
<tr>
<th>Area</th>
<th>Task</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLI Usage</td>
<td>The CLI structure</td>
<td>CLI Usage on page 17</td>
</tr>
<tr>
<td></td>
<td>Basic CLI commands</td>
<td>Basic CLI Commands on page 22</td>
</tr>
<tr>
<td></td>
<td>Configure environment commands</td>
<td>CLI Environment Commands on page 25</td>
</tr>
<tr>
<td></td>
<td>Configure monitor commands</td>
<td>CLI Monitor Commands on page 26</td>
</tr>
<tr>
<td>Operational functions</td>
<td>Directory and file management</td>
<td>File System Management on page 121</td>
</tr>
</tbody>
</table>
### Table 1: Configuration Process

<table>
<thead>
<tr>
<th>Area</th>
<th>Task</th>
<th>Chapter (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boot options</td>
<td>Configure boot option files (BOF)</td>
<td><strong>Boot Options on page 147</strong></td>
</tr>
<tr>
<td>System configuration</td>
<td>Configure system functions, including host name, address, domain name, and time parameters.</td>
<td><strong>System Management on page 195</strong></td>
</tr>
<tr>
<td>Reference</td>
<td>List of IEEE, IETF, and other proprietary entities.</td>
<td><strong>Standards and Protocol Support on page 475</strong></td>
</tr>
</tbody>
</table>
CLI Usage

In This Chapter

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

Topics in this chapter include:

- CLI Structure on page 18
- Navigating in the CLI on page 20
- Basic CLI Commands on page 22
- CLI Environment Commands on page 25
- CLI Monitor Commands on page 26
- Getting Help in the CLI on page 27
- The CLI Command Prompt on page 29
- Displaying Configuration Contexts on page 30
- EXEC Files on page 31
- Entering CLI Commands on page 32
- VI Editor on page 37
Alcatel-Lucent’s ESS-Series Operating System (OS) CLI is a command-driven interface accessible through the console, Telnet and secure shell (SSH). The CLI can be used for configuration and management of 7450 ESS-Series routers.

The 7450 ESS 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 displays the major contexts for router configuration.
Figure 1: Root Operational Root Commands
Navigating in the CLI

The following sections describe additional navigational and syntax information.

- CLI Contexts on page 20
- Basic CLI Commands on page 22
- CLI Environment Commands on page 25
- CLI Monitor Commands on page 26
- Entering Numerical Ranges on page 45

CLI Contexts

Use the CLI to access, configure, and manage Alcatel-Lucent’s ESS-Series 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, you can enter commands at that context level by simply entering the text. It is also possible to include a command in a lower context as long as the command is formatted in the proper command and parameter syntax.

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

Method 1:

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

Method 2:

A:ALA-12>config# service
A:ALA-12>config>service# epipe 6
*A:ALA-12>config>service>epipe# spoke-sdp 2:6
*A:ALA-12>config>service>epipe>spoke-sdp# ingress
*A:ALA-12>config>service>epipe>spoke-sdp>ingress#
The CLI returns an error message when the syntax is incorrect.

*A:ALA-12>config# rooter
Error: Bad command.
Basic CLI Commands

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

Table 2: Console Control Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>&lt;Ctrl-c&gt;</code></td>
<td>Aborts the pending command.</td>
<td>58</td>
</tr>
<tr>
<td><code>&lt;Ctrl-z&gt;</code></td>
<td>Terminates the pending command line and returns to the ROOT context.</td>
<td>58</td>
</tr>
<tr>
<td>back</td>
<td>Navigates the user to the parent context.</td>
<td>58</td>
</tr>
<tr>
<td>clear</td>
<td>Clears statistics for a specified entity or clears and resets the entity.</td>
<td>58</td>
</tr>
<tr>
<td>echo</td>
<td>Echos the text that is typed in. Primary use is to display messages to the screen within an <code>exec</code> file.</td>
<td>59</td>
</tr>
<tr>
<td>exec</td>
<td>Executes the contents of a text file as if they were CLI commands entered at the console.</td>
<td>59</td>
</tr>
<tr>
<td>exit</td>
<td>Returns the user to the previous higher context.</td>
<td>59</td>
</tr>
<tr>
<td>exit all</td>
<td>Returns the user to the ROOT context.</td>
<td>60</td>
</tr>
<tr>
<td>help</td>
<td>Displays help in the CLI.</td>
<td>61</td>
</tr>
<tr>
<td><code>?</code></td>
<td>Displays a list of the most recently entered commands.</td>
<td>62</td>
</tr>
<tr>
<td>history</td>
<td>Displays the running configuration for a configuration context.</td>
<td>63</td>
</tr>
<tr>
<td>info</td>
<td>Terminates the CLI session.</td>
<td>65</td>
</tr>
<tr>
<td>logout</td>
<td>Provides OAM test suite options. See the OAM section of the 7450 ESS OS OAM and Diagnostic Guide.</td>
<td>66</td>
</tr>
<tr>
<td>password</td>
<td>Changes the user CLI login password. The password can only be changed at the ROOT level.</td>
<td>66</td>
</tr>
<tr>
<td>ping</td>
<td>Verifies the reachability of a remote host.</td>
<td>66</td>
</tr>
<tr>
<td>pwc</td>
<td>Displays the present or previous working context of the CLI session.</td>
<td>68</td>
</tr>
</tbody>
</table>
The list of all system global commands is displayed by entering `help globals` in the CLI. For example:

```
*A:ALA-12>config>service# help globals
back            - Go back a level in the command tree  
esleep           - Echo the text that is typed in 
sshecho          - Enable the user to become a system administrator
exec             - Execute a file - use -echo to show the commands and 
exit             - Exit to intermediate mode - use option all to exit to 
help             - Display help
history          - Display configuration for the present node
info             - Log off this system
mrinfo           - Request multicast router information
mstat            - Trace multicast path from a source to a receiver and 
trace            - Display multicast packet rate and loss information
mtrace           - Trace multicast path from a source to a receiver
oam              - OAM Test Suite
ping             - Verify the reachability of a remote host
pwc               - Show the present working context
sleep            - Sleep for specified number of seconds
ssh              - SSH to a host
telnet           - Telnet to a host
traceroute       - Determine the route to a destination address
tree             - Display command tree structure from the context of execution
write            - Write text to another user
*A:ALA-12>config>service#
```

---

**Table 2: Console Control Commands (Continued)**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>sleep</td>
<td>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 <code>exec</code> file.</td>
<td>69</td>
</tr>
<tr>
<td>ssh</td>
<td>Opens a secure shell connection to a host.</td>
<td>69</td>
</tr>
<tr>
<td>telnet</td>
<td>Telnet to a host.</td>
<td>69</td>
</tr>
<tr>
<td>traceroute</td>
<td>Determines the route to a destination address.</td>
<td>70</td>
</tr>
<tr>
<td>tree</td>
<td>Displays a list of all commands at the current level and all sublevels.</td>
<td>71</td>
</tr>
<tr>
<td>write</td>
<td>Sends a console message to a specific user or to all users with active console sessions.</td>
<td>71</td>
</tr>
</tbody>
</table>
Table 3 lists describes command syntax symbols.

**Table 3: Command Syntax Symbols**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A vertical line indicates that one of the parameters within the brackets or braces is required.  tcp-ack {true</td>
</tr>
<tr>
<td>[ ]</td>
<td>Brackets indicate optional parameters. redirects [number seconds]</td>
</tr>
<tr>
<td>&lt; &gt;</td>
<td>Angle brackets indicate that you must enter text based on the parameter inside the brackets. interface &lt;interface-name&gt;</td>
</tr>
<tr>
<td>{ }</td>
<td>Braces indicate that one of the parameters must be selected. default-action {drop</td>
</tr>
<tr>
<td>{{ } }</td>
<td>Braces within square brackets indicates that you must choose one of the optional parameters.  * sdp sdp-id {[gre</td>
</tr>
</tbody>
</table>

**Bold** Commands in bold indicate commands and keywords.

**Italic** Commands in italics indicate command options.
CLI Environment Commands

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

Table 4: CLI Environment Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>alias</td>
<td>Enables the substitution of a command line by an alias.</td>
<td>72</td>
</tr>
<tr>
<td>create</td>
<td>Enables or disables the use of a create parameter check.</td>
<td>72</td>
</tr>
<tr>
<td>more</td>
<td>Configures whether CLI output should be displayed one screen at a time awaiting user input to continue.</td>
<td>72</td>
</tr>
<tr>
<td>reduced-prompt</td>
<td>Configures the maximum number of higher-level CLI context nodes to display by name in the CLI prompt for the current CLI session.</td>
<td>73</td>
</tr>
<tr>
<td>saved-ind-prompt</td>
<td>Saves the indicator in the prompt.</td>
<td>73</td>
</tr>
<tr>
<td>terminal</td>
<td>Configures the terminal screen length for the current CLI session.</td>
<td>74</td>
</tr>
<tr>
<td>time-display</td>
<td>Specifies whether time should be displayed in local time or UTC.</td>
<td>74</td>
</tr>
</tbody>
</table>
CLI Monitor Commands

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

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

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

The CLI monitor command contexts are listed in Table 4.

Table 5: CLI Monitor Command Contexts

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ccag</td>
<td>Enables CCAG port monitoring for traffic statistics.</td>
<td>75</td>
</tr>
<tr>
<td>cpm-filter</td>
<td>Monitor command output for CPM filters.</td>
<td>75</td>
</tr>
<tr>
<td>filter</td>
<td>Enables IP and MAC filter monitoring at a configurable interval until that count is reached.</td>
<td>77</td>
</tr>
<tr>
<td>lag</td>
<td>Enables Link Aggregation Group (LAG) monitoring to display statistics for individual port members and the LAG.</td>
<td>80</td>
</tr>
<tr>
<td>management-access-filter</td>
<td>Enables management access filter monitoring.</td>
<td>81</td>
</tr>
<tr>
<td>port</td>
<td>Enables port traffic monitoring. The specified port(s) statistical information displays at the configured interval until the configured count is reached.</td>
<td>83</td>
</tr>
<tr>
<td>qos</td>
<td>Enables scheduler statistics monitoring per customer multi-service-site or on a per SAP basis.</td>
<td>84</td>
</tr>
<tr>
<td>router</td>
<td>Enables virtual router instance monitoring at a configurable interval until that count is reached.</td>
<td>89</td>
</tr>
<tr>
<td>service</td>
<td>Monitors commands for a particular service.</td>
<td>110</td>
</tr>
</tbody>
</table>
Getting Help in the CLI

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

**Table 6: Online Help Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>help ?</td>
<td>List all commands in the current context.</td>
</tr>
<tr>
<td>string ?</td>
<td>List all commands available in the current context that start with <code>string</code>.</td>
</tr>
<tr>
<td>command ?</td>
<td>Displays the command’s syntax and associated keywords.</td>
</tr>
<tr>
<td>command keyword ?</td>
<td>List the associated arguments for <code>keyword</code> in <code>command</code>.</td>
</tr>
<tr>
<td>string&lt;Tab&gt;</td>
<td>Complete a partial command name (auto-completion) or list available commands that match <code>string</code>.</td>
</tr>
</tbody>
</table>

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

The following example displays a partial list of the **tree** and **tree detail** command output entered at the **config** level.
Getting Help in the CLI

*A:ALA-12>config# tree
configure
  +---card
      |   +---card-type
      |      +---mcm
      |      +---shutdown
      +---mda
      |   +---access
      |       +---egress
      |       |       +---pool
      |       |       |       +---resv-cbs
      |       |       |       +---slope-policy
      |       |       +---ingress
      |       |       |       +---pool
      |       |       |       |       +---resv-cbs
      |       |       |       |       +---slope-policy
      |       |       +---mda-type
      |       |       +---network
      |       |       |       +---egress
      |       |       |       |       +---pool
      |       |       |       |       |       +---resv-cbs
      |       |       |       |       |       +---slope-policy
      |       |       |       +---ingress
      |       |       |       |       +---pool
      |       |       |       |       |       |       +---resv-cbs
      |       |       |       |       |       |       +---slope-policy
      |       |       |       +---mda-type
      |       |       +---network
      |       |       |       +---egress
      |       |       |       |       +---pool
      |       |       |       |       |       +---resv-cbs
      |       |       |       |       |       |       +---slope-policy
      |       |       |       |       +---queue-policy
      |       |       |       +---shutdown
      |       +---shutdown
      +---cron
      |   +---action
      |       +---expire-time
      |       +---lifetime
      |       +---max-completed
      |       +---results
      |       +---script
      |       +---shutdown
      +---schedule
      |   +---day-of-month
      |       +---description
      |       |   +---hour
      |       |       +---script
      |       +---interval
      |       +---minute
      |       +---month
      |       +---script
      |       ...

*A:ALA-12>config# tree detail
configure
  +---card <slot-number>
      |   no card <slot-number>]
      |      +---card-type <card-type>
      |      |   no card-type
      |      +---mda <mda-slot>
      |      |   no mda <mda-slot>
      |      |      +---access
      |      |      |      +---egress
      |      |      |      |      +---pool
      |      |      |      |      |      +---resv-cbs
      |      |      |      |      |      +---slope-policy
      |      |      |      |      +---ingress
      |      |      |      |      |      +---pool
      |      |      |      |      |      |      +---resv-cbs
      |      |      |      |      |      |      +---slope-policy
      |      |      |      +---mda-type
      |      |      |      +---network
      |      |      |      |      +---egress
      |      |      |      |      |      +---pool
      |      |      |      |      |      |      +---resv-cbs
      |      |      |      |      |      |      |      +---slope-policy
      |      |      |      |      |      +---queue-policy
      |      |      |      |      +---shutdown
      |      |      +---shutdown
      +---cron
      |   +---action
      |       +---expire-time
      |       +---lifetime
      |       +---max-completed
      |       +---results
      |       +---script
      |       +---shutdown
      +---schedule
      |   +---day-of-month
      |       +---description
      |       |   +---hour
      |       |       +---script
      |       +---interval
      |       +---minute
      |       +---month
      |       +---script
      |       ...

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The CLI Command Prompt

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

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

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

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

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

When changes are made to the configuration file a “*” appears in the prompt string (**A:ALA-1**) indicating that the changes have not been saved. When an admin save command is executed the “*” disappears. This behavior is controlled in the **saved-ind-prompt** command in the **environment** context.
The `info` and `info detail` commands display configuration for the current level. The `info` command displays non-default configurations. The `info detail` command displays the entire configuration for the current level, including defaults. The following example shows the output that displays using the `info` command and the output that displays using the `info detail` command.

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

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

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

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

The `echo` command can be used within an `exec` command file to display messages on screen while the file executes.
Entering CLI Commands

Command Completion

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

System commands are available in all CLI context levels.

Unordered Parameters

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

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

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

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

**Table 7: Command Editing Keystrokes**

<table>
<thead>
<tr>
<th>Editing Action</th>
<th>Keystrokes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delete current character</td>
<td>&lt;Ctrl-d&gt;</td>
</tr>
<tr>
<td>Delete text up to cursor</td>
<td>&lt;Ctrl-u&gt;</td>
</tr>
<tr>
<td>Delete text after cursor</td>
<td>&lt;Ctrl-k&gt;</td>
</tr>
<tr>
<td>Move to beginning of line</td>
<td>&lt;Ctrl-a&gt;</td>
</tr>
<tr>
<td>Move to end of line</td>
<td>&lt;Ctrl-e&gt;</td>
</tr>
<tr>
<td>Get prior command from history</td>
<td>&lt;Ctrl-p&gt;</td>
</tr>
<tr>
<td>Get next command from history</td>
<td>&lt;Ctrl-n&gt;</td>
</tr>
<tr>
<td>Move cursor left</td>
<td>&lt;Ctrl-b&gt;</td>
</tr>
<tr>
<td>Move cursor right</td>
<td>&lt;Ctrl-f&gt;</td>
</tr>
<tr>
<td>Move back one word</td>
<td>&lt;Esc&gt;&lt;b&gt;</td>
</tr>
<tr>
<td>Move forward one word</td>
<td>&lt;Esc&gt;&lt;f&gt;</td>
</tr>
<tr>
<td>Convert rest of word to uppercase</td>
<td>&lt;Esc&gt;&lt;c&gt;</td>
</tr>
<tr>
<td>Convert rest of word to lowercase</td>
<td>&lt;Esc&gt;&lt;l&gt;</td>
</tr>
<tr>
<td>Delete remainder of word</td>
<td>&lt;Esc&gt;&lt;d&gt;</td>
</tr>
<tr>
<td>Delete word up to cursor</td>
<td>&lt;Ctrl-w&gt;</td>
</tr>
<tr>
<td>Transpose current and previous character</td>
<td>&lt;Ctrl-t&gt;</td>
</tr>
<tr>
<td>Enter command and return to root prompt</td>
<td>&lt;Ctrl-z&gt;</td>
</tr>
<tr>
<td>Refresh input line</td>
<td>&lt;Ctrl-l&gt;</td>
</tr>
</tbody>
</table>
Absolute Paths

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

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

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

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

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

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

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

behave the same as the following series of commands.

**Example:** config>service>ies>exit all
clear card 1
configure service ies 4 (returns you to your starting point)
config>service>ies
If the command takes you to a different context, the following occurs:

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

becomes

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

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

*A:ALA-1# history
1 environment terminal length 48
2 environment no create
3 show version
4 configure port 1/1/1
5 info
6 \configure router isis
7 \port 1/1/1
8 con port 1/1/1
9 \con port 1/1/1
10 \configure router bgp
11 info
12 \configure system login-control
13 info
14 history
15 show version
16 history
*A:ALA-1# :
A:cses-E11# show version
TiMOS-B-0.0.I2838 both/i386 ALCATEL SR 7750 Copyright (c) 2000-2011 Alcatel-Lucent. All rights reserved. All use subject to applicable license agreements.
Built on Mon Jan 10 18:33:16 PST 2011 by builder in /rel0.0/I2838/panos/main
A:cses-E11#
A:ALA-42# show version
TiMOS-B-0.0.I2016 both/i386 ALCATEL ESS 7450 Copyright (c) 2000-2008 Alcatel-Lucent. 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#
Note that “vi”ual editor (vi) is a file editor that can edit any ASCII file. This includes configuration, exec files, BOF and any other ASCII file on the system.

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

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

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

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

Summary of vi Commands

The vi editor operates in two modes:

- Command mode — This mode causes actions to be taken on the file.
  
  In the this mode, each character entered is a command that does something to the text file being edited; a character typed in the command mode may even cause the vi editor to enter the insert mode.

- Insert mode — Entered text is inserted into the file.
  
  In the insert mode, every character typed is added to the text in the file. Hitting the Esc (Escape) key turns off the insert mode.
Using the vi Commands

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

- Cutting and Pasting/Deleting Text in vi on page 38
- Inserting New Text on page 39
- Moving the Cursor Within the File on page 39
- Moving the Cursor Around the Screen on page 41
- Replacing Text on page 41
- Searching for Text or Characters on page 42
- Manipulating Character/Line Formatting on page 43
- Saving and Quitting on page 43
- Miscellaneous on page 43

Table 8: Cutting and Pasting/Deleting Text in vi

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;</td>
<td>Specify a buffer to be used any of the commands using buffers. Follow the &quot; character with a letter or a number, which corresponds to a buffer.</td>
</tr>
<tr>
<td>d</td>
<td>Deletes text. “dd” deletes the current line. A count deletes that many lines. Whatever is deleted is placed into the buffer specified with the &quot; command. If no buffer is specified, then the general buffer is used.</td>
</tr>
<tr>
<td>D</td>
<td>Delete to the end of the line from the current cursor position.</td>
</tr>
<tr>
<td>p</td>
<td>Paste the specified buffer after the current cursor position or line. If no buffer is specified (with the &quot; command.) then 'p' uses the general buffer.</td>
</tr>
<tr>
<td>P</td>
<td>Paste the specified buffer before the current cursor position or line. If no buffer is specified (with the &quot; command.) then P uses the general buffer.</td>
</tr>
<tr>
<td>x</td>
<td>Delete character under the cursor. A count tells how many characters to delete. The characters will be deleted after the cursor.</td>
</tr>
<tr>
<td>X</td>
<td>Delete the character before the cursor.</td>
</tr>
<tr>
<td>y</td>
<td>Yank text, putting the result into a buffer. yy yanks the current line. Entering a number yanks that many lines. The buffer can be specified with the &quot; command. If no buffer is specified, then the general buffer is used.</td>
</tr>
</tbody>
</table>
Table 8: Cutting and Pasting/Deleting Text in vi (Continued)

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Yank the current line into the specified buffer. If no buffer is specified, then the general buffer is used.</td>
</tr>
</tbody>
</table>

Table 9: Inserting New Text

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Append at the end of the current line.</td>
</tr>
<tr>
<td>I</td>
<td>Insert from the beginning of a line.</td>
</tr>
<tr>
<td>O</td>
<td>Enter insert mode in a new line above the current cursor position.</td>
</tr>
<tr>
<td>a</td>
<td>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.</td>
</tr>
<tr>
<td>i</td>
<td>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.</td>
</tr>
<tr>
<td>o</td>
<td>Enter insert mode in a new line below the current cursor position.</td>
</tr>
</tbody>
</table>

Table 10: Moving the Cursor Within the File

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>^B</td>
<td>Scroll backwards one page. A count scrolls that many pages.</td>
</tr>
<tr>
<td>^D</td>
<td>Scroll forwards half a window. A count scrolls that many lines.</td>
</tr>
<tr>
<td>^F</td>
<td>Scroll forwards one page. A count scrolls that many pages.</td>
</tr>
<tr>
<td>^H</td>
<td>Move the cursor one space to the left. A count moves that many spaces.</td>
</tr>
<tr>
<td>^J</td>
<td>Move the cursor down one line in the same column. A count moves that many lines down.</td>
</tr>
<tr>
<td>^M</td>
<td>Move to the first character on the next line.</td>
</tr>
<tr>
<td>^N</td>
<td>Move the cursor down one line in the same column. A count moves that many lines down.</td>
</tr>
<tr>
<td>^P</td>
<td>Move the cursor up one line in the same column. A count moves that many lines up.</td>
</tr>
<tr>
<td>^U</td>
<td>Scroll backwards half a window. A count scrolls that many lines.</td>
</tr>
</tbody>
</table>
**Table 10: Moving the Cursor Within the File**

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>Move the cursor to the end of the current line. A count moves to the end of the following lines.</td>
</tr>
<tr>
<td>%</td>
<td>Move the cursor to the matching parenthesis or brace.</td>
</tr>
<tr>
<td>^</td>
<td>Move the cursor to the first non-whitespace character.</td>
</tr>
<tr>
<td>(</td>
<td>Move the cursor to the beginning of a sentence.</td>
</tr>
<tr>
<td>)</td>
<td>Move the cursor to the beginning of the next sentence.</td>
</tr>
<tr>
<td>{</td>
<td>Move the cursor to the preceding paragraph.</td>
</tr>
<tr>
<td>}</td>
<td>Move the cursor to the next paragraph.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>+</td>
<td>Move the cursor to the first non-whitespace character in the next line.</td>
</tr>
<tr>
<td>-</td>
<td>Move the cursor to the first non-whitespace character in the previous line.</td>
</tr>
<tr>
<td>_</td>
<td>Move the cursor to the first non-whitespace character in the current line.</td>
</tr>
<tr>
<td>0</td>
<td>Move the cursor to the first column of the current line.</td>
</tr>
<tr>
<td>B</td>
<td>Move the cursor back one word, skipping over punctuation.</td>
</tr>
<tr>
<td>E</td>
<td>Move forward to the end of a word, skipping over punctuation.</td>
</tr>
<tr>
<td>G</td>
<td>Go to the line number specified as the count. If no count is given, then go to the end of the file.</td>
</tr>
<tr>
<td>H</td>
<td>Move the cursor to the first non-whitespace character on the top of the screen.</td>
</tr>
<tr>
<td>L</td>
<td>Move the cursor to the first non-whitespace character on the bottom of the screen.</td>
</tr>
<tr>
<td>M</td>
<td>Move the cursor to the first non-whitespace character on the middle of the screen.</td>
</tr>
<tr>
<td>W</td>
<td>Move forward to the beginning of a word, skipping over punctuation.</td>
</tr>
<tr>
<td>b</td>
<td>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.</td>
</tr>
<tr>
<td>e</td>
<td>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.</td>
</tr>
<tr>
<td>h</td>
<td>Move the cursor to the left one character position.</td>
</tr>
</tbody>
</table>
### Table 10: Moving the Cursor Within the File

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>j</td>
<td>Move the cursor down one line.</td>
</tr>
<tr>
<td>k</td>
<td>Move the cursor up one line.</td>
</tr>
<tr>
<td>l</td>
<td>Move the cursor to the right one character position.</td>
</tr>
<tr>
<td>w</td>
<td>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.</td>
</tr>
</tbody>
</table>

### Table 11: Moving the Cursor Around the Screen

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>^E</td>
<td>Scroll forwards one line. A count scrolls that many lines.</td>
</tr>
<tr>
<td>^Y</td>
<td>Scroll backwards one line. A count scrolls that many lines.</td>
</tr>
<tr>
<td>z</td>
<td>Redraw the screen with the following options. ( z&lt;\text{return}&gt; ) 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.</td>
</tr>
</tbody>
</table>

### Table 12: Replacing Text

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Change to the end of the line from the current cursor position.</td>
</tr>
<tr>
<td>R</td>
<td>Replace characters on the screen with a set of characters entered, ending with the Escape key.</td>
</tr>
<tr>
<td>S</td>
<td>Change an entire line.</td>
</tr>
<tr>
<td>c</td>
<td>Change until ( . ). ( cc ) changes the current line. A count changes that many lines.</td>
</tr>
<tr>
<td>r</td>
<td>Replace one character under the cursor. Specify a count to replace a number of characters.</td>
</tr>
<tr>
<td>s</td>
<td>Substitute one character under the cursor, and go into insert mode. Specify a count to substitute a number of characters. A dollar sign ($) will be put at the last character to be substituted.</td>
</tr>
</tbody>
</table>
## Table 13: Searching for Text or Characters

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>,</td>
<td>Repeat the last f, F, t or T command in the reverse direction.</td>
</tr>
</tbody>
</table>
| /           | 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's found. |
### Table 14: Manipulating Character/Line Formatting

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>~</td>
<td>Switch the case of the character under the cursor.</td>
</tr>
<tr>
<td>&lt;</td>
<td>Shift the lines up to where to the left by one shiftwidth. $&lt;$ shifts the</td>
</tr>
<tr>
<td></td>
<td>current line to the left, and can be specified with a count.</td>
</tr>
<tr>
<td>&gt;</td>
<td>Shift the lines up to where to the right by one shiftwidth. $&gt;&gt;$ shifts the</td>
</tr>
<tr>
<td></td>
<td>current line to the right, and can be specified with a count.</td>
</tr>
<tr>
<td>J</td>
<td>Join the current line with the next one. A count joins that many lines.</td>
</tr>
</tbody>
</table>

### Table 15: Saving and Quitting

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZZ</td>
<td>Exit the editor, saving if any</td>
</tr>
<tr>
<td></td>
<td>changes were made.</td>
</tr>
</tbody>
</table>

### Table 16: Miscellaneous

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

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

Table 17: EX commands

<table>
<thead>
<tr>
<th>vi Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>:ab string strings</td>
<td>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.</td>
</tr>
<tr>
<td>:map keys new_seq</td>
<td>Mapping. This lets you map a key or a sequence of keys to another key or a sequence of keys.</td>
</tr>
<tr>
<td>:q</td>
<td>Quit vi. If there have been changes made, the editor will issue a warning message.</td>
</tr>
<tr>
<td>:q!</td>
<td>Quit vi without saving changes.</td>
</tr>
<tr>
<td>:s/pattern/to_pattern/options</td>
<td>Substitute. This substitutes the specified pattern with the string in the to_pattern. Without options, it only substitutes the first occurrence of the pattern. If a 'g' is specified, then all occurrences are substituted. For example, the command :1,$s/Alcatel/Alcatel-Lucent/g substitutes all occurrences of Alcatel to Alcatel-Lucent.</td>
</tr>
<tr>
<td>:set [all]</td>
<td>Sets some customizing options to vi and EX. The :set all command gives all the possible options.</td>
</tr>
<tr>
<td>:una string</td>
<td>Removes the abbreviation previously defined by :ab.</td>
</tr>
<tr>
<td>: unm keys</td>
<td>Removes the remove mapping defined by :map.</td>
</tr>
<tr>
<td>:vi filename</td>
<td>Starts editing a new file. If changes have not been saved, the editor will give you a warning.</td>
</tr>
<tr>
<td>:w</td>
<td>Write out the current file.</td>
</tr>
<tr>
<td>:w filename</td>
<td>Write the buffer to the filename specified.</td>
</tr>
<tr>
<td>:w &gt;&gt; filename</td>
<td>Append the contents of the buffer to the filename.</td>
</tr>
<tr>
<td>:wq</td>
<td>Write the buffer and quit.</td>
</tr>
</tbody>
</table>
Entering Numerical Ranges

The 7450 ESS OS CLI allows the use of a single numerical range as an argument in the command line. A range in a CLI command is limited to positive integers and is denoted with two numbers enclosed in square brackets with two periods (“..”) between the numbers:

\[ [x..y] \]

where \( x \) and \( y \) are positive integers and \( y-x \) is less than 1000.

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

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

\(<\text{Ctrl-C}>\) can be used to abort the execution of a range command.

Specifying a range in the CLI does have limitations. These limitations are summarized in Table 18.

<table>
<thead>
<tr>
<th>Limitation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only a single range can be specified.</td>
<td>It is not possible to shut down ports 1 through 10 on MDA 1 and MDA 2, as the command would look like <code>configure port 1/[1..2]/[1..10]</code> and requires two ranges in the command, [1..2] for the MDA and [1..10] for the port number.</td>
</tr>
<tr>
<td>Ranges within quotation marks are interpreted literally.</td>
<td>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, <code>configure router interface &quot;A[1..10]&quot; no shutdown</code> creates a single router interface with the name “A[1..10]”. However, a command such as: <code>configure router interface A[1..10] no shutdown</code> creates 10 interfaces with names A1, A2 .. A10.</td>
</tr>
</tbody>
</table>
The range cannot cause a change in contexts. Commands should be formed in such a way that there is no context change upon command completion. For example, `configure port 1/1/[1..10]` will attempt to change ten different contexts. When a range is specified in the CLI, the commands are executed in a loop. On the first loop execution, the command changes contexts, but the new context is no longer valid for the second iteration of the range loop. A “Bad Command” error is reported and the command aborts.

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

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

The 7450 ESS OS supports the pipe feature to search one or more files for a given character string or pattern.

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

- Task: Capture all the lines that include “echo” and redirect the output to a file on the compact flash:
  
  ```
  admin display-config | match “echo” > cf3cfl:\echo_list.txt
  ```

- Task: Display all the lines that do not include “echo”:
  
  ```
  admin display-config | match invert-match “echo”
  ```

- Task: Display the first match of “vpls” in the configuration file:
  
  ```
  admin display-config | match max-count 1 “vpls”
  ```

- Task: Display everything in the configuration after finding the first instance of “interface”:
  
  ```
  admin display-config | match post-lines 999999 interface
  ```

Command syntax:

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

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

where:

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

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

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

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

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

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

*A:Dut# show log event-control | match ignore-case pre-lines 10 SyncStatus
L  2016 tmnxLogOnlyEventThrottled MA gen  0   0
MCPATH:
  2001 tmnxMcPathSrcGrpBlkHole MI gen  0   0
  2002 tmnxMcPathSrcGrpBlkHoleClear MI gen  0   0
  2003 tmnxMcPathAvailBwLimitReached MI gen  0   0
  2004 tmnxMcPathAvailBwValWithinRange MI gen  0   0
MC_REDUndANCY:
  2001 tmnxMcRedundancyPeerStateChanged WA gen  0   0
  2002 tmnxMcRedundancyMismatchDetected WA gen  0   0
  2003 tmnxMcRedundancyMismatchResolved WA gen  0   0
  2004 tmnxMcPeerSyncStatusChanged WA gen  0   0
Table 19 describes regular expression symbols and interpretation (similar to what is used for route policy regexp matching). Table 20 describes special characters.

Table 19: Regular Expression Symbols

<table>
<thead>
<tr>
<th>String</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.</td>
<td>Matches any single character.</td>
</tr>
<tr>
<td>[ ]</td>
<td>Matches a single character that is contained within the brackets.</td>
</tr>
<tr>
<td>[abc]</td>
<td>matches “a”, “b”, or “c”. [a-z] matches any lowercase letter.</td>
</tr>
<tr>
<td>[0-9]</td>
<td>matches any number.</td>
</tr>
<tr>
<td>[^ ]</td>
<td>Matches a single character that is not contained within the brackets.</td>
</tr>
<tr>
<td>[^abc]</td>
<td>matches any character other than “a”, “b”, or “c”.</td>
</tr>
<tr>
<td>[^a-z]</td>
<td>matches any single character that is not a lowercase letter.</td>
</tr>
<tr>
<td>^</td>
<td>Matches the start of the line (or any line, when applied in multiline mode)</td>
</tr>
<tr>
<td>$</td>
<td>Matches the end of the line (or any line, when applied in multiline mode)</td>
</tr>
<tr>
<td>( )</td>
<td>Define a “marked subexpression”. Every matched instance will be available to the next command as a variable.</td>
</tr>
<tr>
<td>*</td>
<td>A single character expression followed by “*” matches zero or more copies of the expression.</td>
</tr>
<tr>
<td>{m, n}</td>
<td>Matches least m and at most n repetitions of the term</td>
</tr>
<tr>
<td>{m}</td>
<td>Matches exactly m repetitions of the term</td>
</tr>
<tr>
<td>{m, }</td>
<td>Matches m or more repetitions of the term</td>
</tr>
<tr>
<td>?</td>
<td>The preceding item is optional and matched at most once.</td>
</tr>
<tr>
<td>+</td>
<td>The preceding item is matched one or more times.</td>
</tr>
<tr>
<td>-</td>
<td>Used between start and end of a range.</td>
</tr>
<tr>
<td>\</td>
<td>An escape character to indicate that the following character is a match criteria and not a grouping delimiter.</td>
</tr>
<tr>
<td>&gt;</td>
<td>Redirect output</td>
</tr>
</tbody>
</table>
### Table 20: Special Characters

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

The 7450 ESS 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).

'ping <customer_ip> > cf3cfl:/ping/result.txt'
'ping <customer_ip> > ftp://ron@ftp.alcatel.com/ping/result.txt'

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

ping 10.0.0.1 | match expression "time.\d+" > cf3cfl:/ping/time.txt

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

Command Hierarchies

- Basic CLI Commands
- Environment Commands
- Monitor Commands

Basic CLI Commands

- back
- clear
- echo [text-to-echo] [extra-text-to-echo] [more-text]
- enable-admin
- exec [-echo] [-syntax] filename
- exit [all]
- help
- history
- info [detail]
- logout
- password
- ping {ip-address | dns-name} [rapid | detail] [ttl time-to-live] [tos type-of-service] [size bytes] [pattern pattern] [source ip-address] [interval seconds] [{next-hop ip-address} | {interface interface-name} | bypass-routing] [count requests] [do-not-fragment] [router [router-instance]][timeout timeout]
- pwc [previous]
- sleep [seconds]
- ssh [ip-addr | dns-name |username@ip-addr] [-4 username] [-v SSH-version] [router router-instance] [service-name service-name]
- telnet {ip-address} [dns-name] [port] [router router-instance]
- traceroute {ip-address} [dns-name] [ttl value] [wait milliseconds] [no-dns] [source ip-address] [tos type-of-service]
- tree [detail]
- write {user | broadcast} message-string
Monitor Commands

- **cag cag-id [path a | b] [type {sap-sap | sap-net | net-sap}] [interval seconds] [repeat repeat] [absolute | rate]
- **cpm-filter
  - **ip entry entry-id [interval seconds] [repeat repeat] [absolute | rate]
  - **mac entry entry-id [interval seconds] [repeat repeat] [absolute | rate]
- **filter
  - **ip ip-filter-id entry entry-id [interval seconds] [repeat repeat] [absolute | rate]
  - **mac mac-filter-id entry entry-id [interval seconds] [repeat repeat] [absolute | rate]
- **lag lag-id [lag-id...(up to 5 max)] [interval seconds] [repeat repeat] [absolute | rate]
- **management-access-filter
  - **ip entry entry-id [interval seconds] [repeat repeat] [absolute | rate]
  - **port port-id [port-id...(up to 5 max)] [interval seconds] [repeat repeat] [absolute | rate]
- **qos
  - **arbitrator-stats
    - **sap sap-id [arbiter name | root] [ingress | egress] [interval seconds] [repeat repeat] [absolute | rate]
    - **subscriber sub-ident-string [arbiter name | root] [ingress | egress] [interval seconds] [repeat repeat] [absolute | rate]
  - **scheduler-stats
    - **customer customer-id site customer-site-name [scheduler scheduler-name]
      [ingress | egress] [interval seconds] [repeat repeat] [absolute | rate]
    - **sap sap-id [scheduler scheduler-name] [ingress | egress] [interval seconds]
      [repeat repeat] [absolute | rate]
    - **subscriber sub-ident-string [scheduler scheduler-name] [ingress | egress] [interval seconds]
      [repeat repeat] [absolute | rate]
- **router [router-instance]
  - **isis
    - **statistics [interval seconds] [repeat repeat] [absolute | rate]
  - **ldp
    - **session ldp-id [ldp-id...(up to 5 max)] [interval seconds] [repeat repeat] [absolute | rate]
    - **statistics [interval seconds] [repeat repeat] [absolute | rate]
  - **mpls
    - **interface interface [interface...(up to 5 max)] [interval seconds] [repeat repeat]
      [absolute | rate]
    - **lsp-egress-statistics lsp-name [interval seconds] [repeat repeat] [absolute | rate]
    - **lsp-ingress-statistics ip-address lsp lsp-name [interval seconds] [repeat repeat]
      [absolute | rate]
  - **osfp [ospf-instance]
    - **interface interface [interface...(up to 5 max)] [interval seconds] [repeat repeat]
      [absolute | rate]
    - **virtual-link nbr-rtr-id area area-id [interval seconds] [repeat repeat] [absolute | rate]
    - **virtual-neighbor nbr-rtr-id area area-id [interval seconds] [repeat repeat]
      [absolute | rate]
  - **rip
    - **neighbor neighbor [neighbor...(up to 5 max)] [interval seconds] [repeat repeat]
      [absolute | rate]
  - **rsvp
    - **interface interface [interface...(up to 5 max)] [interval seconds] [repeat repeat]
      [absolute | rate]
— vrrp
  — instance interface interface-name vr-id virtual-router-id [interval seconds] [repeat repeat] [absolute | rate]
— service
  — id service-id
    — sap sap-id [interval seconds] [repeat repeat] [absolute | rate]
    — sdp sd-p-id [far-end] ip-address [interval seconds] [repeat repeat] [absolute | rate]
— subscriber sub-ident-string sap sap-id sla-profile sla-profile-name [base] ingress-queue-id ingress-queue-id egress-queue-id egress-queue-id [interval seconds] [repeat repeat] [absolute | rate]
Environment Commands

<root>
   — environment
      — alias alias-name alias-command-name
      — no alias alias-name
      — [no] create
      — [no] more
      — reduced-prompt [no. of nodes in prompt]
      — no reduced-prompt
      — [no] saved-ind-prompt
      — terminal
         — length lines
      — time-display [local | utc]
Basic CLI Commands

Global Commands

`enable-admin`

**Syntax**
```
enable-admin
```

**Context**
```
<global>
```

**Description**

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

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

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

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

The following displays a password configuration example:

```
A:ALA-1>config>system>security# info
----------------------------------------------
...  
   password
      aging 365
      minimum-length 8
      attempts 5 time 5 lockout 20
      admin-password "rUYUz9XM06I" hash
      exit
...  
----------------------------------------------
A:ALA-1>config>system>security#
```
There are two ways to verify that a user is in the enable-admin mode:

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

```
A:ALA-1# show users
+---------------------------------------------------------------------+
| User Type From Login time Idle time                                 |
+---------------------------------------------------------------------+
| admin Telnet 10.20.30.93 09AUG2004 08:35:23 0d 00:00:00 A            |
+---------------------------------------------------------------------+
Number of users : 2
'A' indicates user is in admin mode
```

```
A:ALA-1# enable-admin
A:ALA-1# enable-admin
MINOR: CLI Already in admin mode.
A:ALA-1#
```

**back**

**Syntax** `back`

**Context** `<GLOBAL>`

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

**clear**

**Syntax** `clear`

**Context** `<GLOBAL>`

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

**Parameters**
- `card` — Reinitializes a I/O module in the specified slot.
- `cpm-filter` — Clears IP filter entry IDs.
- `cron` — Clears CRON history.
- `filter` — Clears IP, MAC, and log filter counters.
- `lag` — Clears LAG-related entities.
- `log` — Closes and reinitializes the log specified by log-id.
- `mda` — Reinitializes the specified MDA in a particular slot.
- `port` — Clears port statistics.
echo

Syntax   echo [text-to-echo] [extra-text-to-echo] [more-text]
Context  <GLOBAL>
Description This command echoes arguments on the command line. The primary use of this command is to allow messages to be displayed to the screen in files executed with the exec command.
Parameters text-to-echo — Specifies a text string to be echoed up to 256 characters.
extra-text-to-echo — Specifies more text to be echoed up to 256 characters.
more-text — Specifies more text to be echoed up to 256 characters.

exec

Syntax   exec [-echo] [-syntax] {filename | <<[eof_string]}
Context  <GLOBAL>
Description This command executes the contents of a text file as if they were CLI commands entered at the console.
Exec commands do not have no versions.
Parameters -echo — Echo the contents of the exec file to the session screen as it executes.
            Default Echo disabled.
-syntax — Perform a syntax check of the file without executing the commands. Syntax checking will be able to find invalid commands and keywords, but it will not be able to validate erroneous user-supplied parameters.
Global Commands

Default Execute file commands.

filename — The text file with CLI commands to execute.

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

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

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

Default <Ctrl-C>, EOF

Related Commands

boot-bad-exec command on page 315 — Use this command to configure a URL for a CLI script to exec following a failed configuration boot.

boot-good-exec command on page 315 — Use this command to configure a URL for a CLI script to exec following a successful configuration boot.

exit

Syntax exit [all]

Context <GLOBAL>

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

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

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

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

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

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

Syntax
help
help edit
help global
help special-characters

<GLOBAL>

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

Help may be requested at any point by hitting a question mark '?'.
In case of an executable node, the syntax for that node will be displayed with an
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.
help edit — Displays help on editing.

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

help global — Displays help on global commands.

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

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

help special-characters — Displays help on special characters.

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

? — Lists all commands in the current context.

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

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

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

history

Syntax  history
Context   <GLOBAL>
Description  This command lists the last 30 commands entered in this session.

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

For example:

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

Syntax info [detail]

Context <GLOBAL>

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

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

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

For example,

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

Global Commands

from 10.10.10.103
rsvp-resv-style ff
cspf
...
----------------------------------------------
A:ALA-48>config>router>mpls#
A:ALA-48>config>router>mpls# info detail
----------------------------------------------
frtr-object
no resignal-timer
admin-group "green" 15
admin-group "red" 25
admin-group "yellow" 20
interface "system"
  no admin-group
  no shutdown
exit
interface "to-104"
  admin-group "green"
  admin-group "red"
  admin-group "yellow"
  label-map 35
    swap 36 nexthop 10.10.10.91
    no shutdown
exit
no shutdown
exit
path "secondary-path"
  hop 1 10.10.0.111 strict
  hop 2 10.10.0.222 strict
  hop 3 10.10.0.123 strict
  no shutdown
exit
path "to-NYC"
  hop 1 10.10.10.104 strict
  hop 2 10.10.0.210 strict
  no shutdown
exit
path "to-104"
  no shutdown
exit
lsp "to-104"
  to 10.10.10.104
  from 10.10.10.103
  rsvp-resv-style ff
  adaptive
cspf
  include "red"
  exclude "green"
adspec
fast-reroute one-to-one
  no bandwidth
  no hop-limit
  node-protect
exit
hop-limit 10
retry-limit 0
retry-timer 30
secondary "secondary-path"
  no standby
  no hop-limit
adaptive
no include
no exclude
record
record-label
bandwidth 50000
no shutdown
exit
primary "to-NYC"

hop-limit 50
adaptive
no include
no exclude
record
record-label
no bandwidth
no shutdown
exit

no shutdown
exit

...----------------------------------------------
A:ALA-48>config>router>mpls#

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

logout

Syntax logout

Context <GLOBAL>

Description This command logs out of the router session.

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

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

Syntax  password

Context  <ROOT>

Description  This command changes a user CLI login password.
When a user logs in after the administrator forces a `new-password-at-login`, or the password has expired (`aging`), then this command is automatically invoked.
When invoked, the user is prompted to enter the old password, the new password, and then the new password again to verify the correct input.
If a user fails to create a new password after the administrator forces a `new-password-at-login` or after the password has expired, the user is not allowed access to the CLI.

ping

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

Context  <GLOBAL>

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

Parameters  ip-address | dns-name — The remote host to ping. The IP address or the DNS name (if DNS name resolution is configured) can be specified.
rapid | detail — The `rapid` parameter specifies to send ping requests rapidly. The results are reported in a single message, not in individual messages for each ping request. By default, five ping requests are sent before the results are reported. To change the number of requests, include the `count` option.
The `detail` parameter includes in the output the interface on which the ping reply was received.

Example output:

```
A:ALA-1# ping 192.168.xx.xx4 detail
PING 192.168.xx.xx4: 56 data bytes
64 bytes from 192.168.xx.xx4 via fei0: icmp_seq=0 ttl=64 time=0.000 ms.
64 bytes from 192.168.xx.xx4 via fei0: icmp_seq=1 ttl=64 time=0.000 ms.
64 bytes from 192.168.xx.xx4 via fei0: icmp_seq=2 ttl=64 time=0.000 ms.
64 bytes from 192.168.xx.xx4 via fei0: icmp_seq=3 ttl=64 time=0.000 ms.
64 bytes from 192.168.xx.xx4 via fei0: icmp_seq=4 ttl=64 time=0.000 ms.
---- 192.168.xx.xx4 PING Statistics ----
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max/stddev = 0.000/0.000/0.000/0.000 ms
A:ALA-1#
```
ttl  time-to-live — The IP Time To Live (TTL) value to include in the ping request, expressed as a decimal integer.

Values  0 — 128

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

Values  0 — 255

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

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

Values  0 — 65507

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

Values  0 — 65535

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

Default  The IP address of the egress IP interface.

Values  0.0.0.0 — 255.255.255.255

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

Default  1

Values  1 — 10000

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

Default  Per the routing table.

Values  A valid IP next hop IP address.

interface  interface-name — Specify the interface name.

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

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

Default  5

Values  1 — 10000

do-not-fragment — Specifies that the request frame should not be fragmented. This option is particularly useful in combination with the size parameter for maximum MTU determination.
outer  router-instance — Specify the router name or service ID.

Default  Base

Values  

router-name:  Base, management

service-id:  1 — 2147483647
timeout timeout — Specify the timeout in seconds.

  Default 5
  Values 1 — 10

pwc

Syntax pwc [previous]

Context <GLOBAL>

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

*A:ALA-1>config>router>ospf>area>if# pwc
-----------------------------------------------------------
Present Working Context :
-----------------------------------------------------------
<root>
  configure
  router "Base"
  ospf
  area "0.0.0.0"
  interface "test123"
-----------------------------------------------------------
*A:ALA-1>config>router>ospf>area>if#

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.

*A:ALA-1>config>router>ospf>area>if# pwc previous

Previous Working Context :

<previous

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

Syntax  sleep [seconds]
Context   <GLOBAL>
Description   This command causes the console session to pause operation (sleep) for 1 second (default) or for the specified number of seconds.
Parameters   seconds — The number of seconds for the console session to sleep, expressed as a decimal integer.
              Default   1
              Values    1 — 100

ssh

Syntax  ssh [ip-addr | dns-name | username@ip-addr] [-l username] [-v SSH-version] [router router-instance] service-name service-name
Context   <GLOBAL>
Description   This command initiates a client SSH session with the remote host and is independent from the administrative or operational state of the SSH server. However, to be the target of an SSH session, the SSH server must be operational.

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

Parameters   ip-address | host-name — The remote host to which to open an SSH session. The IP address or the
              DNS name (providing DNS name resolution is configured) can be specified.
              -l user — The user name to use when opening the SSH session.
              router router-instance — Specify the router name or service ID.

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

telnet

Syntax  telnet [ip-address | dns-name] [port] [router router-instance]
Context   <GLOBAL>
Description   This command opens a Telnet session to a remote host. Telnet servers in 7450 ESS networks limit a
              Telnet clients to three retries to login. The Telnet server disconnects the Telnet client session after
              three retries. The number of retry attempts for a Telnet client session is not user-configurable.
Global Commands

**Parameters**

*ip-address* — The IP address or the DNS name (providing DNS name resolution is configured) can be specified.

**Values**

ipv4-address  a.b.c.d

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

**Values**

128 characters maximum

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

**Default**

23

**Values**

1 — 65535

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

**Values**

router-name:  Base, management

service-id:  1 — 2147483647

**Default**

Base

**traceroute**

**Syntax**

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

**Context**

<GLOBAL>

**Description**

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

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

**Parameters**

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

**Values**

ipv4-address  a.b.c.d

dns-name  128 characters maximum

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

**Values**

1 — 255

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

**Default**

5000

**Values**

1 — 60000

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

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

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

**Values**
- 0 — 255

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

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

Default: Base

---

**tree**

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

**Context**
 `<GLOBAL>`

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

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

---

**write**

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

**Context**
 `<GLOBAL>`

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

**Parameters**
- **user** — The name of a user with an active console session to which to send a console message.
- **broadcast** — Specifies that the `message-string` is to be sent to all users logged into the router.

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

#### alias

**Syntax**  
`alias alias-name alias-command-line`

`no alias alias-name`

**Context**  
environment

**Description**  
This command enables the substitution of a command line by an alias. Use the `alias` command to create alternative or easier to remember/understand names for an entity or command string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes. Only a single command can be present in the command string. The `alias` command can be entered in any context but must be created in the `root>environment` context.

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

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

**Parameters**  
- `alias-name` — The alias name. Do not use a valid command string for the alias. If the alias specified is an actual command, this causes the command to be replaced by the alias.

- `alias-command-line` — The command line to be associated.

#### create

**Syntax**  
`[no] create`

**Context**  
environment

**Description**  
By default, the `create` command is required to create a new OS entity. The `no` form of the command disables requiring the `create` keyword.

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

#### more

**Syntax**  
`[no] more`

**Context**  
environment

**Description**  
This command enables per-screen CLI output, meaning that the output is displayed on a screen-by-screen basis. The terminal screen length can be modified with the `terminal` command.

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

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

The `no` form of the command displays the output all at once. If the output length is longer than one screen, the entire output will be displayed, which may scroll the screen.
Default  more — CLI output pauses at the end of each screen waiting for the user input to continue.

reduced-prompt

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

Context  environment

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

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

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

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

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

The no form of the command reverts to the default.

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

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

        Default  2
        Values  0 — 15

saved-ind-prompt

Syntax  [no] saved-ind-prompt

Context  environment

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

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

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

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

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

Values 1 — 512

time-display

Syntax time-display {local | utc}

Context environment

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

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

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

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

Default time-display local — Displays time stamps based on the local time.
Monitor CLI Commands

ccag

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

Context  
monitor

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

Parameters  
ccag-id — Specifies the CCAG instance to monitor.
path — Specifies the CCA path nodal context where the CCA path bandwidth, buffer and accounting parameters are maintained. The path context must be specified with either the a or b keyword specifying the CCA path context to be entered.
type — Specify cross connect type.

Values  
sap-sap, sap-net, net-sap
interval — Configures the interval for each display in seconds.
Default  
5 seconds
Values  
3 — 60
repeat repeat — Configures how many times the command is repeated.
Default  
10
Values  
1 — 999
absolute — When the absolute keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.
rate — When the rate keyword is specified, the rate-per-second for each statistic is displayed instead of the delta.

cpm-filter

Syntax  
  
Context  
monitor

Description  
Displays monitor command output for CPM filters.
Monitor CLI Commands

ip

Syntax

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

Context

monitor>cpm-filter

Description

This command displays monitor command statistics for IP filter entries.

Parameters

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

  Values 1 — 65535

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

  Default 5 seconds

  Values 3 — 60

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

  Default 10

  Values 1 — 999

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

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

mac

Syntax

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

Context

monitor>cpm-filter

Description

This command displays monitor command statistics for MAC filter entries.

Parameters

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

  Values 1 — 65535

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

  Default 5 seconds

  Values 3 — 60

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

  Default 10

  Values 1 — 999

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

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

Syntax filter

Context monitor

Description This command enables the context to configure criteria to monitor IP and MAC filter statistics.

ip

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

Context monitor>filter

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

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

Parameters

- ip-filter-id — Displays detailed information for the specified filter ID and its filter entries.
  Values 1 — 65535
- entry entry-id — Displays information on the specified filter entry ID for the specified filter ID only.
  Values 1 — 65535
- interval seconds — Configures the interval for each display in seconds.
  Default 5 seconds
  Values 3 — 60
- repeat repeat — Configures how many times the command is repeated.
  Default 10
  Values 1 — 999
- absolute — When the absolute keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.
- rate — When the rate keyword is specified, the rate-per-second for each statistic is displayed instead of the delta.

Sample Output

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

Monitor CLI Commands

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#

mac

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

Context  monitor>filter

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

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

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

- **mac-filter-id** — The MAC filter policy ID.
  - **Values** 1 — 65535

- **entry entry-id** — Displays information on the specified filter entry ID for the specified filter ID only.
  - **Values** 1 — 65535

- **interval seconds** — Configures the interval for each display in seconds.
  - **Default** 5 seconds
  - **Values** 3 — 60

- **repeat repeat** — Configures how many times the command is repeated.
  - **Default** 10
  - **Values** 1 — 999

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

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

Sample Output

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

**lag**

**Syntax**

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

**Context**

`monitor`

**Description**

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

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

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

**Parameters**

*lag-id* — The number of the LAG.

- **Default** none — The LAG ID value must be specified.
- **Values** 1 — 200

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

- **Default** 5 seconds
- **Values** 3 — 60

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

- **Default** 10
- **Values** 1 — 999

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

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

**Sample Output**

```
A:ALA-12# monitor lag 12
Monitor statistics for LAG ID 12

Port-id | Input Bytes | Input Packets | Output Bytes | Output Packets | Input Errors | Output Errors
---------|-------------|---------------|-------------|----------------|--------------|----------------
```
At time t = 0 sec (Base Statistics)

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1/1/1</td>
<td>2168900</td>
<td>26450</td>
<td>64</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1/1/2</td>
<td></td>
<td>10677318</td>
<td>125610</td>
<td>2273750</td>
<td>26439</td>
<td>0</td>
</tr>
<tr>
<td>1/1/3</td>
<td></td>
<td>2168490</td>
<td>26445</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>15014708</td>
<td>178505</td>
<td>2273814</td>
<td>26440</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 5 sec (Mode: Delta)

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1/1/1</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1/1/2</td>
<td></td>
<td>258</td>
<td>3</td>
<td>86</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1/1/3</td>
<td></td>
<td>82</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>340</td>
<td>4</td>
<td>86</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

A:ALA-12#

**lsp-egress-stats**

Syntax: `lsp-egress-stats lsp-name`  
Context: `show>router>mpls`  
Description: This command displays MPLS LSP egress statistics information.

**lsp-ingress-stats**

Syntax: `lsp-ingress-stats ip-address lsp lsp-name`  
Context: `show>router>mpls`  
Description: This command displays MPLS LSP ingress statistics information.

**management-access-filter**

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

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 entry-id — Specifies an existing IP MAF entry ID.
  - Values: 1 — 9999

- interval seconds — Configures the interval for each display in seconds.
  - Default: 10
  - Values: 3 — 60

- repeat repeat — Configures how many times the command is repeated.
  - Default: 10
  - Values: 1 — 999

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

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

mac

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

Context: monitor>management-access-filter

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

Parameters:

- entry entry-id — Specifies an existing IP MAF entry ID.
  - Values: 1 — 9999

- interval seconds — Configures the interval for each display in seconds.
  - Default: 10
  - Values: 3 — 60

- repeat repeat — Configures how many times the command is repeated.
  - Default: 10
  - Values: 1 — 999

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

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

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

Context  monitor

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

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

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

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

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

  Default  5 seconds

  Values  3 — 60

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

  Default  10

  Values  1 — 999

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

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

Sample Output

A:ALA-12>monitor# port 2/1/4 interval 3 repeat 3 absolute

Monitor statistics for Port 2/1/4

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>At time t = 0 sec (Base Statistics)</td>
<td></td>
</tr>
<tr>
<td>Octets</td>
<td>0</td>
</tr>
<tr>
<td>Packets</td>
<td>39</td>
</tr>
<tr>
<td>Errors</td>
<td>0</td>
</tr>
<tr>
<td>At time t = 3 sec (Mode: Absolute)</td>
<td></td>
</tr>
<tr>
<td>Octets</td>
<td>0</td>
</tr>
<tr>
<td>Packets</td>
<td>39</td>
</tr>
<tr>
<td>Errors</td>
<td>0</td>
</tr>
<tr>
<td>At time t = 6 sec (Mode: Absolute)</td>
<td></td>
</tr>
<tr>
<td>Octets</td>
<td>0</td>
</tr>
<tr>
<td>Packets</td>
<td>39</td>
</tr>
<tr>
<td>Errors</td>
<td>0</td>
</tr>
</tbody>
</table>
Monitor CLI Commands

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

-------------------------------------------------------------------------------

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octets</td>
<td>0</td>
</tr>
<tr>
<td>Packets</td>
<td>39</td>
</tr>
<tr>
<td>Errors</td>
<td>0</td>
</tr>
</tbody>
</table>

-------------------------------------------------------------------------------

A:ALA-12>monitor#

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.

sap

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

Context monitor>qos>arbiter-stats

Description This command monitors arbiter statistics for a SAP.

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

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

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

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

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

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

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

Values 11 — 60

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

Default 10

Values 1 — 999

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

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

Syntax

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

Context

`monitor>qos>arbiter-stats`

Description

This command monitors arbiter statistics for a subscriber.

Parameters

- `sub-ident-string` — Specifies an existing subscriber a identification policy name.
- `arbiter name` — Specify the name of the policer control policy arbiter.
  - **Values**
    - An existing `scheduler-name` in the form of a string up to 32 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.
- `root` — Specify the scheduler to which this queue would be feeding.
- `ingress` — Displays `scheduler-name` statistics applied on the ingress SAP.
- `egress` — Displays `scheduler-name` statistics applied on the egress SAP.
- `interval seconds` — Configures the interval for each display in seconds.
  - **Default** 11 seconds
  - **Values** 11 — 60
- `repeat repeat` — Configures how many times the command is repeated.
  - **Default** 10
  - **Values** 1 — 999
- `absolute` — When the `absolute` keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.
- `rate` — When the `rate` keyword is specified, the rate-per-second for each statistic is displayed instead of the delta.

customer

Syntax

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

Context

`monitor>qos>arbiter-stats`

Description

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

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

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

**Values**  

1 — 2147483647

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

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

**Values**  

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

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

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

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

**Default**  

11 seconds

**Values**  

11 — 60

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

**Default**  

10

**Values**  

1 — 999

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

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

sap

**Syntax**  

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

**Context**  

`monitor>qos>scheduler-stats`

**Description**  

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

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

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

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

**Parameters**  

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

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

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

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

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

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

Default 11 seconds

Values 11 — 60

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

Default 10

Values 1 — 999

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

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

subscriber

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

Context monitor>qos>scheduler-stats

Description This command monitors cheduler statistics for a subscriber.

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

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

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

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

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

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

Default 11 seconds

Values 11 — 60

repeat repeat — Configures how many times the command is repeated.
**Default** 10  
**Values** 1 — 999

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

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

---

### router

**Syntax**  
`router router-instance`

**Context**  
`monitor`

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

**Parameters**  
- **router-instance** — Specify the router name or service ID.
  
  **Values**  
  - `router-name`: Base, management
  - `service-id`: 1 — 2147483647
  
  **Default**  
  Base

---

### statistics

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

**Context**  
`monitor>router>isis`

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

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

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

**Parameters**  
- **interval seconds** — Configures the interval for each display in seconds.
  
  **Default**  
  5 seconds
  
  **Values**  
  3 — 60

- **repeat repeat** — Configures how many times the command is repeated.
  
  **Default**  
  10
  
  **Values**  
  1 — 999
**Monitor CLI Commands**

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

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

**Sample Output**

```
A:ALA-12>monitor>router>isis# statistics interval 3 repeat 2 absolute
isis statistics
at time t = 0 sec (base statistics)
isis instance : 1
purge initiated : 0
spf runs : 2
lsp regens : 11

isinstance statistics

isis instance : 1
spf runs : 2
lsp regens : 11

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

sample output

at time t = 0 sec (base statistics)
isis instance : 1
spf runs : 2
lsp regens : 11

purge initiated : 0
lsp regens : 11

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

sample output

at time t = 0 sec (base statistics)
isis instance : 1
spf runs : 2
lsp regens : 11

purge initiated : 0
lsp regens : 11
```
### ISIS Statistics

**Base Statistics**

- **ISIS Instance**: 1
- **SPF Runs**: 2
- **LSP Regens**: 11

**CSPF Statistics**

- **Requests**: 0
- **Request Drops**: 0
- **Paths Found**: 0
- **Paths Not Found**: 0

**PDU Type**

<table>
<thead>
<tr>
<th>Type</th>
<th>Received</th>
<th>Processed</th>
<th>Dropped</th>
<th>Sent</th>
<th>Retransmitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSP</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IIH</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>76</td>
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</tr>
<tr>
<td>CSNP</td>
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<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>PSNP</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Unknown</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Mode: Rate**

- **At time t = 3 sec**
  - **ISIS Instance**: 1
  - **SPF Runs**: 0
  - **LSP Regens**: 0
  - **Requests**: 0
  - **Request Drops**: 0
  - **Paths Found**: 0
  - **Paths Not Found**: 0

- **At time t = 6 sec**
  - **ISIS Instance**: 1
  - **SPF Runs**: 0
  - **LSP Regens**: 0
  - **Requests**: 0
  - **Request Drops**: 0
  - **Paths Found**: 0
  - **Paths Not Found**: 0
Monitor CLI Commands

**session**

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

**Context**  
```
monitor>router>ldp
```

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

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

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

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

**Parameters**

- **ldp-id** — Specify the IP address of the LDP session to display.
  
  **Values**
  ```plaintext
  ip-address[:label-space]
  ip-address — a.b.c.d
  label-space — [0..65535]
  ```

- **interval seconds** — Configures the interval for each display in seconds.
  
  **Default** 5 seconds
  
  **Values** 3 — 60

- **repeat repeat** — Configures how many times the command is repeated.
  
  **Default** 10
  
  **Values** 1 — 999

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

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

**Sample Output**

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

```
Monitor statistics for LDP Session 10.10.10.104

Sent          Received
```
At time t = 0 sec (Base Statistics)

<table>
<thead>
<tr>
<th>Command</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FECs</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Hello</td>
<td>5288</td>
<td>5289</td>
</tr>
<tr>
<td>Keepalive</td>
<td>8225</td>
<td>8225</td>
</tr>
<tr>
<td>Init</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Label Mapping</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Label Request</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Release</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Abort</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Notification</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Address</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Address Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 3 sec (Mode: Absolute)

<table>
<thead>
<tr>
<th>Command</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FECs</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Hello</td>
<td>5288</td>
<td>5289</td>
</tr>
<tr>
<td>Keepalive</td>
<td>8226</td>
<td>8226</td>
</tr>
<tr>
<td>Init</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Label Mapping</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Label Request</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Release</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Abort</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Notification</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Address</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Address Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 6 sec (Mode: Absolute)

<table>
<thead>
<tr>
<th>Command</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FECs</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Hello</td>
<td>5288</td>
<td>5290</td>
</tr>
<tr>
<td>Keepalive</td>
<td>8226</td>
<td>8226</td>
</tr>
<tr>
<td>Init</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Label Mapping</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Label Request</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Release</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Abort</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Notification</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Address</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Address Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 9 sec (Mode: Absolute)

<table>
<thead>
<tr>
<th>Command</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FECs</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Hello</td>
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<td>5290</td>
</tr>
<tr>
<td>Keepalive</td>
<td>8226</td>
<td>8226</td>
</tr>
<tr>
<td>Init</td>
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<td>1</td>
</tr>
<tr>
<td>Label Mapping</td>
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<td>4</td>
</tr>
<tr>
<td>Label Request</td>
<td>0</td>
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</tr>
<tr>
<td>Label Release</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Abort</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Notification</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Address</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Address Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
### Monitor CLI Commands

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

<table>
<thead>
<tr>
<th></th>
<th>Sent</th>
<th>Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>FECs</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Hello</td>
<td>5289</td>
<td>5290</td>
</tr>
<tr>
<td>Keepalive</td>
<td>8227</td>
<td>8227</td>
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<tr>
<td>Init</td>
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<td>1</td>
</tr>
<tr>
<td>Label Mapping</td>
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<td>4</td>
</tr>
<tr>
<td>Label Request</td>
<td>0</td>
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</tr>
<tr>
<td>Label Release</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Withdraw</td>
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<tr>
<td>Label Abort</td>
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</tr>
<tr>
<td>Address</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Address Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 0 sec (Base Statistics)

<table>
<thead>
<tr>
<th></th>
<th>Sent</th>
<th>Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>FECs</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hello</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Keepalive</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Init</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Mapping</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Request</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Release</td>
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<td>0</td>
</tr>
<tr>
<td>Label Withdraw</td>
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<tr>
<td>Label Abort</td>
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</tr>
<tr>
<td>Notification</td>
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<td>0</td>
</tr>
<tr>
<td>Address</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Address Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 3 sec (Mode: Rate)

<table>
<thead>
<tr>
<th></th>
<th>Sent</th>
<th>Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>FECs</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hello</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Keepalive</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Init</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Mapping</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Request</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Release</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Abort</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Notification</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Address</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Address Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 6 sec (Mode: Rate)

<table>
<thead>
<tr>
<th></th>
<th>Sent</th>
<th>Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>FECs</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hello</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Keepalive</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Init</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Mapping</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Request</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Release</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Label Withdraw</td>
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<td>0</td>
</tr>
<tr>
<td>Label Abort</td>
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<td>0</td>
</tr>
<tr>
<td>Notification</td>
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<td>0</td>
</tr>
<tr>
<td>Address</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Address Withdraw</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 9 sec (Mode: Rate)
Label Request                  0                        0
Label Release                  0                        0
Label Withdraw                 0                        0
Label Abort                    0                        0
Notification                   0                        0
Address                       0                        0
Address Withdraw               0                        0

-----------------------------------------------------------------------------------------------
A:ALA-12>monitor>router>ldp#

statistics

Syntax  statistics [interval seconds] [repeat repeat] [absolute | rate]
Context monitor>router>ldp

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

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

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

Parameters

interval seconds — Configures the interval for each display in seconds.
  Default  5 seconds
  Values  3 — 60

repeat repeat — Configures how many times the command is repeated.
  Default  10
  Values  1 — 999

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

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

Sample Output

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

<table>
<thead>
<tr>
<th>Serv FECs Sent</th>
<th>Serv FECs Recv</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

At time t = 6 sec (Mode: Absolute)

<table>
<thead>
<tr>
<th>Addr FECs Sent</th>
<th>Addr FECs Recv</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Serv FECs Sent</td>
<td>Serv FECs Recv</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

At time t = 9 sec (Mode: Absolute)

<table>
<thead>
<tr>
<th>Addr FECs Sent</th>
<th>Addr FECs Recv</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Serv FECs Sent</td>
<td>Serv FECs Recv</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Monitor statistics for LDP instance

At time t = 0 sec (Base Statistics)

<table>
<thead>
<tr>
<th>Addr FECs Sent</th>
<th>Addr FECs Recv</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Serv FECs Sent</td>
<td>Serv FECs Recv</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

At time t = 3 sec (Mode: Rate)

<table>
<thead>
<tr>
<th>Addr FECs Sent</th>
<th>Addr FECs Recv</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Serv FECs Sent</td>
<td>Serv FECs Recv</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 6 sec (Mode: Rate)

<table>
<thead>
<tr>
<th>Addr FECs Sent</th>
<th>Addr FECs Recv</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Serv FECs Sent</td>
<td>Serv FECs Recv</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 9 sec (Mode: Rate)

<table>
<thead>
<tr>
<th>Addr FECs Sent</th>
<th>Addr FECs Recv</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Serv FECs Sent</td>
<td>Serv FECs Recv</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

interface

Syntax

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

Context

`monitor>router>mpls`

Description

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

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

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

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

    Default 11 seconds

    Values 11 — 60

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

    Default 10

    Values 1 — 999

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

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

Sample Output

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

    Transmitted : Pkts - 0 Octets - 0
    Received    : Pkts - 0 Octets - 0

At time t = 3 sec (Mode: Absolute)

    Transmitted : Pkts - 0 Octets - 0
    Received    : Pkts - 0 Octets - 0

At time t = 6 sec (Mode: Absolute)

    Transmitted : Pkts - 0 Octets - 0
    Received    : Pkts - 0 Octets - 0

At time t = 9 sec (Mode: Absolute)

    Transmitted : Pkts - 0 Octets - 0
    Received    : Pkts - 0 Octets - 0

A:ALA-12>monitor>router>mpls#

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

    Transmitted : Pkts - 0 Octets - 0
    Received    : Pkts - 0 Octets - 0

At time t = 3 sec (Mode: Rate)
Monitor CLI Commands

---

Transmitted : Pkts - 0                     Octets - 0
Received     : Pkts - 0                     Octets - 0

At time t = 6 sec (Mode: Rate)

Transmitted : Pkts - 0                     Octets - 0
Received     : Pkts - 0                     Octets - 0

At time t = 9 sec (Mode: Rate)

Transmitted : Pkts - 0                     Octets - 0
Received     : Pkts - 0                     Octets - 0

A:ALA-12>monitor>router>mpls#

---

lsp-egress-statistics

**Syntax**

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

**Context**

```
monitor>router>mpls
```

**Description**

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

**Default**

```
no lsp-egress-statistics
```

**Parameters**

- `repeat repeat` — Specifies how many times the command is repeated.
  - **Values**
    - 10
    - 1 — 999

- `interval seconds` — Specifies the interval for each display, in seconds.
  - **Values**
    - 10
    - 3 — 60

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

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

**Sample**

```
B:Dut-C-cpm2# monitor router mpls lsp-egress-stats sample repeat 3 interval 10 absolute
```

Monitor egress statistics for MPLS LSP "sample"

At time t = 0 sec (Base Statistics)

**LSP Name** : sample

Collect Stats : Enabled  Accting Plcy. : 5
Adm State     : Up      PSB Match     : True
<table>
<thead>
<tr>
<th>Mode</th>
<th>InProf Pkts</th>
<th>OutProf Pkts</th>
<th>InProf Octets</th>
<th>OutProf Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC BE</td>
<td>0</td>
<td>551</td>
<td>0</td>
<td>560918</td>
</tr>
<tr>
<td>FC L2</td>
<td>0</td>
<td>551</td>
<td>0</td>
<td>560918</td>
</tr>
<tr>
<td>FC AF</td>
<td>0</td>
<td>551</td>
<td>0</td>
<td>560918</td>
</tr>
<tr>
<td>FC L1</td>
<td>0</td>
<td>551</td>
<td>0</td>
<td>560918</td>
</tr>
<tr>
<td>FC H2</td>
<td>0</td>
<td>551</td>
<td>0</td>
<td>560918</td>
</tr>
<tr>
<td>FC EF</td>
<td>0</td>
<td>551</td>
<td>0</td>
<td>560918</td>
</tr>
<tr>
<td>FC H1</td>
<td>0</td>
<td>551</td>
<td>0</td>
<td>560918</td>
</tr>
<tr>
<td>FC NC</td>
<td>0</td>
<td>551</td>
<td>0</td>
<td>560918</td>
</tr>
</tbody>
</table>

At time t = 10 sec (Mode: Absolute)

<table>
<thead>
<tr>
<th>LSP Name</th>
<th>Collect Stats: Enabled</th>
<th>Accting Plcy.: 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC BE</td>
<td>0</td>
<td>580</td>
</tr>
<tr>
<td>FC L2</td>
<td>0</td>
<td>580</td>
</tr>
<tr>
<td>FC AF</td>
<td>0</td>
<td>580</td>
</tr>
<tr>
<td>FC L1</td>
<td>0</td>
<td>580</td>
</tr>
<tr>
<td>FC H2</td>
<td>0</td>
<td>580</td>
</tr>
<tr>
<td>FC EF</td>
<td>0</td>
<td>580</td>
</tr>
<tr>
<td>FC H1</td>
<td>0</td>
<td>580</td>
</tr>
<tr>
<td>FC NC</td>
<td>0</td>
<td>580</td>
</tr>
</tbody>
</table>

At time t = 20 sec (Mode: Absolute)

<table>
<thead>
<tr>
<th>LSP Name</th>
<th>Collect Stats: Enabled</th>
<th>Accting Plcy.: 5</th>
</tr>
</thead>
</table>
Monitor CLI Commands

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: 619962
FC L1
InProf Pkts   : 609                     OutProf Pkts : 0
InProf Octets : 619962                   OutProf Octets: 619962
FC H2
InProf Pkts   : 0                       OutProf Pkts : 609
InProf Octets : 619962                   OutProf Octets: 619962
FC EF
InProf Pkts   : 0                       OutProf Pkts : 609
InProf Octets : 619962                   OutProf Octets: 619962
FC H1
InProf Pkts   : 0                       OutProf Pkts : 609
InProf Octets : 619962                   OutProf Octets: 619962
FC NC
InProf Pkts   : 609                     OutProf Pkts : 0
InProf Octets : 619962                   OutProf Octets: 619962
-------------------------------------------------------------------------------
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: 649484
FC L1
InProf Pkts   : 638                     OutProf Pkts : 0
InProf Octets : 649484                   OutProf Octets: 649484
FC H2
InProf Pkts   : 0                       OutProf Pkts : 638
InProf Octets : 649484                   OutProf Octets: 649484
FC EF
InProf Pkts   : 0                       OutProf Pkts : 638
InProf Octets : 649484                   OutProf Octets: 649484
FC H1
InProf Pkts   : 0                       OutProf Pkts : 638
InProf Octets : 649484                   OutProf Octets: 649484
FC NC
InProf Pkts   : 638                     OutProf Pkts : 0
InProf Octets : 649484                   OutProf Octets: 649484
-------------------------------------------------------------------------------
B:Dut-C-cpm2#
**Isp-ingress-statistics**

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

**Context**
```
monitor>router>mpls
```

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

**Parameters**
- **repeat repeat** — Specifies how many times the command is repeated.
  - **Values**
    - 10
    - 1 — 999
- **interval seconds** — Specifies the interval for each display, in seconds.
  - **Values**
    - 10
    - 3 — 60
- **absolute** — When the `absolute` keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.
- **rate** — When the `rate` keyword is specified, the rate-per-second for each statistic is displayed instead of the delta.

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

---

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

At time $t = 20$ sec (Mode: Absolute)
ospf

**Syntax**

`ospf [ospf-instance]`

**Context**

monitor>router>ospf

**Description**

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

**Parameters**

`ospf-instance` — Specifies the OSPF instance.

**Values**

1 — 31
interface

Syntax

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

Context

```
monitor>router>ospf
```

Description

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

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

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

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

Parameters

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

- `interval seconds` — Configures the interval for each display in seconds.
  - Default: 5 seconds
  - Values: 3 — 60

- `repeat repeat` — Configures how many times the command is repeated.
  - Default: 10
  - Values: 1 — 999

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

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

Sample Output

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

Monitor statistics for OSPF Interface "to-104"

At time t = 0 sec (Base Statistics)

<table>
<thead>
<tr>
<th>Total Rx Packets</th>
<th>8379</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rx Hellos</td>
<td>8225</td>
</tr>
<tr>
<td>Rx DBDs</td>
<td>6</td>
</tr>
<tr>
<td>Rx LSRs</td>
<td>2</td>
</tr>
<tr>
<td>Rx LSUs</td>
<td>55</td>
</tr>
<tr>
<td>Rx LS Acks</td>
<td>91</td>
</tr>
<tr>
<td>Retransmits</td>
<td>2</td>
</tr>
<tr>
<td>Bad Networks</td>
<td>0</td>
</tr>
<tr>
<td>Bad Areas</td>
<td>0</td>
</tr>
<tr>
<td>Total Tx Packets</td>
<td>8528</td>
</tr>
<tr>
<td>Tx Hellos</td>
<td>8368</td>
</tr>
<tr>
<td>Tx DBDs</td>
<td>12</td>
</tr>
<tr>
<td>Tx LSRs</td>
<td>1</td>
</tr>
<tr>
<td>Tx LSUs</td>
<td>95</td>
</tr>
<tr>
<td>Tx LS Acks</td>
<td>52</td>
</tr>
<tr>
<td>Discards</td>
<td>0</td>
</tr>
<tr>
<td>Bad Virt Links</td>
<td>0</td>
</tr>
<tr>
<td>Bad Dest Addr</td>
<td>0</td>
</tr>
</tbody>
</table>
```
<table>
<thead>
<tr>
<th>Metric</th>
<th>Value 1</th>
<th>Value 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad Auth Types</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Auth Failures</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Neighbors</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Pkt Types</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Lengths</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Hello Int.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Options</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Versions</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 3 sec (Mode: Absolute)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value 1</th>
<th>Value 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tot Rx Packets</td>
<td>8379</td>
<td>8528</td>
</tr>
<tr>
<td>Rx Hellos</td>
<td>8225</td>
<td>8368</td>
</tr>
<tr>
<td>Rx DBDs</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Rx LSRs</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Rx LSUss</td>
<td>55</td>
<td>95</td>
</tr>
<tr>
<td>Rx LS Acks</td>
<td>91</td>
<td>52</td>
</tr>
<tr>
<td>Retransmits</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Bad Networks</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Virt Links</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Areas</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Dest Addr</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Auth Types</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Auth Failures</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Neighbors</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Pkt Types</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Lengths</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Hello Int.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Options</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Versions</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 6 sec (Mode: Absolute)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value 1</th>
<th>Value 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tot Rx Packets</td>
<td>8380</td>
<td>8529</td>
</tr>
<tr>
<td>Rx Hellos</td>
<td>8226</td>
<td>8369</td>
</tr>
<tr>
<td>Rx DBDs</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Rx LSRs</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Rx LSUss</td>
<td>55</td>
<td>95</td>
</tr>
<tr>
<td>Rx LS Acks</td>
<td>91</td>
<td>52</td>
</tr>
<tr>
<td>Retransmits</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Bad Networks</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Virt Links</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Areas</td>
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<td>0</td>
</tr>
<tr>
<td>Bad Dest Addr</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Auth Types</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Auth Failures</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Neighbors</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Pkt Types</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Lengths</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Hello Int.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Options</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Versions</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At time t = 9 sec (Mode: Absolute)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value 1</th>
<th>Value 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tot Rx Packets</td>
<td>8380</td>
<td>8529</td>
</tr>
<tr>
<td>Rx Hellos</td>
<td>8226</td>
<td>8369</td>
</tr>
<tr>
<td>Rx DBDs</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Rx LSRs</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Rx LSUss</td>
<td>55</td>
<td>95</td>
</tr>
<tr>
<td>Rx LS Acks</td>
<td>91</td>
<td>52</td>
</tr>
<tr>
<td>Retransmits</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Bad Networks</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Virt Links</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Areas</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Dest Addr</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Auth Types</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Auth Failures</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Neighbors</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Pkt Types</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Lengths</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Hello Int.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Options</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bad Versions</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

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

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

Monitor statistics for OSPF Interface "to-104"

At time t = 0 sec (Base Statistics)

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tot Rx Packets</td>
<td>8381</td>
<td>Tot Tx Packets</td>
<td>8530</td>
</tr>
<tr>
<td>Rx Hellos</td>
<td>8227</td>
<td>Tx Hellos</td>
<td>8370</td>
</tr>
<tr>
<td>Rx DBDs</td>
<td>6</td>
<td>Tx DBDs</td>
<td>12</td>
</tr>
<tr>
<td>Rx LSRs</td>
<td>2</td>
<td>Tx LSRs</td>
<td>1</td>
</tr>
<tr>
<td>Rx LSUs</td>
<td>55</td>
<td>Tx LSUs</td>
<td>95</td>
</tr>
<tr>
<td>Rx LS Acks</td>
<td>91</td>
<td>Tx LS Acks</td>
<td>52</td>
</tr>
<tr>
<td>Retransmits</td>
<td>2</td>
<td>Discards</td>
<td>0</td>
</tr>
<tr>
<td>Bad Networks</td>
<td>0</td>
<td>Bad Virt Links</td>
<td>0</td>
</tr>
<tr>
<td>Bad Areas</td>
<td>0</td>
<td>Bad Dest Addr</td>
<td>0</td>
</tr>
<tr>
<td>Bad Auth Types</td>
<td>0</td>
<td>Auth Failures</td>
<td>0</td>
</tr>
<tr>
<td>Bad Neighbors</td>
<td>0</td>
<td>Bad Pkt Types</td>
<td>0</td>
</tr>
<tr>
<td>Bad Lengths</td>
<td>0</td>
<td>Bad Hello Int.</td>
<td>0</td>
</tr>
<tr>
<td>Bad Dead Int.</td>
<td>0</td>
<td>Bad Options</td>
<td>0</td>
</tr>
<tr>
<td>Bad Versions</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 Addr    | 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 Addr    | 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        |
virtual-link

**Syntax**

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

**Context**

```
monitor>router>ospf
```

**Description**

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

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

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

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

**Parameters**

- `nbr-rtr-id` — The IP address to uniquely identify a neighboring router in the autonomous system.
- `area area-id` — The OSPF area ID, expressed in dotted decimal notation or as a 32-bit decimal integer.
- `interval seconds` — Configures the interval for each display in seconds.
  - **Default** 5 seconds
  - **Values** 3 — 60
- `repeat repeat` — Configures how many times the command is repeated.
  - **Default** 10
  - **Values** 1 — 999
- `absolute` — When the `absolute` keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.
- `rate` — When the `rate` keyword is specified, the rate-per-second for each statistic is displayed instead of the delta.
virtual-neighbor

Syntax  
\texttt{virtual-neighbor nbr-rtr-id area area-id [interval seconds] [repeat repeat] [absolute | rate]}

Context  
\texttt{monitor>router>ospf}

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 \texttt{rate} is specified, the "rate per second" for each statistic is displayed instead of the delta.

Monitor commands are similar to \texttt{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
\begin{itemize}
\item \texttt{nbr-rtr-id} — The IP address to uniquely identify a neighboring router in the autonomous system.
\item \texttt{area area-id} — The OSPF area ID, expressed in dotted decimal notation or as a 32-bit decimal integer.
\item \texttt{interval seconds} — Configures the interval for each display in seconds.
  \begin{itemize}
  \item Default: 5 seconds
  \item Values: 3 — 60
  \end{itemize}
\item \texttt{repeat repeat} — Configures how many times the command is repeated.
  \begin{itemize}
  \item Default: 10
  \item Values: 1 — 999
  \end{itemize}
\item \texttt{absolute} — When the \texttt{absolute} keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.
\item \texttt{rate} — When the \texttt{rate} keyword is specified, the rate-per-second for each statistic is displayed instead of the delta.
\end{itemize}

neighbor

Syntax  
\texttt{neighbor neighbor [neighbor...(up to 5 max)] [interval seconds] [repeat repeat] [absolute | rate]}

Context  
\texttt{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 \texttt{rate} is specified, the "rate per second" for each statistic is displayed instead of the delta.
Monitor commands are similar to show commands but only statistical information displays. Monitor commands display the selected statistics according to the configured number of times at the interval specified.

**Parameters**

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

- **interval seconds** — Configures the interval for each display in seconds.
  - **Default** 5 seconds
  - **Values** 3 — 60

- **repeat repeat** — Configures how many times the command is repeated.
  - **Default** 10
  - **Values** 1 — 999

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

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

**interface**

**Syntax**

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

**Context**

```
monitor>router>rsvp
```

**Description**

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

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

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

**Parameters**

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

- **interval seconds** — Configures the interval for each display in seconds.
  - **Default** 5 seconds
  - **Values** 3 — 60

- **repeat repeat** — Configures how many times the command is repeated.
  - **Default** 10
  - **Values** 1 — 999
Monitor CLI Commands

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

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

---

**service**

**Syntax**

```
service
```

**Context**

```
monitor
```

**Description**

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

---

**id**

**Syntax**

```
Id service-id
```

**Context**

```
monitor>service
```

**Description**

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

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

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

**Parameters**

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

---

**sap**

**Syntax**

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

**Context**

```
monitor>service>id service-id
```

**Description**

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

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

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

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

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

**Values**

<table>
<thead>
<tr>
<th>sap-id</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>null</td>
<td>[port-id</td>
</tr>
<tr>
<td>dot1q</td>
<td>[port-id</td>
</tr>
<tr>
<td>qinq</td>
<td>[port-id</td>
</tr>
<tr>
<td>frame</td>
<td>[port-id]:dlci</td>
</tr>
<tr>
<td>port-id</td>
<td>slot/MDA/port[:channel]</td>
</tr>
<tr>
<td>ccag-id</td>
<td>ccag-id.path-id[cc-type]:cc-id</td>
</tr>
<tr>
<td></td>
<td>ccag keyword</td>
</tr>
<tr>
<td></td>
<td>id 1 — 8</td>
</tr>
<tr>
<td></td>
<td>path-id a, b</td>
</tr>
<tr>
<td></td>
<td>cc-type .sap-net, .net-sap</td>
</tr>
<tr>
<td></td>
<td>cc-id 0 — 4094</td>
</tr>
<tr>
<td>lag-id</td>
<td>lag-id</td>
</tr>
<tr>
<td></td>
<td>lag keyword</td>
</tr>
<tr>
<td></td>
<td>id 1 — 64</td>
</tr>
<tr>
<td>qtag1</td>
<td>0 — 4094</td>
</tr>
<tr>
<td>qtag2</td>
<td>*, 0 — 4094</td>
</tr>
<tr>
<td>dlci</td>
<td>16 — 1022</td>
</tr>
</tbody>
</table>

**port-id** — Specifies the physical port ID in the *slot/MDA/port* format.

If the card in the slot has Media Dependent Adapters (MDAs) installed, the *port-id* must be in the *slot_number/MDA_number/port_number* format. For example 6/2/3 specifies port 3 on MDA 2 in slot 6.

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

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

**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 — 4094                                                              |
| qtag2        | *, 0 — 4094                                                           |

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

<table>
<thead>
<tr>
<th>Port Type</th>
<th>Encap-Type</th>
<th>Allowed Values</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet</td>
<td>Null</td>
<td>0</td>
<td>The SAP is identified by the port.</td>
</tr>
<tr>
<td>Ethernet</td>
<td>Dot1q</td>
<td>0 — 4094</td>
<td>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.</td>
</tr>
<tr>
<td>Ethernet</td>
<td>QinQ</td>
<td>qtag1: 0 — 4094</td>
<td>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.</td>
</tr>
</tbody>
</table>
Monitor CLI Commands

| SONET/SDH | IPCP | - | The SAP is identified by the channel. No BCP is deployed and all traffic is IP. |
| SONET/SDH | 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 | BCP-Dot1q | 0 — 4094 | The SAP is identified by the 802.1Q tag on the channel. |

**interval seconds** — Configures the interval for each display in seconds.
- **Default** 11 seconds
- **Values** 11 — 60

**repeat repeat** — Configures how many times the command is repeated.
- **Default** 10
- **Values** 1 — 999

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

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

### Sample Output

```
*A:cses-A13# monitor service id 88 sap 1/1/2:0
===============================================================================
Monitor statistics for Service 88 SAP 1/1/2:0
===============================================================================
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------

Sap Statistics
-------------------------------------------------------------------------------
Last Cleared Time     : N/A
Packets                 Octets
Forwarding Engine Stats
Dropped               : 0                       0
Off. HiPrio           : 0                       0
Off. LowPrio          : 0                       0
Off. Uncolor          : 0                       0

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

Queueing Stats(Egress QoS Policy 1)
Dro. InProf           : 0                       0
Dro. OutProf          : 0                       0
For. InProf           : 0                       0
For. OutProf          : 0                       0
```

SONET/SDH IPCP - The SAP is identified by the channel. No BCP is deployed and all traffic is IP.
SONET/SDH 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 BCP-Dot1q 0 — 4094 The SAP is identified by the 802.1Q tag on the channel.
### sdp

**Syntax**

```
{sdp-id} {far-end ip-address} {interval seconds} {repeat repeat} {absolute | rate}
```

**Context**

```
monitor>service>id service-id
```

**Description**

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

**Parameters**

- **sdp-id** — Specify the SDP identifier.
  - **Values**
    - 1 — 17407

- **far-end ip-address** — The system address of the far-end 7450 ESS-Series for the SDP in dotted decimal notation.

- **interval seconds** — Configures the interval for each display in seconds.
  - **Default** 11 seconds
  - **Values** 11 — 60

- **repeat repeat** — Configures how many times the command is repeated.
  - **Default** 10
  - **Values** 1 — 999

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

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

**Sample Output**

```
A:ALA-12# monitor service id 100 sdp 10 repeat 3
Monitor statistics for Service 100 SDP binding 10
At time t = 0 sec (Base Statistics)
```

---

### Sap per Queue Stats

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingress Queue 1 (Unicast) (Priority)</td>
<td></td>
</tr>
<tr>
<td>Off. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. LoPrio</td>
<td>0</td>
</tr>
<tr>
<td>Dro. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Dro. LoPrio</td>
<td>0</td>
</tr>
<tr>
<td>For. InProf</td>
<td>0</td>
</tr>
<tr>
<td>For. OutProf</td>
<td>0</td>
</tr>
</tbody>
</table>
Monitor CLI Commands

I. Fwd. Pkts.   : 0                     I. Dro. Pkts.   : 0
E. Fwd. Pkts.   : 0                     E. Fwd. Octets  : 0
-------------------------------------------------------------------------------
At time t = 11 sec (Mode: Delta)
-------------------------------------------------------------------------------
I. Fwd. Pkts.   : 0                     I. Dro. Pkts.   : 0
E. Fwd. Pkts.   : 0                     E. Fwd. Octets  : 0
-------------------------------------------------------------------------------
At time t = 22 sec (Mode: Delta)
-------------------------------------------------------------------------------
I. Fwd. Pkts.   : 0                     I. Dro. Pkts.   : 0
E. Fwd. Pkts.   : 0                     E. Fwd. Octets  : 0
-------------------------------------------------------------------------------
At time t = 33 sec (Mode: Delta)
-------------------------------------------------------------------------------
I. Fwd. Pkts.   : 0                     I. Dro. Pkts.   : 0
E. Fwd. Pkts.   : 0                     E. Fwd. Octets  : 0
===============================================================================
A:ALA-12#

vrrp

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

instance

Syntax  instance interface interface-name vr-id virtual-router-id [interval seconds] [repeat repeat] [absolute | rate]
Context monitor>router>vrrp
Description Monitor statistics for a VRRP instance.
Parameters interface-name — The name of the existing IP interface on which VRRP is configured.
   vr-id virtual-router-id — The virtual router ID for the existing IP interface, expressed as a decimal integer.
   interval seconds — Configures the interval for each display in seconds.
      Default 5 seconds
      Values 3 — 60
   repeat repeat — Configures how many times the command is repeated.
      Default 10
      Values 1 — 999
absolute — When the absolute keyword is specified, the raw statistics are displayed, without processing. No calculations are performed on the delta or rate statistics.

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

subscriber

Syntax

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

Context

```
monitor>service
```

Description

This command monitors statistics for a subscriber.

Parameters

```
sub-ident-string — Specifies an existing subscriber identification profile to monitor.
sap sap-id — Specifies the physical port identifier portion of the SAP definition.

Values
dlci 16 — 1022

sla-profile sla-profile-name — Specifies an existing SLA profile.
interval seconds — Configures the interval for each display in seconds

Default 11
Values 11 — 60

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

Default 10
Values 1 — 999

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

Default mode delta

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

base — Monitor base statistics.

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

Values 1 — 32

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

Values 1 — 8

Sample Output

```
A:Dut-A# monitor service subscriber alcatel_100 sap 1/2/1:101 sla-profile sla_default
Monitor statistics for Subscriber alcatel_100
```

7450 ESS OS Basic System Configuration Guide Page 115
At time t = 0 sec (Base Statistics)

SLA Profile Instance statistics

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. LowPrio</td>
<td>94531</td>
</tr>
<tr>
<td>Off. Uncolor</td>
<td>0</td>
</tr>
</tbody>
</table>

Queueing Stats (Ingress QoS Policy 1000)

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dro. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Dro. LowPrio</td>
<td>7332</td>
</tr>
<tr>
<td>For. InProf</td>
<td>0</td>
</tr>
<tr>
<td>For. OutProf</td>
<td>87067</td>
</tr>
</tbody>
</table>

SLA Profile Instance per Queue statistics

Ingress Queue 1 (Unicast) (Priority)

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. LowPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. Uncolor</td>
<td>0</td>
</tr>
<tr>
<td>Dro. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Dro. LowPrio</td>
<td>0</td>
</tr>
<tr>
<td>For. InProf</td>
<td>0</td>
</tr>
<tr>
<td>For. OutProf</td>
<td>0</td>
</tr>
</tbody>
</table>

Ingress Queue 2 (Unicast) (Priority)

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. LowPrio</td>
<td>94531</td>
</tr>
<tr>
<td>Off. Uncolor</td>
<td>0</td>
</tr>
<tr>
<td>Dro. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Dro. LowPrio</td>
<td>7332</td>
</tr>
<tr>
<td>For. InProf</td>
<td>0</td>
</tr>
<tr>
<td>For. OutProf</td>
<td>87067</td>
</tr>
</tbody>
</table>

Ingress Queue 3 (Unicast) (Priority)

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. LowPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. Uncolor</td>
<td>0</td>
</tr>
<tr>
<td>Dro. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Dro. LowPrio</td>
<td>0</td>
</tr>
<tr>
<td>For. InProf</td>
<td>0</td>
</tr>
<tr>
<td>For. OutProf</td>
<td>0</td>
</tr>
</tbody>
</table>

Ingress Queue 11 (Multipoint) (Priority)

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. LowPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. Uncolor</td>
<td>0</td>
</tr>
<tr>
<td>Dro. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Dro. LowPrio</td>
<td>0</td>
</tr>
<tr>
<td>For. InProf</td>
<td>0</td>
</tr>
<tr>
<td>For. OutProf</td>
<td>0</td>
</tr>
</tbody>
</table>
### Egress Queue 1
- **Dro. InProf:** 880  
  **Octets:** 127660
- **Dro. OutProf:** 0  
  **Octets:** 0
- **For. InProf:** 90862  
  **Octets:** 12995616
- **For. OutProf:** 0  
  **Octets:** 0

### Egress Queue 2
- **Dro. InProf:** 0  
  **Octets:** 0
- **Dro. OutProf:** 0  
  **Octets:** 0
- **For. InProf:** 0  
  **Octets:** 0
- **For. OutProf:** 0  
  **Octets:** 0

### Egress Queue 3
- **Dro. InProf:** 0  
  **Octets:** 0
- **Dro. OutProf:** 0  
  **Octets:** 0
- **For. InProf:** 0  
  **Octets:** 0
- **For. OutProf:** 0  
  **Octets:** 0

---

A:Dut-A#

A:Dut-A# monitor service subscriber alcatel_100 sap 1/2/1:101 sla-profile sla_default
base rate

Monitor statistics for Subscriber alcatel_100

At time t = 0 sec (Base Statistics)

SLA Profile Instance statistics

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. LowPrio</td>
<td>109099</td>
</tr>
<tr>
<td>Off. Uncolor</td>
<td>0</td>
</tr>
</tbody>
</table>

Queueing Stats (Ingress QoS Policy 1000)

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dro. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Dro. LowPrio</td>
<td>8449</td>
</tr>
<tr>
<td>For. InProf</td>
<td>0</td>
</tr>
<tr>
<td>For. OutProf</td>
<td>100523</td>
</tr>
</tbody>
</table>

Queueing Stats (Egress QoS Policy 1000)

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dro. InProf</td>
<td>880</td>
</tr>
<tr>
<td>Dro. OutProf</td>
<td>0</td>
</tr>
<tr>
<td>For. InProf</td>
<td>105578</td>
</tr>
<tr>
<td>For. OutProf</td>
<td>0</td>
</tr>
</tbody>
</table>

---

At time t = 11 sec (Mode: Rate)

SLA Profile Instance statistics

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
<th>% Port Util.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off. HiPrio</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Off. LowPrio</td>
<td>1469</td>
<td>477795</td>
</tr>
<tr>
<td>Off. Uncolor</td>
<td>0</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Queueing Stats (Ingress QoS Policy 1000)

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dro. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Dro. LowPrio</td>
<td>119</td>
</tr>
<tr>
<td>For. InProf</td>
<td>0</td>
</tr>
<tr>
<td>For. OutProf</td>
<td>1349</td>
</tr>
</tbody>
</table>

Queueing Stats (Egress QoS Policy 1000)

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dro. InProf</td>
<td>0</td>
</tr>
</tbody>
</table>
A:Dut-A# monitor service subscriber alcatel_100 sap 1/2/1:101 sla-profile sla_default
ingress-queue-id 1
Monitor statistics for Subscriber alcatel_100
At time t = 0 sec (Base Statistics)

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingress Queue 1 (Unicast) (Priority)</td>
<td></td>
</tr>
<tr>
<td>Off. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. LowPrio</td>
<td>0</td>
</tr>
<tr>
<td>Off. Uncolor</td>
<td>0</td>
</tr>
<tr>
<td>Dro. HiPrio</td>
<td>0</td>
</tr>
<tr>
<td>Dro. LowPrio</td>
<td>0</td>
</tr>
<tr>
<td>For. InProf</td>
<td>0</td>
</tr>
<tr>
<td>For. OutProf</td>
<td>0</td>
</tr>
</tbody>
</table>

A:Dut-A# monitor service subscriber alcatel_100 sap 1/2/1:101 sla-profile sla_default
egress-queue-id 1
Monitor statistics for Subscriber alcatel_100
At time t = 0 sec (Base Statistics)

<table>
<thead>
<tr>
<th>Packets</th>
<th>Octets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egress Queue 1</td>
<td></td>
</tr>
<tr>
<td>Dro. InProf</td>
<td>880</td>
</tr>
<tr>
<td>Dro. OutProf</td>
<td>0</td>
</tr>
<tr>
<td>For. InProf</td>
<td>164366</td>
</tr>
<tr>
<td>For. OutProf</td>
<td>0</td>
</tr>
</tbody>
</table>
Show Commands

**alias**

**Syntax** alias

**Context** <root>

**Description** This command displays a list of existing aliases.

**Output** **Show Alias Fields** — The following table describes alias output fields.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alias-Name</td>
<td>Displays the name of the alias.</td>
</tr>
<tr>
<td>Alias-command-name</td>
<td>The command and parameter syntax that define the alias.</td>
</tr>
<tr>
<td>Number of aliases</td>
<td>The total number of aliases configured on the router.</td>
</tr>
</tbody>
</table>

**Sample Output**

A:ALA-103>config>system# show alias

A:ALA-103>config>system# show alias

<table>
<thead>
<tr>
<th>Alias-Name</th>
<th>Alias-command-name</th>
</tr>
</thead>
<tbody>
<tr>
<td>sri</td>
<td>show router interface</td>
</tr>
<tr>
<td>sse</td>
<td>show service service-using epipe</td>
</tr>
<tr>
<td>ssvpl</td>
<td>show service service-using vpl</td>
</tr>
<tr>
<td>ssi</td>
<td>show service service-using ies</td>
</tr>
</tbody>
</table>

Number of aliases : 5

A:ALA-103>config>system#
Show Commands
In This Chapter

This chapter provides information about file system management.

Topics in this chapter include:

- The File System on page 122
  → Compact Flash Devices on page 122
  → URLs on page 123
  → Wildcards on page 124
- File Management Tasks on page 126
  → Modifying File Attributes on page 126
  → Creating Directories on page 127
  → Copying Files on page 128
  → Moving Files on page 129
  → Removing Files and Deleting Directories on page 129
  → Displaying Directory and File Information on page 130
The File System

The 7450 ESS OS file system is used to store files used and generated by the system, for example, image files, configuration files, logging files and accounting files.

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

Compact Flash Devices

The file system is based on a DOS file system. In the 7450 ESS-Series, each control processor can have up to three compact flash devices numbered one through three. The names for these devices are:

- cf1:
- cf2:
- cf3:

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

The compact flash devices on the 7450 ESS-Series routers are removable and have an administrative state (shutdown/no shutdown).

NOTE: To prevent corrupting open files in the file system, you should only remove a compact flash that is administratively shutdown. 7450 ESS OS gracefully closes any open files on the device, so it can be safely removed.
URLs

The arguments for the 7450 ESS OS file commands are modeled after standard universal resource locator (URL). A URL refers to a file (a file-url) or a directory (a directory-url).

7450 ESS OS supports operations on both the local file system and on remote files. For the purposes of categorizing the applicability of commands to local and remote file operations, URLs are divided into three types of URLs: local, ftp and tftp. The syntax for each of the URL types are listed in Table 22.

**Table 22: URL Types and Syntax**

<table>
<thead>
<tr>
<th>URL Type</th>
<th>Syntax</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>local-url</td>
<td><code>/cflash-id:/path</code></td>
<td>cflash-id is the compact flash device name. Values: cf1:, cf2:, cf3:</td>
</tr>
<tr>
<td>ftp-url</td>
<td><code>ftp://[username[:password]@]host/path</code></td>
<td>An absolute ftp path from the root of the remote file system.</td>
</tr>
<tr>
<td>ftp://[username[:password]@]host/./path</td>
<td>A relative ftp path from the user’s home directory. Note the period and slash (“.”) in this syntax compared to the absolute path.</td>
<td></td>
</tr>
<tr>
<td>tftp-url</td>
<td><code>tftp://host[/path]/filename</code></td>
<td>tftp is only supported for operations on file-urls.</td>
</tr>
</tbody>
</table>

The system accepts either forward slash (“/”) or backslash (“\”) characters to delimit directory and/or filenames in URLs. Similarly, the 7450 ESS OS SCP client application can use either slash or backslash characters, but not all SCP clients treat backslash characters as equivalent to slash characters. In particular, UNIX systems will often times interpret the backslash character as an “escape” character. This can cause problems when using an external SCP client application to send files to the SCP server. If the external system treats the backslash like an escape character, the backslash delimiter will get stripped by the parser and will not be transmitted to the SCP server.

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

7450 ESS OS supports the standard DOS wildcard characters. The asterisk (*) can represent zero or more characters in a string of characters, and the question mark (?) can represent any one character.

**Example:**

```
A:ALA-1>file cf3:\ # copy test*.cfg siliconvalley
cf1:\testfile.cfg
1 file(s) copied.
A:ALA-1>file cf3:\ # cd siliconvalley
A:ALA-1>file cf3:\siliconvalley\ # dir
    Volume in drive cf1 on slot A has no label.
Directory of cf3:\siliconvalley\     
  05/10/2006 11:32p      <DIR>          .
  05/10/2006 11:14p      <DIR>          ..
  05/10/2006 11:32p                7597 testfile.cfg
  1 File(s)                  7597 bytes.
  2 Dir(s)                 1082368 bytes free.
A:ALA-1>file cf3:\siliconvalley\ #
```

As in a DOS file system, the wildcard characters can only be used in some of the file commands.

Another example of wildcard usage:

```
A:21# show router mpls lsp l-63-8*
===============================================================================
MPLS LSPs (Originating)
===============================================================================
<table>
<thead>
<tr>
<th>LSP Name</th>
<th>To</th>
<th>Fastfail</th>
</tr>
</thead>
<tbody>
<tr>
<td>l-63-8-cc</td>
<td>213.224.245.8</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Up</td>
<td>Dwn</td>
</tr>
<tr>
<td>l-63-8-cw</td>
<td>213.224.245.8</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Up</td>
<td>Dwn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 File(s)</td>
<td>7597 bytes.</td>
</tr>
<tr>
<td></td>
<td>2 Dir(s)</td>
<td>1082368 bytes free.</td>
</tr>
</tbody>
</table>
A:21#
```

All the commands can operate on the local file system. Table 23 indicates which commands also support remote file operations.
<table>
<thead>
<tr>
<th>Command</th>
<th>local-url</th>
<th>ftp-url</th>
<th>tftp-url</th>
</tr>
</thead>
<tbody>
<tr>
<td>attrib</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cd</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>copy</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>delete</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>dir</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>md</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>move</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>rd</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>repair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>scp</td>
<td></td>
<td>source only</td>
<td></td>
</tr>
<tr>
<td>type</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>version</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>shutdown</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
File Management Tasks

The following sections are basic system tasks that can be performed.

Note that when a file system operation is performed with the copy, delete, move, rd, or scp commands that can potentially delete or overwrite a file system entry, a prompt appears to confirm the action. The `force` keyword performs the copy, delete, move, rd, and scp actions without displaying the confirmation prompt.

- Modifying File Attributes on page 126
- Creating Directories on page 127
- Copying Files on page 128
- Moving Files on page 129
- Removing Files and Deleting Directories on page 129
- Displaying Directory and File Information on page 130
- Repairing the File System on page 132

Modifying File Attributes

The system administrator can change the read-only attribute in the local file. Enter the `attrib` command with no options to display the contents of the directory and the file attributes. Use the CLI syntax displayed below to modify file attributes:

**CLI Syntax:**
```
file>
attrib [+r | -r] file-url
```

The following displays an example of the command syntax:

**Example:**
```
# file
file cf3:\ # attrib
file cf3:\ # attrib +r BOF.SAV
file cf3:\ # attrib
```
Creating Directories

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

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

Use the CLI syntax displayed below to modify file attributes:

**CLI Syntax:**

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

The following displays an example of the command syntax:

**Example:**

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

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

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

The source file for the `scp` command must be local. The file must reside on the 7450 ESS-Series router. The destination file has to be of the format: `user@host:file-name`. The destination does not need to be local.

Use the CLI syntax displayed below to copy files:

**CLI Syntax:**

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

The following displays an example of the copy command syntax:

**Example:**

```
A:ALA-1>file cf1:\ # copy 104.cfg cf1:\test1\test2\test3\test.cfg
A:ALA-1>file cf1:\ # scp file1 admin@192.168.x.x:cf1:\file1
A:ALA-1>file cf1:\ # scp file2 user2@192.168.x.x:/user2/file2
A:ALA-1>file cf1:\ # scp cf2:/file3 admin@192.168.x.x:cf1:\file3
```
Moving Files

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

Use the CLI syntax displayed below to move files:

**CLI Syntax:**
```
file>
  move old-file-url new-file-url [force]
```

The following displays an example of the command syntax:

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

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

Removing Files and Deleting Directories

Use the `delete` and `rd` commands to delete files and remove directories. Directories must be empty in order to delete them. When file or directories are deleted they cannot be recovered.

Use the CLI syntax displayed below to delete files and remove directories:

**CLI Syntax:**
```
file>
  delete file-url [force]
  rd file-url [force]
```

The following displays an example of the command syntax:

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

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

Use the CLI syntax displayed below to display directory and file information:

```
CLI Syntax:  file>
dir [file-url]
type file-url
version file-url
```

The following displays an example of the command syntax:

```
ALA-1>file cf1:\  # dir
Volume in drive cf1 on slot A has no label.
Directory of cf1:\
01/01/1980  12:00a                7597 fred.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               20754 103.cfg
04/05/2003  02:20a             <DIR>          test
15 File(s)                 338240 bytes.
3 Dir(s)                 1097728 bytes free.
ALA-1>file cf1:\  # type fred.cfg
# Saved to /cflash1/fred.cfg
# Generated THU FEB 21 01:30:09 2002 UTC
exit all
```
shutdown
exit
interface faste 2/4
ALA-1>file cf1:\ # version boot.tim
TiMOS-L-1.0.B3-8
ALA-1>file cf1:\ #
Repairing the File System

Use the repair command to check a compact flash device for errors and repair any errors found.

Use the CLI syntax displayed below to check and repair a compact flash device:

**CLI Syntax:**
```
file
    repair [cflash-id]
```

The following displays an example of the command syntax:

```
A:ALA-1>file cf3:\ # repair
Checking drive cf3: on slot A for errors...
Drive cf31: on slot A is OK.
```
File Command Reference

Command Hierarchy

Configuration Commands

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

File System Commands

shutdown

Syntax

[no] shutdown [active] [standby]
[no] shutdown [cflash-id]

Context

file

Description

This command shuts down (unmounts) the specified CPM(s).

Use the no shutdown [active] [standby] command to enable one or both CPM.

Use the no shutdown [cflash-id] command to enable a compact flash (cf1:, cf2:, or cf3:) on the SF/CPM card. The no shutdown command can be issued for a specific slot when no compact flash is present. When a flash card is installed in the slot, the card will be activated upon detection.

In redundant systems, use the no shutdown command on cf3: on both SF/CPM cards in order to facilitate synchronization. See the synchronize command on page 381.

NOTE: The shutdown command must be issued prior to removing a flash card. If no parameters are specified, then the drive referred to by the current working directory will be shut down.

LED Status Indicators — The following states are possible for the compact flash:

- Operational:
  - If a compact flash is present in a drive and operational (no shutdown), the respective LED is lit green. The LED flickers when the compact flash is accessed.
  - NOTE: Do not remove the compact flash during a read/write operation.
  - State: admin = up, operational = up, equipped

- Flash defective:
  - If a compact flash is defective, the respective LED blinks amber to reflect the error condition and a trap is raised.
  - State: admin = up/down, operational = faulty, equipped = no

- Flash drive shut down:
  - When the compact flash drive is shut down and a compact flash present, the LED is lit amber. In this state, the compact flash can be ejected.
  - State: admin = down, operational = down, equipped = yes

- No compact flash present, drive shut down:
  - If no compact flash is present and the drive is shut down the LED is unlit.
  - State: admin = down, operational = down, equipped = no
File System Commands

No compact flash present, drive enabled:

If no compact flash is present and the drive is not shut down the LED is unlit.

State: admin = up, operational = down, equipped = no

Ejecting a compact flash:

The compact flash drive should be shut down before ejecting a compact flash card. The LED should turn to solid (not blinking) amber. This is the only mode to safely remove the flash card.

If a compact flash drive is not shut down before a compact flash is ejected, the LED blinks amber for approximately 5 seconds before shutting off.

State: admin = down, operational = down, equipped = yes

The **shutdown** or **no shutdown** state is not saved in the configuration file. Following a reboot all compact flash drives are in their default state.

**Default**  
**no shutdown** — compact flash device administratively enabled

**Parameters**

cflash-id — Enter the compact flash slot ID to be shut down or enabled. When a specific cflash-id is specified, then that drive is shutdown. If no cflash-id is specified, the drive referred to by the current working directory is assumed. If a slot number is not specified, then the active CPM is assumed.

**Default** The current compact flash device

**Values** cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

active — If **active** is selected, then all drives on the active CPM are shutdown or enabled.

standby — If **standby** is selected, then all drives on the standby CPM are shutdown or enabled.

**Note:** When both **active** and **standby** keywords are specified, then all drives on both CPM are shutdown.
File Commands

attrib

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

Context  file

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

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

ALA-1>file cf3:\ # attrib
   cf3:\bootlog.txt
   cf3:\bof.cfg
   cf3:\boot.ldr
   cf3:\sr1.cfg
   cf3:\test
   cf3:\bootlog_prev.txt
   R cf3:\BOF.SAV

Parameters  file-url — The URL for the local file.

Values  local-url | remote-url: 255 chars max
local-url: [cflash-id/][file-path]
remote-url [ftp://login:pswd@remote-locn][file-path]
cf1:,cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:

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

cd

Syntax  cd [file-url]

desc
File Commands

<none> — Displays the current working directory.

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

directory-url — The destination directory.

copy

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

Context  file

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

“Overwrite destination file (y/n)?”

For example:

To copy a file named srcfile in a directory called test on cf2 in slot B to a file called destfile in a directory called production on cf1 in slot A, the syntax is:

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

To FTP a file named 121201.cfg in directory mydir stored on cf1 in slot A to a network FTP server with IP address 131.12.31.79 in a directory called backup with a destination file name of 121201.cfg, the FTP syntax is:

copy cf1-A/mydir/121201.cfg 131.12.31.79/backup/121201.cfg

Parameters  

source-file-url — The location of the source file or directory to be copied.

dest-file-url — The destination of the copied file or directory.

force — Forces an immediate copy of the specified file(s).

    file copy force executes the command without displaying a user prompt message.

delete

Syntax  delete file-url [force]

Context  file

Description  This command deletes the specified file.

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

“Delete file <filename> (y/n)?”
Configuration Commands

file-url — The file name to delete.

Values

local-url | remote-url: 255 chars max
local-url: [cflash-id][file-path]
remote-url [ftp://login:pswd@remote-locn][file-path]
cf1:,cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:

force — Forces an immediate deletion of the specified file(s).

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

**dir**

**Syntax**

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

**Context**

file

**Description**

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

**Parameters**

`file-url` — The path or directory name.

Use the `file-url` with the optional wildcard (*) to reduce the number of files to list.

**Default**

Lists all files in the present working directory

`sort-order` { d | n | s} — Specifies the sort order.

**Values**

- d — date
- n — name
- s — size

`reverse` — Specifies to reverse the sort order.

**Sample Output**

```
A:cses-E12>file cf3:\ # dir
- dir [<file-url>] [sort-order { d | n | s}] [reverse]
```

```
<file-url> : <local-url>|<remote-url>
local-url  - [<cflash-id>/][<file-path>]
            200 chars max, including cflash-id
directory length 99 chars max each
remote-url - [ftp://<login>:<pswd>@<remote-locn>/][<file-path>]
            255 chars max
directory length 99 chars max each
remote-locn- [ [hostname] | <ipv4-address> | "[*<ipv6-address>!*] ]
ipv4-address - a.b.c.d
ipv6-address - x:x:x:x:x:x:x:x[-interface]
x:x:x:x:x:id.d.d.d[-interface]
x - [0..FFFF]H
 d - [0..255]D
interface - 32 chars max, for link
directory length 99 chars max each
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
Configuration 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.

format

**Syntax**  
format cflash cflash-id [reliable]

**Context**  
root>file

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

**Parameters**  
cflash-id — The compact flash type.

- **Values**  
  - cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
  - reliable — Enables the reliance file system and disables the default DOS file system. This option is valid only on compact flashes 1 and 2.

md

**Syntax**  
md file-url

**Context**  
file

**Description**  
This command creates a new directory in a file system.

Directories can only be created one level at a time.

**Parameters**  
file-url — The directory name to be created.

- **Values**  
  - local-url | remote-url: 255 chars max
  - local-url: [cflash-id][file-path]
  - remote-url: [ftp://login:pswd@remote-locn][file-path]
  - cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
File Commands

move

Syntax

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

Context

file

Description

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

The following prompt appears if the destination file already exists:

“Overwrite destination file (y/n)?”

Parameters

old-file-url — The file or directory to be moved.

Values

local-url | remote-url: 255 chars max
local-url: [cflash-id][file-path]
remote-url: [ftp://login:pswd@remote-locn/][file-path]
cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

new-file-url — The new destination to place the old-file-url.

Values

local-url | remote-url: 255 chars max
local-url: [cflash-id][file-path]
remote-url: [ftp://login:pswd@remote-locn/][file-path]
cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

force — Forces an immediate move of the specified file(s).

file move force executes the command without displaying a user prompt message.

rd

Syntax

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

Context

file

Description

The rd command is used to delete a directory.

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

If a directory has sub-directories, then the force option will fail and the rf parameter should be used instead to force delete that directory including the sub-directories.

Example:

A:nE1>file cf1:\ # rd alcateltest
Are you sure (y/n)? y
Deleting directory cf1:\alcateltest ..MINOR: CLI Cannot delete cf1:\alcateltest.
A:nE1>file cf1:\ # rd alcateltest force
Deleting directory cf1:\alcateltest ..MINOR: CLI Cannot delete cf1:\alcateltest.
A:nE1>file cf1:\ # rd hussein rf
Deleting all subdirectories and files in specified directory. y/n ?y
Deleting directory cf1:\hussein\hussein1 ..OK
Configuration Commands

Deleting directory cf1:\alcateltest .OK

**Parameters**

*file-url* — The directory to be removed.

**Values**

- `local-url` | `remote-url`: 255 chars max
- `local-url`: `[cflash-id][|file-path]`
- `remote-url`: `[ftp://login:pswd@remote-locn][|file-path]`

*cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:*

*rf* — The parameter forces a recursive delete.

*force* — Forces an immediate deletion of the specified directory.

For example, *rd file-url force* executes the command without displaying a user prompt message.

**repair**

**Syntax**

repair [cflash-id]

**Context**

file

**Description**

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

**Parameters**

*cflash-id* — Specify the compact flash slot ID to be shut down or enabled. When a specific *cflash-id* is specified, then that drive is shutdown. If no *cflash-id* is specified, the drive referred to by the current working directory is assumed. If a slot number is not specified, then the active SF/CPM-CFM is assumed.

**Default**

The current compact flash device

**Values**

- `cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:`

**scp**

**Syntax**

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

**Context**

file

**Description**

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

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

**Parameters**

*local-file-url* — The local source file or directory.

**Values**

- `[cflash-id][|file-path]`: Up to 256 characters.

*destination-file-url* — The destination file.

**Values**

- `user@hostname:destination-file`
  - *user* — The SSH user.
  - *host* — The remote host IP address of DNS name.
File Commands

file-path — The destination path.

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

Values

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

Default Base

force — Forces an immediate copy of the specified file.

`file scp local-file-url destination-file-url [router] force` executes the command without displaying a user prompt message.

type

Syntax `type file-url`

Context file

Description Displays the contents of a text file.

Parameters

- `file-url` — The file contents to display.

Values

- `file-url <local-url>|<remote-url>`
  - `local-url` [<cflash-id>/][<file-path>]
    - 200 chars max, including cflash-id
    - directory length 99 chars max each
  - `remote-url` [{ftp://|tftp://}<login>:<pswd>@<remote-locn>/][<file-path>]
    - 255 chars max
directory length 99 chars max each
  - `remote-locn` [ <hostname> | <ipv4-address> |<ipv6-address> ]
    - ipv4-address a.b.c.d
    - ipv6-address x:x:x:x:x:x:[-interface]
x:x:x:x:x:d.d.d.[-interface]
x - [0..FFFF]H
d - [0..255]D
interface - 32 chars max, for link
local addresses
cflash-id cf1:, cf1-A:, cf1-B:

version

Syntax `version file-url [check]`

Context file

Description This command displays the version of a TiMOS cpm.tim or iom.tim file.
### Parameters

`file-url` — The file name of the target file.

**Values**

- `local-url | remote-url`: 255 characters maximum
  - `local-url`: `[cflash-id/]file-path`
  - `remote-url`: `[{ftp://|tftp://}login:pswd@remote-locn/]file-path`
- `cflash-id`: `cf1:, cf1-A:, cf1-B:`

`check` — Validates the `.tim` file.

### Sample Output

```
A:Redundancy>file cf3:\ # version  ftp://ttest:tigris@xxx.xxx.xxx.xx/usr/global/
images/6.1/R4/cpm.tim
TiMOS-C-6.1.R4 for 7450
A:Redundancy>file cf3:\ # version check ftp://test:tigris@xxx.xxx.xxx.xx/usr/global/
images/6.1/R4/cpm.tim
TiMOS-C-6.1.R4 for 7450
Validation successful
A:Redundancy>file cf3:\ #
```

### Vi

**Syntax**

`vi local-url`

**Context**

`file`

**Description**

Edit files using the vi editor. Refer to Vi Editor on page 37.

**Parameters**

`local-url` — Specifies the local source file or directory.

**Values**

- `[cflash-id/]file-path`
  - `cflash-id`: `cf1:, cf1-A:, cf1-B:`
In This Chapter

This chapter provides information about configuring boot option parameters.

Topics in this chapter include:

- System Initialization on page 148
  - Configuration and Image Loading on page 152
    - Persistence on page 154
- Initial System Startup Process Flow on page 156
- Configuration Notes on page 157
System Initialization

The primary copy of SR OS software is located on a compact flash card. The removable media is shipped with each 7450 ESS-Series router and contains a copy of the OS image.

Notes:
- The CPM modules contain three slots for removable compact flash cards. The drives are named Compact Flash Slot #1 (cf1), Compact Flash Slot #2 (cf2), and Compact Flash Slot #3 (cf3). Configurations and executable images can be stored on flash cards or an FTP file location.
- The flash card containing the bootstrap and boot option files must be installed in Compact Flash Slot #3 (cf3) on the CPM.
- You must have a console connection.

Starting a 7450 ESS-Series 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 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.  
(5 second wait)  
Rebooting...  
(memory test messages)  
(user presses '2')  
Skipping CF power on diagnostics, boot from CF2  
(serial number information)  
Searching for boot.ldr on local drives:  
Searching cf2 for boot.ldr...  
**************************  
(normal boot continues)
```

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 2 displays the system initialization sequence.

Figure 2: System Initialization - Part 1
Figure 3 displays the compact flash directory structure and file names for the redundant chassis models.

![Diagram of compact flash directory structure](image)

**Files on the compact flash are:**

- **bof.cfg** — Boot option file
- **boot.ldr** — Bootstrap image
- **config.cfg** — Default configuration file
- **TIMOS-m.n.Yz:**
  - m — Major release number
  - n — minor release number
  - Y:
    - A — Alpha release
    - B — Beta release
    - M — Maintenance release
    - R — Released software
  - z — Version number
  - → **cpm.tim** — CPM image file
  - → **iom.tim** — IOM image file
Figure 4 displays the compact flash directory structure and file names for the 1-slot models.

![Diagram of compact flash directory structure]

**Figure 4: Files on the Compact Flash**

Files on the compact flash are:

- `bof.cfg` — Boot option file
- `boot.ldr` — Bootstrap image
- `config.cfg` — Default configuration file
- `TIMOS-m.n.Yz`:  
  - m — Major release number
  - n — Minor release number
  - Y:  
    - A — Alpha release
    - B — Beta release
    - M — Maintenance release
    - R — Released software
  - z — Version number
- `both.tim` — CPM and IOM image file
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.

When the runtime image is successfully loaded, control is passed from the bootstrap loader to the image. The runtime image attempts to locate the configuration file as configured in the BOF. Like the runtime image, three locations can be configured for the system to search for the configuration file. The locations can be local or remote. The first location searched is the primary configuration location. If not found, the secondary configuration location is searched, and lastly, the tertiary configuration location is searched. The configuration file include chassis, IOM, MDA, and port configurations, as well as system, routing, and service configurations.

Figure 5 displays the boot sequence.
The following displays an example of BOF output.

```
A:ALA-1>bof# show bof
=================================================================
Memory BOF
=================================================================
no autonegotiate
duplex full
speed 100
address 10.10.xx.xx/20 active
wait 3
primary-image cf3:\both.tim
primary-config cf3:\test123.cfg
primary-dns 192.168.xx.xx
persist on
dns-domain test.alcatel.com
=================================================================
A:ALA-1>bof#
```
Persistence

Optionally, the BOF `persist` parameter can specify whether the system should preserve system indexes when a `save` command is executed. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index, LSP IDs, path IDs, etc. If persistence is not required and the configuration file is successfully processed, then the system becomes operational. If `persist` is required, then a matching `x.ndx` file must be located and successfully processed before the system can become operational. Matching files (configuration and index files) must have the same filename prefix such as `test123.cfg` and `test123.ndx` and are created at the same time when a `save` command is executed. Note that the persistence option must be enabled to deploy the Network Management System (NMS). The default is off.

Traps, logs, and console messages are generated if problems occur and SNMP shuts down for all SNMP gets and sets, however, traps are issued.
Lawful Intercept

Lawful Intercept (LI) describes a process to intercept telecommunications by which law enforcement authorities can un-obtrusively monitor voice and data communications to combat crime and terrorism with higher security standards of lawful intercept capabilities in accordance with local law and after following due process and receiving proper authorization from competent authorities. The interception capabilities are sought by various telecommunications providers.

As lawful interception is subject to national regulation, requirements vary from one country to another. Alcatel-Lucent’s implementation satisfies most national standard’s requirements. LI is configurable for all service types.
Initial System Startup Process Flow

Figure 6 displays the process start your system. Note that this example assumes that the boot loader and BOF image and configuration files are successfully located.
Configuration Notes

This section describes BOF configuration caveats.

- For router initialization, the compact flash card must be installed in the Compact Flash #3 slot.
- The loading sequence is based on the order in which it is placed in the configuration file. It is loaded as it is read in at boot time.
Configuring Boot File Options with CLI

This section provides information to configure BOF parameters with CLI.

Topics in this section include:

- Configuring Boot File Options with CLI on page 159
- BOF Configuration Overview on page 160
- Basic BOF Configuration on page 161
- Common Configuration Tasks on page 162
- Configuring BOF Parameters on page 167
- Service Management Tasks on page 168
  → Viewing the Current Configuration on page 168
  → Modifying and Saving a Configuration on page 170
  → Saving a Configuration to a Different Filename on page 172
  → Rebooting on page 172
BOF Configuration Overview

Alcatel-Lucent 7450 ESS-Series routers do not contain a boot EEPROM. The boot loader code is loaded from the boot.ldr file. The BOF file performs the following tasks:

1. Sets up the CPM Ethernet port (speed, duplex, auto).
2. Assigns the IP address for the CPM Ethernet port.
3. Creates static routes for the CPM Ethernet port.
4. Sets the console port speed.
5. Configures the Domain Name System (DNS) name and DNS servers.
6. Configures the primary, secondary, tertiary configuration source.
7. Configures the primary, secondary, and tertiary image source.
8. Configures operational parameters.
Basic BOF Configuration

The parameters which specify location of the image filename that the router will try to boot from and the configuration file are in the BOF.

The most basic BOF configuration should have the following:

- Primary address
- Primary image location
- Primary configuration location

Following is a sample of a basic BOF configuration.

```
A:SR-45# show bof
===============================================================================
BOF (Memory)
===============================================================================
  primary-image  cf3:/4.0.R20
  primary-config cf3:/ospf_default.cfg
  address        138.120.189.53/24 active
  static-route   138.120.0.0/16 next-hop 138.120.189.1
  static-route   172.0.0.0/8 next-hop 138.120.189.1
  autonegotiate
  duplex         full
  speed          100
  wait           3
  persist        on
  console-speed  115200
===============================================================================
A:SR-45#
```
Common Configuration Tasks

The following sections are basic system tasks that must be performed.

- Searching for the BOF on page 163
  - Accessing the CLI on page 165
    - Console Connection on page 165
- Configuring BOF Parameters on page 167

For details about hardware installation and initial router connections, refer to the specific 7450 ESS-Series hardware installation guide.
Searching for the BOF

The BOF should be on the same drive as the boot loader file. If the system cannot load or cannot find the BOF, then the system checks whether the boot sequence was manually interrupted. The system prompts for a different image and configuration location.

The following example displays an example of the output when the boot sequence is interrupted.

...  

Hit a key within 3 seconds to change boot parms...

You must supply some required Boot Options. At any prompt, you can type:

"restart" - restart the query mode.
"reboot" - reboot.
"exit" - boot with with existing values.

Press ENTER to begin, or 'flash' to enter firmware update...

Software Location
------------------
You must enter the URL of the TiMOS software.
The location can be on a Compact Flash device, or on the network.

Here are some examples
  cf31:/timos1.0R1
  ftp://user:passwd@192.168.xx.xxx/./timos1.0R1
  tftp://192.168.xx.xxx/./timos1.0R1

The existing Image URL is 'ftp://vxworks:vxw0rks@192.168.xx.xxx/./rel/0.0/xx'
Press ENTER to keep it.
Software Image URL:
Using: 'ftp://vxworks:vxw0rks@192.168.xx.xxx/./rel/0.0/xx'

Configuration File Location
---------------------------
You must enter the location of configuration
file to be used by TiMOS. The file can be on
a Compact Flash device, or on the network.

Here are some examples
  cf1:/config.cfg
  ftp://user:passwd@192.168.xx.xxx/./config.cfg
  tftp://192.168.xx.xxx/./config.cfg

The existing Config URL is 'cf31:/config.cfg'
Press ENTER to keep it, or the word 'none' for no Config URL.
Config File URL:
Using: 'cf31:/config.cfg'

Network Configuration
----------------------
You specified a network location for either the
software or the configuration file. You need to
assign an IP address for this system.

The IP address should be entered in standard
dotted decimal form with a network length.
example: 192.168.xx.xxx/24

Displays
on non-
Redundant
Models

The existing IP address is 192.168.xx.xxx/20. Press ENTER to keep it.
Enter IP Address:

Display on
Redundant
models

The existing Active IP address is 192.168.xx.xxx/20. Press ENTER to keep it.
Enter Active IP Address:

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):

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.xxx/20 active
primary-dns 192.168.xx.xx
dns-domain xxx.xxx.com
static-route 1.x.x.0/24 next-hop 192.168.xx.xxx
autonegotiate
duplex full
speed 100
wait 3
persist off

Do you want to overwrite cf3:/bof.cfg with the new settings? (yes/no): y
Successfully saved the new settings in cf3:/bof.cfg
Accessing the CLI

To access the CLI to configure the software for the first time, follow these steps:

- When the SF/CPM is installed and power to the chassis is turned on, the 7450 ESS 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).

Console Connection

To establish a console connection, you will need the following:

- An ASCII terminal or a PC running terminal emulation software set to the parameters shown in the table below.
- A standard serial cable with a male DB9.

Table 24: Console Configuration Parameter Values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud Rate</td>
<td>115,200</td>
</tr>
<tr>
<td>Data Bits</td>
<td>8</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
</tr>
<tr>
<td>Stop Bits</td>
<td>1</td>
</tr>
<tr>
<td>Flow Control</td>
<td>None</td>
</tr>
</tbody>
</table>
Figure 7 displays an example of the Console port on a 7450 ESS-1 front panel.

**Figure 7: 7450 ESS-1 Front Panel Console Port**

To establish a console connection:

**Step 1** Connect the terminal to the Console port on the front panel using the serial cable.

**Step 2** Power on the terminal.

**Step 3** Establish the connection by pressing the <Enter> key a few times on your terminal keyboard.

**Step 4** At the router prompt, enter the login and password.
   - The default login is `admin`.
   - The default password is `admin`.
Configuring BOF Parameters

The following output displays a BOF configuration:

A:ALA-1>bof# show bof
==================================================================
Memory BOF
==================================================================
no autonegotiate
duplex full
speed 100
address 10.10.xx.xx/20 active
wait 3
primary-image cf3:\both.tim
primary-config cf3:\test123.cfg
primary-dns 192.168.xx.xx
persist on
dns-domain test.alcatel.com
==================================================================
A:ALA-1>bof#
Service Management Tasks

This section discusses the following service management tasks:

- System Administration Commands on page 168
- Viewing the Current Configuration on page 168
- Modifying and Saving a Configuration on page 170
- Deleting BOF Parameters on page 171
- Saving a Configuration to a Different Filename on page 172

System Administration Commands

Use the following administrative commands to perform management tasks.

**CLI Syntax:**

A:ALA-1# admin
display-config
reboot [active|standby] [now]
save [file-url] [detail] [index]

Viewing the Current Configuration

Use one of the following CLI commands to display the current configuration. The *detail* option displays all default values. The *index* option displays only the persistent indices. The *info* command displays context-level information.

**CLI Syntax:**

admin# display-config [detail|index]
info detail

The following displays an example of a configuration file:

A:7450-3>admin# display-config
# TimOS B-1.0.1630 - Copyright (c) 2000-2007 Alcatel, Inc.
# Built on Tues Jan 30 21:39:07 2007 by builder in /rel1.0/1630/panos/ma

# Generated WED FEB 26 06:15:29 2003 UTC

exit all
configure
#--------------------------------------------------
echo "System Configuration"
#--------------------------------------------------
system
    name "7450-3"
    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 "7450-3"
exit
time
  snmp
  shutdown
exit
zone UTC
exit
thresholds
  rmon
exit
exit
exit...
...
Modifying and Saving a Configuration

If you modify a configuration file, the changes remain in effect only during the current power cycle unless a `save` command is executed. Changes are lost if the system is powered down or the router is rebooted without saving.

- Specify the file URL location to save the running configuration. If a destination is not specified, the files are saved to the location where the files were found for that boot sequence. The same configuration can be saved with different file names to the same location or to different locations.
- The `detail` option adds the default parameters to the saved configuration.
- The `index` option forces a save of the index file.
- Changing the active and standby addresses without reboot standby CPM may cause a boot-env sync to fail.

The following command saves a configuration:

**CLI Syntax:**  `bof# save [cflash-id]`

**Example:**  
```
A:ALA-1# bof
A:ALA-1>bof# save cf3:
A:ALA-1>bof#
```

The following command saves the system configuration:

**CLI Syntax:**  `admin# save [file-url] [detail] [index]`

**Example:**  
```
A:ALA-1# admin save cf3:\test123.cfg
Saving config.# Saved to cf3:\test123.cfg
... complete
A:ALA-1#
```

**NOTE:** If the `persist` option is enabled and the `admin save file-url` command is executed with an FTP path used as the `file-url` parameter, two FTP sessions simultaneously open to the FTP server. The FTP server must be configured to allow multiple sessions from the same login, otherwise, the configuration and index files will not be saved correctly.
Deleting BOF Parameters

You can delete specific BOF parameters. The no form of these commands removes the parameter from configuration. The changes remain in effect only during the current power cycle unless a save command is executed. Changes are lost if the system is powered down or the router is rebooted without saving.

Deleting a BOF address entry is not allowed from a Telnet session.

Use the following CLI syntax to save and remove BOF configuration parameters:

**CLI Syntax:**
```
bof# save [cflash-id]
```

**Example:**
```
A:ALA-1# bof
A:ALA-1>bof# save cf3:
A:ALA-1>bof#
```

**CLI Syntax:**
```
bof#
no address ip-address/mask [active | standby]
no autonegotiate
no console-speed
no dns-domain
no li-local-save
no li-separate
no primary-config
no primary-dns
no primary-image
no secondary-config
no secondary-dns
no secondary-image
no static-route ip-address/mask next-hop ip-address
no tertiary-config
no tertiary-dns
no tertiary-image
```
Saving a Configuration to a Different Filename

Save the current configuration with a unique filename to have additional backup copies and to edit parameters with a text editor. You can save your current configuration to an ASCII file.

Use either of the following CLI syntax to save a configuration to a different location:

**CLI Syntax:**
```
bof# save [cflash-id]
```

**Example:**
```
A:ALA-1# bof
A:ALA-1>bof# save cf3:
A:ALA-1>bof#
```

or

**CLI Syntax:**
```
admin# save [file-url] [detail] [index]
```

**Example:**
```
A:ALA-1>admin# save cf3:\testABC.cfg
Saving config.# Saved to cf3:\testABC.cfg
... complete
A:ALA-1#
```

Rebooting

When an `admin>reboot` command is issued, routers with redundant CPM are rebooted as well as the IOMs. Changes are lost unless the configuration is saved. Use the `admin>save file-url` command to save the current configuration. If no command line options are specified, the user is prompted to confirm the reboot operation.

Use the following CLI syntax to reboot:

**CLI Syntax:**
```
admin# reboot [active|standby] [now]
```

**Example:**
```
A:ALA-1>admin# reboot
A:DutA>admin# reboot
Are you sure you want to reboot (y/n)? y
Resetting...OK

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...
BOF Command Reference

Command Hierarchies

Configuration Commands

```
bof
  — [no] address/ip-prefix/ip-prefix-length [active | standby]
  — [no] autonegotiate
  — console-speed baud-rate
  — no console-speed
  — dns-domain dns-name
  — no dns-domain
  — duplex {full | half}
  — [no] li-local-save
  — [no] li-separate
  — persist {on | off}
  — primary-config file-url
  — no primary-config
  — primary-dns ip-address
  — no primary-dns
  — primary-image file-url
  — no primary-image
  — save [cflash-id]
  — secondary-config file-url
  — no secondary-config
  — [no] secondary-dns ip-address
  — secondary-image file-url
  — no secondary-image
  — speed speed
  — [no] static-route ip-prefix/ip-prefix-length next-hop ip-address
  — tertiary-config file-url
  — no tertiary-config
  — [no] tertiary-dns ip-address
  — tertiary-image file-url
  — no tertiary-image
  — wait seconds
```
Show Commands

```
show
  - bof [cflash-id | booted]
  - boot-messages
```
Configuration Commands

File Management Commands

bof

Syntax:  bof
Context:  <ROOT>
Description:  This command creates or edits the boot option file (BOF) for the specified local storage device.
A BOF file specifies where the system searches for runtime images, configuration files, and other operational parameters during system initialization.
BOF parameters can be modified. Changes can be saved to a specified compact flash. The BOF must be located in the root directory of either an internal or external compact flash local to the system and have the mandatory filename of bof.cfg.
When modifications are made to in-memory parameters that are currently in use or operating, the changes are effective immediately. For example, if the IP address of the management port is changed, the change takes place immediately.
Only one entry of the BOF configuration command statement can be saved once the statement has been found to be syntactically correct.
When opening an existing BOF that is not the BOF used in the most recent boot, a message is issued notifying the user that the parameters will not affect the operation of the node.
No default boot option file exists. The router boots with the factory default boot sequence and options.
Default:  none

save

Syntax:  save [cflash-id]
Context:  bof
Description:  This command uses the boot option parameters currently in memory and writes them from the boot option file to the specified compact flash.
The BOF must be located in the root directory of the internal or external compact flash drives local to the system and have the mandatory filename of bof.cfg.
If a location is not specified, the BOF is saved to the default compact flash drive (cf3:) on the active CPM (typically the CPM in slot A, but the CPM in slot B could also be acting as the active CPM). The slot name is not case-sensitive. You can use upper or lowercase “A” or “B”.
Command usage:

- **bof save** — Saves the BOF to the default drive (cf3:) on the active CPM (either in slot A or B).
- **bof save cf3:** — Saves the BOF to cf3: on the active CPM (either in slot A or B).

To save the BOF to a compact flash drive on the standby CPM (for example, the redundant (standby) CPM is installed in slot B), specify -A or -B option.

Command usage:

- **bof save cf3-A:** — Saves the BOF to cf3: on CPM in 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** — The compact flash ID where the **bof.cfg** is to be saved.

  **Values**
  
  cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

  **Default**
  
  cf3:
BOF Processing Control

wait

Syntax     wait seconds
Context     bof
Description  This command configures a pause, in seconds, at the start of the boot process which allows system initialization to be interrupted at the console.

When system initialization is interrupted the operator is allowed to manually override the parameters defined in the boot option file (BOF).

Only one wait command can be defined in the BOF.

Default    3
Parameters  seconds — The time to pause at the start of the boot process, in seconds.

   Values  1 — 10
Console Port Configuration

console-speed

**Syntax**

console-speed baud-rate
no console-speed

**Context**

bof

**Description**

This command configures the console port baud rate.

When this command is issued while editing the BOF file used for the most recent boot, both the BOF file and the active configuration are changed immediately.

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

**Default**

115200 — console configured for 115,200 bps operation

**Parameters**

*baud-rate* — The console port baud rate, expressed as a decimal integer.

**Values**

9600, 19200, 38400, 57600, 115200
**Image and Configuration Management**

**persist**

| Syntax    | persist {on | off} |
|-----------|------------------|
| Context   | bof              |
| **Description** | This command specifies whether the system will preserve system indexes when a **save** command is executed. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index, LSP IDs, path IDs, etc. This reduces resynchronizations of the Network Management System (NMS) with the affected network element. |
| **Description** | 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. |
| **Description** | If **persist** is enabled and the **admin save <url>** command is executed with an FTP path used as the **<url>** parameter, two FTP sessions simultaneously open to the FTP server. The FTP server must be configured to allow multiple sessions from the same login, otherwise, the configuration and index files will not be saved correctly. |
| **Notes:** | • Persistency files (.ndx) are saved on the same disk as the configuration files and the image files. |
| **Notes:** | • When an operator sets the location for the persistency file, the system will check to ensure that the disk has enough free space. If this there is not enough free space, the persistency will not become active and a trap will be generated. Then, it is up to the operator to free adequate disk space. In the meantime, the system will perform a space availability check every 30 seconds. As soon as the space is available the persistency will become active on the next (30 second) check. |
| **Default** | **off** |
| **Parameters** | **on** — Create when saving the configuration. |
| **Parameters** | **off** — Disables the system index saves between reboots. |
File Management Commands

primary-config
Syntax
Context
Description

primary-config file-url
no primary-config
bof
This command specifies the name and location of the primary configuration file.
The system attempts to use the configuration specified in primary-config. If the specified file cannot
be located, the system automatically attempts to obtain the configuration from the location specified
in secondary-config and then the tertiary-config.
Note that if an error in the configuration file is encountered, the boot process aborts.
The no form of the command removes the primary-config configuration.

Default
Parameters

none
file-url — The primary configuration file location, expressed as a file URL.
Values

file-url
local-url
remote-url
cflash-id

[local-url | remote-url] (up to 180 characters)
[cflash-id/][file-path]
[{ftp://|tftp://} login:pswd@remote-locn/][file-path]
cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

primary-image
Syntax
Context
Description

primary-image file-url
no primary image
bof
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 secondaryimage. If the secondary image load fails, the tertiary image specified in tertiary-image is used.
All runtime image files (cpm.tim & iom.tim) must be located in the same directory.
The no form of the command removes the primary-image configuration.

Default
Parameters

none
file-url — The location-url can be either local (this CPM) or a remote FTP server.
Values

Page 180

file-url
local-url
remote-url
cflash-id

[local-url | remote-url] (up to 180 characters)
[cflash-id/][file-path]
[{ftp://|tftp://} login:pswd@remote-locn/][file-path]
cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

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secondary-config

**Syntax**  
`secondary-config file-url`  
`no secondary-config`

**Context**  
`bof`

**Description**  
This command specifies the name and location of the secondary configuration file.

The system attempts to use the configuration as specified in `secondary-config` if the primary config cannot be located. If the `secondary-config` file cannot be located, the system attempts to obtain the configuration from the location specified in the `tertiary-config`.

Note that if an error in the configuration file is encountered, the boot process aborts.

The `no` form of the command removes the `secondary-config` configuration.

**Default**  
`none`

**Parameters**  
`file-url` — The secondary configuration file location, expressed as a file URL.

<table>
<thead>
<tr>
<th>Values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>file-url</code></td>
<td>`[local-url</td>
</tr>
<tr>
<td><code>local-url</code></td>
<td><code>[cflash-id]/[file-path]</code></td>
</tr>
<tr>
<td><code>remote-url</code></td>
<td>`[[ftp://</td>
</tr>
<tr>
<td><code>cflash-id</code></td>
<td><code>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</code></td>
</tr>
</tbody>
</table>

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 (cpm.tim & iom.tim) must be located in the same directory.

The `no` form of the command removes the `secondary-image` configuration.

**Default**  
`none`

**Parameters**  
`file-url` — The `file-url` can be either local (this CPM) or a remote FTP server.

<table>
<thead>
<tr>
<th>Values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>file-url</code></td>
<td>`[local-url</td>
</tr>
<tr>
<td><code>local-url</code></td>
<td><code>[cflash-id]/[file-path]</code></td>
</tr>
<tr>
<td><code>remote-url</code></td>
<td>`[[ftp://</td>
</tr>
<tr>
<td><code>cflash-id</code></td>
<td><code>cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:</code></td>
</tr>
</tbody>
</table>
tertiary-config

Syntax  tertiary-config file-url  
        no tertiary-config

Context  bof

Description  This command specifies the name and location of the tertiary configuration file.

The system attempts to use the configuration specified in tertiary-config if both the primary and secondary config files cannot be located. If this file cannot be located, the system boots with the factory default configuration.

Note that if an error in the configuration file is encountered, the boot process aborts.

The no form of the command removes the tertiary-config configuration.

Default  none

Parameters  file-url — The tertiary configuration file location, expressed as a file URL.

Values  
        local-url  [cflash-id][/file-path]
        cflash-id  cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
        remote-url  [{ftp://|tftp://} login:pswd@remote-locn]/[file-path]

tertiary-image

Syntax  tertiary-image file-url  
        no tertiary-image

Context  bof

Description  This command specifies the tertiary directory location for runtime image file loading.

The system attempts to load all runtime image files configured in the primary-image first. If this fails, the system attempts to load the runtime images from the location configured in the secondary-image. If the secondary image load fails, the tertiary image specified in tertiary-image is used.

All runtime image files (cpm.tim & iom.tim) must be located in the same directory.

The no form of the command removes the tertiary-image configuration.

Default  none

Parameters  file-url — The location-url can be either local (this CPM) or a remote FTP server.

Values  
        file-url  [local-url | remote-url] (up to 180 characters)
        local-url  [cflash-id][/file-path]
        remote-url  [{ftp://|tftp://} login:pswd@remote-locn]/[file-path]
        cflash-id  cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
Management Ethernet Configuration

address

Syntax: [no] address ip-prefix/ip-prefix-length [active | standby]

Context: bof

Description: This command assigns an IP address to the management Ethernet port on the active CPM in the running configuration and the Boot Option File (BOF) or the standby CPM for systems using redundant CPMs. Deleting a BOF address entry is not allowed from a Telnet session.

Note that changing the active and standby addresses without reboot standby CPM may cause a boot-env sync to fail.

The no form of the command deletes the IP address from the CPM Ethernet port.

Default: no address — There are no IP addresses assigned to Ethernet ports.

Parameters:

ip-prefix/ip-prefix-length — The destination address of the aggregate route in dotted decimal notation.

ipv4-prefix a.b.c.d (host bits must be 0)

ipv4-prefix-length 0 — 32

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

x: [0 — FFFF]H

d: [0 — 255]D

active | standby — Specifies which CPM Ethernet address is being configured: the active CPM Ethernet or the standby CPM Ethernet.

Default: active

autonegotiate

Syntax: [no] autonegotiate [limited]

Context: bof

Description: This command enables speed and duplex autonegotiation on the management Ethernet port in the running configuration and the Boot Option File (BOF).

When autonegotiation is enabled, the link attempts to automatically negotiate the link speed and duplex parameters. If autonegotiation is enabled, then the configured duplex and speed parameters are ignored.

The no form of the command disables the autonegotiate feature on this port.

autonegotiate — Autonegotiation is enabled on the management Ethernet port.
Parameters  limited — Specifies ethernet ports to be configurable to use link autonegotiation but with only a single speed/duplex combination advertised. This allows a specific speed/duplex to be guaranteed without having to turn off autonegotiation, which is not allowed for 1000BASE-T.

duplex

Syntax  duplex {full | half}
Context  bof
Description  This command configures the duplex mode of the CPM management Ethernet port when autonegotiation is disabled in the running configuration and the Boot Option File (BOF).

This configuration command allows for the configuration of the duplex mode of the CPM Ethernet interface. If the port is configured to autonegotiate this parameter will be ignored.

Default  duplex full — Full duplex operation.
Parameters  full — Sets the link to full duplex mode.
half — Sets the link to half duplex mode.

li-local-save

Syntax  [no] li-local-save
Context  bof
Description  This command enables the lawful intercept (LI) configuration to be saved locally.

li-separate

Syntax  [no] li-separate
Context  bof
Description  This command enables separate access to lawful intercept (LI) information.

speed

Syntax  speed speed
Context  bof
Description  This command configures the speed for 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** — 100 M/bps operation.

**Parameters**

- **10** — Sets the link to 10 M/bps speed.
- **100** — Sets the link to 100 M/bps speed.

---

### static-route

**Syntax**

```
[no] static-route ip-prefix/ip-prefix-length next-hop ip-address
```

**Context**

bof

**Description**

This command creates a static route entry for the CPM management Ethernet port in the running configuration and the Boot Option File (BOF).

This command allows manual configuration of static routing table entries. These static routes are only used by traffic generated by the CPM Ethernet port. To reduce configuration, manual address aggregation should be applied where possible.

A static default (0.0.0.0/0 or ::/0) route cannot be configured on the CPM Ethernet port. A maximum of 10 static routes can be configured on the CPM port.

The no form of the command deletes the static route.

**Default**

No default routes are configured.

**Parameters**

- **ip-prefix/ip-prefix-length** — The destination address of the static route in dotted decimal notation.
  
  **Values**
  
  - `ipv4-prefix`: a.b.c.d (host bits must be 0)
  - `ipv4-prefix-length`: 0 — 32
  
  - `ipv4-address`: a.b.c.d

- **mask** — The subnet mask, expressed as an integer or in dotted decimal notation.

  **Values**
  
  - `1` — 32 (mask length), `128.0.0.0` — `255.255.255.255` (dotted decimal)

- **next-hop ip-address** — The next hop IP address used to reach the destination.
DNS Configuration Commands

dns-domain

Syntax
dns-domain dns-name
no dns-domain

Context bof

Description This command configures the domain name used when performing DNS address resolution. This is a required parameter if DNS address resolution is required. Only a single domain name can be configured. If multiple domain statements are configured, the last one encountered is used. The no form of the command removes the domain name from the configuration.

Default no dns-domain — No DNS domain name is configured.

Parameters
dns-name — Specifies the DNS domain name up to 32 characters in length.

primary-dns

Syntax primary-dns ip-address
no primary-dns

Context bof

Description This command configures the primary DNS server used for DNS name resolution. DNS name resolution can be used when executing ping, traceroute, and service-ping, and also when defining file URLs. DNS name resolution is not supported when DNS names are embedded in configuration files. The no form of the command removes the primary DNS server from the configuration.

Default no primary-dns — No primary DNS server is configured.

Parameters ip-address — The IP address of the primary DNS server.

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

secondary-dns

[no] secondary-dns ip-address

Context bof

Description This command configures the secondary DNS server for DNS name resolution. The secondary DNS server is used only if the primary DNS server does not respond.
DNS name resolution can be used when executing ping, traceroute, and service-ping, and also when defining file URLs. DNS name resolution is not supported when DNS names are embedded in configuration files.

The **no** form of the command removes the secondary DNS server from the configuration.

**Default**

**no secondary-dns** — No secondary DNS server is configured.

**Parameters**

*ip-address* — The IP address of the secondary DNS server.

**Values**

ipv4-address - a.b.c.d

---

tertiary-dns

**Syntax**

```
[no] tertiary-dns ip-address
```

**Context**

bof

**Description**

This command configures the tertiary DNS server for DNS name resolution. The tertiary DNS server is used only if the primary DNS server and the secondary DNS server do not respond.

DNS name resolution can be used when executing ping, traceroute, and service-ping, and also when defining file URLs. DNS name resolution is not supported when DNS names are embedded in configuration files.

The **no** form of the command removes the tertiary DNS server from the configuration.

**Default**

**no tertiary-dns** — No tertiary DNS server is configured.

**Parameters**

*ip-address* — The IP address of the tertiary DNS server.

**Values**

ipv4-address - a.b.c.d
Show Commands

bof

**Syntax**  
bof [cflash-id | booted]

**Context**  
show

**Description**  
This command displays the Boot Option File (BOF) executed on last system boot or on the specified device.

If no device is specified, the BOF used in the last system boot displays. If the BOF has been modified since the system boot, a message displays.

**Parameters**  
cflash-id. The cflash directory name. The slot name is not case-sensitive. Use upper or lowercase “A” or “B” for the slot name.

- Values  
  - cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

  booted — Displays the boot option file used to boot the system.

**Output**  
Show BOF Fields — The following table describes BOF output fields.

**Table 25: Show BOF Output Fields**

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>primary-image</td>
<td>The primary location of the directory that contains the runtime images of both CPM and IOM.</td>
</tr>
<tr>
<td>primary-config</td>
<td>The primary location of the file that contains the configuration.</td>
</tr>
<tr>
<td>primary-dns</td>
<td>The primary DNS server for resolution of host names to IP addresses.</td>
</tr>
<tr>
<td>secondary-image</td>
<td>The secondary location of the directory that contains the runtime images of both CPM and IOM.</td>
</tr>
<tr>
<td>secondary-config</td>
<td>The secondary location of the file that contains the configuration.</td>
</tr>
<tr>
<td>secondary-dns</td>
<td>The secondary DNS server for resolution of host names to IP addresses.</td>
</tr>
<tr>
<td>tertiary-image</td>
<td>The tertiary location of the directory that contains the runtime images of both CPM and IOM.</td>
</tr>
<tr>
<td>tertiary-config</td>
<td>The tertiary location of the file that contains the configuration.</td>
</tr>
<tr>
<td>address</td>
<td>The IP address and mask associated with the CPM Ethernet port or the secondary CPM port.</td>
</tr>
<tr>
<td>tertiary-dns</td>
<td>The tertiary DNS server for resolution of host names to IP addresses.</td>
</tr>
</tbody>
</table>
### Table 25: Show BOF Output Fields (Continued)

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>persist</td>
<td>on — Persistent indexes between system reboots is enabled.</td>
</tr>
<tr>
<td></td>
<td>off — Persistent indexes between system reboots is disabled.</td>
</tr>
<tr>
<td>wait</td>
<td>The time configured for the boot to pause while waiting for console input.</td>
</tr>
<tr>
<td>autonegotiate</td>
<td>No autonegotiate — Autonegotiate not enabled.</td>
</tr>
<tr>
<td></td>
<td>autonegotiate — Autonegotiate is enabled.</td>
</tr>
<tr>
<td>duplex</td>
<td>half — Specifies that the system uses half duplex.</td>
</tr>
<tr>
<td></td>
<td>full — Specifies that the system uses full duplex.</td>
</tr>
<tr>
<td>speed</td>
<td>The speed of the CPM Ethernet interface.</td>
</tr>
<tr>
<td>console speed</td>
<td>The console port baud rate.</td>
</tr>
<tr>
<td>dns domain</td>
<td>The domain name used when performing DNS address resolution.</td>
</tr>
<tr>
<td>uplinkA-address</td>
<td>Displays the Uplink-A IP address.</td>
</tr>
<tr>
<td>uplinkA-port</td>
<td>Displays the primary port to be used for auto-boot.</td>
</tr>
<tr>
<td>uplinkA-route</td>
<td>Displays the static route associated with Uplink-A.</td>
</tr>
<tr>
<td>uplinkA-vlan</td>
<td>Displays the VLAN ID to be used on Uplink-A.</td>
</tr>
<tr>
<td>uplinkB-address</td>
<td>Displays the Uplink-B IP address.</td>
</tr>
<tr>
<td>uplinkB-port</td>
<td>Displays the secondary port to be used for auto-boot.</td>
</tr>
<tr>
<td>uplinkB-route</td>
<td>Displays the static route associated with Uplink-B.</td>
</tr>
<tr>
<td>uplinkB-vlan</td>
<td>Displays the VLAN ID to be used on Uplink-B.</td>
</tr>
</tbody>
</table>

### 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   full
  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#
Show Commands

boot-messages

<table>
<thead>
<tr>
<th>Syntax</th>
<th>boot-messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>show</td>
</tr>
<tr>
<td>Description</td>
<td>This command displays boot messages generated during the last system boot.</td>
</tr>
<tr>
<td>Output</td>
<td>Show Boot Messages Fields — The following output shows boot message output fields.</td>
</tr>
</tbody>
</table>

Sample Output

ALA-## show boot-messages
Boot log started on CPU#0
   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 0x22000000 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'
   Board Serial Number is 'eng02-15'
   Chassis type 4 (sr1) found in BP 1 EEPROM
   Chassis Serial Number is '0203210096'
   JTAG chain length = 2
   All requested FPGAs on chain programmed
   Searching for boot.ldr on local drives:
   Searching cf3 for boot.ldr...
   ******************************************************
   Loaded 0x001bc191 bytes from cf3 to 0x80400000
   Decompressing to address 0x0a000000
   Starting code...

   Total Memory: 512MB  Chassis Type: sr1  Card Type: england_r1
   TiMOS-L-1.2.B1-7 boot/hops/T2.02  Copyright (c) 2000-2003 Alcatel, Inc.
   Built on Mon Jul 14 15:15:25 2003 by builder in /rel1.2/b1/B1-7/panos/main

   TiMOS BOOT LOADER
   Time from clock is THU AUG 14 08:39:03 2003 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, Wed Aug 13 21:24:57 2003 by builder in /rel0.0/I129/panos/main

Text: (8906865-->21711576) + data: (587508--->5418992)
Executing TiMOS image at 0x2800000

Total Memory: 512MB  Chassis Type: sr1  Card Type: england_r1
TiMOS-B-0.0.I129 both/hops/T2.02  Copyright (c) 2000-2003 Alcatel.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Aug 13 21:24:57 2003 by builder in /rel0.0/I129/panos/main

Time from clock is THU AUG 14 08:39:11 2003 UTC
Attempting to exec configuration file:
'cf3:\config.cfg' ...
System Configuration
Log Configuration
Card Configuration
Port Configuration
Router (Network Side) Configuration
Service Configuration
Router (Service Side) Configuration
Executed 232 lines in 0.0 seconds from file cf3:\config.cfg
ALA-1#
System Management

In This Chapter

This chapter provides information about configuring basic system management parameters.

Topics in this chapter include:

• System Management Parameters on page 197
  → System Information on page 197
    – System Name on page 197
    – System Contact on page 197
    – System Location on page 198
    – System Coordinates on page 198
    – Naming Objects on page 198
    – Naming Objects on page 198
    → System Time on page 200
      – Time Zones on page 200
      – Network Time Protocol (NTP) on page 202
      – SNTP Time Synchronization on page 203
      – CRON on page 204

• High Availability on page 205
  → HA Features on page 205
    – HA Features on page 205
      • Redundancy on page 206
      • Nonstop Forwarding on page 209
      • Nonstop Routing (NSR) on page 210
      • CPM Switchover on page 211
      • Synchronization on page 212
→ Synchronization and Redundancy on page 213
  — Synchronous Ethernet on page 223
  — Boot-Env Option on page 235
  — Config Option on page 235
  — Active and Standby Designations on page 214
  — When the Active CPM Goes Offline on page 215
  — Persistence on page 216
• Network Synchronization on page 217
  — Synchronous Ethernet on page 223
  — Synchronous Ethernet on page 223
  — Clock Source Quality Level Definitions on page 224
  — DS1 Signals on page 221
  — E1 Signals on page 221
• Link Layer Discovery Protocol (LLDP) on page 227
• Administrative Tasks on page 230
  → Configuring the Chassis Mode on page 230
  → Saving Configurations on page 232
  → Specifying Post-Boot Configuration Files on page 233
  → Network Timing on page 234
  → Power Supplies on page 234
System Management Parameters

System management commands allow you to configure basic system management functions such as the system name, the router’s location and coordinates, and CLLI code as well as time zones, Network Time Protocol (NTP), Simple Network Time Protocol (SNTP) properties, CRON and synchronization properties.

System Information

System information components include:

- System Name on page 197
- System Contact on page 197
- System Location on page 198
- System Coordinates on page 198
- Naming Objects on page 198

System Name

The system name is the MIB II (RFC 1907, Management Information Base for Version 2 of the Simple Network Management Protocol (SNMPv2)) sysName object. By convention, this text string is the node’s fully-qualified domain name. The system name can be any ASCII printable text string of up to 32 characters.

System Contact

The system contact is the MIB II sysContact object. By convention, this text string is a textual identification of the contact person for this managed node, together with information on how to contact this person. The system contact can be any ASCII printable text string of up to 80 characters.
System Location

The system location is the MIB II sysLocation object which is a text string conventionally used to describe the node’s physical location, for example, “Bldg MV-11, 1st Floor, Room 101”. The system location can be any ASCII printable text string of up to 80 characters.

System Coordinates

The system coordinates is the Alcatel-Lucent Chassis MIB tmnxChassisCoordinates object. This text string indicates the Global Positioning System (GPS) coordinates of the location of the chassis.

Two-dimensional GPS positioning offers latitude and longitude information as a four dimensional vector:

\[
\langle \text{direction}, \text{hours}, \text{minutes}, \text{seconds} \rangle
\]

where direction is one of the four basic values: N, S, W, E, hours ranges from 0 to 180 (for latitude) and 0 to 90 for longitude, and minutes and seconds range from 0 to 60.

\(<W, 122, 56, 89>\) is an example of longitude and \(<N, 85, 66, 43>\) is an example of latitude.

System coordinates can be expressed in different notations, examples include:

- N 45 58 23, W 34 56 12
- N37 37' 00 latitude, W122 22' 00 longitude
- N36*39.246' W121*40.121

The system coordinates can be any ASCII printable text string up to 80 characters.

Naming Objects

It is discouraged to configure named objects with a name that starts with “_tmnx_” and with “_” in general.
Common Language Location Identifier

A Common Language Location Identifier (CLLI) code string for the device is an 11-character standardized geographic identifier that uniquely identifies the geographic location of places and certain functional categories of equipment unique to the telecommunications industry. The CLLI code is stored in the Alcatel-Lucent Chassis MIB tmnxChassisCLLICode object.

The CLLI code can be any ASCII printable text string of up to 11 characters.
System Time

7450 ESS-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 7450 ESS OS software has options for local time translation as well as system clock synchronization.

System time parameters include:

- Time Zones on page 200
- Network Time Protocol (NTP) on page 202
- SNTP Time Synchronization on page 203
- CRON on page 204

Time Zones

Setting a time zone in 7450 ESS OS allows for times to be displayed in the local time rather than in UTC. The 7450 ESS OS has both user-defined and system defined time zones.

A user-defined time zone has a user assigned name of up to four printable ASCII characters in length and unique from the system-defined time zones. For user-defined time zones, the offset from UTC is configured as well as any summer time adjustment for the time zone.

The 7450 ESS OS system-defined time zones are listed in Table 26 which includes both time zones with and without summer time correction.

Table 26: System-defined Time Zones

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Time Zone Name</th>
<th>UTC Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GMT</td>
<td>Greenwich Mean Time</td>
<td>UTC</td>
</tr>
<tr>
<td>BST</td>
<td>British Summer Time</td>
<td>UTC +1</td>
</tr>
<tr>
<td>IST</td>
<td>Irish Summer Time</td>
<td>UTC +1*</td>
</tr>
<tr>
<td>WET</td>
<td>Western Europe Time</td>
<td>UTC</td>
</tr>
<tr>
<td>WEST</td>
<td>Western Europe Summer Time</td>
<td>UTC +1</td>
</tr>
<tr>
<td>CET</td>
<td>Central Europe Time</td>
<td>UTC +1</td>
</tr>
<tr>
<td>CEST</td>
<td>Central Europe Summer Time</td>
<td>UTC +2</td>
</tr>
<tr>
<td>EET</td>
<td>Eastern Europe Time</td>
<td>UTC +2</td>
</tr>
<tr>
<td>EEST</td>
<td>Eastern Europe Summer Time</td>
<td>UTC +3</td>
</tr>
</tbody>
</table>
### Table 26: System-defined Time Zones  (Continued)

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Time Zone Name</th>
<th>UTC Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSK</td>
<td>Moscow Time</td>
<td>UTC +3</td>
</tr>
<tr>
<td>MSD</td>
<td>Moscow Summer Time</td>
<td>UTC +4</td>
</tr>
<tr>
<td><strong>US and Canada</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AST</td>
<td>Atlantic Standard Time</td>
<td>UTC -4</td>
</tr>
<tr>
<td>ADT</td>
<td>Atlantic Daylight Time</td>
<td>UTC -3</td>
</tr>
<tr>
<td>EST</td>
<td>Eastern Standard Time</td>
<td>UTC -5</td>
</tr>
<tr>
<td>EDT</td>
<td>Eastern Daylight Saving Time</td>
<td>UTC -4</td>
</tr>
<tr>
<td>ET</td>
<td>Eastern Time</td>
<td>Either as EST or EDT, depending on place and time of year</td>
</tr>
<tr>
<td>CST</td>
<td>Central Standard Time</td>
<td>UTC -6</td>
</tr>
<tr>
<td>CDT</td>
<td>Central Daylight Saving Time</td>
<td>UTC -5</td>
</tr>
<tr>
<td>CT</td>
<td>Central Time</td>
<td>Either as CST or CDT, depending on place and time of year</td>
</tr>
<tr>
<td>MST</td>
<td>Mountain Standard Time</td>
<td>UTC -7</td>
</tr>
<tr>
<td>MDT</td>
<td>Mountain Daylight Saving Time</td>
<td>UTC -6</td>
</tr>
<tr>
<td>MT</td>
<td>Mountain Time</td>
<td>Either as MST or MDT, depending on place and time of year</td>
</tr>
<tr>
<td>PST</td>
<td>Pacific Standard Time</td>
<td>UTC -8</td>
</tr>
<tr>
<td>PDT</td>
<td>Pacific Daylight Saving Time</td>
<td>UTC -7</td>
</tr>
<tr>
<td>PT</td>
<td>Pacific Time</td>
<td>Either as PST or PDT, depending on place and time of year</td>
</tr>
<tr>
<td>HST</td>
<td>Hawaiian Standard Time</td>
<td>UTC -10</td>
</tr>
<tr>
<td>AKST</td>
<td>Alaska Standard Time</td>
<td>UTC -9</td>
</tr>
<tr>
<td>AKDT</td>
<td>Alaska Standard Daylight Saving Time</td>
<td>UTC -8</td>
</tr>
<tr>
<td><strong>Australia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AWST</td>
<td>Western Standard Time (e.g., Perth)</td>
<td>UTC +8</td>
</tr>
<tr>
<td>ACST</td>
<td>Central Standard Time (e.g., Darwin)</td>
<td>UTC +9.5</td>
</tr>
<tr>
<td>AEST</td>
<td>Eastern Standard/Summer Time (e.g., Canberra)</td>
<td>UTC +10</td>
</tr>
</tbody>
</table>
Network Time Protocol (NTP)

NTP is the Network Time Protocol defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis*. 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 7450 ESS-Series device cannot act as stratum-1 servers but can act as stratum-2 devices as a network connection to an NTP server is required.

The higher stratum levels are separated from the stratum-1 server over a network path, thus, a stratum-2 server receives its time over a network link from a stratum-1 server. A stratum-3 server receives its time over a network link from a stratum-2 server.

The following NTP elements are supported:

- **Server mode** — In this mode, the node advertises the ability to act as a clock source for other network elements. In this mode, the node will, by default, transmit NTP packets in NTP version 4 mode.
- **Authentication keys** — Increased security support in carrier and other network has been implemented. Both DES and MD5 authentication are supported as well as multiple keys.
- **Operation in symmetric active mode** — This capability requires that NTP be synchronized with a specific node that is considered more trustworthy or accurate than other nodes carrying NTP in the system. This mode requires that a specific peer is set.
- **Broadcast or multicast modes** — When operating in these modes, the node will receive or send using either a multicast (default 224.0.1.1) or a broadcast address. Multicast is supported on the MGMT port.
- **Alert when NTP server is not available** — When none of the configured servers are reachable on the node, the system reverts to manual timekeeping and issues a critical alarm. When a server becomes available, a trap is issued indicating that standard operation has resumed.
- **NTP and SNTP** — If both NTP and SNTP are enabled on the node, then SNTP transitions to an operationally down state. If NTP is removed from the configuration or shut down, then SNTP resumes an operationally up state.
- **Gradual clock adjustment** — As several applications (such as Service Assurance Agent (SAA)) can use the clock, and if determined that a major (128 ms or more) adjustment needs to be performed, the adjustment is performed by programmatically stepping the clock. If a minor (less than 128 ms) adjustment must be performed, then the adjustment is
performed by either speeding up or slowing down the clock.

- In order to facilitate proper operation once the standby CPM takes over from the active CPM it is required that the time on the secondary CPM is synchronized with the clock of the active CPM.
- In order to avoid the generation of too many events/trap the NTP module will rate limit the generation of events/traps to three per second. At that point a single trap will be generated that indicates that event/trap squashing is taking place.

---

**SNTP Time Synchronization**

For synchronizing the system clock with outside time sources, the 7450 ESS 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.

In the 7450 ESS OS, the SNTP client can be configured for either broadcast or unicast client mode.
CRON

The CRON feature supports the Service Assurance Agent (SAA) functions as well as the ability to schedule turning on and off policies to meet “Time of Day” requirements. CRON functionality includes the ability to specify the commands that need to be run, when they will be scheduled, including one-time only functionality (oneshot), interval and calendar functions, as well as where to store the output of the results. In addition, CRON can specify the relationship between input, output and schedule. Scheduled reboots, peer turn ups, service assurance agent tests and more can all be scheduled with Cron, as well as OAM events, such as connectivity checks, or troubleshooting runs.

CRON features are saved to the configuration file on both primary and backup control modules. If a control module switchover occurs, CRON events are restored when the new configuration is loaded. If a control module switchover occurs during the execution of a cron script, the failover behavior will be determined by the contents of the script.

CRON features run serially with at least 255 separate schedules and scripts. Each instance can support a schedule where the event is executed any number of times.

The following CRON elements are supported:

- **Action** — Parameters for a script including the maximum amount of time to keep the results from a script run, the maximum amount of time a script may run, the maximum number of script runs to store and the location to store the results.
- **Schedule** — The schedule function configures the type of schedule to run, including one-time only (oneshot), periodic or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds).
- **Script** — The script command opens a new nodal context which contains information on a script.
- **Time Range** — ACLs and QoS policy configurations may be enhanced to support time based matching. CRON configuration includes time matching with the 'schedule' sub-command. Schedules are based on events; time-range defines an end-time used as a match criteria.
- **Time of Day** — Time of Day (TOD) suites are useful when configuring many types of time-based policies or when a large number of subscribers or SAPs require the same type of TOD changes. The TOD suite may be configured while using specific ingress or egress ACLs or QoS policies, and is an enhancement of the ingress and egress CLI trees.
High Availability

This section discusses the high availability (HA) routing options and features available to service providers that help diminish vulnerability at the network or service provider edge and alleviate the effect of a lengthy outage on IP networks.

High availability is an important feature in service provider routing systems. High availability is gaining momentum due to the unprecedented growth of IP services and applications in service provider networks driven by the demand from the enterprise and residential communities. Downtime can be very costly, and, in addition to lost revenue, customer information and business-critical communications can be lost. High availability is the combination of continuous uptime over long periods (Mean Time Between Failures (MTBF)) and the speed at which failover or recovery occurs (Mean Time To Repair (MTTR)).

The popularity of high availability routing is evident at the network or service provider edge where thousands of connections are hosted and rerouting options around a failed piece of equipment can often be limiting. Or, a single access link exists to a customer because of additional costs for redundant links. As service providers converge business-critical services such as real-time voice (VoIP), video, and VPN applications over their IP networks, high availability becomes much more stringent compared to the requirements for best-effort data. Network and service availability become critical aspects when offering advanced IP services which dictates that IP routers that are used to construct the foundations of these networks be resilient to component and software outages.

For high availability configuration information, refer to Synchronization and Redundancy on page 213.

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 ESS-7 model.

- Redundancy on page 206
  → Software Redundancy on page 206
  → Configuration Redundancy on page 207
  → Component Redundancy on page 207
  → Service Redundancy on page 208
  → Accounting Configuration Redundancy on page 208
- Nonstop Forwarding on page 209
• Nonstop Routing (NSR) on page 210
• CPM Switchover on page 211
• Synchronization on page 212
  → Configuration and boot-env Synchronization on page 212
  → State Database Synchronization on page 212

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 7740 ESS-Series OS Integrated Services Adapter Guide for information about redundancy for the Integrated Service Adapter (ISA).

Software Redundancy

Software outages are challenging even when baseline hardware redundancy is in place. There should be a balance to provide high availability routing otherwise router problems typically propagate not only throughout the service provider network, but also externally to other connected networks possibly belonging to other service providers. This could affect customers on a broad scale. Presently, there are several software availability features that contribute to the percentage of time that a router is available to process and forward traffic.

To fully appreciate high availability you should realize that all routing protocols specify minimum time intervals in which the peer device must receive an acknowledgement before it disconnects the session.

• OSPF default session timeout is approximately 40 seconds. The timeout intervals are configurable.

Therefore, router software has to recover faster than the specified time interval to maintain up time.
**Configuration Redundancy**

Features configured on the active device CPM are saved on the standby CPM as well. When the active device CPM fails, these features are brought up on the standby device CPM that takes over the mastership.

Even with modern modular and stable software, the failure of route processor hardware or software can cause the router to reboot or cause other service impacting events. In the best circumstances, failure leads to the initialization of a redundant route processor, which hosts the standby software configuration, to become the active processor. The following options are available.

- **Warm standby** — The router image and configuration is already loaded on the standby route processor. However, the standby could still take a few minutes to become effective since it must first re-initialize connections by bringing up Layer 2 connections and Layer 3 routing protocols and then rebuild routing tables.
- **Hot standby** — The router image, configuration, and network state is already loaded on the standby and it receives continual updates from the active route processor and the swapover is immediate. However, hot standby affects conventional router performance as more frequent synchronization increases consumption of system resources. Newer generation service routers, like the 7750 SR-Series, 7450 ESS-Series, 7710 SR-Series, 7750 SR MG routers, address this issue because they already have extra processing built into the system.

---

**Component Redundancy**

7450 ESS-Series component redundancy is critical to reduce MTTR for the routing system and primarily consists of the following router features:

- **Dual route processor modules** — For a highly available architecture, redundant route processors (RPs) or Control Processor Modules (CPM) are essential. The route processor calculates the most efficient route to an Internet destination and communicates the best path information to peer routers. Rapid information synchronization between the primary and secondary route processor is crucial to minimize recovery time.
- **Dual switch fabric** — Failover to the backup switch fabric within a minimum time interval, preferably with no loss of traffic.
- **Redundant line cards** — Failover to the backup within a minimum time interval, preferably with no loss of traffic.
- **Redundant power supply** — A power module can be removed without impact on traffic.
- **Redundant fan** — Failure of a fan module without impacting traffic.
- **Hot swap** — Components in a live system can be replaced or become active without taking the system down or affecting traffic flow to/from other modules.
Router hardware architecture plays a key role in the availability of the system. The principle router architecture styles are centralized and distributed. In these architectures, both active and standby route processors, I/O modules (IOMs) (also called line cards), fans, and power supplies maintain a low MTTR for the routing system.

However, in a centralized architecture, packet processing and forwarding is performed in a central shared route processor and the individual IOMs (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 IOM. Distributing the forwarding engines off the central route processor and positioning one on each IOM lowers the impact of route processor failure as the line cards can continue to forward traffic during an outage.

The distributed system is better suited to enable the convergence of business critical services such as real-time voice (VoIP), Video, and VPN applications over IP networks with superior performance and scalability. The centralized architecture can be prone to performance bottleneck issues and limits service offerings through poor scalability which may lead to customer and service SLA violations.

---

**Service Redundancy**

All service-related statistics are kept during a switchover. Services, SDPs, and SAPs will remain up with a minimum loss of forwarded traffic during a CPM switchover.

---

**Accounting Configuration Redundancy**

When there is a switchover and the standby CPM becomes active, the accounting servers will be checked and if they are administratively up and capable of coming online (media present, etc.), the standby will be brought online and new accounting files will be created at that point. Users must manually copy the accounting records from the failed CPM.
Nonstop Forwarding

In a control plane failure or a forced switchover event, the router continues to forward packets using the existing stale forwarding information. Nonstop forwarding requires clean control plane and data plane separation. Usually the forwarding information is distributed to the IOMs.

Nonstop forwarding is used to notify peer routers to continue forwarding and receiving packets, even if the route processor (control plane) is not working or is in a switch-over state. Nonstop forwarding requires clean control plane and data plane separation and usually the forwarding information is distributed to the line cards. This method of availability has both advantages and disadvantages. Nonstop forwarding continues to forward packets using the existing stale forwarding information during a failure. This may cause routing loops and black holes, and also requires that surrounding routers adhere to separate extension standards for each protocol. Every router vendor must support protocol extensions for interoperability.
Nonstop Routing (NSR)

With NSR on the 7450 ESS-Series routers and 7210 SAS-Series 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 7450 ESS-Series routers supports all routing protocols. NSR makes it possible to keep the existing sessions (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. This is also called the Alcatel-Lucent Carrier Environment Internet System (ACEIS). NSR is a relatively new high availability technique. However, it is regarded the most promising to ensure IP packets continue to forward once a route processor fails and allows for in-service software upgrades.

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.

The following NSR entities remain intact after a switchover:

- OSPF adjacencies — OSPF neighbors do not see any change after the switchover.
- IS-IS adjacencies — IS-IS neighbors do not see any change after the switchover.
- RIP session — RIP neighbors do not see any change after the switchover.
- Frame Relay data-link connection identifiers.
- PPP and MLPPP sessions.
**CPM Switchover**

During a switchover, system control and routing protocol execution are transferred from the active to the standby CPM.

An automatic switchover may occur under the following conditions:

- A fault condition that causes the active CPM to crash or reboot.
- The active CPM is declared down (not responding).
- Online removal of the active CPM.

A manual switchover can occur under the following conditions:

- To force a switchover from an active CPM to a standby, use the `admin redundancy force-switchover` command. You can configure a batch file that executes after failover by using the `config system switchover-exec` and `admin redundancy force-switchover now` CLI commands.

Note that with the 7450 ESS-1 the `admin reboot [now]` CLI command does not cause a switchover but a reboot of the entire system.
Synchronization

Synchronization between the CPMs includes the following:

- Configuration and boot-env Synchronization on page 212
- State Database Synchronization on page 212

Configuration and boot-env Synchronization

Configuration and boot-env synchronization are supported in `admin>redundancy> synchronize` and `config>redundancy>synchronize` contexts.

State Database Synchronization

If a new standby CPM is inserted into the system, it synchronizes with the active CPM upon a successful boot process.

If the standby CPM is rebooted, it synchronizes with the active CPM upon a successful boot process.

When configuration or state changes occur, an incremental synchronization is conducted from the active CPM to the standby CPM.

If the synchronization fails, the standby does not reboot automatically. The `show redundancy synchronization` command displays synchronization output information.

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the `admin reboot standby` command on the active or the standby CPM.
Synchronization and Redundancy

7450 ESS-Series routers supporting redundancy (such as the 7450 ESS-7 model) use a 1:1 redundancy scheme. Redundancy methods facilitate system synchronization between the active and standby Control Processor Modules (CPMs) so they maintain identical operational parameters to prevent inconsistencies in the event of a CPM failure.

When automatic system synchronization is enabled for an entity, any save or delete file operations configured on the primary, secondary or tertiary choices on the active CPM file system are mirrored in the standby CPM file system.

Although software configurations and images can be copied or downloaded from remote locations, synchronization can only occur locally between compact flash drives (cf1:, cf2:, and cf3:).

Synchronization can occur either:

- Automatically — Automatic synchronization is disabled by default. To enable automatic synchronization, the `config>redundancy>synchronization` command must be specified with either the `boot-env` parameter or the `config` parameter.

  When the `boot-env` parameter is specified, the BOF, boot.ldr, config, and image files are automatically synchronized. When the `config` parameter is specified, only the config files are automatically synchronized.

  Automatic synchronization also occurs whenever the BOF is modified and when an `admin>save` command is entered with no filename specified.

- Manually — To execute synchronization manually, the `admin>redundancy>synchronization` command must be entered with the `boot-env` parameter or the `config` parameter.

  When the `boot-env` parameter is specified, the BOF, boot.ldr, config, and image files are synchronized. When the `config` parameter is specified, only the config files are synchronized.

  The following shows the output displayed during a manual synchronization of configuration files.

```
A:ALA-12>admin>redundancy# synchronize config
Syncing configuration......
Syncing configuration......Completed.
A:ALA-12#
```
Active and Standby Designations

Typically, the first Switch Fabric (SF)/CPM card installed in a redundant 7450 ESS-Series chassis assumes the role as active, regardless of being inserted in Slot A or B. The next CPM installed in the same chassis then assumes the role as the standby CPM. If two CPM are inserted simultaneously (or almost simultaneously) and are booting at the same time, then preference is given to the CPM installed in Slot A.

If only one CPM is installed in a redundant routerdevice, then it becomes the active CPM regardless of the slot it is installed in.

To visually determine the active and standby designations, the Status LED on the faceplate is lit green (steady) to indicate the active designation. The Status LED on the second CPM faceplate is lit amber to indicate the standby designation.

The following output shows that the CPM installed in Slot A is acting as the active CPM and the CPM installed in Slot B is acting as the standby.

```
ALA-12# show card
===============================================================================
Card Summary
===============================================================================
<table>
<thead>
<tr>
<th>slot</th>
<th>card allowed</th>
<th>card provisioned</th>
<th>card equipped</th>
<th>admin state</th>
<th>operational state</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>all supported</td>
<td>iom-20g</td>
<td>iom-20g</td>
<td>up</td>
<td>up</td>
</tr>
<tr>
<td>A</td>
<td>all supported</td>
<td>sfm-400g</td>
<td>sfm-400g</td>
<td>up</td>
<td>up/active</td>
</tr>
<tr>
<td>B</td>
<td>all supported</td>
<td>sfm-400g</td>
<td>sfm-400g</td>
<td>up</td>
<td>up/standby</td>
</tr>
</tbody>
</table>
===============================================================================
ALA-12#
```

The following console message displays when a CPM boots, sees an active CPM, and becomes the standby CPM.

```
Slot A contains the Active CPM
This CPM (Slot B) is the Standby CPM
```
When the Active CPM Goes Offline

When an active CPM goes offline (due to reboot, removal, or failure), the standby CPM takes control without rebooting or initializing itself. It is assumed that the CPMs are synchronized, therefore, there is no delay in operability. When the CPM that went offline boots and then comes back online, it becomes the standby CPM.

When the standby CPM comes online, the following output displays:

Active CPM in Slot A has stopped
Slot B is now active CPM

Attempting to exec configuration file:
'cf3:/config.cfg' ...

... 

Executed 49,588 lines in 8.0 seconds from file cf3:\config.cfg
Persistence

The persistence feature allows information learned through DHCP snooping across reboots to be kept. This information can include data such as the IP address, MAC binding information, lease-length information, and ingress sap information (required for VPLS snooping to identify the ingress interface). This information is referred to as the DHCP lease-state information.

When a DHCP message is snooped, there are steps that make the data persistent in a system with dual CPMs. In systems with only one CPM, only Step 1 applies. In systems with dual CPMs, all steps apply.

1. When a DHCP ACK is received from a DHCP server, the entry information is written to the active CPM Compact Flash. If writing was successful, the ACK is forwarded to the DHCP client. If persistency fails completely (bad cflash), a trap is generated indicating that persistency can no longer be guaranteed. If the complete persistency system fails the DHCP ACKs are still forwarded to the DHCP clients. Only during small persistency interruptions or in overload conditions of the Compact Flash, DHCP ACKs may get dropped and not forwarded to the DHCP clients.

2. DHCP message information is sent to the standby CPM and also there the DHCP information is logged on the Compact Flash. If persistency fails on the standby also, a trap is generated.
Network Synchronization

This section describes network synchronization capabilities available on SR and ESS product platforms. These capabilities involve multiple approaches to network timing; namely SDH/SONET, Synchronous Ethernet, and Adaptive clocking. 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 8.

Figure 8: Conventional Network Timing Architecture (North American Nomenclature)

The architecture shown in Figure 8 provides the following benefits:

- Limits the need for high quality clocks at each network element and only requires that they reliably replicate input to remain traceable to its reference.
- Uses reliable physical media to provide transport of the timing signal; it doesn't consume any bandwidth and requires limited additional processing.
The synchronization network is designed so a clock always receives timing from a clock of equal or higher stratum or quality level. This ensures that if an upstream clock has a fault condition (for example, loses its reference and enters a holdover or free-run state) and begins to drift in frequency, the downstream clock will be able to follow it. For greater reliability and robustness, most offices and nodes have at least two synchronization references that can be selected in priority order (such as primary and secondary).

Further levels of resiliency can be provided by designing a capability in the node clock that will operate within prescribed network performance specifications without any reference for a specified timeframe. A clock operating in this mode is said to hold the last known state over (or holdover) until the reference lock is once again achieved. Each level in the timing hierarchy is associated with minimum levels of network performance.

Each synchronization capable port can be independently configured to transmit data using the node reference timing or loop timing. In addition, some TDM channels can use adaptive timing.

Transmission of a reference clock through a chain of Ethernet equipment requires that all equipment supports Synchronous Ethernet. A single piece of equipment that is not capable of performing Synchronous Ethernet breaks the chain. Ethernet frames will still get through but downstream devices should not use the recovered line timing as it will not be traceable to an acceptable stratum source.
Central Synchronization Sub-System

The timing subsystem for the SR/ESS platforms has a central clock located on the CPM (motherboard). The timing subsystem performs many of the duties of the network element clock as defined by Telcordia (GR-1244-CORE) and ITU-T G.781.

The system can select from up to four timing inputs to train the local oscillator. The priority order of these references must be specified. This is a simple ordered list of inputs: {bits, ref1, ref2}. The CPM clock output shall have the ability to drive the clocking for all line cards in the system. The 7210 SASSR/ESS supports selection of the node reference using Quality Level (QL) indications. See Figure 9 for a description of synchronization reference selection.

![Figure 9: Synchronization Reference Selection](image)

The recovered clock will be able to derive its timing from any of the following:

- OC3/STM1, OC12/STM4, OC48/STM16, OC192/STM64 ports
- Synchronous Ethernet ports
- BITS port on the CPM or CFM module

On 7450 ESS-12 and 7450 ESS-7 systems with redundant CPMs, the system will have two BITS input ports (one per CPM). These BITS input ports provide redundant synchronization inputs from an external BITS/SSU.

All settings of the signal characteristics for the BITS input applies to both ports. When the active CPM considers the BITS input as a possible reference, it will consider first the BITS input port on the active CPM followed the BITS input port on the standby CPM in that relative priority order. This relative priority order is in addition to the user definable ref-order. For example, a ref-order of ‘bits-ref1-ref2’ would actually be BITS in (active CPM) followed by BITS in (standby CPM)
followed by ref1 followed by ref2. When ql-selection is enabled, then the QL of each BITS input port shall be viewed independently. The higher QL source shall be chosen.

The BITS output ports is provided to deliver a unfiltered recovered line clock from a SR/ESS port directly to dedicated timing device in the facility (BITS or SASE device). The signal selected will be one of ref1 or ref2. It cannot be the BITS input port signal nor can it be the output of the central clock.

When QL selection mode is disabled, then the reversion setting controls when the central clock can re-select a previously failed reference.

The Table 27 shows the selection followed for two reference in both revertive and non-revertive modes:

<table>
<thead>
<tr>
<th>Status of Reference A</th>
<th>Status of Reference B</th>
<th>Active Reference Non-revertive Case</th>
<th>Active Reference Revertive Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>OK</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Failed</td>
<td>OK</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>OK</td>
<td>OK</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>OK</td>
<td>Failed</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>OK</td>
<td>OK</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Failed</td>
<td>Failed</td>
<td>holdover</td>
<td>holdover</td>
</tr>
<tr>
<td>OK</td>
<td>Failed</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Failed</td>
<td>Failed</td>
<td>holdover</td>
<td>holdover</td>
</tr>
<tr>
<td>Failed</td>
<td>OK</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Failed</td>
<td>Failed</td>
<td>holdover</td>
<td>holdover</td>
</tr>
<tr>
<td>OK</td>
<td>OK</td>
<td>A or B</td>
<td>A</td>
</tr>
</tbody>
</table>
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.

DS1 Signals

DS1 signals can carry an indication of the quality level of the source generating the timing information using the SSM transported within the 1544 Kbit/s signal's Extended Super Frame (ESF) Data Link (DL) as specified in Recommendation G.704. No such provision is extended to SF formatted DS1 signals.

The format of the data link messages in ESF frame format is "0xxx xxx0 1111 1111", transmitted rightmost bit first. The six bits denoted "xxx xxx" contain the actual message; some of these messages are reserved for synchronization messaging. It takes 32 frames (such as 4 ms) to transmit all 16 bits of a complete DL.

E1 Signals

E1 signals can carry an indication of the quality level of the source generating the timing information using the SSM as specified in Recommendation G.704.

One of the Sa4 to Sa8 bits, (the actual Sa bit is for operator selection), is allocated for Synchronization Status Messages. To prevent ambiguities in pattern recognition, it is necessary to align the first bit (San1) with frame 1 of a G.704 E1 multiframe.

The numbering of the San (n = 4, 5, 6, 7, 8) bits. A San bit is organized as a 4-bit nibble San1 to San4. San1 is the most significant bit; San4 is the least significant bit.

The message set in San1 to San4 is a copy of the set defined in SDH bits 5 to 8 of byte S1.
SONET/SDH Signals

The SSM of SDH and SONET interfaces is carried in the S1 byte of the frame overhead. Each frame contains the four bit value of the QL.
Synchronous Ethernet

Traditionally, Ethernet-based networks employ the physical layer transmitter clock to be derived from an inexpensive +/-100ppm crystal oscillator and the receiver locks onto it. There is no need for long term frequency stability because the data is packetized and can be buffered. For the same reason there is no need for consistency between the frequencies of different links. However, you can derive the physical layer transmitter clock from a high quality frequency reference by replacing the crystal with a frequency source traceable to a primary reference clock. This would not effect the operation of any of the Ethernet layers, for which this change would be transparent. The receiver at the far end of the link would lock onto the physical layer clock of the received signal, and thus itself gain access to a highly accurate and stable frequency reference. Then, in a manner analogous to conventional hierarchical master-slave network synchronization, this receiver could lock the transmission clock of its other ports to this frequency reference and a fully time synchronous network could be established.

The advantage of using Synchronous Ethernet, compared with methods that rely on sending timing information in packets over an unclocked physical layer, is that it is not influenced by impairments introduced by the higher levels of the networking technology (packet loss, packet delay variation). Hence, the frequency accuracy and stability may be expected to exceed those of networks with unsynchronized physical layers.

Synchronous Ethernet allows operators to gracefully integrate existing systems and future deployments into conventional industry-standard synchronization hierarchy. The concept behind synchronous Ethernet is analogous to SONET/SDH system timing capabilities. It allows the operator to select any (optical) Ethernet port as a candidate timing reference. The recovered timing from this port will then be used to time the system (for example, the CPM will lock to this provisioned reference selection). The operator then could ensure that any of system output would be locked to a stable traceable frequency source.

The SSM of Synchronous Ethernet uses an Ethernet OAM PDU that uses the slow protocol subtype. For a complete description of the format and processing see ITU-T G.8264.
Clock Source Quality Level Definitions

The following clock source quality levels have been identified for the purpose of tracking network timing flow. These levels make up all of the defined network deployment options given in Recommendation G.803 and G.781. The Option I network is a network developed on the original European SDH model; whereas, the Option II network is a network developed on the North American SONET model. See Table 28 and Table 29 for descriptions of the synchronization message coding and source priorities.

In addition to the QL values received over SSM of an interface, the standards also define additional codes for internal use. These include the following:

- QL INVx is generated internally by the system if and when an unallocated SSM value is received, where x represents the binary value of this SSM. Within the SR/ESS all these independent values are assigned as the singled value of QL-INVALID.
- QL FAILED is generated internally by the system if and when the terminated network synchronization distribution trail is in the signal fail state.

Within the SR/ESS, there is also an internal quality level of QL-UNKNOWN. This is used to differentiate from a received QL-STU code but is equivalent for the purposes of QL selection.

Table 28: Synchronization Message Coding and Source Priorities (Value Received on a Port)

<table>
<thead>
<tr>
<th>SSM value received on port</th>
<th>SDH interface SyncE interface in SDH mode</th>
<th>SONET Interface SyncE interface in SONET mode</th>
<th>E1 interface</th>
<th>T1 interface (ESF)</th>
<th>Internal Relative Quality Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0010 (prc)</td>
<td>0001 (prs)</td>
<td>0010 (prc)</td>
<td>00000100 11111111 (prs)</td>
<td>1. Best quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0000 (stu)</td>
<td></td>
<td>00001000 11111111 (stu)</td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0111 (st2)</td>
<td></td>
<td>00001100 11111111 (ST2)</td>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>0100 (ssua)</td>
<td>0100 (tnc)</td>
<td>0100 (ssua)</td>
<td>01111000 11111111 (TNC)</td>
<td>4.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1101 (st3e)</td>
<td></td>
<td>01111100 11111111 (ST3E)</td>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>1000 (ssub)</td>
<td></td>
<td>1000 (ssub)</td>
<td>00100000 11111111 (ST3)</td>
<td>6.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1010 (st3/eec2)</td>
<td></td>
<td></td>
<td>7.</td>
<td></td>
</tr>
</tbody>
</table>
### Table 28: Synchronization Message Coding and Source Priorities (Value Received on a Port)

<table>
<thead>
<tr>
<th>SSM Values</th>
<th>SDH Interface</th>
<th>SONET Interface</th>
<th>E1 Interface</th>
<th>T1 Interface (ESF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0010 (prc)</td>
<td>0001 (PRS)</td>
<td>0010 (prc)</td>
<td>0001000101111111 (prs)</td>
<td></td>
</tr>
<tr>
<td>0100 (ssua)</td>
<td>0000 (stu)</td>
<td>0100 (ssua)</td>
<td>0001000011111111 (stu)</td>
<td></td>
</tr>
<tr>
<td>0100 (ssua)</td>
<td>0111 (st2)</td>
<td>0100 (ssua)</td>
<td>0001010011111111 (st2)</td>
<td></td>
</tr>
<tr>
<td>0100 (ssua)</td>
<td>0100 (tnc)</td>
<td>0100 (ssua)</td>
<td>0111100001111111 (tnc)</td>
<td></td>
</tr>
<tr>
<td>1000 (ssub)</td>
<td>1101 (st3e)</td>
<td>1000 (ssub)</td>
<td>0111110001111111 (st3e)</td>
<td></td>
</tr>
<tr>
<td>1000 (ssub)</td>
<td>1010 (st3/ee2)</td>
<td>1000 (ssub)</td>
<td>0001000011111111 (st3)</td>
<td></td>
</tr>
<tr>
<td>1011 (sec/ee1)</td>
<td>1010 (st3/ee2)</td>
<td>1011 (sec)</td>
<td>0001000011111111 (st3)</td>
<td></td>
</tr>
<tr>
<td>1011 (sec/ee1)</td>
<td>1100 (smc)</td>
<td>1011 (sec)</td>
<td>0010001001111111 (smc)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 29: Synchronization Message Coding and Source Priorities (Transmitted by Interface of Type)

<table>
<thead>
<tr>
<th>Internal Relative Quality Level</th>
<th>SDH Interface SyncE Interface in SDH mode</th>
<th>SONET Interface SyncE Interface in SONET mode</th>
<th>E1 Interface</th>
<th>T1 Interface (ESF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Best quality</td>
<td>0010 (prc)</td>
<td>0001 (PRS)</td>
<td>0010 (prc)</td>
<td>0000010001111111 (prs)</td>
</tr>
<tr>
<td>2.</td>
<td>0100 (ssua)</td>
<td>0000 (stu)</td>
<td>0100 (ssua)</td>
<td>0001000011111111 (stu)</td>
</tr>
<tr>
<td>3.</td>
<td>0100 (ssua)</td>
<td>0111 (st2)</td>
<td>0100 (ssua)</td>
<td>0001010001111111 (st2)</td>
</tr>
<tr>
<td>4.</td>
<td>0100 (ssua)</td>
<td>0100 (tnc)</td>
<td>0100 (ssua)</td>
<td>0111100001111111 (tnc)</td>
</tr>
<tr>
<td>5.</td>
<td>1000 (ssub)</td>
<td>1101 (st3e)</td>
<td>1000 (ssub)</td>
<td>0111110001111111 (st3e)</td>
</tr>
<tr>
<td>6.</td>
<td>1000 (ssub)</td>
<td>1010 (st3/ee2)</td>
<td>1000 (ssub)</td>
<td>0001000011111111 (st3)</td>
</tr>
<tr>
<td>7.</td>
<td>1011 (sec/ee1)</td>
<td>1010 (st3/ee2)</td>
<td>1011 (sec)</td>
<td>0001000011111111 (st3)</td>
</tr>
<tr>
<td>8. Lowest quality qualified in QL-enabled mode</td>
<td>1011 (sec/ee1)</td>
<td>1100 (smc)</td>
<td>1011 (sec)</td>
<td>0010001001111111 (smc)</td>
</tr>
</tbody>
</table>
Table 29: Synchronization Message Coding and Source Priorities (Transmitted by Interface of Type)

<table>
<thead>
<tr>
<th></th>
<th>dnu</th>
<th>smc</th>
<th>dnu</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>1111</td>
<td>1111</td>
<td>1111</td>
<td>00100010 11111111</td>
</tr>
<tr>
<td>10</td>
<td>1111</td>
<td>1111</td>
<td>1111</td>
<td>00101000 11111111 (st4)</td>
</tr>
<tr>
<td>11</td>
<td>1111</td>
<td>1110</td>
<td>1111</td>
<td>01000000 11111111 (pno)</td>
</tr>
<tr>
<td>12</td>
<td>1111</td>
<td>1111</td>
<td>1111</td>
<td>00110000 11111111 (dus)</td>
</tr>
<tr>
<td>13</td>
<td>QL_INV</td>
<td>1111</td>
<td>1111</td>
<td>00110000 11111111 (dus)</td>
</tr>
<tr>
<td>14</td>
<td>QL-FAILED</td>
<td>1111</td>
<td>1111</td>
<td>00110000 11111111 (dus)</td>
</tr>
<tr>
<td>15</td>
<td>QL-UNC</td>
<td>1011</td>
<td>1010</td>
<td>00100000 11111111 (st3)</td>
</tr>
</tbody>
</table>

Note: When the internal Quality level is in the range of 9 through 14, the output codes shown in Table 29, will only appear if QL selection is disabled. If ql-selection is enabled, then all of these internal states are changed to internal state 15 (Holdover) and the ssm value generated will reflect the holdover quality of the internal clock.
Link Layer Discovery Protocol (LLDP)

The IEEE 802.1ab Link Layer Discovery Protocol (LLDP) is a uni-directional protocol that uses the MAC layer to transmit specific information related to the capabilities and status of the local device. Separately from the transmit direction, the LLDP agent can also receive the same kind of information for a remote device which is stored in the related MIB(s).

LLDP itself does not contain a mechanism for soliciting specific information from other LLDP agents, nor does it provide a specific means of confirming the receipt of information. LLDP allows the transmitter and the receiver to be separately enabled, making it possible to configure an implementation so the local LLDP agent can either transmit only or receive only, or can transmit and receive LLDP information.

The information fields in each LLDP frame are contained in a LLDP Data Unit (LLDPDU) as a sequence of variable length information elements, that each include type, length, and value fields (known as TLVs), where:

- **Type** identifies what kind of information is being sent.
- **Length** indicates the length of the information string in octets.
- **Value** is the actual information that needs to be sent (for example, a binary bit map or an alphanumeric string that can contain one or more fields).

Each LLDPDU contains four mandatory TLVs and can contain optional TLVs as selected by network management:

- Chassis ID TLV
- Port ID TLV
- Time To Live TLV
- Zero or more optional TLVs, as allowed by the maximum size of the LLDPDU
- End Of LLDPDU TLV

The chassis ID and the port ID values are concatenated to form a logical identifier that is used by the recipient to identify the sending LLDP agent/port. Both the chassis ID and port ID values can be defined in a number of convenient forms. Once selected however, the chassis ID/port ID value combination remains the same as long as the particular port remains operable.

A non-zero value in the TTL field of the time-to-live TLV tells the receiving LLDP agent how long all information pertaining to this LLDPDU’s identifier will be valid so that all the associated information can later be automatically discarded by the receiving LLDP agent if the sender fails to update it in a timely manner. A zero value indicates that any information pertaining to this LLDPDU’s identifier is to be discarded immediately.
Note that a TTL value of zero can be used, for example, to signal that the sending port has initiated a port shutdown procedure.

The end of a LLDPDU TLV marks the end of the LLDPDU.

The IEEE 802.1ab standard defines a protocol that:

- Advertises connectivity and management information about the local station to adjacent stations on the same IEEE 802 LAN.
- Receives network management information from adjacent stations on the same IEEE 802 LAN.
- Operates with all IEEE 802 access protocols and network media.
- Establishes a network management information schema and object definitions that are suitable for storing connection information about adjacent stations.
- Provides compatibility with a number of MIBs as depicted in Figure 10.

---

Figure 10: LLDP Internal Architecture for a Network Node
Network operators must be able to discover the topology information in order to detect and address network problems and inconsistencies in the configuration. Moreover, standard-based tools can address the complex network scenarios where multiple devices from different vendors are interconnected using Ethernet interfaces.

![Figure 11: Customer Use Example For LLDP](image)

The example displayed in Figure 11 depicts a MPLS network that uses Ethernet interfaces in the core or as an access/handoff interfaces to connect to different kind of Ethernet enabled devices such as service gateway/routers, QinQ switches, DSLAMs or customer equipment.

IEEE 802.1ab LLDP running on each Ethernet interfaces in between all the above network elements may be used to discover the topology information.
Administrative Tasks

This section contains information to perform administrative tasks.

- Configuring the Chassis Mode on page 230
- Saving Configurations on page 232
- Specifying Post-Boot Configuration Files on page 233
- Network Timing on page 234
- Power Supplies on page 234

Configuring the Chassis Mode

Depending on the chassis type and IOM type, the following modes can be configured:

a: This mode corresponds to scaling and feature set associated with iom-20g.
b: This mode corresponds to scaling and feature set associated with iom-20g-b.
d: This mode corresponds to scaling and feature set associated with iom3-xp.

If the chassis mode is not explicitly provisioned in the configuration file, the chassis will come up in chassis mode a by default. The behavior for the IOMs is described in the following table:

<table>
<thead>
<tr>
<th>IOM</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>iom-20g-b</td>
<td>Comes online if provisioned as iom-20g or iom-20g-b.</td>
</tr>
<tr>
<td>iom2-20g</td>
<td>Comes online if provisioned as iom-20g, iom-20g-b or iom2-20g.</td>
</tr>
<tr>
<td>iom-10g</td>
<td>Comes online if provisioned as iom-10g.</td>
</tr>
<tr>
<td>iom3-xp</td>
<td>Comes online if provisioned as iom3-xp.</td>
</tr>
</tbody>
</table>

To support a particular chassis-mode, all provisioned IOMs must meet the corresponding IOM level.

The chassis Mode corresponds to scaling and feature sets associated with a given card. The base mode is chassis mode A which supports all IOM card types.

IOM cards that are not compatible with more recent chassis modes will stay or be put into an operationally down state.

- Chassis mode A corresponds to iom-20g, chassis mode backwards compatible for iom-
20g-b, iom2-20g, iom3-xp

- Chassis mode B corresponds to iom-20g-b, chassis mode backwards compatible for iom2-20g, iom3-xp
- Chassis mode D corresponds to iom3-xp

NOTE: The iom-20g is not supported from 5.0R and later but chassis mode A is described for backwards compatibility purposes.

The **force** keyword forces an upgrade either from mode **a** to mode **b** or **d** with cards provisioned as iom-20g.
Saving Configurations

Whenever configuration changes are made, the modified configuration must be saved so they will not be lost when the system is rebooted.

Configuration files are saved by executing explicit command syntax which includes the file URL location to save the configuration file as well as options to save both default and non-default configuration parameters. Boot option file (BOF) parameters specify where the system should search for configuration and image files as well as other operational parameters during system initialization.

For more information about boot option files, refer to the *Boot Option Files* section of this manual.
Specifying Post-Boot Configuration Files

Two post-boot configuration extension files are supported and are triggered when either a successful or failed boot configuration file is processed. The `boot-bad-exec` and `boot-good-exec` commands specify URLs for the CLI scripts to be run following the completion of the boot-up configuration. A URL must be specified or no action is taken.

For example, after a configuration file is successfully loaded, the specified URL can contain a nearly identical configuration file with certain commands enabled or disabled, or particular parameters specified and according to the script which loads that file.
Network Timing

In Time Domain Multiplexed (TDM)-based networks (for example, SONET or SDH circuit-switched networks), the concept of network timing is used to prevent over-run or under-run issues where circuits are groomed (rebundled) and switched. Hardware exists in each node that takes a common clock derived from an internal oscillator, a specific receive interface or special BITS interface and provides it to each synchronous interface in the system. Usually, each synchronous interface is allowed to choose between using the chassis-provided clock or the clocking recovered from the received signal on the interface. The clocking is used to drive the transmit side of the interface. The appropriate configuration at each node which defines how interface clocking is handled must be considered when designing a network that has a centralized timing source so each interface is operating in a synchronous manner.

The effect of timing on a network is dependent on the nature of the type of traffic carried on the network. With bit-wise synchronous traffic (traditional circuit-based voice or video), non-synchronous transmissions cause a loss of information in the streams affecting performance. With packet-based traffic, the applications expect and handle jitter and latency inherent to packet-based networks. When a packet-based network is used to carry voice or video traffic, the applications use data compression and elasticity buffering to compensate for jitter and latency. The network itself relies on appropriate Quality of Service (QoS) definitions and network provisioning to further minimize the jitter and latency the application may experience.

Power Supplies

7450 ESS 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.
Automatic Synchronization

Use the CLI syntax displayed below to configure synchronization components relating to active-to-standby CPM switchover. In redundant systems, synchronization ensures that the active and standby CPMs have identical operational parameters, including the active configuration, CPM, and IOM images in the event of a failure or reset of the active CPM. The `force-switchover` command forces a switchover to the standby CPM card.

To enable automatic synchronization, either the `boot-env` parameter or the `config` parameter must be specified. The synchronization occurs when the `admin save` or `bof save` commands are executed.

When the `boot-env` parameter of the `synchronize` command is specified, the bof.cfg, primary/secondary/tertiary configuration files (.cfg and .ndx), li, and ssh files are automatically synchronized. When the `config` parameter is specified, only the configuration files are automatically synchronized.

Synchronization also occurs whenever the BOF is modified and when an `admin>save` command is entered with no filename specified.

Boot-Env Option

The `boot-env` option enables a synchronization of all the files used in system initialization.

When configuring the system to perform this synchronization, the following occurs:

1. The BOF used during system initialization is copied to the same compact flash on the standby CPM (in redundant systems).
   
   **Note:** The synchronization parameters on the standby CPM are preserved.

2. The primary, secondary, and tertiary images, (provided they are locally stored on the active CPM) are copied to the same compact flash on the standby CPM.

3. The primary, secondary, and tertiary configuration files, (provided they are locally stored on the active CPM) are copied to the same compact flash on the standby CPM.

Config Option

The `config` option synchronizes configuration files by copying the files specified in the active CPM BOF file to the same compact flash on the standby CPM.

Both image files (CPM and IOM) must be located in the same directory. Failure to locate and synchronize both images causes an error to be generated.
Manual Synchronization

The `admin redundancy synchronize` command performs manual CPM synchronizations. The `boot-env` parameter synchronizes the BOF, image, and configuration files in redundant systems. The `config` parameter synchronizes only the configuration files in redundant systems.

Forcing a Switchover

The `force-switchover now` command forces an immediate switchover to the standby CPM card.

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the `admin reboot standby` command on the active or the standby CPM.
System Configuration Process Overview

Figure 12 displays the process to provision basic system parameters.

![System Configuration Flowchart]

Figure 12: System Configuration and Implementation Flow
Configuration Notes

This section describes system configuration caveats.

General

- The 7450 ESS-Series router must be properly initialized and the boot loader and BOF files successfully executed in order to access the CLI.
Configuring System Management with CLI

This section provides information about configuring system management features with CLI.

Topics in this chapter include:

- Basic System Configuration on page 242
- Common Configuration Tasks on page 243
- System Information on page 244
  - System Information Parameters
    - Name on page 245
    - Contact on page 245
    - Location on page 246
    - CLLI Code on page 246
    - Coordinates on page 247
  - System Time Elements on page 248
    - Zone on page 248
    - Summer Time Conditions on page 250
    - NTP on page 251
    - SNTP on page 257
    - CRON on page 259
  - Configuring Synchronization and Redundancy on page 272
    - Configuring Synchronization on page 272
    - Configuring Manual Synchronization on page 273
    - Forcing a Switchover on page 273
    - Configuring Synchronization Options on page 274
    - Configuring Multi-Chassis Redundancy on page 275
- Configuring Mixed Mode on page 277
- Configuring Power Supply Parameters on page 279
• System Administration Parameters on page 281
  → Disconnect on page 281
  → Set-time on page 282
  → Display-config on page 282
  → Tech-support on page 284
  → Save on page 284
  → Reboot on page 285
  → Post-Boot Configuration Extension Files on page 286
• System Timing on page 289
  → Edit Mode on page 289
  → Configuring Timing References on page 290
  → Using the Revert Command on page 291
  → Other Editing Commands on page 292
  → Forcing a Specific Reference on page 293
• Configuring System Monitoring Thresholds on page 294
• Configuring LLDP on page 296
Saving Configurations

Whenever configuration changes are made, the modified configuration must be saved so the changes will not be lost when the system is rebooted. The system uses the configuration and image files, as well as other operational parameters necessary for system initialization, according to the locations specified in the boot option file (BOF) parameters. For more information about boot option files, refer to the Boot Option Files section of this manual.

Configuration files are saved by executing implicit or explicit command syntax.

- An explicit save writes the configuration to the location specified in the `save` command syntax (the `file-url` option).
- An implicit save writes the configuration to the file specified in the primary configuration location.

If the `file-url` option is not specified in the `save` command syntax, the system attempts to save the current configuration to the current BOF primary configuration source. If the primary configuration source (path and/or filename) changed since the last boot, the new configuration source is used.

The `save` command includes an option to save both default and non-default configuration parameters (the `detail` option).

The `index` option specifies that the system preserves system indexes when a save command is executed, regardless of the persistent status in the BOF file. During a subsequent boot, the index file is read along with the configuration file. As a result, a number of system indexes are preserved between reboots, including the interface index, LSP IDs, path IDs, etc. This reduces resynchronizations of the Network Management System (NMS) with the affected network element.

If the save attempt fails at the destination, an error occurs and is logged. The system does not try to save the file to the secondary or tertiary configuration sources unless the path and filename are explicitly named with the `save` command.
Basic System Configuration

This section provides information to configure system parameters and provides configuration examples of common configuration tasks. The minimal system parameters that should be configured are:

- System Information Parameters on page 245
- System Time Elements on page 248

The following example displays a basic system configuration:

```
A:ALA-12>config>system# info
#------------------------------------------
echo "System Configuration 
#------------------------------------------
    name "ALA-12"
    coordinates "Unknown"
    snmp
    exit
    security
        snmp
            community "private" rwa version both
            exit
        exit
    exit
    time
        ntp
            server 192.168.15.221
            no shutdown
            exit
        snmp
            shutdown
            exit
        exit
    zone GMT
    exit
#------------------------------------------
A:ALA-12>config>system#
```
Common Configuration Tasks

This section provides a brief overview of the tasks that must be performed to configure system parameters and provides the CLI commands.

- **System Information on page 244**
  - Name on page 245
  - Contact on page 245
  - Location on page 246
  - CLLI Code on page 246
  - Coordinates on page 247

- **System Time Elements on page 248**
  - Zone on page 248
  - Summer Time Conditions on page 250
  - NTP on page 251
  - SNTP on page 257
  - CRON on page 259
    - Time Range on page 262
    - Time of Day on page 266

- **Synchronization and Redundancy on page 213**
  - Automatic Synchronization on page 235
  - Manual Synchronization on page 236

- **System Administration Parameters on page 281**
  - Disconnect on page 281
  - Set-time on page 282
  - Display-config on page 282
  - Reboot on page 285
  - Save on page 284

- **System Timing on page 289**
  - Configuring Timing References on page 290
System Information

This section covers the basic system information parameters to configure the physical location of the ESS-Series, contact information, location information such as the place the router is located such as an address, floor, room number, etc., global positioning system (GPS) coordinates, and system name.

Use the CLI syntax displayed below to configure the following system components:

- System Information Parameters on page 245
- System Time Elements on page 248

General system parameters include:

- Name on page 245
- Contact on page 245
- Location on page 246
- CLLI Code on page 246
- Coordinates on page 247
System Information Parameters

Name

Use the `system` command to configure a name for the device. The name is used in the prompt string. Only one system name can be configured, if multiple system names are configured the last one encountered overwrites the previous entry. Use the following CLI syntax to configure the system name:

**CLI Syntax:**
```
config>system
name system-name
```

**Example:**
```
alcatel>config>system# name ALA-12
```

The following example displays the system name:

```
sysName@domain>config>system# info
#------------------------------------------
echo "System Configuration 
#------------------------------------------
  name "ALA-12"
... exit
----------------------------------------------
sysName@domain>config>system#
```

Contact

Use the `contact` command to specify the name of a system administrator, IT staff member, or other administrative entity.

**CLI Syntax:**
```
config>system
contact contact-name
```

**Example:**
```
config>system# contact "Fred Information Technology"
```
Location

Use the `location` command to specify the system location of the device. For example, enter the city, building address, floor, room number, etc., where the router is located.

Use the following CLI syntax to configure the location:

**CLI Syntax:**
```
config>system
   location location
```

**Example:**
```
config>system# location "Bldg.1-floor 2-Room 201"
```

CLLI Code

The Common Language Location Code (CLLI code) is an 11-character standardized geographic identifier that is used to uniquely identify the geographic location of a 7450 ESS-Series router.

Use the following CLI command syntax to define the CLLI code:

**CLI Syntax:**
```
config>system
   clli-code clli-code
```

**Example:**
```
config>system# clli-code abcdefg1234
```
Coordinates

Use the optional `coordinates` command to specify the GPS location of the device. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

Use the following CLI syntax to configure the location:

**CLI Syntax:**
```
config>system
   coordinates coordinates
```

**Example:**
```
config>system# coordinates "N 45 58 23, W 34 56 12"
```

The following example displays the configuration output of the general system commands:

```
sysName@domain>config>system# info
#------------------------------------------
```
```
echo "System Configuration "
#------------------------------------------
```
```
 name "ALA-12"
   contact "Fred Information Technology"
   location "Bldg.1-floor 2-Room 201"
   clli-code "abcdefg1234"
   coordinates "N 45 58 23, W 34 56 12"
```
```
   . .
   exit
```
```
----------------------------------------------
A:ALA-12>config>system#
```
```
```
System Time Elements

The system clock maintains time according to Coordinated Universal Time (UTC). Configure information time zone and summer time (daylight savings time) parameters to correctly display time according to the local time zone.

Time elements include:

- Zone on page 248
- Summer Time Conditions on page 250
- NTP on page 251
- SNTP on page 257
- CRON on page 259
  - Time Range on page 262
  - Time of Day on page 266

Zone

The zone command sets the time zone and/or time zone offset for the router. The 7450 ESS OS supports system-defined and user-defined time zones. The system-defined time zones are listed in Table 31.

CLI Syntax:  
\[ \text{config>system>time zone std-zone-name|non-std-zone-name [hh [:mm]]} \]

Example:  
\[ \text{config>system>time# zone GMT} \]

The following example displays the zone output:

```
A:ALA-12>config>system>time# info
--------------------------------------------
ntp
   server 192.168.15.221
   no shutdown
exit
snntp
   shutdown
exit
zone UTC
--------------------------------------------
A:ALA-12>config>system>time#
```
### Table 31: System-defined Time Zones

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Time Zone Name</th>
<th>UTC Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Europe:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GMT</td>
<td>Greenwich Mean Time</td>
<td>UTC</td>
</tr>
<tr>
<td>WET</td>
<td>Western Europe Time</td>
<td>UTC</td>
</tr>
<tr>
<td>WEST</td>
<td>Western Europe Summer Time</td>
<td>UTC +1 hour</td>
</tr>
<tr>
<td>CET</td>
<td>Central Europe Time</td>
<td>UTC +1 hour</td>
</tr>
<tr>
<td>CEST</td>
<td>Central Europe Summer Time</td>
<td>UTC +2 hours</td>
</tr>
<tr>
<td>EET</td>
<td>Eastern Europe Time</td>
<td>UTC +2 hours</td>
</tr>
<tr>
<td>EEST</td>
<td>Eastern Europe Summer Time</td>
<td>UTC +3 hours</td>
</tr>
<tr>
<td>MSK</td>
<td>Moscow Time</td>
<td>UTC +3 hours</td>
</tr>
<tr>
<td>MSD</td>
<td>Moscow Summer Time</td>
<td>UTC +4 hours</td>
</tr>
<tr>
<td><strong>US and Canada:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AST</td>
<td>Atlantic Standard Time</td>
<td>UTC -4 hours</td>
</tr>
<tr>
<td>ADT</td>
<td>Atlantic Daylight Time</td>
<td>UTC -3 hours</td>
</tr>
<tr>
<td>EST</td>
<td>Eastern Standard Time</td>
<td>UTC -5 hours</td>
</tr>
<tr>
<td>EDT</td>
<td>Eastern Daylight Saving Time</td>
<td>UTC -4 hours</td>
</tr>
<tr>
<td>CST</td>
<td>Central Standard Time</td>
<td>UTC -6 hours</td>
</tr>
<tr>
<td>CDT</td>
<td>Central Daylight Saving Time</td>
<td>UTC -5 hours</td>
</tr>
<tr>
<td>MST</td>
<td>Mountain Standard Time</td>
<td>UTC -7 hours</td>
</tr>
<tr>
<td>MDT</td>
<td>Mountain Daylight Saving Time</td>
<td>UTC -6 hours</td>
</tr>
<tr>
<td>PST</td>
<td>Pacific Standard Time</td>
<td>UTC -8 hours</td>
</tr>
<tr>
<td>PDT</td>
<td>Pacific Daylight Saving Time</td>
<td>UTC -7 hours</td>
</tr>
<tr>
<td>HST</td>
<td>Hawaiian Standard Time</td>
<td>UTC -10 hours</td>
</tr>
<tr>
<td>AKST</td>
<td>Alaska Standard Time</td>
<td>UTC -9 hours</td>
</tr>
<tr>
<td>AKDT</td>
<td>Alaska Standard Daylight Saving Time</td>
<td>UTC -8 hours</td>
</tr>
<tr>
<td><strong>Australia and New Zealand:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AWST</td>
<td>Western Standard Time (e.g., Perth)</td>
<td>UTC +8 hours</td>
</tr>
<tr>
<td>ACST</td>
<td>Central Standard Time (e.g., Darwin)</td>
<td>UTC +9.5 hours</td>
</tr>
<tr>
<td>AEST</td>
<td>Eastern Standard/Summer Time (e.g., Canberra)</td>
<td>UTC +10 hours</td>
</tr>
<tr>
<td>NZT</td>
<td>New Zealand Standard Time</td>
<td>UTC +12 hours</td>
</tr>
<tr>
<td>NZDT</td>
<td>New Zealand Daylight Saving Time</td>
<td>UTC +13 hours</td>
</tr>
</tbody>
</table>
Summer Time Conditions

The `config(system)time(dst-zone)` context configures the start and end dates and offset for summer time or daylight savings time to override system defaults or for user-defined time zones.

When configured, the time will be adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

**CLI Syntax:**
```
config(system)time
  dst-zone zone-name
  end {end-week} {end-day} {end-month} [hours-minutes]
  offset offset
  start {start-week} {start-day} {start-month} [hours-minutes]
```

**Example:**
```
config(system)# time
config(system)# dst-zone pt
config(system)# dst-zone# start second sunday april 02:00
  end first sunday october 02:00
config(system)# dst-zone# offset 0
```

If the time zone configured is listed in Table 31, 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 31 or entered as optional parameters in this command.

The following example displays the configured parameters.

```
A:ALA-48>config(system)time(dst-zone)# info
----------------------------------------------
  start second sunday april 02:00
  end first sunday october 02:00
  offset 0
----------------------------------------------
A:ALA-48>config(system)time(dst-zone)# offset 0
```
NTP

Network Time Protocol (NTP) is defined in RFC 1305, *Network Time Protocol (Version 3) Specification, Implementation and Analysis*. It allows for participating network nodes to keep time more accurately and maintain time in a synchronized manner between all participating network nodes.

NTP time elements include:

- Authentication-check on page 251
- Authentication-key on page 252
- Broadcast on page 252
- Broadcastclient on page 253
- Multicast on page 254
- Multicastclient on page 254
- NTP-Server on page 255
- Peer on page 255
- Server on page 256

**Authentication-check**

The authentication-check command provides for the option to skip the rejection of NTP PDUs that do not match the authentication key or authentication type requirements. The default behavior when authentication is configured is to reject all NTP protocol PDUs that have a mismatch in either the authentication key-id, type, or key.

When authentication-check is configured, NTP PDUs are authenticated on receipt. However, mismatches cause a counter to be increased, one counter for key-id, one for type, and one for key value mismatches.

**CLI Syntax:**

```
cfg>system>time>ntp
   authentication-check
```

**Example:**

```
cfg>system>time>ntp#
   auth-check
   auth-check
   no shutdown
```
**Authentication-key**

This command configures an authentication key-id, key type, and key used to authenticate NTP PDUs sent to and received from other network elements participating in the NTP protocol. For authentication to work, the authentication key-id, authentication type and authentication key value must match.

**CLI Syntax:**
```
config>system>time>ntp
  authentication-key key-id {key key} [hash | hash2] type
    {des|message-digest}
```

**Example:**
```
config>system>time>ntp#
config>system>time>ntp# authentication-key 1 key A type des
config>system>time>ntp# no shutdown
```

The following example shows NTP disabled with the `authentication-key` parameter enabled.

```
A:sim1>config>system>time>ntp# info
----------------------------------------------
  shutdown
  authentication-key 1 key "OAwqNULbZgI" hash2 type des
----------------------------------------------
A:sim1>config>system>time>ntp#
```

**Broadcast**

The `broadcast` command is used to transmit broadcast packets on a given subnet.

**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#

The following example in the config context shows NTP enabled with the broadcast command configured. At this level, the NTP broadcast commands are displayed at the end of the output after the router interfaces are shown.

A:sim1>config info

...
Multicast

When configuring NTP the node can be configured to transmit or receive multicast packets on the CPM MGMT port. Broadcast & Multicast messages can easily be spoofed, therefore, authentication is strongly recommended. Multicast is used to configure the transmission of NTP multicast messages. The no construct of this command removes the transmission of multicast address from the configuration.

When transmitting multicast NTP messages the default address of 224.0.1.1 is used.

**CLI Syntax:**
```
config>system>time>ntp
    multicast [version version] [key-id key-id]
```

**Example:**
```
config>system>time>ntp#
    config>system>time>ntp# multicast
    config>system>time>ntp# no shutdown
```

The following example shows NTP enabled with the `multicast` command configured.
```
A:ALA-12>config>system>time# info
----------------------------------------------
    server 192.168.15.221
    multicast
    no shutdown
----------------------------------------------
A:ALA-12>config>system>time#
```

**Multicastclient**

This command is used to configure an address to receive multicast NTP messages on the CPM MGMT port. The no construct of this command removes the multicast client. If multicastclient is not configured, all NTP multicast traffic will be ignored.

**CLI Syntax:**
```
config>system>time>ntp
    multicastclient [authenticate]
```

**Example:**
```
config>system>time>ntp#
    config>system>time>ntp# multicastclient authenticate
    config>system>time>ntp# no shutdown
```

The following example shows NTP enabled with the `multicastclient` command configured.
```
A:ALA-12>config>system>time# info
----------------------------------------------
    server 192.168.15.221
    multicastclient
    no shutdown
----------------------------------------------
A:ALA-12>config>system>time##
NTP-Server

This command configures the node to assume the role of an NTP server. Unless the server command is used this node will function as an NTP client only and will not distribute the time to downstream network elements. If an authentication key-id is specified in this command, the NTP server requires client packets to be authenticated.

**CLI Syntax:**
```
config>system>time>ntp
    ntp-server [transmit key-id]
```

**Example:**
```
config>system>time>ntp#
    config>system>time>ntp# ntp-server transmit 1
    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 five NTP servers can be configured.

**CLI Syntax:**
```
config>system>time>ntp
    server ip-address [key-id key-id] [version version]
    [prefer]
```

**Example:**
```
config>system>time>ntp#
    config>system>time>ntp# server 192.168.1.1 key-id 1
    config>system>time>ntp# no shutdown
```

The following example shows NTP enabled with the server command configured.

```
A:sim1>config>system>time>ntp# info
---------------------------------------------
  no shutdown
  server 192.168.1.1 key 1
---------------------------------------------
A:sim1>config>system>time>ntp#
```
SNTP

SNTP is a compact, client-only version of the NTP. SNTP can only receive the time from SNTP/NTP servers; it cannot be used to provide time services to other systems. SNTP can be configured in either broadcast or unicast client mode.

SNTP time elements include:

- Broadcast-client on page 257
- Server-address on page 258

**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#
  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#
Common Configuration Tasks

Server-address

The **server-address** command configures an SNTP server for SNTP unicast client mode.

**CLI Syntax:**
```
config>system>time>sntp#
    config>system>time>sntp# server-address ip-address version version-number [normal|preferred] [interval seconds]
```

**Example:**
```
config>system>time>sntp#
    config>system>time# server-address 10.10.0.94 version 1 preferred interval 100
```

The following example shows SNTP enabled with the **server-address** command configured.

```
A:ALA-12>config>system>time# info
----------------------------------------------
   sntp
       server-address 10.10.0.94 version 1 preferred interval 100
       no shutdown
       exit
       dst-zone PT start-date 2006/04/04 12:00 end-date 2006/10/25 12:00
       zone GMT
----------------------------------------------
A:ALA-12>config>system>time#
```
CRON

The CRON command supports the Service Assurance Agent (SAA) functions as well as the ability to schedule turning on and off policies to meet “Time of Day” requirements. CRON functionality includes the ability to specify the commands that need to be run, when they will be scheduled, including one-time only functionality (oneshot), interval and calendar functions, as well as where to store the output of the results. In addition, CRON can specify the relationship between input, output and schedule. Scheduled reboots, peer turn ups, service assurance agent tests and more can all be scheduled with Cron, as well as OAM events, such as connectivity checks, or troubleshooting runs.

CRON elements include:

- Action
- Schedule
- Script
- Time Range
- Time of Day

Action

Parameters for a script including the maximum amount of time to keep the results from a script run, the maximum amount of time a script may run, the maximum number of script runs to store and the location to store the results.

CLI Syntax: config>cr on

  action action-name [owner action-owner]
  expire-time {seconds|forever}
  lifetime {seconds|forever}
  max-completed unsigned
  results file-url
  script script-name [owner script-owner]
  shutdown

Example: config>cr on# action test

  config>cr on>action# results ftp://172.22.184.249/.sim1/test-results
  config>cr on>action# no shut

The following example shows a script named “test” receiving an action to store its results in a file called “test-results”:

  A:sim1>config>cr on# info
  -------------------------------
  script "test"
  location “ftp://172.22.184.249/.sim1/test.cfg"
Common Configuration Tasks

```
no shutdown
exit
action "test"
    results "ftp://172.22.184.249/./sim1/test-results"
no shutdown
exit
```

```
-----------------------------
A:sim1>config>crong# script

Schedule

The schedule function configures the type of schedule to run, including one-time only (oneshot), periodic or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds). If end-time and interval are both configured, whichever condition is reached first is applied.

**CLI Syntax:**
```plaintext
config>crong
    schedule schedule-name [owner schedule-owner]
    action action-name [owner owner-name]
    count number
    day-of-month {day-number [..day-number]|all}
    description description-string
    end-time [date|day-name] time
    hour {hour-number [..hour-number] | all}
    interval seconds
    minute {minute-number [..minute-number]|all}
    month {month-number [..month-number] | month-name
        [..month-name]|all}
    no shutdown
    type {periodic|calendar|oneshot}
    weekday {weekday-number [..weekday-number] | day-name
        [..day-name]|all}
    shutdown
```

**Example:**
```plaintext
config>crong# schedule test2
config>crong>schd# day-of-month 17
config>crong>schd# end-time 2007/07/17 12:00
config>crong>schd# minute 0 15 30 45
config>crong>schd# weekday friday
config>crong>schd# 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>crong# info
-----------------------------------------------
schedule "test2"
    shutdown
    day-of-month 17
    minute 0 15 30 45
    weekday friday
```
Script

The script command opens a new nodal context which contains information on a script.

**CLI Syntax:**
```
config>cron
   script script-name [owner script-owner]
   description description-string
   location file-url
   shutdown
```

**Example:**
```
config>cron# script test
config>cron>script#
```

The following example names a script “test”:
```
A:si1>config>cron# info
-------------------------------
   script "test"
   location "ftp://172.22.184.249/./si1/test.cfg"
   no shutdown
   exit
-------------------------------
A:si1>config>cron#
```
Time Range

7450 ESS ACLs and QoS policy configurations may be enhanced to support time based matching. CRON configuration includes time matching with the 'schedule' sub-command. Schedules are based on events; time-range defines an end-time and will be used as a match criteria.

Time range elements include:

- Create on page 262
- Absolute on page 262
- Daily on page 263
- Weekdays on page 264
- Weekend on page 264
- Weekly on page 265

Create

Use this command to enable the time-range context.

The following example creates a time-range called test1.

**CLI Syntax:**
```
cfg> cr on
    time-range name create
```

**Example:**
```
cfg> cr on# time-range test1 create
config> cr on
```

Absolute

The absolute command configures a start and end time that will not repeat.

**CLI Syntax:**
```
cfg> cr on
    time-range$ absolute absolute-time end absolute-time
```

**Example:**
```
cfg> cr on
    time-range$ absolute start 2006/05/05,11:00 end
2006/05/06,11:01
config> cr on
```
The following example shows an absolute time range beginning on May 5, 2006 at 11:00 and ending May 6, 2006 at 11:01:

```
A:sim1>config>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : test1
Triggers    : 0
Status      : Inactive
Absolute    : start 2006/05/05,11:00 end 2006/05/06,11:01
===============================================================================
A:sim1>config>cron>time-range#
```

**Daily**

The daily command configures the start and end of a periodic schedule for every day of the week (Sunday through Saturday).

**CLI Syntax:**
```
config>cron>time-range$
daily start time-of-day end time-of-day
```

**Example:**
```
config>cron>time-range$ daily start 11:00 end 12:00
config>cron>time-range$
```

The following example shows a daily time range beginning at 11:00 and ending at 12:00.

```
A:sim1>config>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : 1
Triggers    : 0
Status      : Inactive
Periodic    : daily Start 11:00 End 12:00
===============================================================================
A:sim1>config>cron>time-range#
```
Weekdays

The weekdays command configures the start and end of a periodic schedule for weekdays (Monday through Friday).

**CLI Syntax:**
```
config>cron>time-range$ weekdays start time-of-day end time-of-day
```

**Example:**
```
config>cron>time-range$ weekdays start 11:00 end 12:00
```

The following command shows a time range beginning at 11:00 and ending at 12:00. This schedule runs all weekdays during this time period.

```
A:sim1>config>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : 1
Triggers    : 0
Status      : Inactive
Periodic    : weekdays Start 11:00 End 12:00
===============================================================================
A:sim1>config>cron>time-range#
```

Weekend

The weekend command configures the start and end of a periodic schedule for weekends (Saturday and Sunday). The resolution must be at least one minute apart, for example, start at 11:00 and end at 11:01. A start time and end time of 11:00 is invalid.

**CLI Syntax:**
```
config>cron>time-range$ weekend start time-of-day end time-of-day
```

**Example:**
```
config>cron>time-range$ weekend start 11:00 end 12:00
```

The following command shows a weekend time range beginning at 11:00am and ending at 12:00pm, both Saturday and Sunday.

To specify 11:00am to 12:00pm on Saturday or Sunday only, use the Absolute parameter for one day, or the Weekly parameter for every Saturday or Sunday accordingly. In addition, see the Schedule parameter to schedule oneshot or periodic events in the config>cron> context.

```
A:sim1>config>cron>time-range# show cron time-range detail
===============================================================================
Cron time-range details
===============================================================================
Name        : 1
Triggers    : 0
```
Weekly

The weekly command configures the start and end of a periodic schedule for the same day every week, for example, every Friday. The start and end dates must be the same. The resolution must be at least one minute apart, for example, start at 11:00 and end at 11:01. A start time and end time of 11:00 is invalid.

**CLI Syntax:**
```
config>cron>time-range$
       weekly start time-in-week end time-in-week
```

**Example:**
```
config>cron>time-range$ start fri,01:01 end fri,01:02
config>cron>time-range$
```

The following command shows a weekly time range beginning on Friday at 1:01am ending Friday at 1:02am.

```
A:sim1>config>cron>time-range$ info
----------------------------------------------
weekly start fri,01:01 end fri,01:02
----------------------------------------------
A:sim1>config>cron>time-range$
```
Time of Day

Time of Day (TOD) suites are useful when configuring many types of time-based policies or when a large number of subscribers or SAPs require the same type of TOD changes. The TOD suite may be configured while using specific ingress or egress ACLs or QoS policies, and is an enhancement of the ingress and egress CLI trees.

SAPs

- If a TOD Suite is assigned to a SAP, statistics collection are not collected for that SAP and scheduler overrides cannot be collected on the SAP. If the SAP has an egress aggregate rate limit configured, an egress scheduler policy assignment cannot be applied.
- When an item is configured both on SAP level and in the TOD suite assigned to the SAP, the TOD-suite defined value takes precedence. If a SAP belongs to an IES Interface, TOD Suites are allowed only with generic interfaces (no subscriber, group, redundant, etc.).
- A policy or filter assignment configured directly on a SAP has a lower priority than any assignment in a TOD Suite. Hence, it is possible that a new direct configuration has no immediate effect. If the configuration is made by CLI, a warning is given.

Multiservice Site

When applying a TOD Suite to a multi-service-site, only the scheduler policy assignment is active. If the multi-service-site has an egress aggregate rate limit configured, any egress scheduler policy assignment cannot be applied. While a TOD Suite is assigned to a multi-service-site, it is not possible to configure a scheduler to override it.
ANCP (Access Node Control Protocol)

Static ANCP string mapping and TOD suites must be configured on separate SAPs or multiservice sites.

Time of day elements include:

- Egress on page 267
- Ingress on page 270

Egress

This command is an enhancement for specific egress policies including filter lists, schedulers and QoS. Use this command to create time-range based associations of previously created filter lists, QoS and scheduler policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

Egress Aggregate Rate Limit

Having an egress aggregate rate limit is incompatible with having a scheduler policy. If a SAP or multi-service-site has a configured egress aggregate rate limit, and the TOD suite assigns a scheduler policy to it, that assignment cannot be applied: the configured aggregate rate limit takes precedence over the TOD suite's scheduler policy assignment.

Egress Multicast Group

SAPs may not have a TOD suite while belonging to an egress multicast group (EMG). Since all SAPs that belong to the same EMG must have the same egress filter, it is imperative to ensure that the TOD Suite does not modify the egress filter assignment.
Filters

In a TOD suite, filters that have entries with time-ranges may not be selected. Similarly, filter entries with a time-range may not be created while a TOD suite refers to that filter. QoS policies and filters referred to by a TOD suite must have scope “template” (default).

The following syntax is used to configure TOD-suite egress parameters.

CLI Syntax:

```plaintext
config
cron
tod-suite tod-suite-name create
egress
  filter ip ip-filter-id [time-range time-range-name] [priority priority]
  filter mac mac-filter-id [time-range time-range-name] [priority priority]
  qos policy-id [time-range time-range-name] [priority priority]
  scheduler-policy scheduler-policy-name [time-range time-range-name]
```

Example:

```
config>cron>tod-suite$ egress filter ip 100
config>cron>tod-suite$
```

The following command shows an egress IP filter association with filter ID 100.

```
sim1>config>filter# ip-filter 100 create
A:sim1>config>filter>ip-filter$ entry 10 create
A:sim1>config>filter>ip-filter$ entry$
A:sim1>config>cron>tod-suite# egress filter ip 100
A:sim1>config>cron>tod-suite# info detail
----------------------------------------------
  no description
  egress
    filter ip 100
  exit
----------------------------------------------
A:sim1>config>cron>tod-suite#
```

Example:

```
config>cron>tod-suite$ egress qos 101
config>cron>tod-suite$
```
The following command shows an association with egress QoS-SAP policy 101.

```
A:sim1>config>qos# sap-egress 101 create
A:sim1>config>qos>egress qos 101
A:sim1>config>cron>tod-suite# info detail
---
no description
egress
  qos 101
exit
---
A:sim1>config>cron>tod-suite#
```

**Example:**
```
config>cron>tod-suite$ egress scheduler-policy test1
config>cron>tod-suite$
```

The following command shows an association with an egress scheduler-policy called test1.

```
A:sim1>config# qos scheduler-policy test1 create
A:sim1>config>qos>scheduler-policy#
...
A:sim1>configure cron tod-suite test1 create
A:sim1>config>cron>tod-suite# egress scheduler-policy test1
A:sim1>config>cron>tod-suite# info detail
---
no description
egress
  scheduler-policy test1
exit
---
A:sim1>config>cron>tod-suite$
```
Ingress

This command is an enhancement for specific ingress policies including filter lists, schedulers and QoS policies. Use this command to create time-range based associations of previously created filter lists QoS and scheduler policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range. To configure a daily time-range across midnight, use a combination of two entries. An entry that starts at hour zero will take over from an entry that ends at hour 24.

CLI Syntax:  
```plaintext
config>system
cron
tod-suite tod-suite-name create
  ingress
    filter ip ip-filter-id [time-range time-range-name] [priority priority]
    filter mac mac-filter-id [time-range time-range-name] [priority priority]
    qos policy-id [time-range time-range-name] [priority priority]
    scheduler-policy scheduler-policy-name [time-range time-range-name]
```

Example: config>cron>tod-suite$ ingress filter ip 100
config>cron>tod-suite$

The following command shows an ingress IP filter association with filter ID 100.

```plaintext
sim1>config>filter# ip-filter 100 create
A:sim1>config>filter>ip-filter$ entry 10 create
A:sim1>config>filter>ip-filter$ entry$
...
A:sim1>config>cron>tod-suite# ingress filter ip 100
A:sim1>config>cron>tod-suite# info detail
--------------------------------------------
  no description
  ingress
    filter ip 100
  exit
--------------------------------------------
A:sim1>config>cron>tod-suite#
```
Example:  config>cron>tod-suite$ ingress qos 101
          config>cron>tod-suite$

The following command shows an association with ingress QoS-SAP policy 101.

A:sim1>config>qos# sap-egress 101 create
...  
A:sim1>config>cron>tod-suite# ingress qos 101
A:sim1>config>cron>tod-suite# info detail
----------------------------------------------
        no description
        ingress
        qos 101
        exit
----------------------------------------------
A:sim1>config>cron>tod-suite#

Example:  config>cron>tod-suite$ ingress scheduler-policy test1
          config>cron>tod-suite$

The following command shows an association with an ingress scheduler-policy named test1.

A:sim1>config# qos scheduler-policy test1 create
A:sim1>config>qos>scheduler-policy#
...  
A:sim1# configure cron tod-suite test1 create
A:sim1>config>cron>tod-suite#ingress scheduler-policy test1
A:sim1>config>cron>tod-suite# info detail
----------------------------------------------
        no description
        ingress
        scheduler-policy test1
        exit
----------------------------------------------
A:sim1>config>cron>tod-suite#
Configuring Synchronization and Redundancy

- Configuring Persistence on page 272
- Configuring Synchronization on page 272
- Configuring Manual Synchronization on page 273
- Forcing a Switchover on page 273
- Configuring Synchronization Options on page 274
- Configuring Multi-Chassis Redundancy on page 275

Configuring Persistence

The following example displays subscriber management system persistence command usage:

**Example:**
```
config>system# persistence
   config>system>persistence# subscriber-mgmt
   config>system>persistence>sub-mgmt# description "cf3:SubMgmt-Test"
   config>system>persistence>sub-mgmt# location cf3:
   config>system>persistence>sub-mgmt# exit
```

```
A:ALA-12>config>system>persistence# info
----------------------------------------------
   subscriber-mgmt
       description "cf3:SubMgmt-Test"
       location cf3:
   exit
----------------------------------------------
A:ALA-12>config>system>persistence#
```

Configuring Synchronization

The `switchover-exec` command specifies the location and name of the CLI script file executed following a redundancy switchover from the previously active CPM card.

**CLI Syntax:**
```
admin>redundancy
   synchronize {boot-env|config}
```

```
config>system
   switchover-exec file-url
```
Configuring Manual Synchronization

Note that automatic synchronization can be configured in the `config>system> synchronization` context.

**CLI Syntax:**
```
admin
redundancy
  synchronize {boot-env|config}
```

**Example:**
```
admin>redundancy# synchronize config
```

The following shows the output which displays during a manual synchronization:

```
A:ALA-12>admin# synchronize config
Syncing configuration......
Syncing configuration.....Completed.
A:ALA-12#
```

Forcing a Switchover

The `force-switchover now` command forces an immediate switchover to the standby CPM card.

**CLI Syntax:**
```
admin>redundancy
  force-switchover [now]
```

**Example:**
```
admin>redundancy# force-switchover now
A:ALA-12# admin redundancy force-switchover now
A:ALA-12#
Resetting...
?  
```

If the active and standby are not synchronized for some reason, users can manually synchronize the standby CPM by rebooting the standby by issuing the `admin reboot standby` command on the active or the standby CPM.
Configuring Synchronization Options

Network operators can specify the type of synchronization operation to perform between the primary and secondary CPMs after a change has been made to the configuration files or the boot environment information contained in the boot options file (BOF).

Use the following CLI to configure the boot-env option:

**CLI Syntax:**
```
config>system
  synchronize {boot-env|config}
```

**Example:**
```
config>system# synchronize boot-env
```

The following displays the configuration:
```
A:ALA-12>config>system# synchronize boot-env
A:ALA-12>config>system# show system synchronization
===================================================================
Synchronization Information
===================================================================
Synchronize Mode        : Boot Environment
Synchronize Status      : No synchronization
Last Config Sync Time   : 2006/06/27 06:19:47
Last Boot Env Sync Time : 2006/06/27 06:19:47
===================================================================
A:ALA-12>config>system#
```

Use the following CLI to configure the config option:

**CLI Syntax:**
```
config>system
  synchronize {boot-env|config}
```

**Example:**
```
config>system# synchronize config
```

The following example displays the configuration.
```
A:ALA-12>config>system# synchronize config
A:ALA-12>config>system# show system synchronization
===================================================================
Synchronization Information
===================================================================
Synchronize Mode        : Configuration
Synchronize Status      : No synchronization
Last Config Sync Time   : 2006/06/27 09:17:15
Last Boot Env Sync Time : 2006/06/24 07:16:37
===================================================================
A:ALA-12>config>system#
```
Configuring Multi-Chassis Redundancy

Note: When configuring associated LAG ID parameters, the LAG must be in access mode and LACP must be enabled.

Use the CLI syntax displayed below to configure multi-chassis redundancy features.

**CLI Syntax:**
```
admin>redundancy
    multi-chassis
    peer ip-address
    authentication-key [authentication-key | hash-key]
    [hash | hash2]
    description description-string
    mc-lag
    hold-on-neighbor-failure duration
    keep-alive-interval interval
    lag lag-id lACP-key admin-key system-id system-id [remote-lag lag-id] system-priority system-priority
    no shutdown
    no shutdown
    source-address ip-address
    sync
    igmp
    igmp-snooping
    port [port-id | lag-id] [sync-tag]
    range encap-range sync-tag
    no shutdown
    srrp
    sub-mgmt
```

**Example:**
```
admin>redundancy#
config>redundancy# multi-chassis
config>redundancy>multi-chassis# peer 10.10.10.2 create
config>redundancy>multi-chassis>peer# description "Mc-Lag peer 10.10.10.2"
config>redundancy>multi-chassis>peer# mc-lag
config>redundancy>mc>peer>mc-lag# lag 1 lACP-key 32666 system-id 00:00:00:33:33:33 system-priority 32888
config>redundancy>mc>peer>mc-lag# no shutdown
config>redundancy>mc>peer>mc-lag# exit
config>redundancy>multi-chassis>peer# no shutdown
config>redundancy>multi-chassis>peer# exit
config>redundancy>multi-chassis# exit
config>redundancy#
```
The following displays the configuration:

```
A:ALA-48>config>redundancy# info
---------------------------------------------
multi-chassis
 peer 10.10.10.2 create
     description "Mc-Lag peer 10.10.10.2"
     mc-lag
         no shutdown
 exit
     no shutdown
 exit
 exit
---------------------------------------------
A:ALA-48>config>redundancy#
```
Configuring Mixed Mode

The 7450 mixed mode feature allows a 7450 ESS-7 or ESS-12 chassis to utilize 7750 IOM3-XPs, MDAs, and IMMs to enable 7750 SR capabilities on the associated slots. This allows features such as multicast routing, VPRN and IPv6 support as well as others to be enabled on existing 7450 systems.

The following are mixed-mode requirements:

- SR capabilities (for example, IP-VPNs, IPv6 routing and multicast routing) can only be associated with interfaces on 7750 IOM3-XPs, MDAs, and IMMs
- Network interface ports must be located 7750 IOM3-XPs or IMMs
- Only 7750 IOM3-XPs, 7750 MDAs, or 7750 IMMs can be used in 7450 slots with SR capabilities enabled.

Enabling Mixed Mode on a 7450 System

To configure mixed mode support, 7750 IOM3-XPs, 7750 MDAs, or 7750 IMMs must be installed in a 7450 ESS-7 or ESS-12 router that is running OS 8.0 or later. All network interfaces must be migrated to ports on the 7750 cards.

The mixed mode state is then enabled by using the `mixed-mode-upgrade` command:

**CLI Syntax:** `mixed-mode-upgrade slot-list`

This tool will take a list of slots that should have 7750 cards installed. The command then checks to ensure that all network interfaces are located on ports on these slots and that they are all 7750 cards. It then enables the `mixed-mode` state at the system level and changes the `capability` setting for the specified slots to `sr`.

At this point the 7450 system is operating in a mixed mode state and supported features and services can now be configured on the slots with SR capabilities enabled.

Once in mixed mode use the `capability` command to configure slots for SR capabilities:

**CLI Syntax:** `config>card>capability sr|ess`

Slots using 7750-capable cards will have to have SR capability enabled on all slots with 7750 IOM3s and IMMs, as well as `mixed-mode` at the system level.
See Table 32 for a description of mixed-mode support.

**Table 32: Mixed-Mode Support**

<table>
<thead>
<tr>
<th>Feature</th>
<th>7450 Standard Mode</th>
<th>7450 Mixed Mode (Limited to 7750 IOM3/IMM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full IES Support</td>
<td>Limited IES support</td>
<td>Yes</td>
</tr>
<tr>
<td>Full VPRN Support</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>BGP for routing (all address families)</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>IP Multicast routing and forwarding</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Protocols: PIM, MSDP and IGMP mVPN mVPN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2MP LSP support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spoke termination on L3 (IES/VPRN) interfaces</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>TPSDA</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>IPv4 &amp; v6 Routed subscriber management support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PPPoE support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRRP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routed subscriber management for wholesale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP Mirroring</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Configuring Power Supply Parameters

By default, 7450 ESS-Series routers are configured as DC-input devices. Traps and alarms are automatically sent if DC power supplies are installed in the power supply slots. In order to generate traps and alarms when AC power supplies are installed in 7450 ESS-Series models (except the non-redundant models) the `power-supply` command must be modified. In the non-redundant models, the power supply parameters cannot be modified.

Configuring an existing power supply to `none` prior to powering off the unit will prevent an alarm from being generated.

See the ESS-Series-XX Hardware Installation Guides for instructions to install power supplies.

Use the CLI syntax displayed below to modify power supply parameters.

**CLI Syntax:**
```
config>system
    power-supply {1|2} {dc|ac {single|multiple}|none}
```

**Example:**
```
config>system# power-supply 1 dc
config>system# power-supply 2 dc
```

The following example displays the `power-supply` command configuration:

```
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
    exit
...-------------------------------------------------------------------------------
A:ALA-12>config>system#
```
Configuring Backup Copies

The `config-backup` command allows you to specify the maximum number of backup versions of configuration and index files kept in the primary location.

For example, assume the `config-backup count` is set to 5 and the configuration file is called `xyz.cfg`. When a `save` command is executed, the file `xyz.cfg` is saved with a `.1` extension. Each subsequent `config-backup` command increments the numeric extension until the maximum count is reached. The oldest file (5) is deleted as more recent files are saved.

```
xyz.cfg
xyz.cfg.1
xyz.cfg.2
xyz.cfg.3
xyz.cfg.4
xyz.cfg.5
xyz.ndx
```

Each persistent index file is updated at the same time as the associated configuration file. When the index file is updated, then the save is performed to `xyz.cfg` and the index file is created as `xyz.ndx`. Synchronization between the active and standby SF/CPM is performed for all configurations and their associated persistent index files.

**CLI Syntax:**
```
config>system
    config-backup count
```

**Example:**
```
config>system#
    config>system# config-backup 7
```

The following example shows the `config-backup` configuration.

```
A:ALA-12>config>system>time# info
#------------------------------------------
echo "System Configuration"
#------------------------------------------
   name "ALA-12"
   contact "Fred Information Technology"
   location "Bldg.1-floor 2-Room 201"
   clii-code "abcdefg1234"
   coordinates "N 45 58 23, W 34 56 12"
   config-backup 7
...```

```
A:ALA-12>config>system>time#
```
System Administration Parameters

Use the CLI syntax displayed below to configure various system administration parameters.

Administrative parameters include:

- Disconnect on page 281
- Set-time on page 282
- Display-config on page 282
- Save on page 284
- Reboot on page 285
- Post-Boot Configuration Extension Files on page 286

Disconnect

The `disconnect` command immediately disconnects a user from a console, Telnet, FTP, or SSH session.

**Note:** Configuration modifications are saved to the primary image file.

**CLI Syntax:**
```
admin
    disconnect [address ip-address | username user-name |
               {console|telnet|ftp|ssh}]
```

**Example:**
```
admin# disconnect
ALA-1>admin# disconnect
ALA-1>admin# Logged out by the administrator
Connection to host lost.
C:\>
```
Set-time

Use the set-time command to set the system date and time. The time entered should be accurate for the time zone configured for the system. The system will convert the local time to UTC before saving to the system clock which is always set to UTC. If SNTP or NTP is enabled (no shutdown) then this command cannot be used. The set-time command does not take into account any daylight saving offset if defined.

**CLI Syntax:**
```
admin
set-time date time
```

**Example:**
```
admin# set-time 2007/02/06 04:10:00
```

The following example displays the set-time command results.

```
ALA-2# admin set-time 2007/02/06 04:10:00
ALA-2# show time
Thu Feb 2 04:10:04 GMT 2007
ALA-2#
```

Display-config

The display-config command displays the system’s running configuration.

**CLI Syntax:**
```
admin
display-config [detail] [index]
```

**Example:**
```
admin# display-config detail
```

The following example displays a portion of the display-config detail command results.

```
exit all
configure
#------------------------------------------
echo "System Configuration"
#------------------------------------------

system
    name "ALA-12"
    contact "Fred Information Technology"
    location "Bldg.1-floor 2-Room 201"
    cli-code "abcdefg1234"
```

```
coordinates "N 45 58 23, W 34 56 12"
chassis-mode d
cfg-backup 7
boot-bad-exec "ftp://test:test@192.168.xx.xxx/.1xx.cfg.1"
power-supply 1 dc
power-supply 2 dc
lacp-system-priority 1
no synchronize
snmp
    shutdown
    engineID "0000197f000000000467ff00"
    packet-size 1500
    general-port 161
exit
login-control
    ftp
        inbound-max-sessions 3
    exit
telnet
    inbound-max-sessions 5
    outbound-max-sessions 2
    exit
    idle-timeout 1440
    pre-login-message "Property of Service Routing Inc. Unauthorized access prohibited."
    motd text "Notice to all users: Software upgrade scheduled 3/2 1:00 AM"
exit
security
    management-access-filter
        default-action permit
        entry 1
            no description

#------------------------------------------
echo "Mirror Configuration"
#------------------------------------------
mirror
    mirror-dest 218 create
        fc be
        no remote-source
        sap 2/1/10:0 create
            egress
                qos 1
                exit
        exit
    exit
    no slice-size
    no shutdown
    exit
...

Finished SAT MAR 06 03:23:05 2004 UTC
A:ALA-12>admin#
Tech-support

The tech-support command creates a system core dump. **NOTE:** This command should only be used with explicit authorization and direction from Alcatel-Lucent’s Technical Assistance Center (TAC).

Save

The save command saves the running configuration to a configuration file. When the debug-save parameter is specified, debug configurations are saved in the config file. If this parameter is not specified, debug configurations are not saved between reboots.

**CLI Syntax:**

```
admin
  save [file-url] [detail] [index]
  debug-save [file-url]
```

**Example:**

```
admin# save ftp://test:test@192.168.x.xx/./1.cfg
admin# debug-save debugsave.txt
```

The following example displays the save command results.

```
A:ALA-1>admin# save ftp://test:test@192.168.x.xx/./1x.cfg
Writing file to ftp://test:test@192.168.x.xx/./1x.cfg
Saving configuration ...Completed.
A:ALA-1>admin# debug-save ftp://test:test@192.168.x.xx/./debugsave.txt
Writing file to ftp://julie:julie@192.168.x.xx/./debugsave.txt
Saving debug configuration .....Completed.
A:ALA-1>admin#
```
Reboot

The `reboot` command reboots the router including redundant CPMs and all IOMs in redundant systems. If the `now` option is not specified, you are prompted to confirm the reboot operation. The `reboot upgrade` command forces an upgrade of the boot ROM and reboot.

**CLI Syntax:**
```
admin
    reboot [active | standby] | [upgrade] [now]
```

**Example:**
```
admin# reboot now
```

The following example displays the `reboot` command results.

```
A:ALA-1>admin# reboot now
Are you sure you want to reboot (y/n)? y
Rebooting...
Using preloaded VxWorks boot loader.
...
```

If synchronization fails, the standby does not reboot automatically. The `show redundancy synchronization` command displays synchronization output information.
Post-Boot Configuration Extension Files

Two post-boot configuration extension files are supported and are triggered when either a successful or failed boot configuration file is processed. The commands specify URLs for the CLI scripts to be run following the completion of the boot-up configuration. A URL must be specified or no action is taken. The commands are persistent between router (re)boots and are included in the configuration saves (admin>save).

**CLI Syntax:**
```
config>system
  boot-bad-exec file-url
  boot-good-exec file-url
```

**Example:**
```
config>system# boot-bad-exec ftp://test:test@192.168.xx.xxx/./fail.cfg
config>system# boot-good-exec ftp://test:test@192.168.xx.xxx/./ok.cfg
```

The following example displays the command output:

```
A:ALA-12>config>system# info
#------------------------------------------
echo "System Configuration"
#------------------------------------------
nname "ALA-12"
contact "Fred Information Technology"
location "Bldg.1-floor 2-Room 201"
clli-code "abcdefg1234"
coordinates "N 45 58 23, W 34 56 12"
config-backup 7
boot-good-exec "ftp://test:test@192.168.xx.xxx/./ok.cfg"
boot-bad-exec "ftp://test:test@192.168.xx.xxx/./fail.cfg"
power-supply 1 dc
power-supply 2 dc
lacp-system-priority 1
sync-if-timing
  begin
    ref-order ref1 ref2 bits
..
#------------------------------------------
A:ALA-12>config>system#
```
Show Command Output and Console Messages

The `show>system>information` command displays the current value of the bad/good exec URLs and indicates whether a post-boot configuration extension file was executed when the system was booted. If an extension file was executed, the `show>system>information` command also indicates if it completed successfully or not.

A:ALA-12>config>system#    show system information
===============================================================================
System Information
===============================================================================
System Name            : ALA-12
System Contact         : Fred Information Technology
System Location        : Bldg.1-floor 2-Room 201
System Coordinates     : N 45 58 23, W 34 56 12
System Up Time         : 1 days, 04:59:33.56 (hr:min:sec)

SNMP Port              : 161
SNMP Engine ID         : 0000197f000000000467ff00
SNMP Max Message Size  : 1500
SNMP Admin State       : Disabled
SNMP Oper State        : Disabled
SNMP Index Boot Status : Not Persistent

BOF Source             : cf1:
Image Source           : primary
Config Source          : primary
Last Booted Config File: ftp://test:test@192.168.xx.xxx/./12.cfg
Last Boot Cfg Version  : THU MAR 04 22:39:03 2004 UTC
Last Boot Config Header: # TiMOS B-0.0.I323 - Copyright (c) 2000-2004 Alcatel.
                        # All rights reserved. All use subject to applicable l
                        #icense agreements. # Built on Sun Feb 29 21:43:13 PST
                        # Generated
                        THU MAR 04 22:39:03 2004 UTC
Last Boot Index Version: N/A
Last Boot Index Header : N/A
Last Saved Config      : N/A
Time Last Saved        : N/A
Changes Since Last Save: Yes
Time Last Modified     : 2004/03/06 03:30:45
Max Cfg/BOF Backup Rev : 7
Cfg-OK Script          : ftp://test@test@192.168.xx.xxx/./ok.cfg
Cfg-OK Script Status   : not used
Cfg-Fail Script        : ftp://test@test@192.168.xx.xxx/./fail.cfg
Cfg-Fail Script Status : not used

DNS Server             : 192.168.1.254
DNS Domain             : eng.timetra.com
BOF Static Routes      :
To                     
172.22.184.0/22        192.168.1.251

A: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 -
CRITICAL: CLI #1002 An error occurred while processing the configuration file.
The system configuration is missing or incomplete.
MAJOR: CLI #1008 The SNMP daemon is disabled.
If desired, enable SNMP with the 'config>system>snmp no shutdown' command.
Attempting to exec configuration failure extension file:
'ftp://test:test@192.168.xx.xxx/.fail.cfg' ...
Config fail extension
Enabling SNMP daemon
MAJOR: CLI #1009 An error occurred while processing a CLI command -
File ftp://test@test@192.168.xx.xxx/.fail.cfg, Line 5: Command "abc log" failed.
TiMOS-B-X.0.Rx both/hops ALCATEL 7450 Copyright (c) 2000-2009 Alcatel-Lucent.
All rights reserved. All use subject to applicable license agreements.
Built on Thu Nov 207 19:19:11 PST 2008 by builder in /rel5x.0/1/Rx/panos/main

Login:
System Timing

In the event that network timing is required for the synchronous interfaces in the 7450 ESS-Series, a timing subsystem is utilized to provide a clock to all synchronous interfaces within the system.

This section describes the commands used to configure and control the timing subsystem.

Use the CLI syntax displayed below to:

- Edit Mode on page 289
- Configuring Timing References on page 290
- Using the Revert Command on page 291
- Other Editing Commands on page 292
- Forcing a Specific Reference on page 293

Edit Mode

To enter the mode to edit timing references, you must enter the `begin` keyword at the `config>system>sync-if-timing#` prompt.

Use the following CLI syntax to enter the edit mode:

**CLI Syntax:**

```
config>system>sync-if-timing
begin
```

The following error message displays when you try to modify `sync-if-timing` parameters without entering the keyword `begin`.

```
A:ALA-12>config>system>sync-if-timing>ref1# source-port 2/1/1
MINOR: CLI The sync-if-timing must be in edit mode by calling begin before any changes can be made.
MINOR: CLI Unable to set source port for ref1 to 2/1/1.
A:ALA-12>config>system>sync-if-timing>ref1#
```
Configuring Timing References

Use the following CLI syntax to configure timing reference parameters. Note that the source port specified for ref1 and ref2 is dependent on the 7450 ESS-Series model type and chassis slot.

<table>
<thead>
<tr>
<th>7450 Model</th>
<th>Ref1/Slots</th>
<th>Ref2/Slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESS-1</td>
<td>Not enabled</td>
<td>Not enabled</td>
</tr>
<tr>
<td>ESS-6</td>
<td>1 — 2</td>
<td>3 — 4</td>
</tr>
<tr>
<td>ESS-7</td>
<td>1 — 2</td>
<td>3 — 5</td>
</tr>
<tr>
<td>ESS-12</td>
<td>1 — 5</td>
<td>6 — 10</td>
</tr>
</tbody>
</table>

The following displays a timing reference configuration example:

A: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
--------------------------------------------
A:ALA-12>config>system>sync-if-timing#
Using the Revert Command

The `revert` command allows the clock to revert to a higher priority reference if the current reference goes offline or becomes unstable. When the failed reference becomes operational, it is eligible for selection.

When mode is non-revertive, a failed clock source is not selected again. If a node would enter holdover due to the references being in previous failed state, then the node will select one of the previously failed references rather than going into holdover.

**CLI Syntax:**
```
config>system>sync-if-timing
    revert
```
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:**

```
cfg>system>sync-if-timing
abort
ccommit
```
Forcing a Specific Reference

You can force the system synchronous timing output to use a specific reference.

Note: The **debug sync-if-timing force-reference** command should only be used to test and debug problems. 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.

When the command is executed, the current system synchronous timing output is immediately referenced from the specified reference input. If the command forces the BITS input, then both CPMs will select their local BITS input ports; otherwise, the standby CPM locks to the output of the active CPM clock.

If the specified input is not available (shutdown), or in a disqualified state, the timing output will enter a holdover state based on the previous input reference.

On a CPM activity switch, the force command is cleared and normal reference selection is determined.

The **force** command affects both the central clock and the BITS output.

Debug configurations are not saved between reboots.

**CLI Syntax:**
```
debug>sync-if-timing
    force-reference {ref1 | ref2 | bits}
```

**Example:**
```
debuge>sync-if-timing# force-reference
```
Configuring System Monitoring Thresholds

Creating Events

The `event` command controls the generation and notification of threshold crossing events configured with the `alarm` command. When a threshold crossing event is triggered, the `rmon event` configuration optionally specifies whether an entry in the RMON-MIB log table be created to record the occurrence of the event. It can also specify whether an SNMP notification (trap) be generated for the event. There are two notifications for threshold crossing events, a rising alarm and a falling alarm.

Creating an event entry in the RMON-MIB log table does not create a corresponding entry in the event logs. However, when the event is set to trap the generation of a rising alarm or falling alarm notification creates an entry in the event logs and that is distributed to whatever log destinations are configured: console, session, memory, file, syslog, or SNMP trap destination. The logger message includes a rising or falling threshold crossing event indicator, the sample type (absolute or delta), the sampled value, the threshold value, the `rmon-alarm-id`, the associated `rmon-event-id` and the sampled SNMP object identifier.

The `alarm` command configures an entry in the RMON-MIB alarm table. The `alarm` command controls the monitoring and triggering of threshold crossing events. In order for notification or logging of a threshold crossing event to occur there must be at least one associated `rmon event` configured.

The agent periodically takes statistical sample values from the MIB variable specified for monitoring and compares them to thresholds that have been configured with the `alarm` command. The `alarm` command configures the MIB variable to be monitored, the polling period (interval), sampling type (absolute or delta value), and rising and falling threshold parameters. If a sample has crossed a threshold value, the associated ‘event’ is generated.

Preconfigured CLI threshold commands are available. Preconfigured commands hide some of the complexities of configuring RMON alarm and event commands and perform the same function. In particular, the preconfigured commands do not require the user to know the SNMP object identifier to be sampled. The preconfigured threshold configurations include memory warnings and alarms and compact flash usage warnings and alarms.
To create events, use the following CLI:

**Example:** config>system>thresholds# cflash-cap-warn cf1-B: rising-threshold 2000000 falling-threshold 1999900 interval 240 trap startup-alarm either

**Example:** config>system>thresholds# memory-use-alarm rising-threshold 50000000 falling-threshold 45999999 interval 500 both startup-alarm either

**Example:** config>system>thresh# rmon

**Example:** config>system>thresh>rmon# event 5 both description "alarm testing" owner "Timos CLI"

The following example displays the command output:

```
A:ALA-49>config>system>thresholds# info
-----------------------------------------------
 rmon
  event 5 description "alarm testing" owner "Timos CLI"
  exit
  cflash-cap-warn cf1-B: rising-threshold 2000000 falling-threshold 1999900
  interval 240 trap
  memory-use-alarm rising-threshold 50000000 falling-threshold 45999999 interval 500
-----------------------------------------------
A:ALA-49>config>system>thresholds#
```
Configuring LLDP

The following output displays LLDP defaults:

```
A:testSr1>config>system>lldp# info detail
----------------------------------------------
  no tx-interval
  no tx-hold-multiplier
  no reinit-delay
  no notification-interval
  no tx-credit-max
  no message-fast-tx
  no message-fast-tx-init
  no shutdown
----------------------------------------------
A:testSr1>config>system>lldp#
```

The following example shows an LLDP port configuration.

```
*A:ALA-48>config>port>ethernet>lldp# info
----------------------------------------------
dest-mac nearest-bridge
  admin-status tx-rx
tx-tlvs port-desc sys-cap
tx-mgmt-address system
exit
----------------------------------------------
*A:ALA-48>config>port>ethernet>lldp#
```

The following example shows a global system LLDP configuration.

```
A:ALA-48>config>system>lldp# info
----------------------------------------------
tx-interval 10
tx-hold-multiplier 2
reinit-delay 5
notification-interval 10
----------------------------------------------
A:ALA-48>config>system>lldp#
```
System Command Reference

Command Hierarchies

Configuration Commands

- System Information Commands on page 297
- System Alarm Commands on page 299
- Hardware Configuration Commands on page 300
- Persistence Commands on page 300
- System Time Commands on page 301
- Cron Commands on page 302
- System Synchronization Commands on page 305
- System Administration (Admin) Commands on page 304
- High Availability (Redundancy) Commands on page 307
- LLDP System Commands on page 309
- LLDP Ethernet Port Commands on page 309
- Show Commands on page 310
- Debug Commands on page 311
- Clear Commands on page 311
- Tools Commands on page 312

System Information Commands

```
config
  — system
    — 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
    — coordinates coordinates
    — no coordinates
    — dns
      — address-pref {ipv4-only}
      — no address-pref
```
— [no] enable-icmp-vse
— lACP-system-priority lACP-system-priority
— no lACP-system-priority
— [no] 14-load-balancing
— lsr-load-balancing {lbl-only | lbl-ip}
— no lsr-load-balancing
— location location
— no location
— name system-name
— no name
System Alarm Commands

```
config
  system
    thresholds
      cflash-cap-alarm cflash-id rising-threshold threshold [falling-threshold threshold] interval seconds [rmon-event-type] [startup-alarm alarm-type]
      no cflash-cap-alarm cflash-id
      cflash-cap-warn cflash-id rising-threshold threshold [falling-threshold threshold] interval seconds [rmon-event-type] [startup-alarm alarm-type]
      no cflash-cap-warn cflash-id
      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
```
Command Hierarchies

Hardware Configuration Commands

```
config
  — system
    — power-supply [power-supply-id] [type]
```

Persistence Commands

```
config
  — system
    — persistence
      — application-assurance
        — description description-string
        — no description
        — location cflash-id
        — no location
      — nat-port-forwarding
        — description description-string
        — no description
        — location cflash-id
        — no location
      — subscriber-mgmt
        — description description-string
        — no description
        — location cflash-id
        — no location
```
System Time Commands

root
  — admin
    — set-time [date] [time]

config
  — system
    — time
      — [no] ntp
        — [no] authentication-check
        — authentication-key key-id key [hash | hash2] type {des | message-digest}
        — no authentication-key key-id
        — [no] broadcast [router router-name] {interface ip-int-name} [key-id key-id]
          [version version] [ttl ttl]
        — broadcastclient [router router-name] {interface ip-int-name} [authenticate]
        — [no] multicast [version version] [key-id key-id]
        — [no] multicastclient [authenticate]
        — [no] ntp-server [transmit key-id]
        — [no] peer ip-address [version version] [key-id key-id] [prefer]
        — [no] server ip-address [version version] [key-id key-id] [prefer]
        — [no] shutdown
      — [no] sntp
        — [no] broadcast-client
        — server-address ip-address [version version-number] [normal | preferred]
          [interval seconds]
        — no server-address ip-address
        — [no] shutdown
      — [no] dst-zone [std-zone-name | non-std-zone-name]
        — end {end-week} {end-day} {end-month} [hours-minutes]
        — offset offset
        — start {start-week} {start-day} {start-month} [hours-minutes]
      — zone std-zone-name | non-std-zone-name [hh [:mm]]
      — no zone
Cron Commands

```bash
config
  -- [no] cron
      -- [no] action action-name [owner owner-name]
      -- expire-time {seconds | forever}
      -- lifetime {seconds | forever}
      -- max-completed unsigned
      -- [no] results file-url
      -- [no] script script-name [owner owner-name]
      -- [no] shutdown
  -- [no] schedule schedule-name [owner owner-name]
      -- [no] action action-name [owner owner-name]
      -- [no] day-of-month {day-number |..day-number | all}
      -- count number
      -- [no] description description-string
      -- [no] end-time [date|day-name] time
      -- [no] hour {..hour-number |..hour-number | all}
      -- [no] interval seconds
      -- [no] minute {minute-number |..minute-number | all}
      -- [no] month {month-number |..month-number |month-name |..month-name | all}
      -- [no] shutdown
      -- type {schedule-type}
      -- [no] weekday {weekday-number |..weekday-number | day-name |..day-name | all}
  -- [no] script [no] script script-name [owner owner-name]
      -- [no] description description-string
      -- [no] Specifies the script name.location file-url
      -- [no] shutdown
  -- [no] time-range name
      -- absolute start start-absolute-time end end-absolute-time
      -- no absolute start start-absolute-time
      -- daily start start-time-of-day end end-time-of-day
      -- no daily start start-time-of-day
      -- weekdays start start-time-of-day end end-time-of-day
      -- no weekdays start start-time-of-day
      -- weekend start start-time-of-day end end-time-of-day
      -- no weekend start start-time-of-day
      -- weekly start start-time-in-week end end-time-in-week
      -- no weekly start start-time-in-week
  -- [no] tod-suite
      -- egress
          -- filter ip ip-filter-id [time-range time-range-name] [priority priority]
          -- filter mac mac-filter-id [time-range time-range-name] [priority priority]
          -- no filter ip ip-filter-id [time-range time-range-name]
          -- no filter mac mac-filter-id [time-range time-range-name]
          -- qos policy-id [time-range time-range-name] [priority priority]
          -- no qos policy-id [time-range time-range-name]
          -- scheduler-policy scheduler-policy-name [time-range time-range-name] [priority priority]
          -- no scheduler-policy scheduler-policy-name [time-range time-range-name]
      -- ingress
          -- filter ip ip-filter-id [time-range time-range-name] [priority priority]
          -- filter mac mac-filter-id [time-range time-range-name] [priority priority]
          -- no filter ip ip-filter-id [time-range time-range-name]
          -- no filter mac mac-filter-id [time-range time-range-name]
```

Command Hierarchies
- `qos policy-id [time-range time-range-name] [priority priority]`
- `no qos policy-id [time-range time-range-name]`
- `scheduler-policy scheduler-policy-name [time-range time-range-name] [priority priority]`
- `no scheduler-policy scheduler-policy-name [time-range time-range-name]`
System Administration (Admin) Commands

```
root
  - admin
    - application-assurance
    - upgrade
    - debug-save file-url
    - disconnect {address ip-address | username user-name | console | telnet | ftp | ssh}
    - display-config [detail | index]
    - [no] enable-tech
    - radius-discovery
      - force-discover [svc-id.service-id]
    - reboot [active | standby | upgrade] [now]
    - redundancy
    - save [file-url] [detail] [index]
    - synchronize [boot-env | config]
    - tech-support [file-url]
```
System Synchronization Commands

The following commands apply to the 7450 ESS-7 and 7450 ESS-12 models.

```
config
  — system
    — sync-if-timing
      — abort
      — begin
      — bits
        — input
          — [no] shutdown
        — interface-type {ds1 [{esf | sf}] | e1 [{pem30crc | pem31crc}]}
        — no interface-type
        — output
          — line-length {110, 220, 330, 440, 550, 660}
          — [no] shutdown
        — ql-override {prs | stu | st2 | tnc | st3e | st3 | eec1 | sec | prc | ssu-a | ssu-b | eec2}
        — no ql-override
        — ssm-bit sa-bit
      — commit
      — ref-order first second [third]
      — no ref-order
      — ref1
        — ql-override {prs | stu | st2 | tnc | st3e | st3 | eec1 | sec | prc | ssu-a | ssu-b | eec2}
        — no ql-override
        — [no] shutdown
        — source-port port-id
        — no source-port
      — ref2
        — ql-override {prs | stu | st2 | tnc | st3e | st3 | eec1 | sec | prc | ssu-a | ssu-b | eec2}
        — no ql-override
        — [no] shutdown
        — source-port port-id
        — no source-port
      — [no] ql-selection
      — [no] revert
```

The following commands apply to the 7450 ESS-6 and 7450 ESS-6v models.

```
config
  — system
    — sync-if-timing
      — abort
      — begin
      — commit
      — ref-order first second [third]
      — no ref-order
      — ref1
        — ql-override {prs | stu | st2 | tnc | st3e | st3 | eec1 | sec | prc | ssu-a | ssu-b | eec2}
        — no ql-override
        — [no] shutdown
        — source-port port-id
        — no source-port
```

System Management
Command Hierarchies

- ref2
  - ql-override {prs | stu | st2 | tnc | st3e | st3 | eec1 | sec | prc | ssu-a | ssu-b | eec2}
  - no ql-override
  - [no] shutdown
  - source-port port-id
  - no source-port
- [no] ql-selection
- [no] revert
High Availability (Redundancy) Commands

root
  — admin
  — redundancy
    — force-switchover [now]
    — synchronize [boot-env | config]

config
  — system
    — switchover-exec file-url
    — no switchover-exec
  — redundancy
    — multi-chassis
      — [no] peer ip-address
        — [no] 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 [remote-lag lag-id] system-priority system-priority
        — no lag lag-id
        — [no] shutdown
      — mc-ring
        — ring sync-tag [create]
        — no ring sync-tag
          — in-band-control-path
            — dst-ip ip-address
            — no dst-ip
            — interface ip-int-name
            — no interface
            — service-id service-id
            — no service-id
        — [no] path-b
          — [no] range vlan-range
        — [no] path-excl
          — [no] range vlan-range
        — ring-node ring-node-name [create]
        — no ring-node ring-node-name
— connectivity-verify
  — dst-ip ip-address
  — no dst-ip
  — interval interval
  — no interval
  — service-id service-id
  — no service-id
  — [no] shutdown
  — src-ip ip-address
  — no src-ip
  — src-mac ieee-address
  — no src-mac
  — vlan [0..4094]
  — no vlan

— [no] shutdown
  — peer-name name
  — no peer-name
  — [no] shutdown
  — source-address ip-address
  — no source-address
  — [no] sync
    — [no] igmp
    — [no] igmp-snooping
    — [no] local-dhcp-server
    — [no] mc-ring
    — [no] mld-snooping
    — port [port-id | lag-id] [sync-tag sync-tag]
    — no port [port-id | lag-id]
      — range encap-range [sync-tag sync-tag]
      — no range encap-range
  — [no] shutdown
  — [no] srrp
  — [no] sub-mgmt

— bgp-multi-homing
  — boot-timer seconds
  — no boot-timer
  — site-activation-timer seconds
  — no site-activation-timer

— synchronize {boot-env | config}
LLDP System Commands

configure
   — system
      — lldp
         — message-fast-tx time
         — no message-fast-tx
         — message-fast-tx-init count
         — no message-fast-tx-init
         — notification-interval time
         — no notification-interval
         — reinit-delay time
         — no reinit-delay
         — [no] shutdown
         — tx-credit-max count
         — no tx-credit-max
         — tx-hold-multiplier multiplier
         — no tx-hold-multiplier
         — tx-interval interval
         — no tx-interval

LLDP Ethernet Port Commands

configure
   — port port-id
      — ethernet
         — lldp
            — dest-mac {nearest-bridge | nearest-non-tpmr | nearest-customer}
            — admin-status {rx | tx | tx-rx | disabled}
            — [no] notification
            — tx-mgmt-address [system]
            — no tx-mgmt-address
            — tx-tlvs [port-desc] [sys-name] [sys-desc] [sys-cap]
            — no tx-tlvs
Show Commands

```markdown
show
  — chassis [environment] [power-supply]
  — cron
    — action
    — schedule
    — script
    — tod-suite tod-suite-name [detail] associations failed-associations
    — time-range name associations [detail]
  — redundancy
    — multi-chassis
      — all [detail]
      — mc-endpoint statistics
      — mc-endpoint peer [ip-address] statistics
      — mc-endpoint endpoint [mcep-id] statistics
      — mc-endpoint peer [ip-address]
      — mc-lag [lag lag-id]
        — peer [peer ip-address [lag lag-id]] mc-lag
        — statistics
      — mc-ring peer ip-address statistics
      — mc-ring peer ip-address [ring sync-tag [detail] statistics]
      — mc-ring peer ip-address ring sync-tag ring-node [ring-node-name [detail] statistics]
      — mc-ring global-statistics
      — sync [port port-id | lag-id]
        — peer [port port-id]
        — detail
  — synchronization
  — time
  — system
    — connections [address ip-address [interface interface-name]] [port port-number] [detail]
    — cpu [sample-period seconds]
    — information
    — load-balancing-alg [detail]
    — memory-pools
    — ntp
    — sntp
    — switch-fabric
    — sync-if-timing
    — thresholds
    — time
  — uptime
```
Clear Commands

clear
  — application-assurance
    — group isa-aa-group-id statistics
    — group isa-aa-group-id status
  — redundancy
    — multi-chassis
      — mc-endpoint endpoint [mcep-id] statistics
      — mc-endpoint statistics
      — mc-endpoint peer [ip-address] statistics
      — mc-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
      — sync-database peer ip-address port port-id | lag-id sync-tag sync-tag application application
        — screen action-name [owner owner-name]
        — system sync-if-timing {ref1 | ref2 | bits}
        — sync-if-timingtrace log

Debug Commands

depth
  — sync-if-timing
    — force-reference {ref1 | ref2 | bits}
    — no force-reference
  — [no] system
    — http-connections [host-ip-address/mask]
    — no http-connections
    — ntp [router router-name] [interface ip-int-name]
    — persistence
Tools Commands

```plaintext
tools
  - dump
    - redundancy
      - multi-chassis
        - mc-endpoint peer ip-address
        - mc-ring
        - mc-ring peer ip-address [ring sync-tag]
        - sync-database [instance instance-id] [peer ip-address]
        - sync-database [peer ip-address] [port port-id | lag-id] [sync-tag sync-tag]
          [application application] [detail] [type type]
    - perform
      - system
        - mixed-mode-upgrade [slot-list] [now]
```
System Command Reference

Generic Commands

shutdown

Syntax
[no] shutdown

Context
config>system>time>ntp
config>system>time>snntp
config>system>persistence>app-assure
config>system>persistence>nat-port-forward
config>system>persistence>subscriber-mgmt
config>cron>action
config>cron>sched
config>cron>script
config>redundancy>multi-chassis>peer
config>redundancy>multi-chassis>peer>mc-lag
config>redundancy>multi-chassis>peer>sync
config>redundancy>mc>peer>mcr>node>cv
config>system>lldp
config>redundancy>multi-chassis>peer>mc-ep

Description
This command administratively disables the entity. When disabled, an entity does not change, reset, or remove any configuration settings or statistics.

The operational state of the entity is disabled as well as the operational state of any entities contained within. Many objects must be shut down before they may be deleted.

The no form of this command places the entity into an administratively enabled state.

Default
no shutdown

description

Syntax
description description-string
no description

Context
config>cron>sched
config>redundancy>multi-chassis>peer

Description
This command creates a text description stored in the configuration file for a configuration context.

The description command associates a text string with a configuration context to help identify the content in the configuration file.

The no form of this command removes the string from the configuration.
Default

No description associated with the configuration context.

Parameters

string — The description character string. Allowed values are any string up to 80 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.
System Information Commands

boot-bad-exec

Syntax

boot-bad-exec file-url
no boot-bad-exec

Context

config>system

Description

Use this command to configure a URL for a CLI script to exec following a failure of a boot-up configuration. The command specifies a URL for the CLI scripts to be run following the completion of the boot-up configuration. A URL must be specified or no action is taken.

The commands are persistent between router (re)boots and are included in the configuration saves (admin>save).

Default

no boot-bad-exec

Parameters

file-url — Specifies the location and name of the CLI script file executed following failure of the boot-up configuration file execution. When this parameter is not specified, no CLI script file is executed.

Values

file url: local-url | remote-url: 255 chars max
local-url: [cflash-id][file-path]
remote-url: [{ftp://} login:pswd@remote-locn][file-path]
ipv4-address a.b.c.d
cflash-id: cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

Related Commands

exec command on page 59 — This command executes the contents of a text file as if they were CLI commands entered at the console.

boot-good-exec

Syntax

boot-good-exec file-url
no boot-good-exec

Context

config>system

Description

Use this command to configure a URL for a CLI script to exec following the success of a boot-up configuration.

Default

no boot-good-exec

Parameters

file-url — Specifies the location and name of the file executed following successful completion of the boot-up configuration file execution. When this parameter is not specified, no CLI script file is executed.
Values

file url: local-url | remote-url: 255 chars max
local-url: \[cflash-id\]/file-path
remote-url: \[{ftp://} login:pswd@remote-locn[/file-path]
  remote-locn [hostname | ipv4-address]
  ipv4-address a.b.c.d

cflash-id: cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

Related Commands exec command on page 59 — This command executes the contents of a text file as if they were CLI commands entered at the console.

chassis-mode

Syntax chassis-mode [chassis-mode] [force]

Context config>system

Description This command configures the chassis scaling and feature set.

Note that, if you are in chassis-mode d and configure an IOM type as iom2-20g and then downgrade to chassis-mode a or b (must specify force keyword), a warning appears about the IOM downgrade. In this case, the IOM’s provisioned type will downgrade to iom-20g-b. Once this is done, the ASAP MDA cannot be configured.

The ASAP MDA can only be configured if the iom2-20g IOM type is provisioned and equipped and the chassis mode is configured as a or b.

For chassis mode d, the default must be changed from the default mode a which assumes the least available features. Mode d enables the new feature sets available with newer generations of IOMs. Chassis mode d supports the P2/Q2/T2-based IOMs products and the extensive queuing/policing/bandwidth. Mode d assumes that the iom3-xp is installed.

Default a

Parameters chassis-mode — Specify the one of the following chassis modes:

  a: This mode corresponds to scaling and feature set associated with iom-20g.
  b: This mode corresponds to scaling and feature set associated with iom-20g-b.
  d: This mode corresponds to scaling and feature set associated with iom3-xp.

If the chassis mode is not explicitly provisioned in the configuration file, the chassis will come up in chassis mode a by default. The behavior for the IOMs is described in the following table:

<table>
<thead>
<tr>
<th>IOM</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>iom-20g-b</td>
<td>Comes online if provisioned as iom-20g or iom-20g-b.</td>
</tr>
</tbody>
</table>
force — Forces an upgrade from mode a to mode b or d, or an upgrade from mode b to mode d.

clli-code

| Syntax       | clli-code clli-code  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>no clli-code</td>
<td></td>
</tr>
</tbody>
</table>

| Context      | config>system       |

| Description  | This command creates a Common Language Location Identifier (CLLI) code string for the 7450 ESS-Series router. A CLLI code is an 11-character standardized geographic identifier that uniquely identifies geographic locations and certain functional categories of equipment unique to the telecommunications industry. No CLLI validity checks other than truncating or padding the string to eleven characters are performed. Only one CLLI code can be configured, if multiple CLLI codes are configured the last one entered overwrites the previous entry. The no form of the command removes the CLLI code. |

| Default      | none — No CLLI codes are configured. |

| Parameters   | clli-code — The 11 character string CLLI code. Any printable, seven bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes. If more than 11 characters are entered, the string is truncated. If less than 11 characters are entered the string is padded with spaces. |

<table>
<thead>
<tr>
<th>IOM</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>iom2-20g</td>
<td>Comes online if provisioned as iom-20g, iom-20g-b or iom2-20g.</td>
</tr>
<tr>
<td>iom-10g</td>
<td>Comes online if provisioned as iom-10g.</td>
</tr>
<tr>
<td>iom3-xp</td>
<td>Comes online if provisioned as iom3-xp.</td>
</tr>
</tbody>
</table>

Table 33: Chassis Mode Behavior
config-backup

Syntax

config-backup count

no config-backup

Context

config>system

Description

This command configures the maximum number of backup versions maintained for configuration files and BOF.

For example, assume the config-backup count is set to 5 and the configuration file is called xyz.cfg. When a save command is executed, the file xyz.cfg is saved with a .1 extension. Each subsequent config-backup command increments the numeric extension until the maximum count is reached.

xyz.cfg
xyz.cfg.1
xyz.cfg.2
xyz.cfg.3
xyz.cfg.4
xyz.cfg.5
xyz.ndx

Each persistent index file is updated at the same time as the associated configuration file. When the index file is updated, then the save is performed to xyz.cfg and the index file is created as xyz.ndx. Synchronization between the active and standby CPM is performed for all configurations and their associated persistent index files.

The no form of the command returns the configuration to the default value.

Default

5

Parameters

count — The maximum number of backup revisions.

Values

1 — 9

contact

Syntax

contact contact-name

no contact

Context

config>system

Description

This command creates a text string that identifies the contact name for the device.

Only one contact can be configured, if multiple contacts are configured the last one entered will overwrite the previous entry.

The no form of the command reverts to default.

Default

none — No contact name is configured.
Parameters

**contact-name** — The contact name character string. The string can be up to 80 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

coordinates

**Syntax**

coordinates coordinates
no coordinates

**Context**

config>system

**Description**

This command creates a text string that identifies the system coordinates for the device location. For example, the command `coordinates "37.390 -122.0550"` is read as latitude 37.390 north and longitude 122.0550 west.

Only one set of coordinates can be configured. If multiple coordinates are configured, the last one entered overwrites the previous entry.

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

**Default**

none — No coordinates are configured.

**Parameters**

coordinates — The coordinates describing the device location character string. The string may be up to 80 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes. If the coordinates are subsequently used by an algorithm that locates the exact position of this node then the string must match the requirements of the algorithm.

dns

**Syntax**

dns

**Context**

config>system

**Description**

This command configures DNS settings.

address-pref

**Syntax**

address-pref {ipv4-only}
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).
enable-icmp-vse

Syntax   [no] enable-icmp-vse
Context   config>system
Description   This command enables vendor specific extensions to ICMP.

l4-load-balancing

Syntax   [no] l4-load-balancing
Context   config>system
Description   This command configures system-wide Layer 4 load balancing. The configuration at system level can enable or disable load balancing based on Layer 4 fields. If enabled, Layer 4 source and destination port fields will be included in hashing calculation for TCP/UDP packets.

The hashing algorithm addresses finer spraying granularity where many hosts are connected to the network.

To address more efficient traffic distribution between network links (forming a LAG group), a hashing algorithm extension takes into account L4 information (i.e., src/dst L4-protocol port).

The hashing index can be calculated according to the following algorithm:

```
If [(TCP or UDP traffic) & enabled]
hash (<TCP/UDP ports>, <IP addresses>)
else if (IP traffic)
hash (<IP addresses>)
else
hash (<MAC addresses>)
endif
```

This algorithm will be used in all cases where IP information in per-packet hashing is included (see LAG and ECMP Hashing on page 99). However the Layer 4 information (TCP/UDP ports) will not be used in the following cases:

- Fragmented packets

Default   no l4-load-balancing

lsr-load-balancing

Syntax   lsr-load-balancing {lbl-only | lbl-ip}
no lsr-load-balancing
Context   config>system
Description   This command configures system-wide LSR load balancing.
Hashing can be enabled on IP header at an LSR for spraying labeled IP 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. In previous releases, the LSR hash routine operated on the label stack only. However, this lacked the granularity to provide hashing on 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. This feature is supported for IPv4 support only and on IOM-3 and IMMs only. The hash on label and IPv4 header can be enabled or disabled at the system level only.

**Default**

disabled

### lACP-System-Priority

**Syntax**

```
lacp-system-priority
no lacp-system-priority
```

**Context**

config>system

**Description**

This command configures the Link Aggregation Control Protocol (LACP) system priority on aggregated Ethernet interfaces. LACP allows the operator to aggregate multiple physical interfaces to form one logical interface.

**Default**

32768

**Parameters**

- `lacp-system-priority` — Specifies the LACP system priority.
  - **Values**
    - 1 — 65535

### Location

**Syntax**

```
location location
no location
```

**Context**

config>system

**Description**

This command creates a text string that identifies the system location for the device. Only one location can be configured. If multiple locations are configured, the last one entered overwrites the previous entry. The no form of the command reverts to the default value.

**Default**

none — No system location is configured.

**Parameters**

- `location` — Enter the location as a character string. The string may be up to 80 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.
name

Syntax  name  system-name
no  name

Context  config>system

Description  This command creates a system name string for the device.
For example, system-name parameter ALA-1 for the name command configures the device name as ALA-1.

ABC>config>system#  name "ALA-1"
ALA-1>config>system#

Only one system name can be configured. If multiple system names are configured, the last one encountered overwrites the previous entry.

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

Default  The default system name is set to the chassis serial number which is read from the backplane EEPROM.

Parameters  system-name — Enter the system name as a character string. The string may be up to 32 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

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 and mirroring settings, and other commands not maintained by the configuration redundancy.

When the file-url parameter is not specified, no CLI script file is executed.

Default  none

Parameters  file-url — Specifies the location and name of the CLI script file.

Values  file-url:  local-url | remote-url: 255 chars max
local-url:  [cflash-id][file-path]
remote-url:  [{ftp://|tftp://} login:pswd@remote-locn][file-path]
cflash-id:  cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
## System Alarm Commands

### alarm

**Syntax**
```
alarm  rmon-alarm-id  variable-oid  oid-string  interval  seconds  [sample-type]  [startup-alarm  alarm-type]  [rising-event  rmon-event-id  rising-threshold  threshold]  [falling-event  rmon-event-id  falling threshold  threshold]  [owner  owner-string]
```

**Context**
```
config>system>thresholds>rmon
```

**Description**
The alarm command configures an entry in the RMON-MIB alarmTable. The alarm command controls the monitoring and triggering of threshold crossing events. In order for notification or logging of a threshold crossing event to occur there must be at least one associated rmon>event configured.

The agent periodically takes statistical sample values from the MIB variable specified for monitoring and compares them to thresholds that have been configured with the alarm command. The alarm command configures the MIB variable to be monitored, the polling period (interval), sampling type (absolute or delta value), and rising and falling threshold parameters. If a sample has crossed a threshold value, the associated event is generated.

Use the `no` form of this command to remove an rmon-alarm-id from the configuration.

**Parameters**
- **rmon-alarm-id** — The rmon-alarm-id is a numerical identifier for the alarm being configured. The number of alarms that can be created is limited to 1200.
  - **Default** None
  - **Values** 1 — 65535

- **variable-oid oid-string** — The oid-string is the SNMP object identifier of the particular variable to be sampled. Only SNMP variables that resolve to an ASN.1 primitive type of integer (integer, Integer32, Counter32, Counter64, Gauge, or TimeTicks) may be sampled. The oid-string may be expressed using either the dotted string notation or as object name plus dotted instance identifier. For example, "1.3.6.1.2.1.2.2.1.10.184582144" or "ifInOctets.184582144".
  - The oid-string has a maximum length of 255 characters
  - **Default** None
  - **Values**

- **interval seconds** — The interval in seconds specifies the polling period over which the data is sampled and compared with the rising and falling thresholds. When setting this interval value, care should be taken in the case of 'delta’ type sampling - the interval should be set short enough that the sampled variable is very unlikely to increase or decrease by more than 2147483647 - 1 during a single sampling interval. Care should also be taken not to set the interval value too low to avoid creating unnecessary processing overhead.
  - **Default** None
  - **Values** 1 — 2147483647
**sample-type** — Specifies the method of sampling the selected variable and calculating the value to be compared against the thresholds.

- **Default**: Absolute
- **Values**:
  - `absolute` — Specifies that the value of the selected variable will be compared directly with the thresholds at the end of the sampling interval.
  - `delta` — Specifies that the value of the selected variable at the last sample will be subtracted from the current value, and the difference compared with the thresholds.

**startup-alarm alarm-type** — Specifies the alarm that may be sent when this alarm is first created.
- If the first sample is greater than or equal to the rising threshold value and 'startup-alarm' is equal to 'rising' or 'either', then a single rising threshold crossing event is generated.
- If the first sample is less than or equal to the falling threshold value and 'startup-alarm' is equal to 'falling' or 'either', a single falling threshold crossing event is generated.

- **Default**: either
- **Values**:
  - rising
  - falling
  - either

**rising-event rmon-event-id** — The identifier of the the `rmon>event` that specifies the action to be taken when a rising threshold crossing event occurs.
- If there is no corresponding event configured for the specified rmon-event-id, then no association exists and no action is taken.
- If the 'rising-event rmon-event-id' has a value of zero (0), no associated event exists.
- If a 'rising event rmon-event' is configured, the CLI requires a 'rising-threshold' to also be configured.

- **Default**: 0
- **Values**: 0 — 65535

**rising-threshold threshold** — Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

- After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the 'falling-threshold' value.

- **Default**: 0
- **Values**: -2147483648 — 2147483647

**falling-event rmon-event-id** — The identifier of the `rmon>event` that specifies the action to be taken when a falling threshold crossing event occurs. If there is no corresponding event configured for the specified rmon-event-id, then no association exists and no action is taken. If the falling-event has a value of zero (0), no associated event exists.

- If a 'falling event' is configured, the CLI requires a 'falling-threshold' to also be configured.

- **Default**: 0
- **Values**: -2147483648 — 2147483647
falling-threshold threshold — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated 'startup-alarm' is equal to 'falling' or 'either'.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value rises above this threshold and reaches greater than or equal the rising-threshold value.

Default 0

Values -2147483648 — 2147483647

owner owner — The owner identifies the creator of this alarm. It defaults to "TiMOS CLI". This parameter is defined primarily to allow entries that have been created in the RMON-MIB alarmTable by remote SNMP managers to be saved and reloaded in a CLI configuration file. The owner will not normally be configured by CLI users and can be a maximum of 80 characters long.

Default TiMOS CLI

Configuration example:
alarm 3 variable-oid ifInOctets.184582144 interval 20 sample-type delta start-alarm either rising-event 5 rising-threshold 10000 falling-event 5 falling-threshold 9000 owner "TiMOS CLI"

cflash-cap-alarm

Syntax cflash-cap-alarm cflash-id rising-threshold threshold [falling-threshold threshold] interval seconds [rmon-event-type] [startup-alarm alarm-type] no cflash-cap-alarm cflash-id

Context config>system>thresholds

Description This command enables capacity monitoring of the compact flash specified in this command. The severity level is alarm. Both a rising and falling threshold can be specified.

The no form of this command removes the configured compact flash threshold alarm.

Parameters cflash-id — The cflash-id specifies the name of the cflash device to be monitored.

  Values cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

rising-threshold threshold — Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated 'startup-alarm' is equal to 'rising' or 'either'.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the 'falling-threshold' value.

**Default** 0

**Values** -2147483648 — 2147483647

**falling-threshold** *threshold* — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value raises above this threshold and reaches greater than or equal the rising-threshold value.

**Default** 0

**Values** -2147483648 — 2147483647

**interval seconds** — Specifies the polling period, in seconds, over which the data is sampled and compared with the rising and falling thresholds.

**Values** 1 — 2147483647

**rmon-event-type** — Specifies the type of notification action to be taken when this event occurs.

**Values**
- **log** — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the `show>system>thresholds` CLI command.
- **trap** — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.
- **both** — Both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.
- **none** — No action is taken.

**Default** both

**startup-alarm** *alarm-type* — Specifies the alarm that may be sent when this alarm is first created.

If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated.

If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

**Default** either

**Values** rising, falling, either

Configuration example:
cflash-cap-alarm cf1-A: rising-threshold 50000000 falling-threshold 49999900 interval 120
rmon-event-type both start-alarm rising.

cflash-cap-warn

Syntax cflash-cap-warn cflash-id rising-threshold threshold [falling-threshold threshold] interval seconds [rmon-event-type] [startup-alarm alarm-type] no cflash-cap-warn cflash-id

Context config>system>thresholds

Description This command enables capacity monitoring of the compact flash specified in this command. The severity level is warning. Both a rising and falling threshold can be specified. The no form of this command removes the configured compact flash threshold warning.

Parameters cflash-id — The cflash-id specifies the name of the cflash device to be monitored.

Values cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

rising-threshold threshold — Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

Default 0

Values -2147483648 — 2147483647

falling-threshold threshold — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value raises above this threshold and reaches greater than or equal the rising-threshold value.

Default 0

Values -2147483648 — 2147483647

interval seconds — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 — 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.
System Alarm Commands

Values

log — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the show>system>thresholds CLI command.

trap — In the case of trap, a TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — In the case of both, both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — In the case of none, no action is taken.

Default

both

startup-alarm alarm-type — Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

Values

rising, falling, either

Default

either

Configuration example:

cflash-cap-warn cf1-B: rising-threshold 2000000 falling-threshold 1999900 interval 240 rmon-event-type trap start-alarm either

event

Syntax

event rmon-event-id [event-type] [description description-string] [owner owner-string] no event rmon-event-id

Context

cfg>system>thresholds>rmon

Description

The event command configures an entry in the RMON-MIB event table. The event command controls the generation and notification of threshold crossing events configured with the alarm command. When a threshold crossing event is triggered, the rmon>event configuration optionally specifies if an entry in the RMON-MIB log table should be created to record the occurrence of the event. It may also specify that an SNMP notification (trap) should be generated for the event. The RMON-MIB defines two notifications for threshold crossing events: Rising Alarm and Falling Alarm.

Creating an event entry in the RMON-MIB log table does not create a corresponding entry in the TiMOS event logs. However, when the event-type is set to trap, the generation of a Rising Alarm or Falling Alarm notification creates an entry in the TiMOS event logs and that is distributed to whatever TiMOS log destinations are configured: CONSOLE, session, memory, file, syslog, or SNMP trap destination.
The TiMOS logger message includes a rising or falling threshold crossing event indicator, the sample type (absolute or delta), the sampled value, the threshold value, the RMON-alarm-id, the associated RMON-event-id and the sampled SNMP object identifier.

Use the **no** form of this command to remove an rmon-event-id from the configuration.

**Parameters**

**rmon-event-type** — The rmon-event-type specifies the type of notification action to be taken when this event occurs.

**Values**

- **log** — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence. This does **not** create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the `show>system>thresholds` CLI command.

- **trap** — In the case of trap, a TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

- **both** — In the case of both, both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.

- **none** — In the case of none, no action is taken.

**Default** both

**description** — The description is a user configurable string that can be used to identify the purpose of this event. This is an optional parameter and can be 80 characters long. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

**Default** An empty string.

**owner** — The owner identifies the creator of this alarm. It defaults to "TiMOS CLI". This parameter is defined primarily to allow entries that have been created in the RMON-MIB alarmTable by remote SNMP managers to be saved and reloaded in a CLI configuration file. The owner will not normally be configured by CLI users and can be a maximum of 80 characters long.

**Default** TiMOS CLI

Configuration example:

```
Default event 5 rmon-event-type both description "alarm testing" owner "TiMOS CLI"
```
memory-use-alarm

Syntax  
memory-use-alarm rising-threshold threshold [falling-threshold threshold] interval seconds [rmon-event-type] [startup-alarm alarm-type]
no memory-use-alarm

Context  
config>system>thresholds

Description  
The memory thresholds are based on monitoring the TIMETRA-SYSTEM-MIB sgiMemoryUsed object. This object contains the amount of memory currently used by the system. The severity level is Alarm. The absolute sample type method is used.

The no form of this command removes the configured memory threshold warning.

Parameters  
rising-threshold threshold — Specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

Default 0
Values -2147483648 — 2147483647

falling-threshold threshold — Specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value raises above this threshold and reaches greater than or equal the rising-threshold threshold value.

Default 0
Values -2147483648 — 2147483647

interval seconds — Specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 — 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values log — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence. This does not create an OS logger entry. The RMON-MIB log table entries can be viewed using the CLI command.

trap — In the case of trap, a TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log
destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.

both — In the case of both, both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — In the case of none, no action is taken.

Default both

startup-alarm alarm-type — Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

Values rising, falling, either

Default either

Configuration example:

memory-use-alarm rising-threshold 50000000 falling-threshold 45999999 interval 500 rmon-event-type both start-alarm either

memory-use-warn

Syntax memory-use-warn rising-threshold [falling-threshold] [interval seconds] [rmon-event-type] [startup-alarm alarm-type]

Context config>system>thresholds

Description The memory thresholds are based on monitoring MemoryUsed object. This object contains the amount of memory currently used by the system. The severity level is Alarm.

The absolute sample type method is used.

The no form of this command removes the configured compact flash threshold warning.

Parameters rising-threshold threshold — The rising-threshold specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal the falling-threshold value.

Default 0

Values -2147483648 — 2147483647
falling-threshold threshold — The falling-threshold specifies a threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is less than or equal to this threshold and the associated startup-alarm is equal to falling or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value raises above this threshold and reaches greater than or equal the rising-threshold threshold value.

Default 0
Values -2147483648 — 2147483647

interval seconds — The interval in seconds specifies the polling period over which the data is sampled and compared with the rising and falling thresholds.

Values 1 — 2147483647

rmon-event-type — Specifies the type of notification action to be taken when this event occurs.

Values
  log — In the case of log, an entry is made in the RMON-MIB log table for each event occurrence.
  trap — In the case of trap, a TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.
  both — In the case of both, both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.
  none — In the case of none, no action is taken.

Default both
Values log, trap, both, none

startup-alarm alarm-type — Specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

Default either
Values rising, falling, either

Configuration example:

memory-use-warn rising-threshold 500000 falling-threshold 400000 interval 800 rmon-event-type log start-alarm falling
rmon

Syntax  rmon
Context  config>system>thresholds
Description  This command creates the context to configure generic RMON alarms and events.
Generic RMON alarms can be created on any SNMP object-ID that is valid for RMON monitoring (for example, an integer-based datatype).
The configuration of an event controls the generation and notification of threshold crossing events configured with the alarm command.

thresholds

Syntax  thresholds
Context  config>system
Description  This command enables the context to configure monitoring thresholds.
mixed-mode

Syntax   [no] mixed-mode
Context   config>system
Description   This command enables 7750 SR IOM3/IMMs to operate in a 7450 ESS chassis with 7750 functionality. After a 7450 system is placed in mixed mode, all network ports must exist only on IOM3/IMMs with 7750 capabilities. If mixed-mode is not enabled, 7750 IOM3/IMMs can exist in a 7450 chassis but they will not be able to support 7750 functionality.

The no form of this command disables the mixed-mode capability.

Default   no mixed-mode

power-supply

Syntax   power-supply [power-supply-id] [type]
Context   config>system
Description   This command specifies the power supply slot ID and the power type. This allows for the proper generation of traps and LED management.

Specify the none keyword when a power supply unit is removed from a 7450 ESS-Series chassis or if a power supply slot will not be populated.

If this command is not configured the LEDs will indicate the installed power supplies but traps will not be issued and alarms will not raised because the desired behavior is not known.

If this command is not modified to reflect the current power configuration when a unit is removed or the power type is changed, alarms will be generated.

Parameters   power-supply-id — Specifies the identifier for a power supply tray in the chassis.

Values   1 | 2 — Specifies the power supply slot ID.

type — Specifies the type of power supply for a platform. Based on the value assigned to this object, various power supply monitoring signals are interpreted. For example, if a platform is provisioned to use DC power supplies, then the signal that indicates an AC power supply is missing can be ignored. This is required for proper generation of traps and LED management.

Values   dc — Specifies that the power supply slot is DC.

ac — Specifies that the power supply slot is AC.

none — Specifies that no power supply unit is installed in the given power supply slot.

single — Specifies that one AC power supply unit is installed in the power supply slot.
multiple — Specifies that more than one AC power supply unit is installed in the power supply slot.
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.

Parameters  

date  — The local date and time accurate to the minute in the YYYY/MM/DD format.

Values

YYYY is the four-digit year
MM is the two-digit month
DD is the two-digit date

time  — The time (accurate to the second) in the hh:mm[:ss] format. If no seconds value is entered, the seconds are reset to :00.

Default  
0

Values

hh is the two-digit hour in 24 hour format (00=midnight, 12=noon)
mm is the two-digit minute

time

Syntax  
time

Context  
config>system

Description  
This command enables the context to configure the system time zone and time synchronization parameters.
Network Time Protocol Commands

ntp

Syntax  

[no] ntp

Context  

cfg>system>time

Description  

This command enables the context to configure Network Time Protocol (NTP) and its operation. This protocol defines a method to accurately distribute and maintain time for network elements. Furthermore this capability allows for the synchronization of clocks between the various network elements. Use the no form of the command to stop the execution of NTP and remove its configuration.

Default  

none

authentication-check

Syntax  

[no] authentication-check

Context  

cfg>system>time>ntp

Description  

This command provides the option to skip the rejection of NTP PDUs that do not match the authentication key-id, type or key requirements. The default behavior when authentication is configured is to reject all NTP protocol PDUs that have a mismatch in either the authentication key-id, type or key.

When authentication-check is enabled, NTP PDUs are authenticated on receipt. However, mismatches cause a counter to be increased, one counter for type and one for key-id, one for type, value mismatches. These counters are visible in a show command.

The no form of this command allows authentication mismatches to be accepted; the counters however are maintained.

Default  

authentication-check — Rejects authentication mismatches.

authentication-key

Syntax  

authentication-key key-id {key key} [hash | hash2] type {des | message-digest}

no authentication-key key-id

Context  

cfg>system>time>ntp

Description  

This command sets the authentication key-id, type and key used to authenticate NTP PDUs sent to or received by other network elements participating in the NTP protocol. For authentication to work, the authentication key-id, type and key value must match.

The no form of the command removes the authentication key.
Default none

Parameters

key-id — Configure the authentication key-id that will be used by the node when transmitting or receiving Network Time Protocol packets.

Entering the authentication-key command with a key-id value that matches an existing configuration key will result in overriding the existing entry.

Recipients of the NTP packets must have the same authentication key-id, type, and key value in order to use the data transmitted by this node. This is an optional parameter.

Default None

Values 1 — 255

key — The authentication key associated with the configured key-id, the value configured in this parameter is the actual value used by other network elements to authenticate the NTP packet.

The key can be any combination of ASCII characters up to 32 characters in length for message-digest (md5) or 8 characters in length for des (length limits are unencrypted lengths). If spaces are used in the string, enclose the entire string in quotation marks (“”).

hash — Specifies the key is entered in an encrypted form. If the hash or hash2 parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the hash or hash2 parameter specified.

hash2 — Specifies the key is entered in a more complex encrypted form that involves more variables than the key value alone, this means that hash2 encrypted variable can’t be copied and pasted. If the hash or hash2 parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the hash or hash2 parameter specified.

type — This parameter determines if DES or message-digest authentication is used.

This is a required parameter; either DES or message-digest must be configured.

Values des — Specifies that DES authentication is used for this key
message-digest — Specifies that MD5 authentication in accordance with RFC 2104 is used for this key.

broadcast

Syntax broadcast [router router-name] {interface ip-int-name} [key-id key-id] [version version] [ttl ttl]
no broadcast [router router-name] {interface ip-int-name}

Context config>system>time>ntp

Description This command configures the node to transmit NTP packets on a given interface. Broadcast and multicast messages can easily be spoofed, thus, authentication is strongly recommended.

The no form of this command removes the address from the configuration.

Parameters router — Specifies the router name used to transmit NTP packets. Base is the default. Select management to use the management port (Ethernet port on the CPM).
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.

Values  32 character maximum

key-id  key-id — Identifies the configured authentication key and authentication type used by this node to receive and transmit NTP packets to and from an NTP server and peers. If an NTP packet is received by this node both authentication key and authentication type must be valid otherwise the packet will be rejected and an event/trap generated.

Values  1 — 255
Default  none

version version — Specifies the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode in which case all versions will be accepted.

Values  1 — 4
Default  4

ttl ttl — Specifies the IP Time To Live (TTL) value.

Values  1 — 255
Default  none

broadcastclient

Syntax  broadcastclient [router router-name] {interface ip-int-name} [authenticate]
no broadcastclient [router router-name] {interface ip-int-name}

Context  config>system>time>ntp

Description  When configuring NTP, the node can be configured to receive broadcast packets on a given subnet. Broadcast and multicast messages can easily be spoofed, thus, authentication is strongly recommended. If broadcast is not configured then received NTP broadcast traffic will be ignored. Use the show command to view the state of the configuration.

The no form of this command removes the address from the configuration.

Parameters  router router-name — Specifies the router name used to receive NTP packets.

Values  Base, management
Default  Base

interface ip-int-name — Specifies the local interface on which to receive NTP broadcast packets. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

Values  32 character maximum
**authenticate** — Specifies whether or not to require authentication of NTP PDUs. When enabled, NTP PDUs are authenticated upon receipt.

**multicast**

**Syntax**
```
multicast [version version] [key-id key-id]
```
```
no multicast
```

**Context**
```
config>system>time>ntp
```

**Description**
This command configures NTP the node to transmit multicast packets on the CPMCCM MGMT port. Broadcast and multicast messages can easily be spoofed; authentication is strongly recommended.

The **no** form of this command removes the multicast address from the configuration.

**Parameters**
- **version version** — Specifies the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode in which case all three versions are accepted.
  - **Values** 2 — 4
  - **Default** 4
- **key-id key-id** — Specifies the configured authentication key and authentication type used by this version to transmit NTP packets. If this command is omitted from the configuration, packets are sent un-encrypted.
  - **Values** 1 — 255
  - **Default** None

**multicastclient**

**Syntax**
```
multicastclient [authenticate]
```
```
no multicastclient
```

**Context**
```
config>system>time>ntp
```

**Description**
This command configures the node to receive multicast NTP messages on the CPMCCM MGMT port. If multicastclient is not configured, received NTP multicast traffic will be ignored. Use the **show** command to view the state of the configuration.

The **no** construct of this message removes the multicast client for the specified interface from the configuration.

**Parameters**
- **authenticate** — This optional parameter makes authentication a requirement. If authentication is required, the authentication key-id received must have been configured in the “authentication-key” command, and that key-id’s type and key value must also match.
ntp-server

**Syntax**
```
ntp-server [transmit key-id]
no ntp-server
```

**Context**
cfg-system-time

**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**
- **key-id** — If specified, requires client packets to be authenticated.
  - **Values**
    - 1 — 255
  - **Default**
    - None

peer

**Syntax**
```
peer ip-address [key-id key-id] [version version] [prefer]
nor peer ip-address
```

**Context**
cfg-system-time

**Description**
Configuration of an NTP peer configures symmetric active mode for the configured peer. Although any system can be configured to peer with any other NTP node it is recommended to configure authentication and to configure known time servers as their peers.

The `no` form of the command removes the configured peer.

**Parameters**
- **ip-address** — Configure the IP address of the peer that requires a peering relationship to be set up.
  - This is a required parameter.
  - **Default**
    - None
  - **Values**
    - Any valid IP-address
- **key-id**
  - **key-id** — Successful authentication requires that both peers must have configured the same authentication key-id, type and key value.
  - Specify the `key-id` that identifies the configured authentication key and authentication type used by this node to transmit NTP packets to an NTP peer. If an NTP packet is received by this node, the authentication key-id, type, and key value must be valid otherwise the packet will be rejected and an event/trap generated.
  - **Default**
    - None
  - **Values**
    - 1 — 255

- **version**
  - **version** — Specify the NTP version number that is generated by this node. This parameter does not need to be configured when in client mode in which case all three nodes are accepted.
  - **Default**
    - 4
Date and Time Commands

Values

2 — 4

prefer — When configuring more than one peer, one remote system can be configured as the preferred peer. When a second peer is configured as preferred, then the new entry overrides the old entry.

server

Syntax

server ip address [key-id key-id] [version version] [prefer]

no server ip address

Context

cfg>system>time>ntp

Description

This command is used when the node should operate in client mode with the ntp server specified in the address field of this command. The no construct of this command removes the server with the specified address from the configuration.

Up to five NTP servers can be configured.

Parameters

ip-address — Configure the IP address of a node that acts as an NTP server to this network element. This is a required parameter.

Values

Any valid IP address

key-id key-id — Enter the key-id that identifies the configured authentication key and authentication type used by this node to transmit NTP packets to an NTP server. If an NTP packet is received by this node, the authentication key-id, type, and key value must be valid otherwise the packet will be rejected and an event/trap generated. This is an optional parameter.

Values

1 — 255

version version — Use this command to configure the NTP version number that is expected by this node. This is an optional parameter.

Default

4

Values

2 — 4

prefer — When configuring more than one peer, one remote system can be configured as the preferred peer. When a second peer is configured as preferred, then the new entry overrides the old entry.
SNTP Commands

sntp

Syntax  [no] sntp
Context  config>system>time
Description  This command creates the context to edit the Simple Network Time Protocol (SNTP).

SNTP can be configured in either broadcast or unicast client mode. SNTP is a compact, client-only version of the NTP. SNTP can only receive the time from SNTP/NTP servers. It cannot be used to provide time services to other systems.

The system clock is automatically adjusted at system initialization time or when the protocol first starts up.

When the time differential between the SNTP/NTP server and the system is more than 2.5 seconds, the time on the system is gradually adjusted.

SNTP is created in an administratively enabled state (no shutdown).

The no form of the command removes the SNTP instance and configuration. SNTP does not need to be administratively disabled when removing the SNTP instance and configuration.

Default  no sntp

broadcast-client

Syntax  [no] broadcast-client
Context  config>system>time>sntp
Description  This command enables listening to SNTP/NTP broadcast messages on interfaces with broadcast client enabled at global device level.

When this global parameter is configured then the ntp-broadcast parameter must be configured on selected interfaces on which NTP broadcasts are transmitted.

SNTP must be shutdown prior to changing either to or from broadcast mode.

The no form of the command disables broadcast client mode.

Default  no broadcast-client
server-address

Syntax  server-address ip-address [version version-number] [normal | preferred] [interval seconds] no server-address

Context  config>system>time>sntp

Description  This command creates an SNTP server for unicast client mode.

Parameters  ip-address — Specifies the IP address of the SNTP server.

version version-number — Specifies the SNTP version supported by this server.

Values  1 — 3

Default  3

normal | preferred — Specifies the preference value for this SNTP server. When more than one time-server is configured, one server can have preference over others. The value for that server should be set to preferred. Only one server in the table can be a preferred server.

Default  normal

interval seconds — Specifies the frequency at which this server is queried.

Values  64 — 1024

Default  64
CRON Commands

cron

Syntax

cron

Context

cron

Description

This command creates the context to create scripts, script parameters and schedules which support the
Service Assurance Agent (SAA) functions.

CRON features are saved to the configuration file on both primary and backup control modules. If a
control module switchover occurs, CRON events are restored when the new configuration is loaded.
If a control module switchover occurs during the execution of a cron script, the failover behavior will
be determined by the contents of the script.

action

Syntax

[no] action action-name [owner action-owner]

Context

cron>sched

Description

This command configures action parameters for a script.

Default

none

Parameters

action action-name — Specifies the action name.

   Values      Maximum 32 characters.

owner action-owner — Specifies the owner name.

   Default     TiMOS CLI

expire-time

Syntax

expire-time seconds | forever

Context

cron>action

Description

This command configures the maximum amount of time to keep the results from a script run.

Parameters

seconds — Specifies the maximum amount of time to keep the results from a script run.

   Values      1 — 21474836
              3600 (1 hour)

   forever — Specifies to keep the results from a script run forever.
Date and Time Commands

**lifetime**

**Syntax**  lifetime {seconds | forever}

**Context** config>cron>action

**Description** This command configures the maximum amount of time the script may run.

**Parameters**

- **seconds** — Specifies the maximum amount of time to keep the results from a script run.
  - **Values** 1 — 21474836
  - **Default** 3600 (1 hour)

- **forever** — Specifies to keep the results from a script run forever.

**max-completed**

**Syntax**  max-completed unsigned

**Context** config>cron>action

**Description** This command specifies the maximum number of completed sessions to keep in the event execution log. If a new event execution record exceeds the number of records specified this command, the oldest record is deleted.

The no form of this command resets the value to the default.

**Parameters**

- **unsigned** — Specifies the maximum number of completed sessions to keep in the event execution log.
  - **Values** 0 — 255
  - **Default** 1

**results**

**Syntax**  [no] results file-url

**Context** config>cron>action

**Description** This command specifies the location where the system writes the output of an event script’s execution.

The no form of this command removes the file location from the configuration.

**Parameters**

- **file-url** — Specifies the location where the system writes the output of an event script’s execution.
  - **Values**
    - file url: local-url | remote-url: 255 chars max
    - local-url: [cflash-id]/[file-path]
    - remote-url: [{ftp://} login:pswd@remote-locn]/[file-path]
    - remote-locn [ hostname | ipv4-address]
    - ipv4-address a.b.c.d
    - cflash-id: cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:
script

Syntax  
[no] script script-name [owner owner-name]

Context  
config>cron>action

Description  
This command creates action parameters for a script including the maximum amount of time to keep
the results from a script run, the maximum amount of time a script may run, the maximum number of
script runs to store and the location to store the results.

The no form of this command removes the script parameters from the configuration.

Default  
none — No server-address is configured.

Parameters  
script script-name — The script command in the action context connects an event to the script
which will run when the event is triggered.

owner owner-name — Owner name of the schedule.

  Default  
  TiMOS CLI

The no form of this command removes the script entry from the action context.

schedule

Syntax  
[no] schedule schedule-name [owner owner-name]

Context  
config>cron

Description  
This command configures the type of schedule to run, including one-time only (oneshot), periodic or
calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and
interval (seconds).

The no form of the command removes the context from the configuration.

Default  
none

Parameters  
schedule-name — Name of the schedule.

owner owner-name — Owner name of the schedule.

count

Syntax  
count number

Context  
config>cron>sched

Description  
This command configures the total number of times a CRON “interval” schedule is run. For example,
if the interval is set to 600 and the count is set to 4, the schedule runs 4 times at 600 second intervals.
Date and Time Commands

**Parameters**

*number* — The number of times the schedule is run.

**Values**

1 — 65535

**Default**

65535

**day-of-month**

**Syntax**

[no] day-of-month {day-number [..day-number] all}

**Context**

config>cron>sched

**Description**

This command specifies which days of the month that the schedule will occur. Multiple days of the month can be specified. When multiple days are configured, each of them will cause the schedule to trigger. If a day-of-month is configured without configuring month, weekday, hour and minute, the event will not execute.

Using the **weekday** command as well as the **day-of-month** command will cause the script to run twice. For example, consider that “today” is Monday January 1. If “Tuesday January 5” is configured, the script will run on Tuesday (tomorrow) as well as January 5 (Friday).

The **no** form of this command removes the specified day-of-month from the list.

**Parameters**

*day-number* — The positive integers specify the day of the month counting from the first of the month. The negative integers specify the day of the month counting from the last day of the month. For example, configuring **day-of-month -5, 5** in a month that has 31 days will specify the schedule to occur on the 27th and 5th of that month.

Integer values must map to a valid day for the month in question. For example, February 30 is not a valid date.

**Values**

1 — 31, -31 — -1 (maximum 62 day-numbers)

all — Specifies all days of the month.

**end-time**

**Syntax**

[no] end-time [date | day-name] time

**Context**

config>cron>sched

**Description**

This command is used concurrently with type **periodic** or **calendar**. Using the type of **periodic**, end-time determines at which interval the schedule will end. Using the type of **calendar**, end-time determines on which date the schedule will end.

When no **end-time** is specified, the schedule runs forever.

**Parameters**

*date* — Specifies the date to schedule a command.

**Values**

YYYY:MM:DD in year:month:day number format

day-name — Specifies the day of the week to schedule a command.

**Values**

sunday/monday/tuesday/wednesday/thursday/friday/saturday
time — Specifies the time of day to schedule a command.

Values hh:mm in hour:minute format

hour

Syntax [no] hour {..hour-number [..hour-number]} all

Context config>cron>sched

Description This command specifies which hour to schedule a command. Multiple hours of the day can be specified. When multiple hours are configured, each of them will cause the schedule to trigger. Day-of-month or weekday must also be specified. All days of the month or weekdays can be specified. If an hour is configured without configuring month, weekday, day-of-month, and minute, the event will not execute.

The no form of this command removes the specified hour from the configuration.

Parameters hour-number — Specifies the hour to schedule a command.

Values 0 — 23 (maximum 24 hour-numbers)

all — Specifies all hours.

interval

Syntax [no] interval seconds

Context config>cron>sched

Description This command specifies the interval between runs of an event.

Parameters seconds — The interval, in seconds, between runs of an event.

Values 30 — 4,294,967,295
Date and Time Commands

minute

Syntax  [no] minute {minute-number [..minute-number]| all}

Context  config>cron>sched

Description  This command specifies the minute to schedule a command. Multiple minutes of the hour can be specified. When multiple minutes are configured, each of them will cause the schedule to occur. If a minute is configured, but no hour or day is configured, the event will not execute. If a minute is configured without configuring month, weekday, day-of-month, and hour, the event will not execute.

The no form of this command removes the specified minute from the configuration.

Parameters  minute-number — Specifies the minute to schedule a command.

Values  0 — 59 (maximum 60 minute-numbers)

all — Specifies all minutes.

month

Syntax  [no] month {month-number [..month-number]|month-name [..month-name]| all}

Context  config>cron>sched

Description  This command specifies the month when the event should be executed. Multiple months can be specified. When multiple months are configured, each of them will cause the schedule to trigger. If a month is configured without configuring weekday, day-of-month, hour and minute, the event will not execute.

The no form of this command removes the specified month from the configuration.

Parameters  month-number — Specifies a month number.

Values  1 — 12 (maximum 12 month-numbers)

all — Specifies all months.

month-name — Specifies a month by name

Values  january, february, march, april, may, june, july, august, september, october, november, december (maximum 12 month names)
type

Syntax  type {schedule-type}

Context  config>cron>sched

Description  This command specifies how the system should interpret the commands contained within the schedule node.

Parameters  schedule-type — Specify the type of schedule for the system to interpret the commands contained within the schedule node.

Values  periodic — Specifies a schedule which runs at a given interval. interval must be specified for this feature to run successfully.

calendar — Specifies a schedule which runs based on a calendar. weekday, month, day-of-month, hour and minute must be specified for this feature to run successfully.

oneshot — Specifies a schedule which runs one time only. As soon as the first event specified in these parameters takes place and the associated event occurs, the schedule enters a shutdown state. month, weekday, day-of-month, hour and minute must be specified for this feature to run successfully.

Default  periodic

weekday

Syntax  [no] weekday {weekday-number [..weekday-number]}day-name [..day-name] all

Context  config>cron>sched

Description  This command specifies which days of the week that the schedule will fire on. Multiple days of the week can be specified. When multiple days are configured, each of them will cause the schedule to occur. If a weekday is configured without configuring month, day-of-month, hour and minute, the event will not execute.

Using the weekday command as well as the day-of-month command will cause the script to run twice. For example, consider that “today” is Monday January 1. If “Tuesday January 5” is configured, the script will run on Tuesday (tomorrow) as well as January 5 (Friday).

The no form of this command removes the specified weekday from the configuration.

Parameters  day-number — Specifies a weekday number.

Values  1 —7 (maximum 7 week-day-numbers)

day-name — Specifies a day by name

Values  sunday, monday, tuesday, wednesday, thursday, friday, saturday (maximum 7 week-day names)

all — Specifies all days of the week.
script

Syntax  
[no] script  *script-name* [owner  *owner-name*]

Context  
config>cron>script

Description  
This command configures the name associated with this script.

Parameters  
*script-name* — Specifies the script name.

Syntax  
[no] location  *file-url*

Context  
config>cron>script

Description  
This command configures the location of script to be scheduled.

Parameters  
*file-url* — Specifies the location where the system writes the output of an event script’s execution.

Values  
file url: local-url | remote-url: 255 chars max
local-url:  [cflash-id]/[file-path]
remote-url:  [{ftp://} login:pswd@remote-locn/][file-path]
remote-locn  [hostname | ipv4-address]
ipv4-address  a.b.c.d
cflash-id:  cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:
Time Range Commands

time-range

Syntax

[no] time-range name

Context

config>cron

Description

This command configures a time range.

The no form of the command removes the name from the configuration.

Default

none

Parameters

name — Configures a name for the time range up to 32 characters in length.

absolute

Syntax

absolute start absolute-time end absolute-time

no absolute start absolute-time

Context

config>cron>time-range

Description

This command configures an absolute time interval that will not repeat.

The no form of the command removes the absolute time range from the configuration.

Parameters

start absolute-time — Specifies starting parameters for the absolute time-range.

Values

absolute-time: year/month/day,hh:mm
year: 2005 — 2099
month: 1 — 12
day: 1 — 31
hh: 0 — 23
mm: [ 0 — 59

end absolute-time — Specifies end parameters for the absolute time-range.

Values

absolute-time: year/month/day,hh:mm
year: 2005 — 2099
month: 1 — 12
day: 1 — 31
hh: 0 — 23
mm: [ 0 — 59
**daily**

**Syntax**  
daily start start-time-of-day end end-time-of-day  
no daily start start-time-of-day

**Context**  
config>cron>time-range

**Description**  
This command configures the start and end of a schedule for every day of the week. To configure a daily time-range across midnight, use a combination of two entries. An entry that starts at hour zero will take over from an entry that ends at hour 24.

The **no** form of the command removes the daily time parameters from the configuration.

**Parameters**  
*start-time-of-day* — Specifies the starting time for the time range.

  **Values**  
  Syntax: hh:mm  
  hh 0 — 23  
  mm 0 — 59

*end-time-of-day* — Specifies the ending time for the time range.

  **Values**  
  Syntax: hh:mm  
  hh 0 — 24  
  mm 0 — 59

**weekdays**

**Syntax**  
weekdays start start-time-of-day end end-time-of-day  
no weekdays start start-time-of-day

**Context**  
config>cron>time-range

**Description**  
This command configures the start and end of a weekday schedule.

The **no** form of the command removes the weekday parameters from the configuration.

**Parameters**  
*start-time-of-day* — Specifies the starting time for the time range.

  **Values**  
  Syntax: hh:mm  
  hh 0 — 23  
  mm 0 — 59

*end-time-of-day* — Specifies the ending time for the time range.

  **Values**  
  Syntax: hh:mm  
  hh 0 — 24  
  mm 0 — 59
weekend

**Syntax**
```
weekend start start-time-of-day end end-time-of-day
no weekend start start-time-of-day
```

**Context**
config>cron>time-range

**Description**
This command configures a time interval for every weekend day in the time range.
The resolution must be at least one minute apart, for example, start at 11:00 and end at 11:01. An 11:00 start and end time is invalid. This example configures a start at 11:00 and an end at 11:01 on both Saturday and Sunday.
The `no` form of the command removes the weekend parameters from the configuration.

**Parameters**
- `start-time-of-day` — Specifies the starting time for the time range.
  - **Values**
    - **Syntax:** hh:mm
      - `hh` 0 — 23
      - `mm` 0 — 59

- `end-time-of-day` — Specifies the ending time for the time range.
  - **Values**
    - **Syntax:** hh:mm
      - `hh` 0 — 24
      - `mm` 0 — 59

weekly

**Syntax**
```
weekly start start-time-in-week end end-time-in-week
no weekly start start-time-in-week
```

**Context**
config>cron>time-range

**Description**
This command configures a weekly periodic interval in the time range.
The `no` form of the command removes the weekly parameters from the configuration.

**Parameters**
- `start-time-in-week` — Specifies the start day and time of the week.
  - **Values**
    - **Syntax:** day,hh:mm
      - `day` sun, mon, tue, wed, thu, fri, sat
        - sunday, monday, tuesday, wednesday, thursday, friday, saturday
      - `hh` 0 — 23
      - `mm` 0 — 59

- `end-time-in-week` — Specifies the end day and time of the week.
  - **Values**
    - **Syntax:** day,hh:mm
      - `day` sun, mon, tue, wed, thu, fri, sat
        - sunday, monday, tuesday, wednesday, thursday, friday, saturday
Date and Time Commands

hh  0 — 24  
mn  0 — 59

weekly start time-in-week end time-in-week — This parameter configures the start and end of a schedule for the same day every week, for example, every Friday. The start and end dates must be the same. The resolution must be at least one minute apart, for example, start at 11:00 and end at 11:01. A start time and end time of 11:00 is invalid.

**Values**  00 — 23, 00 — 59

**Default**  no time-range
Time of Day Commands

tod-suite

Syntax: [no] tod-suite tod-suite name create
Context: config>cron
Description: This command creates the tod-suite context.
Default: no tod-suite

egress

Syntax: egress
Context: config>cron>tod-suite
Description: This command enables the TOD suite egress parameters.

ingress

Syntax: ingress
Context: config>cron>tod-suite
Description: This command enables the TOD suite ingress parameters.

filter

Syntax: filter ip ip-filter-id [time-range time-range-name] [priority priority]
filter mac mac-filter-id [time-range time-range-name] [priority priority]
no ip ip-filter-id [time-range time-range-name]
no filter mac mac-filter-id [time-range time-range-name]
Context: config>cron>tod-suite>egress
config>cron>tod-suite>ingress
Description: This command creates time-range based associations of previously created filter policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.
Parameters: ip-filter ip-filter-id — Specifies an IP filter for this tod-suite.
Date and Time Commands

Values 1 — 65535

time-range time-range-name — Name for the specified time-range. If the time-range is not populated the system will assume the assignment to mean “all times”. Only one entry without a time-range is allowed for every type of policy. The system does not allow the user to specify more than one policy with the same time-range and priority.

Values Up to 32 characters

priority priority — Priority of the time-range. Only one time-range assignment of the same type and priority is allowed.

Values 1 — 10

mac mac-filter-id — Specifies a MAC filter for this tod-suite.

Values 1 — 65535

qos

Syntax qos policy-id [time-range time-range-name] [priority priority]

no qos policy-id [time-range time-range-name] [

Context config>cron>tod-suite>egress
config>cron>tod-suite>ingress

Description This command creates time-range based associations of previously created QoS policies. Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

The no form of the command reverts to the

Parameters policy-id — Specifies an egress QoS policy for this tod-suite.

Values 1 — 65535

time-range time-range-name — Name for the specified time-range. If the time-range is not populated the system will assume the assignment to mean “all times”. Only one entry without a time-range is allowed for every type of policy. The system does not allow the user to specify more than one policy with the same time-range and priority.

Values Up to 32 characters

Default "NO-TIME-RANGE" policy

priority priority — Priority of the time-range. Only one time-range assignment of the same type and priority is allowed.

Values 1 — 10

Default 5

scheduler-policy
Syntax  

[no] scheduler-policy scheduler-policy-name [time-range time-range-name] [priority priority]

Context  

config>cron> tod-suite> egress  
config>cron> tod-suite> ingress

Description  

This command creates time-range based associations of previously created scheduler policies.  
Multiple policies may be included and each must be assigned a different priority; in case time-ranges overlap, the priority will be used to determine the prevailing policy. Only a single reference to a policy may be included without a time-range.

Parameters  

scheduler-policy-name — Specifies a scheduler policy for this tod-suite.

  Values  
  Up to 32 characters

time-range time-range-name — Specifies the name for a time-range. If the time-range is not populated the system will assume the assignment to mean “all times”. Only one entry without a time-range is allowed for every type of policy. The system does not allow the user to specify more than one policy and the same time-range and priority.

  Values  
  Up to 32 characters

priority priority — Specifies the time-range priority. Only one time-range assignment of the same type and priority is allowed.

  Values  
  1 — 10
System Time Commands

dst-zone

Syntax

[no] dst-zone [std-zone-name | non-std-zone-name]

Context

config>system>time

Description

This command configures the start and end dates and offset for summer time or daylight savings time to override system defaults or for user defined time zones.

When configured, the time is adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

If the time zone configured is listed in Table 26, System-defined Time Zones, on page 200, then the starting and ending parameters and offset do not need to be configured with this command unless it is necessary to override the system defaults. The command returns an error if the start and ending dates and times are not available either in Table 26 on or entered as optional parameters in this command.

Up to five summer time zones may be configured, for example, for five successive years or for five different time zones. Configuring a sixth entry will return an error message. If no summer (daylight savings) time is supplied, it is assumed no summer time adjustment is required.

The no form of the command removes a configured summer (daylight savings) time entry.

Default

none — No summer time is configured.

Parameters

std-zone-name — The standard time zone name. The standard name must be a system-defined zone in Table 26. For zone names in the table that have an implicit summer time setting, for example MDT for Mountain Daylight Saving Time, the remaining start-date, end-date and offset parameters need to be provided unless it is necessary to override the system defaults for the time zone.

Values

std-zone-name ADT, AKDT, CDT, CEST, EDT, EEST, MDT, PDT, WEST

non-std-zone-name — The non-standard time zone name. Create a user-defined name created using the zone command on page 363

Values

5 characters maximum

end

Syntax

end {end-week} {end-day} {end-month} [hours-minutes]

Context

config>system>time>dst-zone

Description

This command configures start of summer time settings.

Parameters

end-week — Specifies the starting week of the month when the summer time will end.
Values  first, second, third, fourth, last
Default  first

day — Specifies the starting day of the week when the summer time will end.
Values  sunday, monday, tuesday, wednesday, thursday, friday, saturday
Default  sunday

month — The starting month of the year when the summer time will take effect.
Values  january, february, march, april, may, june, july, august, september, october, november, december
Default  january

hours — Specifies the hour at which the summer time will end.
Values  0 — 24
Default  0

minutes — Specifies the number of minutes, after the hours defined by the hours parameter, when the summer time will end.
Values  0 — 59
Default  0

offset

Syntax  offset offset
Context  config>system>time>dst-zone
Description  This command specifies the number of minutes that will be added to the time when summer time takes effect. The same number of minutes will be subtracted from the time when the summer time ends.

Parameters  offset — The number of minutes added to the time at the beginning of summer time and subtracted at the end of summer time, expressed as an integer.

Default  60
Values  0 — 60

start

Syntax  start {start-week} {start-day} {start-month} [hours-minutes]
Context  config>system>time>dst-zone
Description  This command configures start of summer time settings.
### Date and Time Commands

**Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>start-week</code></td>
<td>Specifies the starting week of the month when the summer time will take effect.</td>
<td>first, second, third, fourth, last</td>
<td>first</td>
</tr>
<tr>
<td><code>start-day</code></td>
<td>Specifies the starting day of the week when the summer time will take effect.</td>
<td>sunday, monday, tuesday, wednesday, thursday, friday, saturday</td>
<td>sunday</td>
</tr>
<tr>
<td><code>start-month</code></td>
<td>The starting month of the year when the summer time will take effect.</td>
<td>january, february, march, april, may, june, july, august, september, october, november, december</td>
<td>january</td>
</tr>
<tr>
<td><code>hours</code></td>
<td>Specifies the hour at which the summer time will take effect.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><code>minutes</code></td>
<td>Specifies the number of minutes, after the hours defined by the <code>hours</code> parameter, when the summer time will take effect.</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
zone

Syntax  
```plaintext
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.

7450 ESS OS supports system-defined and user-defined time zones. The system-defined time zones are listed in Table 26, System-defined Time Zones, on page 200.

For user-defined time zones, the zone and the UTC offset must be specified.

The `no` form of the command reverts to the default of Coordinated Universal Time (UTC). If the time zone in use was a user-defined time zone, the time zone will be deleted. If a `dst-zone` command has been configured that references the zone, the summer commands must be deleted before the zone can be reset to UTC.

Default  
`zone utc` - The time zone is set for Coordinated Universal Time (UTC).

Parameters  
`std-zone-name` — The standard time zone name. The standard name must be a system-defined zone in Table 26. For zone names in the table that have an implicit summer time setting, for example MDT for Mountain Daylight Saving Time, the remaining `start-date`, `end-date` and `offset` parameters need to be provided unless it is necessary to override the system defaults for the time zone.

For system-defined time zones, a different offset cannot be specified. If a new time zone is needed with a different offset, the user must create a new time zone. Note that some system-defined time zones have implicit summer time settings which causes the switchover to summer time to occur automatically; configuring the `dst-zone` parameter is not required.

A user-defined time zone name is case-sensitive and can be up to 5 characters in length.

`non-std-zone-name` — The non-standard time zone name.

Values  
A user-defined value can be up to 4 characters or one of the following values: GMT, BST, IST, WET, WEST, CET, CEST, EET, EEST, MSK, MSD, AST, ADT, EST, EDT, ET, CST, CDT, CT, MST, MDT, MT, PST, PDT, PT, HST, AKST, AKDT, WAST, CAST, EAST

`hh [:mm]` — The hours and minutes offset from UTC time, expressed as integers. Some time zones do not have an offset that is an integral number of hours. In these instances, the `minutes-offset` must be specified. For example, the time zone in Pirlanngimpi, Australia UTC + 9.5 hours.

Default  
hours: 0
minutes: 0

Values  
hours: -11 — 11
minutes: 0 — 59
System Synchronization Configuration Commands

sync-if-timing

Syntax: `sync-if-timing`

Context: `config>system`

Description: This command creates or edits the context to create or modify timing reference parameters. This command is not enabled in the 7450 ESS-1.

Default: Disabled (The ref-order must be specified in order for this command to be enabled.)

abort

Syntax: `abort`

Context: `config>system>sync-if-timing`

Description: This command is required to discard changes that have been made to the synchronous interface timing configuration during a session.

Default: No default

begin

Syntax: `begin`

Context: `config>system>sync-if-timing`

Description: This command is required in order to enter the mode to create or edit the system synchronous interface timing configuration.

Default: No default

bits

Syntax: `bits`

Context: `config>system>sync-if-timing`

Description: This command enables the context to configure parameters for the Building Integrated Timing Supply (BITS). The settings specified under this context apply to both the BITS input and BITS output ports. The `bits` command subtree is only available on the 7450 ESS-7 and 7450 ESS-12.
commit

Syntax: commit

Context: config>system>sync-if-timing

Description: This command saves changes made to the system synchronous interface timing configuration.

Default: No default

interface-type

Syntax: interface-type (ds1 [esf | sf]) | e1 [{pcm30crc | pcm31crc}]

no interface-type

Context: config>system>sync-if-timing>ref1
config>system>sync-if-timing>ref2

Description: This command configures the Building Integrated Timing Source (BITS) timing reference. The no form of the command reverts to the default configuration.

Default: ds1 esf

Parameters:
- ds1 esf — Specifies Extended Super Frame (ESF). This is a framing type used on DS1 circuits that consists of 24 192-bit frames. The 193rd bit provides timing and other functions.
- ds1 sf — Specifies Super Frame (SF), also called D4 framing. This is a common framing type used on DS1 circuits. SF consists of 12 192-bit frames. The 193rd bit provides error checking and other functions. ESF supersedes SF.
- e1 pcm30crc — Specifies the pulse code modulation (PCM) type. PCM30CRC uses PCM to separate the signal into 30 user channels with CRC protection.
- e1 pcm31crc — Specifies the pulse code modulation (PCM) type. PCM31CRC uses PCM to separate the signal into 31 user channels with CRC protection.
input
Syntax  input
Context  config>system>sync-if-timing>bits
Description  This command provides a context to enable or disable the external BITS timing reference inputs to the SR/ESS router. In redundant systems with BITS ports, there are two possible BITS-in interfaces, one for each CPM. They are configured together, but they are displayed separately in the show command.
Default  shutdown

output
Syntax  output
Context  config>system>sync-if-timing>bits
Description  This command provides a context to configure and enable or disable the external BITS timing reference output to the SR/ESS router. On redundant systems, there are two possible BITS-out interfaces, one for each CPM. They are configured together, but they are displayed separately in the show command.
Default  shutdown

line-length
Syntax  line-length {110,220,330,440,550,660}
Context  config>system>sync-if-timing>bits
Description  This command configures the line-length parameter of the BITS output. This is the distance in feet between the network element and the office clock (BITS/SSU). There are two possible BITS-out interfaces, one for each CPM. They are configured together, but they are displayed separately in the show command. This command is only applicable when the interface-type is DS1.
Default  110
Parameters  110 — Distance is from 0 to 110 feet
             220 — Distance is from 110 to 220 feet
             330 — Distance is from 220 to 330 feet
             440 — Distance is from 330 to 440 feet
             550 — Distance is from 440 to 550 feet
             660 — Distance is from 550 to 660 feet
ssm-bit

Syntax ssm-bit sa-bit

Context config>system>sync-if-timing>bits
config>system>sync-if-timing>ref1
config>system>sync-if-timing>ref2

Description This command configures which sa-bit to use for conveying SSM information when the interface-type is E1.

Default 8

Parameters sa-bit — Specifies the sa-bit value.

Values 4–8

ql-override

Syntax ql-overide {prs|stu|st2|tnc|st3e|st3|eec1|sec|prc|ssu-a|ssu-b|eec2}
no ql-overide

Context config>system>sync-if-timing>bits
config>system>sync-if-timing>ref1
config>system>sync-if-timing>ref2

Description This command configures the QL value to be used for the reference for SETS input selection and BITS output. This value overrides any value received by that reference's SSM process.

Default no ql-overide

Parameters prs — SONET Primary Reference Source Traceable
stu — SONET Synchronous Traceability Unknown
st2 — SONET Stratum 2 Traceable
tnc — SONET Transit Node Clock Traceable
st3e — SONET Stratum 3E Traceable
st3 — SONET Stratum 3 Traceable
eec1 — Ethernet Equipment Clock Option 1 Traceable (sdh)
eec2 — Ethernet Equipment Clock Option 2 Traceable (sonet)
prc — SDH Primary Reference Clock Traceable
ssu-a — SDH Primary Level Synchronization Supply Unit Traceable
ssu-b — SDH Second Level Synchronization Supply Unit Traceable
sec — SDH Synchronous Equipment Clock Traceable
ql-selection

Syntax     [no] ql-selection
Context    config>system>sync-if-timing
Description When enabled the selection of system timing reference and BITS output timing reference takes into account quality level. This command turns-on or turns-off SSM encoding as a means of timing reference selection.
Default    no ql-selection

ref-order

Syntax     ref-order first second [third]
            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 refl, ref2 and bits command configuration. This command organizes the priority order of the timing references.

If a reference source is disabled, then the clock from the next reference source as defined by ref-order is used. If all reference sources are disabled, then clocking is derived from a local oscillator.

Note that if a sync-if-timing reference is linked to a source port that is operationally down, the port is no longer qualified as a valid reference.

For 7450 ESS 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 refl ref2” will actually be bits (active CPM), followed by bits (standby CPM), followed by refl, followed by ref2.

The no form of the command resets the reference order to the default values.

Default    bits refl ref2

Parameters  first — Specifies the first timing reference to use in the reference order sequence.
             Values      refl, ref2, bits

second — Specifies the second timing reference to use in the reference order sequence.
             Values      refl, ref2, bits

third — Specifies the third timing reference to use in the reference order sequence.
             Values      refl, ref2, bits
ref1

**Syntax**

ref1

**Context**

config>system>sync-if-timing

**Description**

This command enables the context to configure parameters for the first timing reference. The timing reference for ref1 must be specified for the following chassis slots:

<table>
<thead>
<tr>
<th>7450 Model</th>
<th>Ref1/Slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESS-1</td>
<td>Not enabled</td>
</tr>
<tr>
<td>ESS-6</td>
<td>1 — 2</td>
</tr>
<tr>
<td>ESS-7</td>
<td>1 — 2</td>
</tr>
<tr>
<td>ESS-12</td>
<td>1 — 5</td>
</tr>
</tbody>
</table>

ref2

**Syntax**

ref2

**Context**

config>system>sync-if-timing

**Description**

This command enables the context to configure parameters for the second timing reference. The timing reference for ref2 must be specified for the following chassis slots:

<table>
<thead>
<tr>
<th>7450 Model</th>
<th>Ref2/Slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESS-1</td>
<td>Not enabled</td>
</tr>
<tr>
<td>ESS-6</td>
<td>3 — 4</td>
</tr>
<tr>
<td>ESS-7</td>
<td>3 — 5</td>
</tr>
<tr>
<td>ESS-12</td>
<td>6 — 10</td>
</tr>
</tbody>
</table>

**Default**

none
revert

Syntax  [no] revert

Context  config>system>sync-if-timing

Description  This command allows the clock to revert to a higher priority reference if the current reference goes offline or becomes unstable. When the failed reference becomes operational, it is eligible for selection. When the mode is non-revertive, a failed clock source is not selected again.

Default  no revert

source-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.

The timing reference for ref1 and ref2 must be specified for ports in the following chassis slots:

<table>
<thead>
<tr>
<th>7450 Model</th>
<th>Ref1/Slots</th>
<th>Ref2/Slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESS-1</td>
<td>Not enabled</td>
<td>Not enabled</td>
</tr>
<tr>
<td>ESS-6</td>
<td>1 — 2</td>
<td>3 — 4</td>
</tr>
<tr>
<td>ESS-7</td>
<td>1 — 2</td>
<td>3 — 5</td>
</tr>
<tr>
<td>ESS-12</td>
<td>1 — 5</td>
<td>6 — 10</td>
</tr>
</tbody>
</table>

Parameters  port-id — Identify the physical port in the slot/mda/port format.
Generic Commands

shutdown

Syntax  [no] shutdown

Context  config>system>time>sntp
         config>system>sync-if-timing>ref1
         config>system>sync-if-timing>ref2
         config>system>sync-if-timing>bits
         config>system>sync-if-timing>bits>input
         config>system>sync-if-timing>bits>output

Description  This command administratively disables an entity. When disabled, an entity does not change, reset, or remove any configuration settings or statistics.

The operational state of the entity is disabled as well as the operational state of any entities contained within. Many objects must be shut down before they may be deleted.

The no form of this command administratively enables an entity.

Unlike other commands and parameters where the default state is not indicated in the configuration file, the shutdown and no shutdown states are always indicated in system generated configuration files.

The no form of the command places an entity in an administratively enabled state.

description

Syntax  description description-string
        no description

Context  config>system>persistence>sub-mgmt
         config>system>persistence>dhcp-server

Description  The command allows the user to configure a string that can be used to identify the purpose of this event. This is an optional parameter and can be 80 characters long. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.
System Administration Commands

admin

Syntax: admin

Context: <ROOT>

Description: The context to configure administrative system commands. Only authorized users can execute the commands in the admin context.

Default: none

application-assurance

Syntax: application-assurance

Context: admin

Description: This command enables the context to perform application-assurance operations.

upgrade

Syntax: upgrade

Context: admin>app-assure

Description: This command loads a new protocol list from the isa-aa.tim file into the CPM. Note that an ISA-AA reboot is required.

debug-save

Syntax: debug-save file-url

Context: admin

Description: This command saves existing debug configuration. Debug configurations are not preserved in configuration saves.

Default: none

Parameters: file-url — The file URL location to save the debug configuration.
Values

file url: local-url | remote-url: 255 chars max
local-url: [cflash-id][file-path], 200 chars max, including the cflash-id
directory length, 99 chars max each
remote-url: [{ftp://} login:pswd@remote-locn][file-path]
remote-locn [ hostname | ipv4-address]
ipv4-address a.b.c.d
255 chars max, directory length 99 chars max each
cflash-id: cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:

disconnect

Syntax

disconnect {address ip-address | username user-name | console | telnet | ftp | ssh}

Context

admin

Description

This command disconnects a user from a console, Telnet, FTP, or SSH session.
If any of the console, Telnet, FTP, or SSH options are specified, then only the respective console,
Telnet, FTP, or SSH sessions are affected.
If no console, Telnet, FTP, or SSH options are specified, then all sessions from the IP address or from
the specified user are disconnected.
Any task that the user is executing is terminated. FTP files accessed by the user will not be removed.
A major severity security log event is created specifying what was terminated and by whom.

Default

none — No disconnect options are configured.

Parameters

address ip-address — The IP address to disconnect, specified in dotted decimal notation.

Values

ipv4-address a.b.c.d

username user-name — The name of the user.

console — Disconnects the console session.

telnet — Disconnects the Telnet session.

ftp — Disconnects the FTP session.

ssh — Disconnects the SSH session.
display-config

Syntax

```
display-config [detail | index]
```

Context

```
admin
```

Description

This command displays the system’s running configuration.
By default, only non-default settings are displayed.
Specifying the `detail` option displays all default and non-default configuration parameters.

Parameters

- **detail** — Displays default and non-default configuration parameters.
- **index** — Displays only persistent-indices.

reboot

Syntax

```
reboot [active | standby | upgrade] [now]
```

Context

```
admin
```

Description

This command reboots the router including redundant CPMs and all IOMs or upgrades the boot ROMs.
If no options are specified, the user is prompted to confirm the reboot operation. For example:
```
ALA-1>admin# reboot
Are you sure you want to reboot (y/n)?
```
If the `now` option is specified, boot confirmation messages appear.

Parameters

- **active** — Keyword to reboot the active CPM.
  - Default: `active`
- **standby** — Keyword to reboot the standby CPM.
  - Default: `active`
- **upgrade** — Enables card firmware to be upgraded during chassis reboot. The 7450 ESS OS and the boot.ldr support functionality to perform automatic firmware upgrades on CPMs and IOM cards.
  - The automatic upgrade must be enabled in the 7450 ESS OS Command Line Interface (CLI) when rebooting the system.
  - When the `upgrade` keyword is specified, a chassis flag is set for the BOOT Loader (boot.ldr) and on the subsequent boot of the 7450 ESS OS on the chassis, any firmware images on CPMs or IOMs requiring upgrading will be upgraded automatically.
  - If an 7450 ESS is rebooted with the `admin reboot` command (without the `upgrade` keyword), the firmware images are left intact.
  - Any CPMs that are installed in the chassis will be upgraded automatically. For example, if a card is inserted with down revision firmware as a result of a card hot swap with the latest OS version running, the firmware on the card will be automatically upgraded before the card is brought online.
If the card firmware is upgraded automatically, a chassis cardUpgraded (event 2032) log event is generated. The corresponding SNMP trap for this log event is tmnxEqCardFirmwareUpgraded.

During any firmware upgrade, automatic or manual, it is imperative that during the upgrade procedure:

- Power must NOT be switched off or interrupted.
- The system must NOT be reset.
- No cards are inserted or removed.

Any of the above conditions may render cards inoperable requiring a return of the card for resolution.

The time required to upgrade the firmware on the cards in the chassis depends on the number of cards to be upgraded. On system reboot, the firmware upgrades can take from approximately 3 minutes for a minimally loaded 7450 ESS-Series after which the configuration file will be loaded. The progress of the firmware upgrades can be monitored at the console. Inserting a single card requiring a firmware upgrade in a running system generally takes less than 2 minutes before the card becomes operationally up.

*now* — Forces a reboot of the router immediately without an interactive confirmation.

---

**save**

**Syntax**

```
save [file-url] [detail] [index]
```

**Context**

admin

**Description**

This command saves the running configuration to a configuration file. For example:

```
A:ALA-1>admin# save ftp://test:test@192.168.x.xx/./100.cfg
Saving configuration ..........Completed.
```

By default, the running configuration is saved to the primary configuration file.

**Parameters**

- **file-url** — The file URL location to save the configuration file.
  
  **Default**
  
  The primary configuration file location.

  **Values**
  
  - `local-url`: local-url | remote-url: 255 chars max
  - `remote-url`: \{ftp://\} login:pswd@remote-locn/][file-path]
    remote-locn [ hostname ] [ ipv4-address ]
    ipv4-address a.b.c.d
    255 chars max, directory length 99 chars max each
  - `cflash-id`: cf1:, cf1-A:,cf1-B:,cf2:,cf2-A:,cf2-B:,cf3:,cf3-A:,cf3-B:

- **detail** — Saves both default and non-default configuration parameters.

- **index** — Forces a save of the persistent index file regardless of the persistent status in the BOF file.
  
  The index option can also be used to avoid an additional boot required while changing your system to use the persistence indices.
enable-tech

Syntax: [no] enable-tech
Context: admin
Description: This command enables the shell and kernel commands.

NOTE: This command should only be used with authorized direction from the Alcatel-Lucent Technical Assistance Center (TAC).

radius-discovery

Syntax: radius-discovery
Context: admin
Description: This command performs RADIUS discovery operations.

force-discover

Syntax: force-discover [svc-id service-id]
Context: admin>radius-discovery
Description: When enabled, the server is immediately contacted to attempt discovery.
Parameters:

svc-id service-id — Specifies an existing service ID.
Values: 1 — 2147483648 | svc-name, up to 64 char max

tech-support

Syntax: tech-support file-url
Context: admin
Description: This command creates a system core dump.

NOTE: This command should only be used with authorized direction from the Alcatel-Lucent Technical Assistance Center (TAC).

file-url — The file URL location to save the binary file.

file url: local-url | remote-url: 255 chars max
local-url: [cflash-id][file-path], 200 chars max, including the cflash-id directory length, 99 chars max each
remote-url: [{ftp://} login:pswd@remote-locn/][file-path]
remote-locn [hostname | ipv4-address]
ipv4-address a.b.c.d
cflash-id:
cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B:, cf3:, cf3-A:, cf3-B:

Values

255 chars max, directory length 99 chars max each
Persistence Commands

persistence

Syntax
[no] persistence

Context
config>system

Description
This command enables the context to configure persistence parameters on the system.

The persistence feature enables state on information learned through DHCP snooping across reboots to be retained. This information includes data such as the IP address and MAC binding information, lease-length information, and ingress sap information (required for VPLS snooping to identify the ingress interface).

If persistence is enabled when there are no DHCP relay or snooping commands enabled, it will simply create an empty file.

Default
no persistence

dhcp-server

Syntax
dhcp-server

Context
config>system>persistence

Description
This command configures DHCP server persistence parameters.

subscriber-mgmt

Syntax
subscriber-mgmt

Context
config>system>persistence

Description
This command configures subscriber management persistence parameters.
### location

| Syntax      | location [cf1: | cf2: | cf3:] |
|-------------|---------------|
|             | no location   |

<table>
<thead>
<tr>
<th>Context</th>
<th>config&gt;system&gt;persistence&gt;sub-mgmt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>config&gt;system&gt;persistence&gt;dhcp-server</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>This command instructs the system where to write the file. The name of the file is: dhcp-persistence.db. On boot the system scans the file systems looking for dhcp-persistence.db, if it finds it it starts to load it.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Default</th>
<th>no location</th>
</tr>
</thead>
</table>
Redundancy Commands

redundancy

Syntax redundancy
Context admin
config
Description This command enters the context to allow the user to perform redundancy operations.

force-switchover

Syntax force-switchover [now]
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.

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  

- 1 — 100

---

**site-activation-timer**

Syntax  

- `site-activation-timer seconds`
- `no site-activation-timer`

Context  

- `config>redundancy>bgp-multi-homing`

Description  

This command defines the amount of time the service manager will keep the local sites in standby status, waiting for BGP updates from remote PEs before running the DF election algorithm to decide whether the site should be unblocked. The timer is started when one of the following events occurs if the site is operationally up:

- Manual site activation using the `no shutdown` command at site-id level or at member object(s) level (SAP(s) or PW(s))
- Site activation after a failure

Default  

- `no site-activation-timer`

Parameters  

- **seconds** — Specifies the standby status in seconds.

Values  

- 1 — 100

Default  

- 2

---

**synchronize**

Syntax  

- `synchronize {boot-env | config}`

Context  

- `config>redundancy`

Description  

This command performs a synchronization of the standby CPM’s images and/or config files to the active CPM. Either the `boot-env` or `config` parameter must be specified.

In the `config>redundancy` context, this command performs an automatically triggered standby CPM synchronization. When the standby CPM takes over operation following a failure or reset of the active CPM, it is important to ensure that the active and standby CPMs have identical operational parameters. This includes the saved configuration, CPM and IOM images.

The active CPM ensures that the active configuration is maintained on the standby CPM. However, to ensure smooth operation under all circumstances, runtime images and system initialization configurations must also be automatically synchronized between the active and standby CPM.

If synchronization fails, alarms and log messages that indicate the type of error that caused the failure of the synchronization operation are generated. When the error condition ceases to exist, the alarm is cleared.
Redundancy Commands

Only files stored on the router are synchronized. If a configuration file or image is stored in a location other than on a local compact flash, the file is not synchronized (for example, storing a configuration file on an FTP server).

**Default** enabled

**Parameters**
- **boot-env** — Synchronizes all files required for the boot process (loader, BOF, images, and config).
- **config** — Synchronize only the primary, secondary, and tertiary configuration files.

**Default** config

### synchronize

**Syntax** synchronize {boot-env | config}

**Context** admin>redundancy

**Description** This command performs a synchronization of the standby CPM’s images and/or config files to the active CPM. Either the **boot-env** or **config** parameter must be specified.

In the **admin>redundancy** context, this command performs a manually triggered standby CPM synchronization. When the standby CPM takes over operation following a failure or reset of the active CPM, it is important to ensure that the active and standby CPM have identical operational parameters. This includes the saved configuration, CPM and IOM images.

The active CPM ensures that the active configuration is maintained on the standby CPM. However, to ensure smooth operation under all circumstances, runtime images and system initialization configurations must also be automatically synchronized between the active and standby CPM.

If synchronization fails, alarms and log messages that indicate the type of error that caused the failure of the synchronization operation are generated. When the error condition ceases to exist, the alarm is cleared.

Only files stored on the router are synchronized. If a configuration file or image is stored in a location other than on a local compact flash, the file is not synchronized (for example, storing a configuration file on an FTP server).

**Default** none

**Parameters**
- **boot-env** — Synchronizes all files required for the boot process (loader, BOF, images, and configuration files).
- **config** — Synchronize only the primary, secondary, and tertiary configuration files.
multi-chassis

Syntax  multi-chassis
Context  config>redundancy
Description  This command enables the context to configure multi-chassis parameters.

peer-name

Syntax  peer-name name
no peer-name
Context  config>redundancy>multi-chassis>peer
Description  This command specifies a peer name.
Parameters  name — The string may be up to 32 characters long. Any printable, seven-bit ASCII characters can be used within the string. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

source-address

Syntax  source-address ip-address
no source-address
Context  config>redundancy>multi-chassis>peer
Description  This command specifies the source address used to communicate with the multi-chassis peer.
Parameters  ip-address — Specifies the source address used to communicate with the multi-chassis peer.

sync

Syntax  [no] sync
Context  config>redundancy>multi-chassis>peer
Description  This command enables the context to configure synchronization parameters.
Redundancy Commands

igmp

Syntax: `[no] igmp`

Context: `config>redundancy>multi-chassis>peer>sync`

Description: This command specifies whether IGMP protocol information should be synchronized with the multi-chassis peer.

Default: `no igmp`

igmp-snooping

Syntax: `[no] igmp-snooping`

Context: `config>redundancy>multi-chassis>peer>sync`

Description: This command specifies whether IGMP snooping information should be synchronized with the multi-chassis peer.

Default: `no igmp-snooping`

local-dhcp-server

Syntax: `[no] local-dhcp-server`

Context: `config>redundancy>multi-chassis>peer>sync`

Description: This command synchronizes DHCP server information.

mld-snooping

Syntax: `[no] mld-snooping`

Context: `config>redundancy>multi-chassis>peer>sync`

Description: This command synchronizes MLD Snooping information.
port

Syntax

```
port [port-id | lag-id] [sync-tag sync-tag]
no port [port-id | lag-id]
```

Context

```
config>redundancy>multi-chassis>peer>sync
```

Description

This command specifies the port to be synchronized with the multi-chassis peer and a synchronization tag to be used while synchronizing this port with the multi-chassis peer.

Parameters

- `port-id` — Specifies the port to be synchronized with the multi-chassis peer.
- `lag-id` — Specifies the LAG ID to be synchronized with the multi-chassis peer.
- `sync-tag` — Specifies a synchronization tag to be used while synchronizing this port with the multi-chassis peer.

range

Syntax

```
range encap-range sync-tag sync-tag
no range encap-range
```

Context

```
config>redundancy>multi-chassis>peer>sync>port
```

Description

This command configures a range of encapsulation values.

Parameters

- `encap-range` — Specifies a range of encapsulation values on a port to be synchronized with a multi-chassis peer.

Values

```
Dot1Q     start-vlan-end-vlan
QinQ      Q1.start-vlan-Q1.end-vlan
```

- `sync-tag` — Specifies a synchronization tag up to 32 characters in length to be used while synchronizing this encapsulation value range with the multi-chassis peer.

srrp

Syntax

```
[sno] 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
```
Redundancy Commands

sub-mgmt

<table>
<thead>
<tr>
<th>Syntax</th>
<th>[no] sub-mgmt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>config&gt;redundancy&gt;multi-chassis&gt;peer&gt;sync</td>
</tr>
<tr>
<td>Description</td>
<td>This command specifies whether subscriber management information should be synchronized with the multi-chassis peer.</td>
</tr>
<tr>
<td>Default</td>
<td>no sub-mgmt</td>
</tr>
</tbody>
</table>
Peer Commands

**peer**

**Syntax**

[no] peer ip-address

**Context**

config>redundancy>multi-chassis

**Description**

This command configures a multi-chassis redundancy peer.

**Parameters**

*ip-address* — Specifies a peer IP address. Multicast address are not allowed.

**authentication-key**

**Syntax**

authentication-key [authentication-key | hash-key] [hash | hash2]

no authentication-key

**Context**

config>redundancy>multi-chassis>peer

**Description**

This command configures the authentication key used between this node and the multi-chassis peer. The authentication key can be any combination of letters or numbers.

**Parameters**

*authentication-key* — Specifies the authentication key. Allowed values are any string up to 20 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

*hash-key* — The hash key. The key can be any combination of ASCII characters up to 33 (hash1-key) or 55 (hash2-key) characters in length (encrypted). If spaces are used in the string, enclose the entire string in quotation marks (“ ”).

*hash* — Specifies the key is entered in an encrypted form. If the hash or hash2 parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the hash or hash2 parameter specified.

*hash2* — Specifies the key is entered in a more complex encrypted form that involves more variables than the key value alone, this means that hash2 encrypted variable cannot be copied and pasted. If the hash or hash2 parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the hash or hash2 parameter specified.
MC Endpoint Commands

mc-endpoint

Syntax       [no] mc-endpoint
Context      config>redundancy>multi-chassis>peer
Description  This command specifies that the endpoint is multi-chassis. This value should be the same on both MC-EP peers for the pseudowires that must be part of the same group.

The no form of this command removes the endpoint from the MC-EP. Single chassis behavior applies.

bfd-enable

Syntax       [no] bfd-enable
Context      config>redundancy>multi-chassis>peer>mc-ep
config>router>rsvp
config>router>bgp
config>router>bgp>group
config>router>bgp>group>neighbor
config>redundancy>multi-chassis>peer>mc-ep

Description  This command enables the use of bi-directional forwarding (BFD) to control the state of the associated protocol interface. By enabling BFD on a given protocol interface, the state of the protocol interface is tied to the state of the BFD session between the local node and the remote node. The parameters used for the BFD are set via the BFD command under the IP interface.

The no form of this command disables BFD.

Default      no bfd-enable

boot-timer

Syntax       boot-timer interval
             no boot-timer
Context      config>redundancy>multi-chassis>peer>mc-ep

Description  This command configures the boot timer interval. This command applies only when the node reboots. It specifies the time the MC-EP protocol keeps trying to establish a connection before assuming a failure of the remote peer. This is different from the keep-alives mechanism which is used just after the peer-peer communication was established. After this time interval passed all the mc-endpoints configured under services will revert to single chassis behavior, activating the best local PW.
The `no` form of this command sets the interval to default.

**Default**

300

**Parameters**

`interval` — Specifies the boot timer interval.

**Values** 1 — 600

---

**hold-on-neighbor-failure**

**Syntax**

`hold-on-neighbor-failure multiplier`

`no hold-on-neighbor-failure`

**Context**

`config>redundancy>multi-chassis>peer>mc-ep`

**Description**

This command specifies the number of keep-alive intervals that the local node will wait for packets from the MC-EP peer before assuming failure. After this time interval passed the all the mc-endpoints configured under services will revert to single chassis behavior, activating the best local pseudowire.

The `no` form of this command sets the multiplier to default value

**Default**

3

**Parameters**

`multiplier` — Specifies the hold time applied on neighbor failure.

**Values** 2 — 25

---

**keep-alive-interval**

**Syntax**

`keep-alive-interval interval`

`no keep-alive-interval`

**Context**

`config>redundancy>multi-chassis>peer>mc-ep`

**Description**

This command sets the interval at which keep-alive messages are exchanged between two systems participating in MC-EP when bfd is not enabled or is down. These fast keep-alive messages are used to determine remote-node failure and the interval is set in deci-seconds.

The `no` form of this command sets the interval to default value

**Default**

5 (0.5s)

**Parameters**

`interval` — The time interval expressed in deci-seconds.

**Values** 5 — 500 (tenths of a second)
passive-mode

Syntax  \[no\] passive-mode

Context  config>redundancy>multi-chassis>peer>mc-ep

Description  This command configures the passive mode behavior for the MC-EP protocol. When in passive mode the MC-EP pair will be dormant until two of the pseudowires in a MC-EP will be signaled as active by the remote PEs, being assumed that the remote pair is configured with regular MC-EP. As soon as more than one pseudowire is active, dormant MC-EP pair will activate. It will use the regular exchange to select the best pseudowire between the active ones and it will block the Rx and Tx directions of the other pseudowires.

The \textbf{no} form of this command will disable the passive mode behavior.

Default  no passive-mode

system-priority

Syntax  system-priority \textit{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 \textbf{no} form of this command sets the system priority to default

Default  no system-priority

Parameters  \textit{value} — Specifies the priority assigned to the local MC-EP peer.

\textbf{Values}  

\begin{tabular}{|l|l|}
\hline
\textbf{1 — 255}  
\hline
\end{tabular}
MC-LAG Commands

mc-lag

Syntax  [no] mc-lag
Context  config>redundancy>multi-chassis>peer>mc-lag
Description  This command enables the context to configure multi-chassis LAG operations and related parameters. The no form of this command administratively disables multi-chassis LAG. MC-LAG can only be issued only when mc-lag is shutdown.

hold-on-neighbor-failure

Syntax  hold-on-neighbor-failure multiplier
no hold-on-neighbor-failure
Context  config>redundancy>multi-chassis>peer>mc-lag
Description  This command specifies the interval that the standby node will wait for packets from the active node before assuming a redundant-neighbor node failure. This delay in switch-over operation is required to accommodate different factors influencing node failure detection rate, such as IGP convergence, or HA switch-over times and to prevent the standby node to take action prematurely. The no form of this command sets this parameter to default value.

Default  3
Parameters  multiplier — The time interval that the standby node will wait for packets from the active node before assuming a redundant-neighbor node failure.

Values  2 — 25

keep-alive-interval

Syntax  keep-alive-interval interval
no keep-alive-interval
Context  config>redundancy>multi-chassis>peer>mc-lag
Description  This command sets the interval at which keep-alive messages are exchanged between two systems participating in MC-LAG. These keep-alive messages are used to determine remote-node failure and the interval is set in deci-seconds.

The no form of this command sets the interval to default value

Default  1s (10 hundreds of milliseconds means interval value of 10)
Parameters

*interval* — The time interval expressed in deci-seconds

**Values**

5 — 500

### lag

**Syntax**

```
lag lag-id lACP-key admin-key system-id system-id [remote-lag lag-id] system-priority
```

```
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 part of the same LAG. In order to achieve this in MC operation, both redundant-pair nodes have to be configured with the same values. In case of the mismatch, MC-LAG is kept operationally down.

**Default**

none

**Parameters**

*lag-id* — The LAG identifier, expressed as a decimal integer. Specifying the *lag-id* allows the mismatch between lag-id on redundant-pair. If no *lag-id* is specified it is assumed that neighbor system uses the same *lag-id* as a part of the given MC-LAG. If no matching MC-LAG group can be found between neighbor systems, the individual LAGs will operate as usual (no MC-LAG operation is established.).

**Values**

1 — 200

*lACP-key admin-key* — Specifies a 16 bit key that needs to be configured in the same manner on both sides of the MC-LAG in order for the MC-LAG to come up.

**Values**

1 — 65535

*system-id* — Specifies a 6 byte value expressed in the same notation as MAC address

**Values**


*remote-lag lag-id* — Specifies the LAG ID on the remote system.

**Values**

1 — 200

*system-priority* — Specifies the system priority to be used in the context of the MC-LAG. The partner system will consider all ports using the same *lACP-key*, *system-id*, and *system-priority* as part of the same LAG.

**Values**

1 — 65535
Multi-Chassis Ring Commands

mc-ring

Syntax: `mc-ring`

Context: `config>redundancy>mc>peer`
`config>redundancy>multi-chassis>peer>sync`

Description: This command enables the context to configure the multi-chassis ring parameters.

ring

Syntax: `ring sync-tag`
`no ring sync-tag`

Context: `config>redundancy>mc>peer>mcr`

Description: This command configures a multi-chassis ring.

Parameters:
- `sync-tag` — Specifies a synchronization tag to be used while synchronizing this port with the multi-chassis peer.

in-band-control-path

Syntax: `in-band-control-path`

Context: `config>redundancy>mc>peer>mcr>ring`

Description: This command enables the context to configure multi-chassis ring inband control path parameters.

dst-ip

Syntax: `dst-ip ip-address`
`no dst-ip`

Context: `config>redundancy>mc>peer>mcr>ring>in-band-control-path`

Description: This command specifies the destination IP address used in the inband control connection. If the address is not configured, the ring cannot become operational.

Parameters:
- `ip-address` — Specifies the destination IP address.
Redundancy Commands

**interface**

**Syntax**

```plaintext
interface ip-int-name
no interface
```

**Context**

```plaintext
config>redundancy>mc>peer>mcr>ring>in-band-control-path
```

**Description**

This command specifies the name of the IP interface used for the inband control connection. If the name is not configured, the ring cannot become operational.

**service-id**

**Syntax**

```plaintext
service-id service-id
no service-id
```

**Context**

```plaintext
config>redundancy>mc>peer>mcr>ring>ibc
```

**Description**

This command specifies the service ID if the interface used for the inband control connection belongs to a VPRN service. If not specified, the `service-id` is zero and the interface must belong to the Base router.

The `no` form of the command removes the service-id from the IBC configuration.

**Parameters**

`service-id` — Specifies the service ID if the interface.

**path-b**

**Syntax**

```plaintext
[no] path-b
```

**Context**

```plaintext
config>redundancy>mc>peer>mcr>ring
```

**Description**

This command specifies the set of upper-VLAN IDs associated with the SAPs that belong to path B with respect to load-sharing. All other SAPs belong to path A.

**Default**

If not specified, the default is an empty set.

**range**

**Syntax**

```plaintext
[no] range vlan-range
```

**Context**

```plaintext
config>redundancy>mc>peer>mcr>ring>path-b
config>redundancy>mc>peer>mcr>ring>path-excl
```

**Description**

This command configures a MCR b-path VLAN range.

**Parameters**

`vlan-range` — Specifies the VLAN range.

**Values**

1 to 4094 — 1 to 4094
path-excl

Syntax: [no] path-excl

Context: config>redundancy>mc>peer>mcr>ring

Description: This command specifies the set of upper-VLAN IDs associated with the SAPs that are to be excluded from control by the multi-chassis ring.

Default: If not specified, the default is an empty set.

ring-node

Syntax: ring-node ring-node-name [create]

no ring-node ring-node-name

Context: config>redundancy>mc>peer>mcr>ring

Description: This command specifies the unique name of a multi-chassis ring access node.

Parameters:
- ring-node-name — Specifies the unique name of a multi-chassis ring access node.
- create — Keyword used to create the ring node instance. The create keyword requirement can be enabled/disabled in the environment>create context.

cannectivity-verify

Syntax: connectivity-verify

Context: config>redundancy>mc>peer>mcr>ring>ring-node

Description: This command enables the context to configure node connectivity check parameters.

dst-ip

Syntax: dst-ip ip-address

no dst-ip

Context: config>redundancy>mc>peer>mcr>ring>ring-node>connectivity-verify

Description: This command configures the node cc destination IP address.

Default: no dst-ip

Parameters:
- ip-address — Specifies the destination IP address used in the inband control connection.
Redundancy Commands

interval

Syntax

```
interval interval
no interval
```

Context

```
config>redundancy>mc>peer>mcr>ring>ring-node>connectivity-verify
```

Description

This command specifies the polling interval of the ring-node connectivity verification of this ring node.

Default

```
5
```

Parameters

```
interval — Specifies the polling interval, in minutes.
```

Values

```
1 — 6000
```

service-id

Syntax

```
service-id service-id
no service-id
```

Context

```
config>redundancy>mc>peer>mcr>ring>ring-node>connectivity-verify
```

Description

This command specifies the service ID of the SAP used for the ring-node connectivity verification of this ring node.

Default

```
no service-id
```

Parameters

```
service-id — Specifies the service ID of the SAP.
```

Values

```
1 — 2147483647
```

src-ip

Syntax

```
src-ip ip-address
no src-ip
```

Context

```
config>redundancy>mc>peer>mcr>ring>ring-node>connectivity-verify
```

Description

This command specifies the source IP address used in the ring-node connectivity verification of this ring node.

Default

```
no src-ip
```

Parameters

```
ip-address — Specifies the address of the multi-chassis peer.
```
src-mac

Syntax  src-mac ieee-address
      no src-mac

Context  config>redundancy>mc>peer>mcr>node>cv

Description  This command specifies the source MAC address used for the Ring-Node Connectivity Verification of this ring node.

A value of all zeroes (000000000000 H (0:0:0:0:0:0)) specifies that the MAC address of the system management processor (CPM) is used.

Default  no src-mac

Parameters  ieee-address — Specifies the source MAC address.

vlan

Syntax  vlan [0..4094]
      no vlan

Context  config>redundancy>mc>peer>mcr>node>cv

Description  This command specifies the VLAN tag of the SAP used for the ring-node connectivity verification of this ring node. It is only meaningful if the value of service ID is not zero. A zero value means that no VLAN tag is configured.

Default  no vlan

Parameters  [0..4094] — Specifies the set of VLAN IDs associated with the SAPs that are to be controlled by the slave peer.
LLDP System Commands

lldp

**Syntax**
```
lldp
```

**Context**
```
config>system
```

**Description**
This command enables the context to configure system-wide Link Layer Discovery Protocol parameters.

message-fast-tx

**Syntax**
```
message-fast-tx time
no message-fast-tx
```

**Context**
```
config>system>lldp
```

**Description**
This command configures the duration of the fast transmission period.

**Parameters**
- `time` — Specifies the fast transmission period in seconds.
  - **Values**
    - 1 — 3600
  - **Default**
    - 1

message-fast-tx-init

**Syntax**
```
message-fast-tx-init count
no message-fast-tx-init
```

**Context**
```
config>system>lldp
```

**Description**
This command configures the number of LLDPDUs to send during the fast transmission period.

**Parameters**
- `count` — Specifies the number of LLDPDUs to send during the fast transmission period.
  - **Values**
    - 1 — 8
  - **Default**
    - 4
notification-interval

Syntax   notification-interval time
         no notification-interval

Context  config>system>lldp

Description  This command configures the minimum time between change notifications.

Parameters  time — Specifies the minimum time, in seconds, between change notifications.

   Values    5 — 3600
   Default   5

reinit-delay

Syntax    reinit-delay time
         no reinit-delay

Context   config>system>lldp

Description  This command configures the time before re-initializing LLDP on a port.

Parameters  time — Specifies the time, in seconds, before re-initializing LLDP on a port.

   Values    1 — 10
   Default   2

tx-credit-max

Syntax    tx-credit-max count
         no tx-credit-max

Context   config>system>lldp

Description  This command configures the maximum consecutive LLDPDUs transmitted.

Parameters  count — Specifies the maximum consecutive LLDPDUs transmitted.

   Values    1 — 100
   Default   5
tx-hold-multiplier

Syntax

```
 tx-hold-multiplier multiplier
 no tx-hold-multiplier
```

Context

```
 config>system>lldp
```

Description

This command configures the multiplier of the tx-interval.

Parameters

- `multiplier` — Specifies the multiplier of the tx-interval.

  Values
  - 2 — 10
  - Default: 4

---

tx-interval

Syntax

```
 tx-interval interval
 no tx-interval
```

Context

```
 config>system>lldp
```

Description

This command configures the LLDP transmit interval time.

Parameters

- `interval` — Specifies the LLDP transmit interval time.

  Values
  - 1 — 100
  - Default: 5
LLDP Ethernet Port Commands

Refer to the 7450 ESS OS Interface Guide for command descriptions and CLI usage.

lldp

**Syntax**
```
lldp
```

**Context**
```
config>port>ethernet
```

**Description**
This command enables the context to configure Link Layer Discovery Protocol (LLDP) parameters on the specified port.

**dest-mac**

**Syntax**
```
dest-mac {bridge-mac}
```

**Context**
```
config>port>ethernet>lldp
```

**Description**
This command configures destination MAC address parameters.

**Parameters**
- **bridge-mac** — Specifies destination bridge MAC type to use by LLDP.
  
  **Values**
  - nearest-bridge — Specifies to use the nearest bridge.
  - nearest-non-tpmr — Specifies to use the nearest non-Two-Port MAC Relay (TPMR).
  - nearest-customer — Specifies to use the nearest customer.

**admin-status**

**Syntax**
```
admin-status {rx | tx | tx-rx | disabled}
```

**Context**
```
config>port>ethernet>lldp>dstmac
```

**Description**
This command specifies the administratively desired status of the local LLDP agent.

**Parameters**
- **rx** — Specifies the LLDP agent will receive, but will not transmit LLDP frames on this port.

- **tx** — Specifies that the LLDP agent will transmit LLDP frames on this port and will not store any information about the remote systems connected.

- **tx-rx** — Specifies that the LLDP agent will transmit and receive LLDP frames on this port.

- **disabled** — Specifies that the LLDP agent will not transmit or receive LLDP frames on this port. If there is remote systems information which is received on this port and stored in other tables, before the port's admin status becomes disabled, then the information will naturally age out.
notification

Syntax     [no] notification
Context    config>port>ethernet>lldp>dstmac
Description This command enables LLDP notifications.
The no form of the command disables LLDP notifications.

tx-mgmt-address

Syntax     tx-mgmt-address [system]
           no tx-mgmt-address
Context    config>port>ethernet>lldp>dstmac
Description This command specifies which management address to transmit.
The no form of the command resets value to the default.
Default    no tx-mgmt-address
Parameters system — Specifies to use the system IP address. Note that the system address will only be transmitted once it has been configured if this parameter is specified

tx-tlvs

Syntax     tx-tlvs [port-desc] [sys-name] [sys-desc] [sys-cap]
           no tx-tlvs
Context    config>port>ethernet>lldp>dstmac
Description This command specifies which LLDP TLVs to transmit.
The no form of the command resets the value to the default.
Default    no tx-tlvs
Parameters port-desc — Indicates that the LLDP agent should transmit port description TLVs.
sys-name — Indicates that the LLDP agent should transmit system name TLVs.
sys-desc — Indicates that the LLDP agent should transmit system description TLVs.
sys-cap — Indicates that the LLDP agent should transmit system capabilities TLVs.
# Show Commands

## SYSTEM COMMANDS

**connections**

**Syntax**

`connections [address ip-address [interface interface-name]] [port port-number] [detail]`

**Context**

`show>system`

**Description**

This command displays UDP and TCP connection information. If no command line options are specified, a summary of the TCP and UDP connections displays.

**Parameters**

- `ip-address` — Displays only the connection information for the specified IP address. 
  ipv4-address: `a.b.c.d` (host bits must be 0)
- `port-number` — Displays only the connection information for the specified port number.
  
  **Values**
  
  0 — 65535

- `detail` — Appends TCP statistics to the display output.

**Output**

**Standard Connection Output** — The following table describes the system connections output fields.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proto</td>
<td>Displays the socket protocol, either TCP or UDP.</td>
</tr>
<tr>
<td>RecvQ</td>
<td>Displays the number of input packets received by the protocol.</td>
</tr>
<tr>
<td>TxmtQ</td>
<td>Displays the number of output packets sent by the application.</td>
</tr>
<tr>
<td>Local Address</td>
<td>Displays the local address of the socket. The socket port is separated by a period.</td>
</tr>
<tr>
<td>Remote Address</td>
<td>Displays the remote address of the socket. The socket port is separated by a period.</td>
</tr>
<tr>
<td>State</td>
<td><code>Listen</code> — The protocol state is in the listen mode.</td>
</tr>
<tr>
<td></td>
<td><code>Established</code> — The protocol state is established.</td>
</tr>
</tbody>
</table>

**Sample Output**

```
A:ALA-12# show system connections
```
System Commands

===============================================================================
Connections :
===============================================================================

<table>
<thead>
<tr>
<th>Proto</th>
<th>RecvQ</th>
<th>TxmtQ</th>
<th>Local Address</th>
<th>Remote Address</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP</td>
<td>0</td>
<td>0</td>
<td>0.0.0.0.21</td>
<td>0.0.0.0.0</td>
<td>LISTEN</td>
</tr>
<tr>
<td>TCP</td>
<td>0</td>
<td>0</td>
<td>0.0.0.0.23</td>
<td>0.0.0.0.0</td>
<td>LISTEN</td>
</tr>
<tr>
<td>TCP</td>
<td>0</td>
<td>0</td>
<td>0.0.0.0.179</td>
<td>0.0.0.0.0</td>
<td>LISTEN</td>
</tr>
<tr>
<td>TCP</td>
<td>0</td>
<td>0</td>
<td>0.0.0.0.xxx.51138</td>
<td>10.0.0.104.179</td>
<td>SYN_SENT</td>
</tr>
<tr>
<td>TCP</td>
<td>0</td>
<td>0</td>
<td>0.0.0.0.xxx.51139</td>
<td>10.0.0.91.179</td>
<td>SYN_SENT</td>
</tr>
<tr>
<td>TCP</td>
<td>0</td>
<td>0</td>
<td>0.0.0.0.xxx.646</td>
<td>0.0.0.0.0</td>
<td>LISTEN</td>
</tr>
<tr>
<td>TCP</td>
<td>0</td>
<td>0</td>
<td>10.10.10.xxx.646</td>
<td>10.10.10.104.49406</td>
<td>ESTABLISHED</td>
</tr>
<tr>
<td>TCP</td>
<td>0</td>
<td>0</td>
<td>11.1.0.1.51140</td>
<td>11.1.0.2.179</td>
<td>SYN_SENT</td>
</tr>
<tr>
<td>TCP</td>
<td>0</td>
<td>993</td>
<td>192.168.x.xxx.23</td>
<td>192.168.x.xx.xxxx</td>
<td>ESTABLISHED</td>
</tr>
<tr>
<td>UDP</td>
<td>0</td>
<td>0</td>
<td>0.0.0.0.123</td>
<td>0.0.0.0.0</td>
<td>---</td>
</tr>
<tr>
<td>UDP</td>
<td>0</td>
<td>0</td>
<td>0.0.0.0.0.646</td>
<td>0.0.0.0.0</td>
<td>---</td>
</tr>
<tr>
<td>UDP</td>
<td>0</td>
<td>0</td>
<td>0.0.0.0.0.17185</td>
<td>0.0.0.0.0</td>
<td>---</td>
</tr>
<tr>
<td>UDP</td>
<td>0</td>
<td>0</td>
<td>10.10.10.xxx.646</td>
<td>0.0.0.0.0</td>
<td>---</td>
</tr>
<tr>
<td>UDP</td>
<td>0</td>
<td>0</td>
<td>127.0.0.1.50130</td>
<td>127.0.0.1.17185</td>
<td>---</td>
</tr>
</tbody>
</table>

No. of Connections: 14

A:ALA-12#

Sample Detailed Output

A:ALA-12# show system connections detail

TCP Statistics

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>packets sent</td>
<td>659635</td>
</tr>
<tr>
<td>data packets</td>
<td>338982 (7435146 bytes)</td>
</tr>
<tr>
<td>data packet retransmitted</td>
<td>73 (1368 bytes)</td>
</tr>
<tr>
<td>ack-only packets</td>
<td>320548 (140960 delayed)</td>
</tr>
<tr>
<td>URG only packet</td>
<td>0</td>
</tr>
<tr>
<td>window probe packet</td>
<td>0</td>
</tr>
<tr>
<td>window update packet</td>
<td>0</td>
</tr>
<tr>
<td>control packets</td>
<td>32</td>
</tr>
<tr>
<td>packets received</td>
<td>658893</td>
</tr>
<tr>
<td>acks</td>
<td>338738 for (7435123 bytes)</td>
</tr>
<tr>
<td>duplicate acks</td>
<td>23</td>
</tr>
<tr>
<td>ack for unsent data</td>
<td>0</td>
</tr>
<tr>
<td>packets received in-sequence</td>
<td>334705 (5568368 bytes)</td>
</tr>
<tr>
<td>completely duplicate packet</td>
<td>2 (36 bytes)</td>
</tr>
<tr>
<td>packet with some dup. data</td>
<td>0 (0 bytes)</td>
</tr>
<tr>
<td>out-of-order packets</td>
<td>20 (0 bytes)</td>
</tr>
<tr>
<td>packet of data after window</td>
<td>0 (0 bytes)</td>
</tr>
<tr>
<td>window probe</td>
<td>0</td>
</tr>
<tr>
<td>window update packet</td>
<td>3</td>
</tr>
<tr>
<td>packets received after close</td>
<td>0</td>
</tr>
<tr>
<td>discarded for bad checksum</td>
<td>0</td>
</tr>
<tr>
<td>discarded for bad header offset field</td>
<td>0</td>
</tr>
<tr>
<td>discarded because packet too short</td>
<td>0</td>
</tr>
<tr>
<td>connection request</td>
<td>4</td>
</tr>
<tr>
<td>connection accept</td>
<td>24</td>
</tr>
<tr>
<td>connections established (including accepts)</td>
<td>27</td>
</tr>
</tbody>
</table>
connections closed : 26 (including 2 drops)
embryonic connections dropped : 0
segments updated rtt : 338742 (of 338747 attempts)
retransmit timeouts : 75
connections dropped by rexmit timeout : 0
persist timeouts : 0
keepalive timeouts : 26
keepalive probes sent : 0
connections dropped by keepalive : 1
pcb cache lookups failed : 0
===============================================================================
A:ALA-12#

cpu

Syntax    cpu [sample-period seconds]
Context    show>system
Description This command displays CPU utilization per task over a sample period.
Parameters sample-period seconds — The number of seconds over which to sample CPU task utilization.
Default    1
Values      1 — 5
Output     System CPU Output — The following table describes the system CPU output fields.

Table 34: Show System CPU Output Fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Utilization</td>
<td>The total amount of CPU time.</td>
</tr>
<tr>
<td>Name</td>
<td>The process or protocol name.</td>
</tr>
<tr>
<td>CPU Time (uSec)</td>
<td>The CPU time each process or protocol has used in the specified time.</td>
</tr>
<tr>
<td>CPU Usage</td>
<td>The sum of CPU usage of all the processes and protocols.</td>
</tr>
<tr>
<td>Capacity Usage</td>
<td>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.</td>
</tr>
</tbody>
</table>
Sample Output

*A:cses-E11# show system cpu sample-period 2
-----------------------------------------------------------------------------------------------
CPU Utilization (Sample period: 2 seconds)
-----------------------------------------------------------------------------------------------
<table>
<thead>
<tr>
<th>Name</th>
<th>CPU Time (\uSec)</th>
<th>CPU Usage</th>
<th>Capacity Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>BFD</td>
<td>10</td>
<td>~0.00%</td>
<td>~0.00%</td>
</tr>
<tr>
<td>BGP</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>CFLOWD</td>
<td>61</td>
<td>~0.00%</td>
<td>~0.00%</td>
</tr>
<tr>
<td>Cards &amp; Ports</td>
<td>8,332</td>
<td>0.41%</td>
<td>0.08%</td>
</tr>
<tr>
<td>DHCP Server</td>
<td>79</td>
<td>~0.00%</td>
<td>~0.00%</td>
</tr>
<tr>
<td>ICC</td>
<td>408</td>
<td>0.02%</td>
<td>0.01%</td>
</tr>
<tr>
<td>IGMP/MLD</td>
<td>1,768</td>
<td>0.08%</td>
<td>0.08%</td>
</tr>
<tr>
<td>IOM</td>
<td>17,197</td>
<td>0.85%</td>
<td>0.31%</td>
</tr>
<tr>
<td>IP Stack</td>
<td>4,080</td>
<td>0.20%</td>
<td>0.09%</td>
</tr>
<tr>
<td>IS-IS</td>
<td>1,213</td>
<td>0.06%</td>
<td>0.06%</td>
</tr>
<tr>
<td>ISA</td>
<td>2,496</td>
<td>0.12%</td>
<td>0.07%</td>
</tr>
<tr>
<td>LDP</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Logging</td>
<td>32</td>
<td>~0.00%</td>
<td>~0.00%</td>
</tr>
<tr>
<td>MPLS/RSVP</td>
<td>2,380</td>
<td>0.11%</td>
<td>0.08%</td>
</tr>
<tr>
<td>MSDP</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Management</td>
<td>5,969</td>
<td>0.29%</td>
<td>0.15%</td>
</tr>
<tr>
<td>OAM</td>
<td>907</td>
<td>0.04%</td>
<td>0.02%</td>
</tr>
<tr>
<td>OSPF</td>
<td>25</td>
<td>~0.00%</td>
<td>~0.00%</td>
</tr>
<tr>
<td>PIM</td>
<td>5,600</td>
<td>0.27%</td>
<td>0.27%</td>
</tr>
<tr>
<td>RIP</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>RTM/Policies</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Redundancy</td>
<td>3,635</td>
<td>0.18%</td>
<td>0.13%</td>
</tr>
<tr>
<td>SIM</td>
<td>1,462</td>
<td>0.07%</td>
<td>0.04%</td>
</tr>
<tr>
<td>SNMP Daemon</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Services</td>
<td>2,241</td>
<td>0.11%</td>
<td>0.05%</td>
</tr>
<tr>
<td>Stats</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Subscriber Mgmt</td>
<td>2,129</td>
<td>0.10%</td>
<td>0.04%</td>
</tr>
<tr>
<td>System</td>
<td>8,802</td>
<td>0.43%</td>
<td>0.17%</td>
</tr>
<tr>
<td>Traffic Eng</td>
<td>0</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>VRRP</td>
<td>697</td>
<td>0.03%</td>
<td>0.02%</td>
</tr>
<tr>
<td>WEB Redirect</td>
<td>125</td>
<td>~0.00%</td>
<td>~0.00%</td>
</tr>
</tbody>
</table>
-----------------------------------------------------------------------------------------------
| Total         | 2,014,761        | 100.00%   |
| Idle          | 1,945,113        | 96.54%    |
| Usage         | 69,648           | 3.45%     |
| Busiest Core Utilization | 69,648 | 3.45% |
-----------------------------------------------------------------------------------------------
*A:cses-E11#

cron

**Syntax**
cron

**Context**
show>cron

**Description**
This command enters the show CRON context.
**action**

**Syntax**  
`action [action-name] [owner action-owner] run-history run-state`

**Context**  
`show>cron#`

**Description**  
This command displays cron action parameters.

**Parameters**  
`action action-name` — Specifies the action name.

**Values**  
- maximum 32 characters

`owner action-owner` — Specifies the owner name.

**Default**  
TiMOS CLI

`run-history run-state` — Specifies the state of the test to be run.

**Values**  
- executing, initializing, terminated

**Output**  
The following table describes the show cron action output fields.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>Displays the name of the action.</td>
</tr>
<tr>
<td>Action owner</td>
<td>The name of the action owner.</td>
</tr>
<tr>
<td>Administrative status</td>
<td>Enabled — Administrative status is enabled</td>
</tr>
<tr>
<td></td>
<td>Disabled — Administrative status is disabled</td>
</tr>
<tr>
<td>Script</td>
<td>The name of the script</td>
</tr>
<tr>
<td>Script owner</td>
<td>The name of the script owner</td>
</tr>
<tr>
<td>Script source location</td>
<td>Displays the location of scheduled script.</td>
</tr>
<tr>
<td>Max running allowed</td>
<td>Displays the maximum number of allowed sessions.</td>
</tr>
<tr>
<td>Max completed run histories</td>
<td>Displays the maximum number of sessions previously run.</td>
</tr>
<tr>
<td>Max lifetime allowed</td>
<td>Displays the maximum amount of time the script may run.</td>
</tr>
<tr>
<td>Completed run histories</td>
<td>Displays the number of completed sessions.</td>
</tr>
<tr>
<td>Executing run histories</td>
<td>Displays the number of sessions in the process of executing.</td>
</tr>
<tr>
<td>Initializing run histories</td>
<td>Displays the number of sessions ready to run/queued but not executed.</td>
</tr>
</tbody>
</table>

| Completed run histories      | Displays the number of completed sessions.                  |
| Executing run histories      | Displays the number of sessions in the process of executing.|
| Initializing run histories   | Displays the number of sessions ready to run/queued but not executed. |
### Sample Output

*A:Redundancy# show cron action run-history terminated
===============================================================================
CRON Action Run History
===============================================================================
Action "test"
Owner "TiMOS CLI"

<table>
<thead>
<tr>
<th>Script Run #17</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Start time</td>
<td>2006/11/06 20:30:09</td>
<td>End time</td>
<td>2006/11/06 20:35:24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elapsed time</td>
<td>0d 00:05:15</td>
<td>Lifetime</td>
<td>0d 00:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>terminated</td>
<td>Run exit code</td>
<td>noError</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Result time</td>
<td>2006/11/06 20:35:24</td>
<td>Keep history</td>
<td>0d 00:49:57</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error time</td>
<td>never</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results file</td>
<td>ftp://<em>:</em>@192.168.15.18/home/testlab_bgp/cron/_20061106-203008.out</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run exit</td>
<td>Success</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Script Run #18</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Start time</td>
<td>2006/11/06 20:35:24</td>
<td>End time</td>
<td>2006/11/06 20:40:40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elapsed time</td>
<td>0d 00:05:16</td>
<td>Lifetime</td>
<td>0d 00:00:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>terminated</td>
<td>Run exit code</td>
<td>noError</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Result time</td>
<td>2006/11/06 20:40:40</td>
<td>Keep history</td>
<td>0d 00:55:13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error time</td>
<td>never</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results file</td>
<td>ftp://<em>:</em>@192.168.15.18/home/testlab_bgp/cron/_20061106-203523.out</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run exit</td>
<td>Success</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**System Commands**

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Script source location</td>
<td>Displays the location of scheduled script.</td>
</tr>
<tr>
<td>Max running allowed</td>
<td>Displays the maximum number of allowed sessions.</td>
</tr>
<tr>
<td>Max completed run histories</td>
<td>Displays the maximum number of sessions previously run.</td>
</tr>
<tr>
<td>Max lifetime allowed</td>
<td>Displays the maximum amount of time the script may run.</td>
</tr>
<tr>
<td>Completed run histories</td>
<td>Displays the number of completed sessions.</td>
</tr>
<tr>
<td>Executing run histories</td>
<td>Displays the number of sessions in the process of executing.</td>
</tr>
<tr>
<td>Initializing run histories</td>
<td>Displays the number of sessions ready to run/queued but not executed.</td>
</tr>
</tbody>
</table>
*A:Redundancy#

*A:Redundancy# show cron action run-history executing

CRON Action Run History

Action "test"
Owner "TiMOS CLI"

Script Run #20

Start time : 2006/11/06 20:46:00   End time      : never
Elapsed time : 0d 00:00:56   Lifetime : 0d 00:59:04
State : executing   Run exit code : noError
Result time : never   Keep history : 0d 01:00:00
Error time : never
Results file : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-204559.out

*A:Redundancy#

*A:Redundancy# show cron action run-history initializing

CRON Action Run History

Action "test"
Owner "TiMOS CLI"

Script Run #21

Start time : never   End time : never
Elapsed time : 0d 00:00:00   Lifetime : 0d 01:00:00
State : initializing   Run exit code : noError
Result time : never   Keep history : 0d 01:00:00
Error time : never
Results file : none

Script Run #22

Start time : never   End time : never
Elapsed time : 0d 00:00:00   Lifetime : 0d 01:00:00
State : initializing   Run exit code : noError
Result time : never   Keep history : 0d 01:00:00
Error time : never
Results file : none

Script Run #23

Start time : never   End time : never
Elapsed time : 0d 00:00:00   Lifetime : 0d 01:00:00
State : initializing   Run exit code : noError
Result time : never   Keep history : 0d 01:00:00
Error time : never
Results file : none

*A:Redundancy#
schedule

**Syntax**

```
schedule [schedule-name] [owner schedule-owner]
```

**Context**

```
show>cron#
```

**Description**

This command displays cron schedule parameters.

**Parameters**

- **schedule-name** — Displays information for the specified scheduler name.
- **owner schedule-owner** — Displays information for the specified scheduler owner.

**Output**

The following table describes the show cron schedule output fields.

```
A:sim1>show>cron schedule test
```

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule name</td>
<td>Displays the schedule name.</td>
</tr>
<tr>
<td>Schedule owner</td>
<td>Displays the owner name of the action.</td>
</tr>
<tr>
<td>Description</td>
<td>Displays the schedule’s description.</td>
</tr>
<tr>
<td>Administrative status</td>
<td>Enabled — The administrative status is enabled.</td>
</tr>
<tr>
<td></td>
<td>Disabled — Administratively disabled.</td>
</tr>
<tr>
<td>Operational status</td>
<td>Enabled — The operational status is enabled.</td>
</tr>
<tr>
<td></td>
<td>Disabled — Operationally disabled.</td>
</tr>
<tr>
<td>Action</td>
<td>Displays the action name</td>
</tr>
<tr>
<td>Action owner</td>
<td>Displays the name of action owner.</td>
</tr>
<tr>
<td>Script</td>
<td>Displays the name of the script.</td>
</tr>
<tr>
<td>Script owner</td>
<td>Displays the name of the script.</td>
</tr>
<tr>
<td>Script owner</td>
<td>Displays the name of script owner.</td>
</tr>
<tr>
<td>Script source location</td>
<td>Displays the location of scheduled script.</td>
</tr>
<tr>
<td>Script results location</td>
<td>Displays the location where script results have been sent.</td>
</tr>
<tr>
<td>Schedule type</td>
<td>Periodic — Displays a schedule which ran at a given interval.</td>
</tr>
<tr>
<td></td>
<td>Calendar — Displays a schedule which ran based on a calendar.</td>
</tr>
<tr>
<td></td>
<td>Oneshot — Displays a schedule which ran one time only.</td>
</tr>
<tr>
<td>Interval</td>
<td>Displays the interval between runs of an event.</td>
</tr>
<tr>
<td>Next scheduled run</td>
<td>Displays the time for the next scheduled run.</td>
</tr>
</tbody>
</table>
### CRON Schedule Information

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekday</td>
<td>Displays the configured weekday.</td>
</tr>
<tr>
<td>Month</td>
<td>Displays the configured month.</td>
</tr>
<tr>
<td>Day of Month</td>
<td>Displays the configured day of month.</td>
</tr>
<tr>
<td>Hour</td>
<td>Displays the configured hour.</td>
</tr>
<tr>
<td>Minute</td>
<td>Displays the configured minute.</td>
</tr>
<tr>
<td>Number of scheduled runs</td>
<td>Displays the number of scheduled sessions.</td>
</tr>
<tr>
<td>Last scheduled run</td>
<td>Displays the last scheduled session.</td>
</tr>
<tr>
<td>Number of scheduled failures</td>
<td>Displays the number of scheduled sessions that failed to execute.</td>
</tr>
<tr>
<td>Last scheduled failure</td>
<td>Displays the last scheduled session that failed to execute.</td>
</tr>
<tr>
<td>Last failure time</td>
<td>Displays the system time of the last failure.</td>
</tr>
</tbody>
</table>

```
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 scheduled runs : 10
Last schedule run : 2008/01/01 17:20:52
Number of scheduled failures : 0
Last schedule failure : no error
Last failure time : never
```

A:sim1>show>cron
**script**

**Syntax**
```
script [script-name] [owner script-owner]
```

**Context**
```
show>cron#
```

**Description**
This command displays cron script parameters.

**Parameters**
- `schedule-name` — Displays information for the specified script.
- `owner schedule-owner` — Displays information for the specified script owner.

**Output**
The following table describes the show cron script output fields.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Script</td>
<td>Displays the name of the script.</td>
</tr>
<tr>
<td>Script owner</td>
<td>Displays the owner name of script.</td>
</tr>
<tr>
<td>Administrative status</td>
<td>Enabled — Administrative status is enabled.</td>
</tr>
<tr>
<td></td>
<td>Disabled — Administratively abled.</td>
</tr>
<tr>
<td>Operational status</td>
<td>Enabled — Operational status is enabled.</td>
</tr>
<tr>
<td></td>
<td>Disabled — Operationally disabled.</td>
</tr>
<tr>
<td>Script source location</td>
<td>Displays the location of scheduled script.</td>
</tr>
<tr>
<td>Last script error</td>
<td>Displays the system time of the last error.</td>
</tr>
<tr>
<td>Last change</td>
<td>Displays the system time of the last change.</td>
</tr>
</tbody>
</table>

**Sample Output**

```
A:sim1>show>cron# script
===============================================================================
CRON Script Information
===============================================================================
Script                       : test
Owner name                   : TiMOS CLI
Description                  : asd
Administrative status        : enabled
Operational status           : enabled
Script source location       : ftp://****:******@192.168.15.1/home/testlab_bgp/cron/test1.cfg
Last script error            : none
Last change                  : 2006/11/07 17:10:03
===============================================================================
A:sim1>show>cron#
```
information

Syntax

information

Context

show>system

Description

This command displays general system information including basic system, SNMP server, last boot and DNS client information.

Output

System Information Output — The following table describes the system information output fields.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Name</td>
<td>The configured system name.</td>
</tr>
<tr>
<td>System Contact</td>
<td>A text string that describes the system contact information.</td>
</tr>
<tr>
<td>System Location</td>
<td>A text string that describes the system location.</td>
</tr>
<tr>
<td>System Coordinates</td>
<td>A text string that describes the system coordinates.</td>
</tr>
<tr>
<td>System Up Time</td>
<td>The time since the last boot.</td>
</tr>
<tr>
<td>SNMP Port</td>
<td>The port number used by this node to receive SNMP request messages and to send replies.</td>
</tr>
<tr>
<td>SNMP Engine ID</td>
<td>The SNMP engineID to uniquely identify the SNMPv3 node.</td>
</tr>
<tr>
<td>SNMP Max Message Size</td>
<td>The maximum SNMP packet size generated by this node.</td>
</tr>
<tr>
<td>SNMP Admin State</td>
<td>Enabled — SNMP is administratively enabled and running.</td>
</tr>
<tr>
<td></td>
<td>Disabled — SNMP is administratively shutdown and not running.</td>
</tr>
<tr>
<td>SNMP Oper State</td>
<td>Enabled — SNMP is operationally enabled.</td>
</tr>
<tr>
<td></td>
<td>Disabled — SNMP is operationally disabled.</td>
</tr>
<tr>
<td>SNMP Index Boot Status</td>
<td>Persistent — System indexes are saved between reboots.</td>
</tr>
<tr>
<td></td>
<td>Not Persistent — System indexes are not saved between reboots.</td>
</tr>
<tr>
<td>Telnet/SSH/FTP Admin</td>
<td>Displays the administrative state of the Telnet, SSH, and FTP sessions.</td>
</tr>
<tr>
<td>Telnet/SSH/FTP Oper</td>
<td>Displays the operational state of the Telnet, SSH, and FTP sessions.</td>
</tr>
<tr>
<td>BOF Source</td>
<td>The location of the BOF.</td>
</tr>
<tr>
<td>Image Source</td>
<td>Primary — Indicates that the directory location for runtime image file was loaded from the primary source.</td>
</tr>
<tr>
<td>Label</td>
<td>Description (Continued)</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Secondary</strong></td>
<td>Indicates that the directory location for runtime image file was loaded from the secondary source.</td>
</tr>
<tr>
<td><strong>Tertiary</strong></td>
<td>Indicates that the directory location for runtime image file was loaded from the tertiary source.</td>
</tr>
<tr>
<td><strong>Config Source</strong></td>
<td>Primary — Indicates that the directory location for configuration file was loaded from the primary source.</td>
</tr>
<tr>
<td></td>
<td>Secondary — Indicates that the directory location for configuration file was loaded from the secondary source.</td>
</tr>
<tr>
<td></td>
<td>Tertiary — Indicates that the directory location for configuration file was loaded from the tertiary source.</td>
</tr>
<tr>
<td><strong>DNS Resolve Preference</strong></td>
<td>ipv4-only — Dns-names are queried for A-records only.</td>
</tr>
<tr>
<td><strong>Last Booted Config File</strong></td>
<td>The URL and filename of the last loaded configuration file.</td>
</tr>
<tr>
<td><strong>Last Boot Cfg Version</strong></td>
<td>The date and time of the last boot.</td>
</tr>
<tr>
<td><strong>Last Boot Config Header</strong></td>
<td>Displays header information such as image version, date built, date generated.</td>
</tr>
<tr>
<td><strong>Last Boot Index Version</strong></td>
<td>The version of the persistence index file read when this CPM card was last rebooted.</td>
</tr>
<tr>
<td><strong>Last Boot Index Header</strong></td>
<td>The header of the persistence index file read when this CPM card was last rebooted.</td>
</tr>
<tr>
<td><strong>Last Saved Config</strong></td>
<td>The location and filename of the last saved configuration file.</td>
</tr>
<tr>
<td><strong>Time Last Saved</strong></td>
<td>The date and time of the last time configuration file was saved.</td>
</tr>
<tr>
<td><strong>Changes Since Last Save</strong></td>
<td>Yes — There are unsaved configuration file changes.</td>
</tr>
<tr>
<td></td>
<td>No — There are no unsaved configuration file changes.</td>
</tr>
<tr>
<td><strong>Time Last Modified</strong></td>
<td>The date and time of the last modification.</td>
</tr>
<tr>
<td><strong>Max Cfg/BOF Backup Rev</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Cfg-OK Script</strong></td>
<td>URL — The location and name of the CLI script file executed following successful completion of the boot-up configuration file execution.</td>
</tr>
<tr>
<td><strong>Cfg-OK Script Status</strong></td>
<td>Successful/Failed. The results from the execution of the CLI script file specified in the Cfg-OK Script location.</td>
</tr>
<tr>
<td></td>
<td>Not used — No CLI script file was executed.</td>
</tr>
</tbody>
</table>
### Sample Output

ALA-12>config>system#  show system information

```
===============================================================================
System Information
===============================================================================
System Name            : ALA-42
System Type            : 7450 ESS-12
System Version         : B-6.0.B1-17
System Contact         : Wis Information Technology
System Location        : Bldg.1-floor 2-Room 201
System Coordinates     : N 45 58 23, W 34 56 12
System Active Slot     : A
System Up Time         : 0 days, 17:42:48.72 (hr:min:sec)
SNMP Port              : 161
SNMP Engine ID         : 0000197f0000142aff000000
SNMP Max Message Size  : 1500
SNMP Admin State       : Disabled
SNMP Oper State        : Disabled
SNMP Index Boot Status : Not Persistent
SNMP Sync State        : OK
Telnet/SSH/FTP Admin   : Enabled/Enabled/Enabled
Telnet/SSH/FTP Oper    : Up/Up/Up
BOF Source             : cf1:
Image Source           : primary
Config Source          : primary
Last Boot Cfg Version  : MON FEB 04 09:18:39 2008 UTC
Last Boot Config Header: # TiMOS-B-0.0.11752 both/1386 ALCATEL ESS 7450
Copyright (c) 2000-2008 Alcatel-Lucent. # All rights
```

<table>
<thead>
<tr>
<th>Label</th>
<th>Description (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cfg-Fail Script URL</td>
<td>The location and name of the CLI script file executed following a failed boot-up configuration file execution.</td>
</tr>
<tr>
<td>Cfg-Fail Script Status</td>
<td>Successful/Failed – The results from the execution of the CLI script file specified in the Cfg-Fail Script location.</td>
</tr>
<tr>
<td>Management IP Address</td>
<td>The management IP address and mask.</td>
</tr>
<tr>
<td>DNS Server</td>
<td>The IP address of the DNS server.</td>
</tr>
<tr>
<td>DNS Domain</td>
<td>The DNS domain name of the node.</td>
</tr>
<tr>
<td>BOF Static Routes To</td>
<td>The static route destination.</td>
</tr>
<tr>
<td>Next Hop</td>
<td>The next hop IP address used to reach the destination.</td>
</tr>
<tr>
<td>Metric</td>
<td>Displays the priority of this static route versus other static routes.</td>
</tr>
<tr>
<td>None</td>
<td>No static routes are configured.</td>
</tr>
</tbody>
</table>

---

7450 ESS OS Basic System Configuration Guide
System Commands

load-balancing-alg

Syntax  load-balancing-alg [detail]

Context  show>system

Description  This command displays system load balancing settings.

Parameters  detail — Displays port settings.

Sample Output

*A:ALA-49>show>system# load-balancing-alg
===============================================================================
System-wide Load Balancing Algorithms
===============================================================================
L4 - Load Balance : exclude-L4
LSR - Load Balance : lbl-only
===============================================================================
*A:ALA-49>show>system#
memory-pools

Syntax  memory-pools

Context  show>system

Description  This command displays system memory status.

Output  Memory Pools Output — The following table describes memory pool output fields.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The name of the system or process.</td>
</tr>
<tr>
<td>Max Allowed</td>
<td>Integer — The maximum allocated memory size.</td>
</tr>
<tr>
<td></td>
<td>No Limit — No size limit.</td>
</tr>
<tr>
<td>Current Size</td>
<td>The current size of the memory pool.</td>
</tr>
<tr>
<td>Max So Far</td>
<td>The largest amount of memory pool used.</td>
</tr>
<tr>
<td>In Use</td>
<td>The current amount of the memory pool currently in use.</td>
</tr>
<tr>
<td>Current Total Size</td>
<td>The sum of the Current Size column.</td>
</tr>
<tr>
<td>Total In Use</td>
<td>The sum of the In Use column.</td>
</tr>
<tr>
<td>Available Memory</td>
<td>The amount of available memory.</td>
</tr>
</tbody>
</table>

Sample Output

A:ALA-1# show system memory-pools

<table>
<thead>
<tr>
<th>Name</th>
<th>Max Allowed</th>
<th>Current Size</th>
<th>Max So Far</th>
<th>In Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>No limit</td>
<td>24,117,248</td>
<td>24,117,248</td>
<td>16,974,832</td>
</tr>
<tr>
<td>icc</td>
<td>8,388,608</td>
<td>1,048,576</td>
<td>1,048,576</td>
<td>85,200</td>
</tr>
<tr>
<td>RTM/Policies</td>
<td>No limit</td>
<td>5,242,912</td>
<td>5,242,912</td>
<td>3,944,104</td>
</tr>
<tr>
<td>OSPF</td>
<td>No limit</td>
<td>3,145,728</td>
<td>3,145,728</td>
<td>2,617,384</td>
</tr>
<tr>
<td>MPLS/RSVP</td>
<td>No limit</td>
<td>9,769,480</td>
<td>9,769,480</td>
<td>8,173,760</td>
</tr>
<tr>
<td>LDP</td>
<td>No limit</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IS-IS</td>
<td>No limit</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>RIP</td>
<td>No limit</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>VRRP</td>
<td>No limit</td>
<td>1,048,576</td>
<td>1,048,576</td>
<td>96</td>
</tr>
<tr>
<td>Services</td>
<td>No limit</td>
<td>2,097,152</td>
<td>2,097,152</td>
<td>1,589,824</td>
</tr>
<tr>
<td>ICM</td>
<td>No limit</td>
<td>205,226,800</td>
<td>205,226,800</td>
<td>202,962,744</td>
</tr>
<tr>
<td>SIM</td>
<td>No limit</td>
<td>1,048,576</td>
<td>1,048,576</td>
<td>392</td>
</tr>
<tr>
<td>IGMP</td>
<td>No limit</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MMPPI</td>
<td>No limit</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MFP1</td>
<td>No limit</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PIP</td>
<td>No limit</td>
<td>79,943,024</td>
<td>79,943,024</td>
<td>78,895,248</td>
</tr>
</tbody>
</table>
System Commands

A:ALA-1# ntp

Syntax ntp

Context show>system

Description This command displays NTP protocol configuration and state.

Output Show NTP Output — The following table describes NTP output fields.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
</table>
| Enabled          | yes — NTP is enabled.  
                  | no — NTP is disabled. |
| Admin Status     | yes — Administrative state is enabled.  
                  | no — Administrative state is disabled. |
| NTP Server       | Displays NTP server state of this node. |
| Stratum          | Displays stratum level of this node. |
| Oper Status      | yes — The operational state is enabled.  
<pre><code>              | no — The operational state is disabled. |
</code></pre>
<p>| Auth Check       | Displays the authentication requirement |
| System Ref. ID   | IP address of this node or a 4-character ASCII code showing the state. |
| Auth Error       | Displays the number of authentication errors. |
| Auth Errors      | Displays the number of authentication errors ignored. |
| Ignored          | |
| Auth key ID Errors | Displays the number of key identification errors. |
| Auth Key Type Errors | Displays the number of authentication key type errors. |
| Reject           | The peer is rejected and will not be used for synchronization. Rejection reasons could be the peer is unreachable, the peer is synchronized to this local server so synchronizing with it would create a sync loop, or the synchronization distance is too large. This is the normal startup state. |</p>
<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invalid</td>
<td>The peer is not maintaining an accurate clock. This peer will not be used for synchronization.</td>
</tr>
<tr>
<td>Excess</td>
<td>The peer’s synchronization distance is greater than ten other peers. This peer will not be used for synchronization.</td>
</tr>
<tr>
<td>Outlyer</td>
<td>The peer is discarded as an outlyer. This peer will not be used for synchronization.</td>
</tr>
<tr>
<td>Candidate</td>
<td>The peer is accepted as a possible source of synchronization.</td>
</tr>
<tr>
<td>Selected</td>
<td>The peer is an acceptable source of synchronization, but its synchronization distance is greater than six other peers.</td>
</tr>
<tr>
<td>Chosen</td>
<td>The peer is chosen as the source of synchronization.</td>
</tr>
<tr>
<td>ChosenPPS</td>
<td>The peer is chosen as the source of synchronization, but the actual synchronization is occurring from a pulse-per-second (PPS) signal.</td>
</tr>
<tr>
<td>Remote</td>
<td>The IP address of the remote NTP server or peer with which this local host is exchanging NTP packets.</td>
</tr>
<tr>
<td>Reference ID</td>
<td>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:     ASA — The association belongs to any cast server.     SUTH — Server authentication failed. Please wait while the association is restarted.     AUTO — Autokey sequence failed. Please wait while the association is restarted.     BCST — The association belongs to a broadcast server.     CRPT — Cryptographic authentication or identification failed. The details should be in the system log file or the cryptostats statistics file, if configured. No further messages will be sent to the server.     DENY — Access denied by remote server. No further messages will be sent to the server.</td>
</tr>
</tbody>
</table>
### System Commands

**Sample Output**

```plaintext
A:pc-40>config>system>time>ntp# show system ntp

<table>
<thead>
<tr>
<th>Label</th>
<th>Description (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DROP</td>
<td>Lost peer in symmetric mode. Please wait while the association is restarted.</td>
</tr>
<tr>
<td>RSTR</td>
<td>Access denied due to local policy. No further messages will be sent to the server.</td>
</tr>
<tr>
<td>INIT</td>
<td>The association has not yet synchronized for the first time.</td>
</tr>
<tr>
<td>MCST</td>
<td>The association belongs to a manycast server.</td>
</tr>
<tr>
<td>NKEY</td>
<td>No key found. Either the key was never installed or is not trusted.</td>
</tr>
<tr>
<td>RATE</td>
<td>Rate exceeded. The server has temporarily denied access</td>
</tr>
<tr>
<td>RMOT</td>
<td>The association from a remote host running ntpdc has had unauthorized attempted access.</td>
</tr>
<tr>
<td>STEP</td>
<td>A step change in system time has occurred, but the association has not yet resynchronized.</td>
</tr>
</tbody>
</table>

**System Codes**

- **INIT**: The system clock has not yet synchronized for the first time.
- **STEP**: A step change in system time has occurred, but the system clock has not yet resynchronized.

- St: Stratum level of this node.
- Auth: Authentication is enabled.
  - yes: Authentication is enabled.
  - no: Authentication is disabled.
- Poll: Polling interval in seconds.
- R: The NTP peer or server has been reached at least once in the last 8 polls.
  - Yes: The NTP peer or server has been reached at least once in the last 8 polls.
  - No: The NTP peer or server has not been reached at least once in the last 8 polls.
- Offset: The time between the local and remote UTC time, in milliseconds.

**A:pc-40>config>system>time>ntp# show system ntp**

<table>
<thead>
<tr>
<th>NTP Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled: Yes</td>
</tr>
<tr>
<td>Admin Status: up</td>
</tr>
<tr>
<td>Server enabled: No</td>
</tr>
<tr>
<td>System Ref Id: 192.168.15.221</td>
</tr>
</tbody>
</table>

**A:pc-40>config>system>time>ntp# show system ntp all**

---

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NTP Status
==================================================================================
| Enabled | Yes | Stratum   | 3 |
| Admin Status | up | Oper Status | up |
| Server enabled | No | Server keyId | none |
| System Ref Id | 192.168.15.221 | Auth Check | Yes |

NTP Active Associations
==================================================================================
<table>
<thead>
<tr>
<th>State</th>
<th>Remote</th>
<th>Reference ID</th>
<th>St</th>
<th>Type</th>
<th>Auth</th>
<th>Poll</th>
<th>R</th>
<th>Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>reject</td>
<td>192.168.15.221</td>
<td>192.168.14.50</td>
<td>2</td>
<td>srvr</td>
<td>none</td>
<td>64</td>
<td>y</td>
<td>0.901</td>
</tr>
<tr>
<td>chosen</td>
<td>192.168.15.221</td>
<td>192.168.14.50</td>
<td>2</td>
<td>mclnt</td>
<td>none</td>
<td>64</td>
<td>y</td>
<td>1.101</td>
</tr>
</tbody>
</table>

A:pc-40>config>system>time>ntp#
A:pc-40>config>system>time>ntp# show system ntp detail
==================================================================================
| Enabled | Yes | Stratum   | 3 |
| Admin Status | up | Oper Status | up |
| Server enabled | No | Server keyId | none |
| System Ref Id | 192.168.15.221 | Auth Check | Yes |
| Auth Errors | 0 | Auth Errors Ignored | 0 |
| Auth Key Id Errors | 0 | Auth Key Type Errors | 0 |

NTP Configured Broadcast/Multicast Interfaces
==================================================================================
<table>
<thead>
<tr>
<th>vRouter</th>
<th>Interface</th>
<th>Address</th>
<th>Type</th>
<th>Auth</th>
<th>Poll</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>i3/1/1</td>
<td>Host-ones</td>
<td>bcast</td>
<td>yes</td>
<td>off</td>
</tr>
<tr>
<td>management</td>
<td>management</td>
<td>224.0.1.1</td>
<td>mcast</td>
<td>no</td>
<td>off</td>
</tr>
<tr>
<td>Base</td>
<td>t2</td>
<td>bclnt</td>
<td>no</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>management</td>
<td>management</td>
<td>224.0.1.1</td>
<td>mclnt</td>
<td>no</td>
<td>n/a</td>
</tr>
</tbody>
</table>

A:pc-40>config>system>time>ntp#
A:pc-40>config>system>time>ntp# show system ntp detail all
==================================================================================
| Enabled | Yes | Stratum   | 3 |
| Admin Status | up | Oper Status | up |
| Server enabled | No | Server keyId | none |
| System Ref Id | 192.168.15.221 | Auth Check | Yes |
| Auth Errors | 0 | Auth Errors Ignored | 0 |
| Auth Key Id Errors | 0 | Auth Key Type Errors | 0 |

NTP Configured Broadcast/Multicast Interfaces
==================================================================================
<table>
<thead>
<tr>
<th>vRouter</th>
<th>Interface</th>
<th>Address</th>
<th>Type</th>
<th>Auth</th>
<th>Poll</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>i3/1/1</td>
<td>Host-ones</td>
<td>bcast</td>
<td>yes</td>
<td>off</td>
</tr>
<tr>
<td>management</td>
<td>management</td>
<td>224.0.1.1</td>
<td>mcast</td>
<td>no</td>
<td>off</td>
</tr>
<tr>
<td>Base</td>
<td>t2</td>
<td>bclnt</td>
<td>no</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>management</td>
<td>management</td>
<td>224.0.1.1</td>
<td>mclnt</td>
<td>no</td>
<td>n/a</td>
</tr>
</tbody>
</table>
### NTP Active Associations

<table>
<thead>
<tr>
<th>State</th>
<th>Remote</th>
<th>Reference ID</th>
<th>St</th>
<th>Type</th>
<th>Auth</th>
<th>Poll</th>
<th>R</th>
<th>Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>reject</td>
<td>192.168.15.221</td>
<td>192.168.14.50</td>
<td>2</td>
<td>srvr</td>
<td>none</td>
<td>64</td>
<td>y</td>
<td>0.901</td>
</tr>
<tr>
<td>chosen</td>
<td>192.168.15.221</td>
<td>192.168.1.160</td>
<td>4</td>
<td>mclnt</td>
<td>none</td>
<td>64</td>
<td>y</td>
<td>1.101</td>
</tr>
</tbody>
</table>

A:pc-40>config>system>time>ntp#

### sntp

**Syntax**
sntp

**Context**
show>system

**Description**
This command displays SNTP protocol configuration and state.

**Output**
**Show SNTP Output** — The following table describes SNTP output fields.

#### Table 36: Show System SNTP Output Fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNTP Server</td>
<td>The SNTP server address for SNTP unicast client mode.</td>
</tr>
<tr>
<td>Version</td>
<td>The SNTP version number, expressed as an integer.</td>
</tr>
<tr>
<td>Preference</td>
<td>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.</td>
</tr>
<tr>
<td>Interval</td>
<td>The frequency, in seconds, that the server is queried.</td>
</tr>
</tbody>
</table>

**Sample Output**

A:ALA-1# show system sntp

```plaintext
SNTP
SNTP Server Version Preference Interval
-----------------------------------------------
10.10.20.253 3 Preferred 64
```

A:ALA-1#

### thresholds

**Syntax**
thresholds

**Context**
show>system
**Description**  
This command displays system monitoring thresholds.

**Output**  
**Thresholds Output** — The following table describes system threshold output fields.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Displays the variable OID.</td>
</tr>
<tr>
<td>Alarm Id</td>
<td>Displays the numerical identifier for the alarm.</td>
</tr>
<tr>
<td>Last Value</td>
<td>Displays the last threshold value.</td>
</tr>
<tr>
<td>Rising Event Id</td>
<td>Displays the identifier of the RMON rising event.</td>
</tr>
<tr>
<td>Threshold</td>
<td>Displays the identifier of the RMON rising threshold.</td>
</tr>
<tr>
<td>Falling Event Id</td>
<td>Displays the identifier of the RMON falling event.</td>
</tr>
<tr>
<td>Threshold</td>
<td>Displays the identifier of the RMON falling threshold.</td>
</tr>
<tr>
<td>Sample Interval</td>
<td>Displays the polling interval, in seconds, over which the data is sampled and compared with the rising and falling thresholds.</td>
</tr>
<tr>
<td>Sample Type</td>
<td>Displays the method of sampling the selected variable and calculating the value to be compared against the thresholds.</td>
</tr>
<tr>
<td>Startup Alarm</td>
<td>Displays the alarm that may be sent when this alarm is first created.</td>
</tr>
<tr>
<td>Owner</td>
<td>Displays the owner of this alarm.</td>
</tr>
<tr>
<td>Description</td>
<td>Displays the event cause.</td>
</tr>
<tr>
<td>Event Id</td>
<td>Displays the identifier of the threshold event.</td>
</tr>
<tr>
<td>Last Sent</td>
<td>Displays the date and time the alarm was sent.</td>
</tr>
</tbody>
</table>
| Action Type         | log — An entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the `show>system>thresholds` CLI command.  
trap — A TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs.  
both — Both a entry in the RMON-MIB logTable and a TiMOS logger event are generated.  
none — No action is taken |
| Owner               | Displays the owner of the event.                 |
Sample Output

A:ALA-48# show system thresholds

================================================================
Threshold Alarms
================================================================
Variable: tmnxCpmFlashUsed.1.11.1
Alarm Id         : 1        Last Value : 835
Rising Event Id  : 1        Threshold  : 5000
Falling Event Id : 2        Threshold  : 2500
Sample Interval  : 2147483* SampleType : absolute
Startup Alarm    : either   Owner      : TiMOS CLI
Variable: tmnxCpmFlashUsed.1.11.1
Alarm Id         : 2        Last Value : 835
Rising Event Id  : 3        Threshold  : 10000
Falling Event Id : 4        Threshold  : 5000
Sample Interval  : 2147483* SampleType : absolute
Startup Alarm    : rising   Owner      : TiMOS CLI
Variable: sgiMemoryUsed.0
Alarm Id         : 3        Last Value : 42841056
Rising Event Id  : 5        Threshold  : 4000
Falling Event Id : 6        Threshold  : 2000
Sample Interval  : 2147836  SampleType : absolute
Startup Alarm    : either   Owner      : TiMOS CLI

================================================================
* indicates that the corresponding row element may have been truncated.
================================================================
Threshold Events
================================================================
Description: TiMOS CLI - cflash capacity alarm rising event
Event Id         : 1        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - cflash capacity alarm falling event
Event Id         : 2        Last Sent  : 10/31/2006 08:48:00
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - cflash capacity warning rising event
Event Id         : 3        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - cflash capacity warning falling event
Event Id         : 4        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - memory usage alarm rising event
Event Id         : 5        Last Sent  : 10/31/2006 08:48:00
Action Type      : both     Owner      : TiMOS CLI
Description: TiMOS CLI - memory usage alarm falling event
Event Id         : 6        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI

================================================================
Threshold Events Log
================================================================
Description : TiMOS CLI - cflash capacity alarm falling event:
              value=835, <=2500 : alarm-index 1, event-index 2
              alarm-variable OID tmnxCpmFlashUsed.1.11.1
Event Id      : 2        Time Sent  : 10/31/2006 08:48:00
Description : TiMOS CLI - memory usage alarm rising event:
value=42841056, >=4000 : alarm-index 3, even
t-index 5 alarm-variable OID sgiMemoryUsed.0

Event Id    : 5    Time Sent  : 10/31/2006 08:48:00

------------------------------------------------------------------
A:ALA-48#

time

Syntax      time
Context     show>system

Description This command displays the system time and zone configuration parameters.

Output      System Time Output — The following table describes system time output fields.

Table 37: Show System Time Output Fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date &amp; Time</td>
<td>The system date and time using the current time zone.</td>
</tr>
<tr>
<td>DST Active</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes — Daylight Savings Time is currently in effect.</td>
</tr>
<tr>
<td></td>
<td>No — Daylight Savings Time is not currently in effect.</td>
</tr>
<tr>
<td>Zone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The zone names for the current zone, the non-DST zone, and the DST zone if configured.</td>
</tr>
<tr>
<td>Zone type</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-standard — The zone is user-defined.</td>
</tr>
<tr>
<td></td>
<td>Standard — The zone is system defined.</td>
</tr>
<tr>
<td>Offset from UTC</td>
<td>The number of hours and minutes added to universal time for the zone, including the DST offset for a DST zone</td>
</tr>
<tr>
<td>Offset from Non-DST</td>
<td>The number of hours (always 0) and minutes (0—60) added to the time at the beginning of Daylight Saving Time and subtracted at the end Daylight Saving Time.</td>
</tr>
<tr>
<td>Starts</td>
<td>The date and time Daylight Saving Time begins.</td>
</tr>
<tr>
<td>Ends</td>
<td>The date and time Daylight Saving Time ends.</td>
</tr>
</tbody>
</table>

Sample Output

A:ALA-1# show system time
==============================================================================
Date & Time
==============================================================================
Current Date & Time : 2006/05/05 23:03:13   DST Active : yes
Current Zone       : FDT   Offset from UTC : -7:00
==============================================================================
### Non-DST Zone
- Zone type: standard

### DST Zone
- Zone type: standard
- 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**
- Zone Type: non-standard
- Offset from UTC: -8:00

---

No DST zone configured

---

**A:ALA-1#**

---

#### time

**Syntax**

```
time
```

**Context**

```
show
```

**Description**

This command displays the current day, date, time and time zone.

The time is displayed either in the local time zone or in UTC depending on the setting of the root level `time-display` command for the console session.

**Output**

**Sample Output**

A:ALA-49# show time

```
Tue Oct 31 12:17:15 GMT 2006
```

---

#### tod-suite

**Syntax**

```
tod-suite [detail]
tod-suite associations
tod-suite failed-associations
```

**Context**

```
show>cron
```

**Description**

This command displays information on the configured time-of-day suite.
Output

CRON TOD Suite Output — The following table describes TOD suite output fields:

Table 38: Show System tod-suite Output Fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associations</td>
<td>Shows which SAPs this tod-suite is associated with.</td>
</tr>
<tr>
<td>failed-associations</td>
<td>Shows the SAPs or Multiservice sites where the TOD Suite could not be applied successfully.</td>
</tr>
<tr>
<td>Detail</td>
<td>Shows the details of this tod-suite.</td>
</tr>
</tbody>
</table>

Sample Output

A:kerckhot_4# show cron tod-suite suite_sixteen detail

Cron tod-suite details

Name : suite_sixteen

<table>
<thead>
<tr>
<th>Type / Id</th>
<th>Time-range</th>
<th>Prio</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingress Qos Policy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1160</td>
<td>day</td>
<td>5</td>
<td>Inact</td>
</tr>
<tr>
<td>1190</td>
<td>night</td>
<td>6</td>
<td>Activ</td>
</tr>
<tr>
<td>Ingress Scheduler Policy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SchedPolCust1_Day</td>
<td>day</td>
<td>5</td>
<td>Inact</td>
</tr>
<tr>
<td>SchedPolCust1_Night</td>
<td>night</td>
<td>6</td>
<td>Activ</td>
</tr>
<tr>
<td>Egress Qos Policy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1160</td>
<td>day</td>
<td>5</td>
<td>Inact</td>
</tr>
<tr>
<td>1190</td>
<td>night</td>
<td>6</td>
<td>Activ</td>
</tr>
<tr>
<td>Egress Scheduler Policy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SchedPolCust1Egress_Day</td>
<td>day</td>
<td>5</td>
<td>Inact</td>
</tr>
</tbody>
</table>

A:kerckhot_4#

The following example shows output for TOD suite associations.

A:kerckhot_4# show cron tod-suite suite_sixteen associations

Cron tod-suite associations for suite suite_sixteen

<table>
<thead>
<tr>
<th>Service Id</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VPLS</td>
</tr>
</tbody>
</table>

SAP 1/1/1:1
SAP 1/1/1:2
SAP 1/1/1:3
SAP 1/1/1:4
SAP 1/1/1:5
SAP 1/1/1:6
SAP 1/1/1:20

Number of SAP's : 7

Customer Multi-Service Site associations

Multi Service Site: mss_1_1
The following example shows output for TOD suite failed-associations.

```
A:kerckhot_4# show cron tod-suite suite_sixteen failed-associations
Cron tod-suite associations failed

tod-suite suite_sixteen : failed association for SAP

<table>
<thead>
<tr>
<th>Service Id</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VPLS</td>
</tr>
<tr>
<td>SAP 1/1/1:2</td>
<td></td>
</tr>
<tr>
<td>SAP 1/1/3</td>
<td></td>
</tr>
<tr>
<td>SAP 1/1/4</td>
<td></td>
</tr>
<tr>
<td>SAP 1/1/5</td>
<td></td>
</tr>
<tr>
<td>SAP 1/1/6</td>
<td></td>
</tr>
<tr>
<td>SAP 1/1/20</td>
<td></td>
</tr>
</tbody>
</table>

tod-suite suite_sixteen : failed association for Customer MSS

None

Number of tod-suites failed/total : 1/1
```

Zooming in on one of the failed SAPs, the assignments of QoS and scheduler policies are shown as not as intended:

```
A:kerckhot_4# show service id 1 sap 1/1/1:2
Service Access Points(SAP)

| Service Id | SAP       | Encap    | Dot1Q Ethertype | QinQ Ethertype | Admin State | Oper State | Flags   | Last Status Change     | Last Mgmt Change   | Max Nbr of MAC Addr: No Limit | Learned MAC Addr | Static MAC Addr | Admin MTU | Ingress qos-policy | Egress qos-policy | Intend Ing qos-pol*: 1190 | Intend Egr qos-po*: 1190 | Shared Q plcy | Multipoint shared | Ingr IP Fltr-Id | Egr IP Fltr-Id | Multpoint shared | Disabled | Ingr MAC Fltr-Id | Egr MAC Fltr-Id | qinq-pbit-marking | both | ARP Reply Agent | Host Conn Verify | Mac Learning | Enabled | Discard Unkwn Srce: Disabled | Mac Aging | Enabled | Mac Pinning | BPDU Translation | Disabled | L2PT Termination | Enabled | Disabled |
|-------------|-----------|----------|-----------------|----------------|--------------|------------|---------|-------------------------|-------------------|-------------------------|----------------|----------------|-----------|-----------------|----------------|------------------|-----------------|-------------|----------------|-------------|-------------|-----------------|----------|-------------|-----------|-------------|-----------------|--------------|-------------|----------|------------------|
Multi Svc Site : None
I. Sched Pol : SchedPolCust1
Intend I Sched Pol : SchedPolCust1_Night
E. Sched Pol : SchedPolCust1Egress
Intend E Sched Pol : SchedPolCust1Egress_Night
Acct. Pol : None
Collect Stats : Disabled
Anti Spoofing : None
Nbr Static Hosts : 0

If a time-range is specified for a filter entry, use the show filter command to view results:

A:kerckhot_4# show filter ip 10

If a filter is referred to in a TOD Suite assignment, use the show filter associations command to view the output:

A:kerckhot_4# show filter ip 160 associations
redundancy

Syntax redundancy

Context show

Description This command enables the context to show redundancy information.

multi-chassis

Syntax multi-chassis

Context show>redundancy

Description This command enables the context to show multi-chassis redundancy information.

all

Syntax all [detail]

Context show>redundancy>multi-chassis

Description This command displays brief multi-chassis redundancy information.

Parameters detail — Shows detailed multi-chassis redundancy information.

Output Show Redundancy Multi-Chassis All Output — The following table describes Redundancy Multi-Chassis All fields:

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer IP Address</td>
<td>Displays the multi-chassis redundancy peer.</td>
</tr>
</tbody>
</table>
Table 39: Show Multi-Chassis Redundancy Output Fields (Continued)

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The text string describing the peer.</td>
</tr>
<tr>
<td>Authentication</td>
<td>If configured, displays the authentication key used between this node and the MC peer.</td>
</tr>
<tr>
<td>Source IP Address</td>
<td>Displays the source address used to communicate with the MC peer.</td>
</tr>
<tr>
<td>Admin State</td>
<td>Displays the administrative state of the peer.</td>
</tr>
</tbody>
</table>

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# 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
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
### System Commands

**MC System Id**: 00:00:00:33:33:33  
**MC System Priority**: 32888  
**MC Admin Key**: 32666  
**MC LACP ID in use**: true  
**MC Active/Standby**: active  
**MC Selection Logic**: peer decided  
**MC Config Mismatch**: no mismatch

<table>
<thead>
<tr>
<th>Port-id</th>
<th>Adm</th>
<th>Act/Stdby</th>
<th>Opr</th>
<th>Primary</th>
<th>Sub-group</th>
<th>Forced</th>
<th>Prio</th>
</tr>
</thead>
<tbody>
<tr>
<td>331/2/1</td>
<td>up</td>
<td>active</td>
<td>up</td>
<td>yes</td>
<td>1</td>
<td>-</td>
<td>32768</td>
</tr>
<tr>
<td>331/2/2</td>
<td>up</td>
<td>active</td>
<td>up</td>
<td>1</td>
<td>-</td>
<td>32768</td>
<td></td>
</tr>
<tr>
<td>331/2/3</td>
<td>up</td>
<td>active</td>
<td>up</td>
<td>1</td>
<td>-</td>
<td>32768</td>
<td></td>
</tr>
<tr>
<td>331/2/4</td>
<td>up</td>
<td>active</td>
<td>up</td>
<td>1</td>
<td>-</td>
<td>32768</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Port-id</th>
<th>Role</th>
<th>Exp</th>
<th>Def</th>
<th>Dist</th>
<th>Col</th>
<th>Syn</th>
<th>Aggr</th>
<th>Timeout</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>331/2/1</td>
<td>actor</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>331/2/1</td>
<td>partner</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>331/2/2</td>
<td>actor</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>331/2/2</td>
<td>partner</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>331/2/3</td>
<td>actor</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>331/2/3</td>
<td>partner</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>331/2/4</td>
<td>actor</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>331/2/4</td>
<td>partner</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

---

**mc-endpoint**

**Syntax**

```
mc-endpoint
mc-endpoint statistics
mc-endpoint peer [ip-address] statistics
mc-endpoint endpoint [mcep-id] statistics
mc-endpoint peer [ip-address]
```

**Context**

```
show>redundancy>multi-chassis
```

**Description**

This command displays multi-chassis endpoint information.

**Parameters**

- **statistics** — Displays the global statistics for the MC endpoint.
- **peer ip-address** — Specifies the IP address of multi-chassis end-point peer.
- **endpoint mcep-id** — Specifies the multi-chassis endpoint.

**Values**

| Values  | 1 — 4294967295 |

**Sample Output**

```
*A:Dut-B# show redundancy multi-chassis mc-endpoint statistics
```

**Multi-Chassis Endpoint Global Statistics**

```
Packets Rx : 533
Packets Rx Keepalive : 522
Packets Rx Config : 3
Packets Rx Peer Config : 1
```
Packets Rx State : 7
Packets Dropped Keep-Alive Task : 7
Packets Dropped Too Short : 0
Packets Dropped Verify Failed : 0
Packets Dropped Tlv Invalid Size : 0
Packets Dropped Out Of Seq : 0
Packets Dropped Unknown Tlv : 0
Packets Dropped Tlv Invalid MC-Endpoint Id : 0
Packets Dropped MDS : 0
Packets Dropped Unknown Peer : 0
Packets Dropped MC Endpoint No Peer : 0
Packets Tx : 26099
Packets Tx Keepalive : 8221
Packets Tx Config : 2
Packets Tx Peer Config : 17872
Packets Tx State : 4
Packets Tx Failed : 0

*A:Dut-B#

*A:Dut-B# show redundancy multi-chassis mc-endpoint peer 3.1.1.3 statistics

Multi-Chassis MC-Endpoint Statistics

Peer Addr : 3.1.1.3

Packets Rx : 597
Packets Rx Keepalive : 586
Packets Rx Config : 3
Packets Rx Peer Config : 1
Packets Rx State : 7
Packets Dropped State Disabled : 0
Packets Dropped Packets Too Short : 0
Packets Dropped Tlv Invalid Size : 0
Packets Dropped Tlv Invalid LagId : 0
Packets Dropped Out of Seq : 0
Packets Dropped No Peer : 0
Packets Dropped Unknown Tlv : 0
Packets Dropped MDS : 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
mc-lag

Syntax  
`mc-lag [lag lag-id]`

Context  
`show>redundancy>multi-chassis`

Description  
This command displays multi-chassis LAG information.

Parameters  
- `lag lag-id` — Shows information for the specified LAG identifier.
  - Values: 1 — 20020064

peer

Syntax  
`peer ip-address [lag lag-id]`

Context  
`show>redundancy>multi-chassis>mc-lag`

Description  
This command enables the context to display mc-lag peer-related redundancy information.

Parameters  
- `ip-address` — Shows peer information about the specified IP address.
- `lag lag-id` — Shows information for the specified LAG identifier.
  - Values: 1 — 20020064

Output  
Show Redundancy Multi-chassis MC-Lag Peer Output — The following table describes show redundancy multi-chassis mc-lag peer output fields:

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Changed</td>
<td>Displays date and time of the last mc-lag peer.</td>
</tr>
<tr>
<td>Admin State</td>
<td>Displays the administrative state of the mc-lag peer.</td>
</tr>
<tr>
<td>Oper State</td>
<td>Displays the operation state of the mc-lag peer.</td>
</tr>
<tr>
<td>KeepAlive</td>
<td>Displays the length of time to keep alive the mg-lag peer.</td>
</tr>
<tr>
<td>Hold On Ngbr Failure</td>
<td>Specifies how many “keepalive” intervals the standby SR will wait for packets from the active node before assuming a redundant-neighbor node failure.</td>
</tr>
</tbody>
</table>
**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

<table>
<thead>
<tr>
<th>Lag Id</th>
<th>Lacp Key</th>
<th>Remote Lag Id</th>
<th>System Id</th>
<th>Sys Prio</th>
<th>Last Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>00:00:00:00:00:01</td>
<td>1</td>
<td>01/23/2007 18:20:13</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
<td>00:00:00:00:00:02</td>
<td>2</td>
<td>01/24/2007 08:53:48</td>
</tr>
</tbody>
</table>

Number of LAGs : 2
```

```
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

<table>
<thead>
<tr>
<th>Lag Id</th>
<th>Lacp Key</th>
<th>Remote Lag Id</th>
<th>System Id</th>
<th>Sys Prio</th>
<th>Last Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>00:00:00:00:00:01</td>
<td>1</td>
<td>01/23/2007 18:20:13</td>
</tr>
</tbody>
</table>

Number of LAGs : 1
```

**statistics**

**Syntax**  
```
statistics mc-lag [peer ip-address [lag lag-id]]
```

**Context**  
```
show>redundancy>multi-chassis>mc-lag
```

**Description**  
This command displays multi-chassis statistics.

**Parameters**
- peer ip-address — Shows the specified address of the multi-chassis peer.
- lag lag-id — Shows information for the specified LAG identifier.

**Values**
- lag  1 — 200

**Output**
```
Show Redundancy Multi-chassis MC-Lag Peer Statistics Output — The following table describes show redundancy multi-chassis mc-lag peer output fields:
```
### Table 41: ShowRedundancy Multi-chassis mc-lag Peer Output Fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packets Rx</td>
<td>Indicates the number of MC-Lag packets received from the peer.</td>
</tr>
<tr>
<td>Packets Rx Keepalive</td>
<td>Indicates the number of MC-Lag keepalive packets received from the peer.</td>
</tr>
<tr>
<td>Packets Rx Config</td>
<td>Indicates the number of received MC-Lag configured packets from the peer.</td>
</tr>
<tr>
<td>Packets Rx Peer Config</td>
<td>Indicates the number of received MC-Lag packets configured by the peer.</td>
</tr>
<tr>
<td>Packets Rx State</td>
<td>Indicates the number of MC-Lag “lag” state packets received from the peer.</td>
</tr>
<tr>
<td>Packets Dropped State Disabled</td>
<td>Indicates the number of packets that were dropped because the peer was administratively disabled.</td>
</tr>
<tr>
<td>Packets Dropped Too Short</td>
<td>Indicates the number of packets that were dropped because the packet was too short.</td>
</tr>
<tr>
<td>Packets Dropped Tlv Invalid Size</td>
<td>Indicates the number of packets that were dropped because the packet size was invalid.</td>
</tr>
<tr>
<td>Packets Dropped Tlv Invalid LagId</td>
<td>Indicates the number of packets that were dropped because the packet referred to an invalid or non multi-chassis lag.</td>
</tr>
<tr>
<td>Packets Dropped Out of Seq</td>
<td>Indicates the number of packets that were dropped because the packet size was out of sequence.</td>
</tr>
<tr>
<td>Packets Dropped Unknown Tlv</td>
<td>Indicates the number of packets that were dropped because the packet contained an unknown TLV.</td>
</tr>
<tr>
<td>Packets Dropped MD5</td>
<td>Indicates the number of packets that were dropped because the packet failed MD5 authentication.</td>
</tr>
<tr>
<td>Packets Tx</td>
<td>Indicates the number of packets transmitted from this system to the peer.</td>
</tr>
<tr>
<td>Packets Tx Keepalive</td>
<td>Indicates the number of keepalive packets transmitted from this system to the peer.</td>
</tr>
<tr>
<td>Packets Tx Peer Config</td>
<td>Indicates the number of configured packets transmitted from this system to the peer.</td>
</tr>
<tr>
<td>Packets Tx Failed</td>
<td>Indicates the number of packets that failed to be transmitted from this system to the peer.</td>
</tr>
</tbody>
</table>

**Sample Output**

```
A:subscr_mgt# show redundancy multi-chassis mc-lag statistics

Multi-Chassis Statistics
```

---

**System Commands**
mc-ring

Syntax  
mc-ring peer ip-address statistics  
mc-ring peer ip-address [ring sync-tag [detail|statistics] ]  
mc-ring peer ip-address ring sync-tag ring-node [ring-node-name [detail|statistics] ]  
mc-ring global-statistics

Context  
show>redundancy>multi-chassis

Description  
This command displays multi-chassis ring information.
Parameters

*ip-address* — Specifies the address of the multi-chassis peer to display.

*ring sync-tag* — Specifies a synchronization tag to be displayed that was used while synchronizing this port with the multi-chassis peer.

*node ring-node-name* — Specifies a ring-node name.

*global-statistics* — Displays global statistics for the multi-chassis ring.

*detail* — Displays detailed peer information for the multi-chassis ring.

Output

**Show mc-ring peer ip-address ring Output** — The following table describes mc-ring peer ip-address ring output fields.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sync Tag</td>
<td>Displays the synchronization tag that was used while synchronizing this port with the multi-chassis peer.</td>
</tr>
<tr>
<td>Oper State</td>
<td>noPeer — The peer has no corresponding ring configured.</td>
</tr>
<tr>
<td></td>
<td>connected — The inband control connection with the peer is operational.</td>
</tr>
<tr>
<td></td>
<td>broken — The inband control connection with the peer has timed out.</td>
</tr>
<tr>
<td></td>
<td>conflict — The inband control connection with the peer has timed out but the physical connection is still OK; the failure of the inband 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.</td>
</tr>
<tr>
<td></td>
<td>testingRing — The inband control connection with the peer is being set up. Waiting for result.</td>
</tr>
<tr>
<td></td>
<td>waitingForPeer — Verifying if this ring is configured on the peer.</td>
</tr>
<tr>
<td></td>
<td>configErr — The ring is administratively up, but a configuration error prevents it from operating properly.</td>
</tr>
<tr>
<td></td>
<td>halfBroken — The inband control connection indicates that the ring is broken in one direction (towards the peer).</td>
</tr>
<tr>
<td></td>
<td>localBroken — The inband control connection with the peer is known to be broken due to local failure or local administrative action.</td>
</tr>
<tr>
<td></td>
<td>shutdown — The ring is shutdown.</td>
</tr>
<tr>
<td>Failure Rea-</td>
<td>Displays the reason of the failure of the operational state of a MC ring.</td>
</tr>
<tr>
<td>son</td>
<td>No. of MC Ring entries</td>
</tr>
</tbody>
</table>
Sample Output

*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2 ring ring11 detail
==============================================================================
Multi-Chassis MC-Ring Detailed Information
==============================================================================
Peer : 10.0.0.2  
Sync Tag : ring11  
Port ID : 1/1/3  
Admin State : inService  
Oper State : connected  
Admin Change : 01/07/2008 21:40:07  
Oper Change : 01/07/2008 21:40:24  
Failure Reason : None
In Band Control Path
Service ID : 10  
Interface Name : to_an1  
Oper State : connected  
Dest IP : 10.10.0.2  
Src IP : 10.10.0.1
VLAN Map B Path Provisioned
range 13-13  
range 17-17
VLAN Map Excluded Path Provisioned
range 18-18
VLAN Map B Path Operational
range 13-13  
range 17-17
VLAN Map Excluded Path Operational
range 18-18
==============================================================================
*A:ALA-48>show>redundancy>multi-chassis#

*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 192.251.10.104
==============================================================================
MC Ring entries
Sync Tag  Oper State  Failure Reason
No. of MC Ring entries: 0
==============================================================================
*A:ALA-48>show>redundancy>multi-chassis#

*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 10.0.0.2
==============================================================================
MC Ring entries
==============================================================================
### System Commands

<table>
<thead>
<tr>
<th>Sync Tag</th>
<th>Oper State</th>
<th>Failure Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>ring11</td>
<td>connected</td>
<td>None</td>
</tr>
<tr>
<td>ring12</td>
<td>shutdown</td>
<td>None</td>
</tr>
</tbody>
</table>

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

### MC 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

<table>
<thead>
<tr>
<th>Name</th>
<th>Loc Oper St.</th>
<th>Failure Reason</th>
<th>Rem Oper St.</th>
</tr>
</thead>
<tbody>
<tr>
<td>an1</td>
<td>connected</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>an2</td>
<td>connected</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

No. of MC Ring Node entries: 2

`*A:ALA-48>show>redundancy>multi-chassis#`
Show Redundancy Multi-Chassis Ring Peer Statistics Output — The following table describes multi-chassis ring peer output fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message</td>
<td>Displays the message type.</td>
</tr>
<tr>
<td>Received</td>
<td>Indicates the number of valid MC-ring signalling messages received from the peer.</td>
</tr>
<tr>
<td>Transmitted</td>
<td>Indicates the number of valid MC-ring signalling messages transmitted from the peer.</td>
</tr>
<tr>
<td>MCS ID Request</td>
<td>Displays the number of valid MCS ID requests were received from the peer.</td>
</tr>
<tr>
<td>MCS ID Response</td>
<td>Displays the number of valid MCS ID responses were received from the peer.</td>
</tr>
<tr>
<td>Ring Exists Request</td>
<td>Displays the number of valid 'ring exists' requests were received from the peer.</td>
</tr>
<tr>
<td>Ring Exists Response</td>
<td>Displays the number of valid ring exists' responses were received from the peer.</td>
</tr>
<tr>
<td>Keepalive</td>
<td>Displays the number of valid MC-ring control packets of type 'keepalive' were received from the peer.</td>
</tr>
</tbody>
</table>

*A:ALA-48>show>redundancy>multi-chassis# mc-ring peer 192.251.10.104 statistics
-----------------------------------------------------------------------------------------------
MC Ring statistics for peer 192.251.10.104
-----------------------------------------------------------------------------------------------
<table>
<thead>
<tr>
<th>Message</th>
<th>Received</th>
<th>Transmitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS ID Request</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MCS ID Response</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ring Exists Request</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ring Exists Response</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Keepalive</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*A:ALA-48>show>redundancy>multi-chassis#*
### Show mc-ring ring-node Command Output

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oper State</td>
<td>Displays the state of the connection verification (both local and remote).</td>
</tr>
<tr>
<td></td>
<td>notProvisioned – Connection verification is not provisioned.</td>
</tr>
<tr>
<td></td>
<td>configErr – Connection verification is provisioned but a configuration error prevents it from operating properly.</td>
</tr>
<tr>
<td></td>
<td>notTested – Connection verification is administratively disabled or is not possible in the current situation.</td>
</tr>
<tr>
<td></td>
<td>testing – Connection Verification is active, but no results are yet available.</td>
</tr>
<tr>
<td></td>
<td>connected – The ring node is reachable.</td>
</tr>
<tr>
<td></td>
<td>disconnected – Connection verification has timed out.</td>
</tr>
<tr>
<td>In Use</td>
<td>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.</td>
</tr>
</tbody>
</table>

### Show mc-ring global-statistics Command Output

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rx</td>
<td>Displays the number of MC-ring signalling packets were received by this system.</td>
</tr>
<tr>
<td>Rx Too Short</td>
<td>Displays the number of MC-ring signalling packets were received by this system that were too short.</td>
</tr>
<tr>
<td>Rx Wrong Authentication</td>
<td>Displays the number of MC-ring signalling packets were received by this system with invalid authentication.</td>
</tr>
<tr>
<td>Rx Invalid TLV</td>
<td>Displays the number of MC-ring signalling packets were received by this system with invalid TLV.</td>
</tr>
<tr>
<td>Rx Incomplete</td>
<td>Displays the number of MC-ring signalling packets were received by this system that were incomplete.</td>
</tr>
<tr>
<td>Rx Unknown Type</td>
<td>Displays the number of MC-ring signalling packets were received by this system that were of unknown type.</td>
</tr>
<tr>
<td>Rx Unknown Peer</td>
<td>Displays the number of MC-ring signalling packets were received by this system that were related to an unknown peer.</td>
</tr>
<tr>
<td>Rx Unknown Ring</td>
<td>Displays the number of MC-ring signalling packets were received by this system that were related to an unknown ring.</td>
</tr>
</tbody>
</table>
### Label | Description
--- | ---
Rx Unknown Ring Node | Displays the number of MC-ring signalling packets were received by this system that were related to an unknown ring node.
Rx | Displays the number of MC-ring signalling packets were transmitted by this system.
Rx Too Short | Displays the number of MC-ring signalling packets could not be transmitted by this system due to a lack of packet buffers.
Rx Wrong Authentication | Displays the number of MC-ring signalling packets could not be transmitted by this system due to a transmission failure.
Rx Invalid TLV | Displays the number of MC-ring signalling packets were transmitted by this system.
Rx Incomplete | Displays the number of missed configuration events on this system.
Rx Unknown Type | Displays the number of missed BFD events on this system.
Rx Unknown Ring Node | Displays the number of MC-ring 'unknown destination' signalling packets were transmitted by this system.
Tx | Displays the number of missed configuration events on this system.
Tx No Buffer | Displays the number of missed BFD events on this system.
Tx Transmission Failed | Displays the number of MC-ring signalling packets were transmitted by this system.
Tx Unknown Destination | Displays the number of missed configuration events on this system.
Missed Configuration Events | Displays the number of missed BFD events on this system.
Missed BFD Events | Displays the number of missed BFD events on this system.

*A:ALA-48>show>redundancy>multi-chassis# mc-ring global-statistics
==============================================================================
Global MC Ring statistics
==============================================================================
Rx : 0
Rx Too Short : 0
Rx Wrong Authentication : 0
Rx Invalid TLV : 0
Rx Incomplete : 0
Rx Unknown Type : 0
Rx Unknown Peer : 0
Rx Unknown Ring : 0
Rx Unknown Ring Node : 0
Tx : 36763
Tx No Buffer : 0
Tx Transmission Failed : 0
Tx Unknown Destination : 0
Missed Configuration Events : 0
Missed BFD Events : 0
==============================================================================
*A:ALA-48>show>redundancy>multi-chassis#

### sync

**Syntax**    
sync [port port-id | lag-id]

**Context**    
show>redundancy>multi-chassis

**Description**    
This command displays synchronization information.
Parameters

- **port port-id** — Shows the specified port ID of the multi-chassis peer.
- **lag lag-id** — Shows information for the specified LAG identifier.

**Values**

Values: 1 — 20020064

**Output**

**Show Redundancy Multi-chassis Sync Output** — The following table describes show redundancy multi-chassis sync output fields:

### Table 42: Show Redundancy Multi-chassis Sync Output Fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer IP Address</td>
<td>Displays the multi-chassis redundancy peer.</td>
</tr>
<tr>
<td>Description</td>
<td>The text string describing the peer.</td>
</tr>
<tr>
<td>Authentication</td>
<td>If configured, displays the authentication key used between this node and the multi-chassis peer.</td>
</tr>
<tr>
<td>Source IP Address</td>
<td>Displays the source address used to communicate with the multi-chassis peer.</td>
</tr>
<tr>
<td>Admin State</td>
<td>Displays the administrative state of the peer.</td>
</tr>
<tr>
<td>Client Applications</td>
<td>Displays the list of client applications synchronized between SRs.</td>
</tr>
<tr>
<td>Sync Admin State</td>
<td>Displays the administrative state of the synchronization.</td>
</tr>
<tr>
<td>Sync Oper State</td>
<td>Displays the operation state of the synchronization.</td>
</tr>
<tr>
<td>DB Sync State</td>
<td>Displays the database state of the synchronization.</td>
</tr>
<tr>
<td>Num Entries</td>
<td>Displays the number of entries on local router.</td>
</tr>
<tr>
<td>Lcl Deleted Entries</td>
<td>Displays the number of deleted entries made at the local router.</td>
</tr>
<tr>
<td>Alarm Entries</td>
<td>Displays the alarm entries on the local router.</td>
</tr>
<tr>
<td>Rem Num Entries</td>
<td>Displays the number of entries on the remote router.</td>
</tr>
<tr>
<td>Rem Lcl Deleted Entries</td>
<td>Displays the number of locally deleting entries made by the remote router.</td>
</tr>
<tr>
<td>Rem Alarm Entries</td>
<td>Displays alarm entries on the remote router.</td>
</tr>
</tbody>
</table>

**Sample Output**

```
*A:subscr_mgt_2# show redundancy multi-chassis sync
-------------------------------------------------------------------
Multi-chassis Peer Table
-------------------------------------------------------------------
Peer
-------------------------------------------------------------------
```

Page 444
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

peer

Syntax peer ip-address

Context show>redundancy>multi-chassis>sync

Description This command enables the context to display peer-related redundancy information.

Parameters ip-address — Shows peer information about the specified IP address.

Output Show Redundancy Multi-chassis Sync Peer Output — The following table describes show redundancy multi-chassis sync output fields:

Table 43: Show Redundancy Multi-chassis Sync Peer Output Fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer IP Address</td>
<td>Displays the multi-chassis redundancy peer.</td>
</tr>
<tr>
<td>Description</td>
<td>The text string describing the peer.</td>
</tr>
<tr>
<td>Authentication</td>
<td>If configured, displays the authentication key used between this node and</td>
</tr>
<tr>
<td></td>
<td>the multi-chassis peer.</td>
</tr>
<tr>
<td>Source IP Address</td>
<td>Displays the source address used to communicate with the multi-chassis peer.</td>
</tr>
<tr>
<td>Admin State</td>
<td>Displays the administrative state of the peer.</td>
</tr>
<tr>
<td>Client Applications</td>
<td>Displays the list of client applications synchronized between SRs.</td>
</tr>
<tr>
<td>Sync Admin State</td>
<td>Displays the administrative state of the synchronization.</td>
</tr>
<tr>
<td>Sync Oper State</td>
<td>Displays the operation state of the synchronization.</td>
</tr>
</tbody>
</table>
### Table 43: Show Redundancy Multi-chassis Sync Peer Output Fields (Continued)

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB Sync State</td>
<td>Displays the database state of the synchronization.</td>
</tr>
<tr>
<td>Num Entries</td>
<td>Displays the number of entries on local router.</td>
</tr>
<tr>
<td>Lcl Deleted Entries</td>
<td>Displays the number of deleted entries made at the local router.</td>
</tr>
<tr>
<td>Alarm Entries</td>
<td>Displays the alarm entries on the local router.</td>
</tr>
<tr>
<td>Rem Num Entries</td>
<td>Displays the number of entries on the remote router.</td>
</tr>
<tr>
<td>Rem Lcl Deleted Entries</td>
<td>Displays the number of locally deleting entries made by the remote router.</td>
</tr>
<tr>
<td>Rem Alarm Entries</td>
<td>Displays alarm entries on the remote router.</td>
</tr>
</tbody>
</table>

#### Sample Output

```
*A:subscr_mgt_2# show redundancy multi-chassis sync peer 10.10.10.20
```

---

**Multi-chassis Peer Table**

---

<table>
<thead>
<tr>
<th>Peer IP Address</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.10.10.20</td>
<td>Mc-Lag peer 10.10.10.20</td>
</tr>
</tbody>
</table>

---

**Sync-status**

---

<table>
<thead>
<tr>
<th>Client Applications</th>
<th>SUBMGMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sync Admin State</td>
<td>Up</td>
</tr>
<tr>
<td>Sync Oper State</td>
<td>Up</td>
</tr>
<tr>
<td>DB Sync State</td>
<td>inSync</td>
</tr>
<tr>
<td>Num Entries</td>
<td>1</td>
</tr>
<tr>
<td>Lcl Deleted Entries</td>
<td>0</td>
</tr>
<tr>
<td>Alarm Entries</td>
<td>0</td>
</tr>
<tr>
<td>Rem Num Entries</td>
<td>1</td>
</tr>
<tr>
<td>Rem Lcl Deleted Entries</td>
<td>0</td>
</tr>
<tr>
<td>Rem Alarm Entries</td>
<td>0</td>
</tr>
</tbody>
</table>

---

**MCS Application Stats**

---

<table>
<thead>
<tr>
<th>Application</th>
<th>igmp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Num Entries</td>
<td>0</td>
</tr>
<tr>
<td>Lcl Deleted Entries</td>
<td>0</td>
</tr>
<tr>
<td>Alarm Entries</td>
<td>0</td>
</tr>
<tr>
<td>Rem Num Entries</td>
<td>0</td>
</tr>
<tr>
<td>Rem Lcl Deleted Entries</td>
<td>0</td>
</tr>
<tr>
<td>Rem Alarm Entries</td>
<td>0</td>
</tr>
</tbody>
</table>
detail

Syntax        detail
Context       show>redundancy>multi-chassis>peer
Description   This command displays detailed peer information.
Output        Show Redundancy Multi-chassis Sync Peer Detail Output — The following table describes show redundancy multi-chassis sync detail output fields:

Table 44: Show Redundancy Multi-chassis Sync Peer Detail Output Fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer IP Address</td>
<td>Displays the multi-chassis redundancy peer.</td>
</tr>
<tr>
<td>Description</td>
<td>The text string describing the peer.</td>
</tr>
<tr>
<td>Authentication</td>
<td>If configured, displays the authentication key used between this node and the multi-chassis peer.</td>
</tr>
</tbody>
</table>
## Table 44: Show Redundancy Multi-chassis Sync Peer Detail Output Fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source IP Address</td>
<td>Displays the source address used to communicate with the multi-chassis peer.</td>
</tr>
<tr>
<td>Admin State</td>
<td>Displays the administrative state of the peer.</td>
</tr>
<tr>
<td>Client Applications</td>
<td>Displays the list of client applications synchronized between routers.</td>
</tr>
<tr>
<td>Sync Admin State</td>
<td>Displays the administrative state of the synchronization.</td>
</tr>
<tr>
<td>Sync Oper State</td>
<td>Displays the operation state of the synchronization.</td>
</tr>
<tr>
<td>DB Sync State</td>
<td>Displays the database state of the synchronization.</td>
</tr>
<tr>
<td>Num Entries</td>
<td>Displays the number of entries on local router.</td>
</tr>
<tr>
<td>Lcl Deleted Entries</td>
<td>Displays the number of deleted entries made at the local router.</td>
</tr>
<tr>
<td>Alarm Entries</td>
<td>Displays the alarm entries on the local router.</td>
</tr>
<tr>
<td>Rem Num Entries</td>
<td>Displays the number of entries on the remote router.</td>
</tr>
<tr>
<td>Rem Lcl Deleted Entries</td>
<td>Displays the number of locally deleting entries made by the remote router.</td>
</tr>
<tr>
<td>Rem Alarm Entries</td>
<td>Displays alarm entries on the remote router.</td>
</tr>
</tbody>
</table>

## Sample Output

```
*A:subscr_mgt_2# show redundancy multi-chassis sync peer 10.10.10.20 detail

Multi-chassis Peer Table

Peer

<table>
<thead>
<tr>
<th>Peer IP Address</th>
<th>10.10.10.20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Mc-Lag peer 10.10.10.20</td>
</tr>
<tr>
<td>Authentication</td>
<td>Disabled</td>
</tr>
<tr>
<td>Source IP Address</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>Admin State</td>
<td>Enabled</td>
</tr>
</tbody>
</table>

Sync-status

<table>
<thead>
<tr>
<th>Client Applications</th>
<th>SUBMGMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sync Admin State</td>
<td>Up</td>
</tr>
<tr>
<td>Sync Oper State</td>
<td>Up</td>
</tr>
<tr>
<td>DB Sync State</td>
<td>inSync</td>
</tr>
<tr>
<td>Num Entries</td>
<td>1</td>
</tr>
<tr>
<td>Lcl Deleted Entries</td>
<td>0</td>
</tr>
<tr>
<td>Alarm Entries</td>
<td>0</td>
</tr>
<tr>
<td>Rem Num Entries</td>
<td>1</td>
</tr>
</tbody>
</table>
```
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
-----------------------------------------------------------------------------
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
-----------------------------------------------------------------------------
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
-----------------------------------------------------------------------------
Rem Num Entries         : 0
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
===============================================================================
<table>
<thead>
<tr>
<th>Port/Encap</th>
<th>Tag</th>
</tr>
</thead>
<tbody>
<tr>
<td>lag-1</td>
<td>test123</td>
</tr>
</tbody>
</table>

*s*A:subscr_mgt_2*

**synchronization**

**Syntax**  
`synchronization`

**Context**  
`show>redundancy`

**Description**  
This command displays redundancy synchronization times.
Sample Output

A:ALA-48>show>redundancy# synchronization
===============================================================================
Synchronization Information
===============================================================================
Standby Status : disabled
Last Standby Failure : N/A
Standby Up Time : N/A
Failover Time : N/A
Failover Reason : N/A
Boot/Config Sync Mode : None
Boot/Config Sync Status : No synchronization
Last Config File Sync Time : Never
Last Boot Env Sync Time : Never
===============================================================================
A:ALA-48>show>redundancy#

time-range

Syntax  time-range name associations [detail]

Context  show>cron

Description  This command displays information on the configured time ranges.

Output  Time Range Output — The following table displays system time range output fields:

Table 45: Show System Time-range Output Fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associations</td>
<td>Shows the time-range as it is associated with the TOD suites and ACL entries as well as the SAPs using them.</td>
</tr>
<tr>
<td>Detail</td>
<td>Shows the details of this time-range.</td>
</tr>
</tbody>
</table>

Sample Output

The following example shows time-range detail output.

A:ala# show cron time-range time-range2 detail
===============================================================================
Cron time-range
===============================================================================
Name : time-range1
Periodic : Start * * * * End * * * *
Absolute  : Start * * * * End * * * *

The following example shows output for time-range associations with previously created IP and MAC filters.

A:ala# show cron time-range day associations
Cron time-range associations

Name          : day                          State  : Inactive
-------------------------------------------------------------------------------
IP Filter associations
-------------------------------------------------------------------------------
IP filter Id : 10, entry 1010
-------------------------------------------------------------------------------
MAC Filter associations
None
-------------------------------------------------------------------------------
Tod-suite associations
-------------------------------------------------------------------------------
Tod-suite : suite_sixteen, for Ingress Qos Policy "1160"
Tod-suite : suite_sixteen, for Ingress Scheduler Policy "SchedPolCust1_Day"
Tod-suite : suite_sixteen, for Egress Qos Policy "1160"
Tod-suite : suite_sixteen, for Egress Scheduler Policy "SchedPolCust1Egress_Day"

uptime

Syntax uptime
Context show
Description This command displays the time since the system started.
Output Uptime Output — The following table describes uptime output fields.

Table 46: System Timing Output Fields

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Up Time</td>
<td>Displays the length of time the system has been up in days, hr:min:sec format.</td>
</tr>
</tbody>
</table>

Sample Output

A:ALA-1# show uptime
System Up Time : 11 days, 18:32:02.22 (hr:min:sec)
A:ALA-1#

switch-fabric

Syntax switch-fabric
Context show>system
System Commands

**Description**

This command displays switch fabric information.

**Output**

**Switch fabric output** — The following table describes switch-fabric output fields for 12-slot and 7-slot chassis models:

**Table 47: Show System Switch-Fabric Output Fields**

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot/MDA</td>
<td>Displays the fabric slot within a chassis in the system. The CPM cards and IOM cards cannot be physically inserted into the switch fabric card slots.</td>
</tr>
<tr>
<td>Min. Forwarding Capacity</td>
<td>Displays the minimum forwarding capacity of the slot and MDA as a percentage.</td>
</tr>
<tr>
<td>Max. Forwarding Capacity</td>
<td>Displays the maximum forwarding capacity of the slot and MDA as a percentage.</td>
</tr>
</tbody>
</table>

**Sample Output**

A:ALA-7# show system switch-fabric

```
Switch Fabric
Slot/MDA Min. Forwarding Capacity Max. Forwarding Capacity
1/1 100% 100%
1/2 100% 100%
2/1 100% 100%
2/2 100% 100%
3/1 100% 100%
3/2 100% 100%
4/1 100% 100%
4/2 100% 100%
5/1 100% 100%
5/2 100% 100%
A 100% 100%
B 100% 100%
```

A:ALA-7#

A:ALA-12# show system switch-fabric

```
Switch Fabric
Slot/MDA Min. Forwarding Capacity Max. Forwarding Capacity
1/1 100% 100%
1/2 100% 100%
2/1 100% 100%
2/2 100% 100%
3/1 100% 100%
3/2 100% 100%
4/1 100% 100%
4/2 100% 100%
```
sync-if-timing

Syntax  sync-if-timing

Context  show>system

Description  This command displays synchronous interface timing operational information.

Output  System Timing Output — The following table describes sync-if-timing output fields.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Status CPM A/B</td>
<td>Indicates the present status of the synchronous timing equipment subsystem (SETS).</td>
</tr>
<tr>
<td></td>
<td>not-present</td>
</tr>
<tr>
<td></td>
<td>master-freerun</td>
</tr>
<tr>
<td></td>
<td>master-holdover</td>
</tr>
<tr>
<td></td>
<td>master-locked</td>
</tr>
<tr>
<td></td>
<td>slave</td>
</tr>
<tr>
<td></td>
<td>acquiring</td>
</tr>
<tr>
<td>Reference Input Mode</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Non-revertive — The clock cannot revert to a higher priority clock if the current clock goes offline.</td>
</tr>
<tr>
<td>Quality Level Selection</td>
<td>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.</td>
</tr>
</tbody>
</table>
## System Commands

<table>
<thead>
<tr>
<th>Label</th>
<th>Description (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Selected</td>
<td>Indicates which reference has been selected:</td>
</tr>
<tr>
<td></td>
<td>• ref1, ref2 - (for all chassis)</td>
</tr>
<tr>
<td></td>
<td>• BITS A, BITS B - (7450 ESS-7/12)</td>
</tr>
<tr>
<td></td>
<td>• Mate CPM (BITS A), Mate CPM (BITS B) - (7450 ESS-7/12 on the active CPM)</td>
</tr>
<tr>
<td></td>
<td>• Mate CPM (none) - show&gt;system&gt;sync-if-timing&gt; standby when standby locked to active which is freerun or holdover - (7450 ESS-7/12)</td>
</tr>
<tr>
<td></td>
<td>• Mate CPM (ref1), Mate CPM (ref2) - show&gt;system&gt;sync-if-timing&gt;standby when standby locked to active which is locked to ref1 or ref2 - (7450 ESS-7/12)</td>
</tr>
<tr>
<td>System Quality Level</td>
<td>Indicates the quality level being generated by the system clock.</td>
</tr>
<tr>
<td>Current Frequency Offset</td>
<td>(value) — The frequency offset of the currently selected timing reference in parts per million.</td>
</tr>
<tr>
<td>Reference Order</td>
<td>ref1, ref2, bits — Indicates that the priority order of the timing references.</td>
</tr>
<tr>
<td>Reference Mate CPM</td>
<td>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.</td>
</tr>
<tr>
<td>Admin Status</td>
<td>down — The <strong>ref1</strong> or <strong>ref2</strong> configuration is administratively shutdown.</td>
</tr>
<tr>
<td></td>
<td>up — The <strong>ref1</strong> or <strong>ref2</strong> configuration is administratively enabled.</td>
</tr>
<tr>
<td></td>
<td>diag — Indicates the reference has been forced using the force-reference command.</td>
</tr>
<tr>
<td>Quality Level Override</td>
<td>Indicates whether the QL value used to determine the reference was configured directly by the user.</td>
</tr>
<tr>
<td>Rx Quality Level</td>
<td>Indicates the QL value received on the interface.</td>
</tr>
<tr>
<td></td>
<td>• inv - SSM received on the interface indicates an invalid code for the interface type.</td>
</tr>
<tr>
<td></td>
<td>• unknown - No QL value was received on the interface.</td>
</tr>
<tr>
<td>Qualified for Use</td>
<td>Indicates whether the reference has been qualified to be used as a source of timing for the node.</td>
</tr>
</tbody>
</table>
The following example is for a node locked to the active BITS input and directing the signal on ref1 to the BITS output:

**Sample Output**

```
*A:SR7# show system sync-if-timing
System Interface Timing Operational Info
System Status CPM A : Master Locked
   Reference Input Mode : Non-revertive
```

**Label** | **Description** (Continued)
--- | ---
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.

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 | The BITS output is administratively shutdown.
- down — The BITS output is administratively shutdown.
- up — The BITS output is administratively enabled.
- diag — Indicates the BITS output has been forced using the force-reference command.

Output Reference Selected | The reference selected as the source for the BITS output signal (ref1 or ref2).

TX Quality Level | QL value for BITS output signal.
Quality Level Selection : Disabled
Reference Selected : BITS A
System Quality Level : prs
Current Frequency Offset (ppm) : +0

Reference Order : bits ref1 ref2

Reference Mate CPM
Qualified For Use : Yes
Selected For Use : No
Not Selected Due To : on standby

Reference Input 1
Admin Status : up
Rx Quality Level : prs
Qualified Level Override : none
Qualified For Use : Yes
Selected For Use : No
Not Selected Due To : on standby
Source Port : 3/1/2

Reference Input 2
Admin Status : down
Rx Quality Level : unknown
Qualified Level Override : none
Qualified For Use : No
Selected For Use : No
Not Selected Due To : disabled
Source Port : None

Reference BITS A
Admin Status : up
Rx Quality Level : prs
Qualified Level Override : none
Qualified For Use : Yes
Selected For Use : Yes
Interface Type : DS1
Framing : ESF
Line Coding : B8ZS
Line Length : 550-660ft
Output Admin Status : up
Output Reference Selected : ref1
Tx Quality Level : prs

The following example is for a node locked to the standby CPM BITS input and directing the ref1 signal to the BITS output port:
*A:SR7# show system sync-if-timing

A:SR7# show system sync-if-timing
Reference Selected : Mate CPM (BITS B)
System Quality Level : prs
Current Frequency Offset (ppm) : +0

Reference Order : bits ref1 ref2

Reference Mate CPM
Qualified For Use : Yes
Selected For Use : Yes

Reference Input 1
Admin Status : up
Rx Quality Level : prs
Quality Level Override : none
Qualified For Use : Yes
Selected For Use : No
Not Selected Due To : on standby
Source Port : 3/1/2

Reference Input 2
Admin Status : down
Rx Quality Level : unknown
Quality Level Override : none
Qualified For Use : No
Not Qualified Due To : disabled
Selected For Use : No
Not Selected Due To : disabled
Source Port : None

Reference BITS A
Admin Status : up
Rx Quality Level : unknown
Quality Level Override : none
Qualified For Use : No
Not Qualified Due To : LOS
Selected For Use : No
Not Selected Due To : not qualified
Interface Type : DS1
Framing : ESF
Line Coding : B8ZS
Line Length : 550-660ft
Output Admin Status : up
Output Reference Selected : ref1
TX Quality Level : prs

The following example is for a node whose standby CPM is locked to its local BITS port and the signal from ref1 is directed to the BITS output port:

A:SR7# show system sync-if-timing standby

System Interface Timing Operational Info

System Status CPM B : Master Locked
Reference Input Mode : Non-revertive
Quality Level Selection : Disabled
Reference Selected : BITS B
System Quality Level : prs
Current Frequency Offset (ppm) : +0
Reference Order                    : bits ref1 ref2

Reference Mate CPM
  Qualified For Use      : Yes
  Selected For Use       : No
    Not Selected Due To : on standby

Reference Input 1
  Admin Status           : down
  Rx Quality Level       : unknown
  Quality Level Override : none
  Qualified For Use      : No
    Not Qualified Due To : disabled
  Selected For Use       : No
    Not Selected Due To : disabled
  Source Port            : None

Reference Input 2
  Rx Quality Level       : unknown
  Quality Level Override : none
  Qualified For Use      : No
    Not Qualified Due To : disabled
  Selected For Use       : No
    Not Selected Due To : disabled
  Source Port            : None

Reference BITS B
  Admin Status           : up
  Rx Quality Level       : prs
  Quality Level Override : none
  Qualified For Use      : Yes
  Selected For Use       : Yes
  Interface Type         : DS1
  Framing                : ESF
  Line Coding            : B8ZS
  Line Length            : 550-660ft
  Output Admin Status    : up
  TX Quality Level       : prs

*A:*SR7#

**chassis**

**Syntax**

```
chassis [environment] [power-supply]
```

**Context**

```
show
```

**Description**

This command displays general chassis status information.

**Parameters**

- `environment` — Displays chassis environmental status information.

  **Default**
  
  Display all chassis information.
**power-supply** — Displays chassis power supply status information.

**Default**  
Display all chassis information.

**Output**  
**Chassis Output** — The following table describes chassis output fields.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>The system name for the router.</td>
</tr>
<tr>
<td>Type</td>
<td>The router series model number.</td>
</tr>
<tr>
<td>Location</td>
<td>The system location for the device.</td>
</tr>
</tbody>
</table>
| Coordinates            | A user-configurable string that indicates the Global Positioning System (GPS) coordinates for the location of the chassis. For example:  
N 45 58 23, W 34 56 12  
N37 37' 00 latitude, W122 22' 00 longitude  
N36*39.246' W121*40.121' |
| CLLI Code              | The Common Language Location Identifier (CLLI) that uniquely identifies the geographic location of places and certain functional categories of equipment unique to the telecommunications industry. |
| Number of slots        | The number of slots in this chassis that are available for plug-in cards. The total number includes the IOM slots and the CPM slots. |
| Number of ports        | The total number of ports currently installed in this chassis. This count does not include the Ethernet ports on the CPMCCMs that are used for management access. |
| Critical LED state     | The current state of the Critical LED in this chassis.                      |
| Major LED state        | The current state of the Major LED in this chassis.                         |
| Minor LED state        | The current state of the Minor LED in this chassis.                         |
| Base MAC address       | The base chassis Ethernet MAC address.                                       |
| Part number            | The SF/CPM part number.                                                      |
| CLEI code              | The code used to identify the router.                                        |
| Serial number          | The SF/CPM part number. Not user modifiable.                                |
| Manufacture date       | The chassis manufacture date. Not user modifiable.                           |
| Manufacturing string   | Factory-inputted manufacturing text string. Not user modifiable.             |
| Time of last boot      | The date and time the most recent boot occurred.                             |
| Current alarm state    | Displays the alarm conditions for the specific board.                       |
### System Commands

#### Sample Output

B:Dut-D# show chassis

```
Chassis Information
```

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of fan trays</td>
<td>The total number of fan trays installed in this chassis.</td>
</tr>
<tr>
<td>Number of fans</td>
<td>The total number of fans installed in this chassis.</td>
</tr>
<tr>
<td>Operational status</td>
<td>Current status of the fan tray.</td>
</tr>
<tr>
<td>Fan speed</td>
<td>Half speed — The fans are operating at half speed. Full speed — The fans are operating at full speed.</td>
</tr>
<tr>
<td>Number of power supplies</td>
<td>The number of power supplies installed in the chassis.</td>
</tr>
<tr>
<td>Power supply number</td>
<td>The ID for each power supply installed in the chassis.</td>
</tr>
<tr>
<td>AC power</td>
<td>Within range — AC voltage is within range. Out of range — AC voltage is out of range.</td>
</tr>
<tr>
<td>DC power</td>
<td>Within range — DC voltage is within range. Out of range — DC voltage is out of range.</td>
</tr>
<tr>
<td>Over temp</td>
<td>Within range — The current temperature is within the acceptable range. Out of range — The current temperature is above the acceptable range.</td>
</tr>
<tr>
<td>Status</td>
<td>Up/Present — The specified power supply is up. Down — The specified power supply is down.</td>
</tr>
</tbody>
</table>

---

Note: The text above is a sample output. The actual system commands and their outputs may differ based on the system configuration and hardware specifics.
Hardware Data

- Part number: 3HE00186AAAA01
- CLEI code:
- Serial number: NS042450133
- Manufacture date: 06172004
- Manufacturing string:
- Manufacturing deviations:
- Time of last boot: 2006/06/16 09:37:51
- Current alarm state: alarm cleared

Environment Information

- Number of fan trays: 2
- Number of fans: 4
- Fan tray number: 1
- Status: up
- Speed: half speed
- Fan tray number: 2
- Status: up
- Speed: half speed

Power Supply Information

- Number of power supplies: 2
- Power supply number: 1
- Defaulted power supply type: none
- Status: not equipped
- Power supply number: 2
- Defaulted power supply type: dc
- Status: up

B:Dut-D#

ALA-4# show chassis environment

Chassis Information

Environment Information

- Number of fan trays: 1
- Number of fans: 2
- Fan tray number: 1
- Status: up
- Speed: half speed

ALA-4#
synchronization

Syntax: synchronization
(Context: show>redundancy>synchronization)

Description: This command displays redundancy synchronization times.
Output  

**Synchronization Output** — The following table describes redundancy synchronization output fields.

**Table 48: Show Synchronization Output Fields**

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby Status</td>
<td>Displays the status of the standby CPM.</td>
</tr>
<tr>
<td>Last Standby Failure</td>
<td>Displays the timestamp of the last standby failure.</td>
</tr>
<tr>
<td>Standby Up Time</td>
<td>Displays the length of time the standby CPM has been up.</td>
</tr>
<tr>
<td>Failover Time</td>
<td>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.</td>
</tr>
<tr>
<td>Failover Reason</td>
<td>Displays a text string giving an explanation of the cause of the last redundancy failover. If no failover has occurred, an empty string displays.</td>
</tr>
<tr>
<td>Boot/Config Sync Mode</td>
<td>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).</td>
</tr>
<tr>
<td>Boot/Config Sync Status</td>
<td>Displays the results of the last synchronization operation between the primary and secondary CPMs.</td>
</tr>
<tr>
<td>Last Config File Sync Time</td>
<td>Displays the timestamp of the last successful synchronization of the configuration files.</td>
</tr>
<tr>
<td>Last Boot Env Sync Time</td>
<td>Displays the timestamp of the last successful synchronization of the boot environment files.</td>
</tr>
</tbody>
</table>

Sample Output

A:ALA-1>show>redundancy# synchronization

Synchronization Information

Standby Status : disabled
Last Standby Failure : N/A
Standby Up Time : N/A
Failover Time : N/A
Failover Reason : N/A
Boot/Config Sync Mode : None
Boot/Config Sync Status : No synchronization
Last Config File Sync Time : Never
Last Boot Env Sync Time : Never

A:ALA-1>show>redundancy#
Debug Commands

sync-if-timing

Syntax

sync-if-timing

Context
ddebug

Description
The context to debug synchronous interface timing references.

force-reference

Syntax

force-reference {ref1 | ref2 | bits }

no force-reference

Context
ddebug>sync-if-timing

Description
This command allows an operator to force the system synchronous timing output to use a specific reference.

NOTE: This command should be used for testing and debugging purposes only. Once the system timing reference input has been forced, it will not revert back to another reference at anytime. The state of this command is not persistent between system boots.

When the debug force-reference command is executed, the current system synchronous timing output is immediately referenced from the specified reference input. If the specified input is not available (shutdown), or in a disqualified state, the timing output will enter the holdover state based on the previous input reference.

Parameters
ref1 — The clock will use the first timing reference.
ref2 — The clock will use the second timing reference.
bits — The clock will use the external network interface on the active CPM to be the highest priority input.

system

Syntax

[no] system

Context
ddebug

Description
This command displays system debug information.

http-connections
System Commands

http-connections

Syntax
http-connections [host-ip-address/mask]

Context
debug>system

Description
This command displays HTTP connections debug information.

Parameters
host-ip-address/mask — Displays information for the specified host IP address and mask.

ntp

Syntax
[no] router router-name interface ip-int-name

Context
debug>system

Description
This command enables and configures debugging for NTP. The no form of the command disables debugging for NTP.

Parameters
router-name — Base, management
Default
Base

ip-int-name — maximum 32 characters; must begin with a letter. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

persistence

Syntax
[no] persistence

Context
debug>system

Description
This command displays persistence debug information.
Tools Commands

redundancy

Syntax redundancy
Context tools>dump
Description This command enables the context to dump redundancy parameters.

multi-chassis

Syntax multi-chassis
Context tools>dump>redundancy
Description This command enables the context to dump multi-chassis parameters.

mc-endpoint

Syntax mc-endpoint peer ip-address
Context tools>dump>redundancy>multi-chassis
Description This command dumps multi-chassis endpoint information.
Parameters peer ip-address — Specifies the peer’s IP address.

Sample Output

*A:Dut-B# tools dump redundancy multi-chassis mc-endpoint peer 3.1.1.3
MC Endpoint Peer Info
  peer addr : 3.1.1.3
  peer name : Dut-C
  peer name refs : 1
  src addr conf : Yes
  source addr : 2.1.1.2
  num of mcep : 1
  num of non-mcep : 0
  own sess num : 5b8ba0d39
  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
mc-ring

**Syntax**
```
mc-ring
mc-ring peer ip-address [ring sync-tag]
```

**Context**
tools>dump>redundancy>multi-chassis

**Description**
This command dumps multi-chassis ring information.

- `peer ip-address` — Specifies the peer’s IP address.
- `ring sync-tag` — Specifies the ring’s sync-tag created in the `config>redundancy>mc>peer>mcr>ring` context.
sync-database

Syntax  
```
sync-database [peer ip-address] [port port-id | lag-id] [sync-tag sync-tag] [application application] [detail] [type type]
```

Context  
tools>dump>redundancy>multi-chassis

Description  
This command dumps MCS database information.

- **peer ip-address** — Specifies the peer’s IP address.
- **port port-id | lag-id** — Indicates the port or LAG ID to be synchronized with the multi-chassis peer.
- **slot/mda/port **or **lag-lag-id**
- **sync-tag sync-tag** — Specifies a synchronization tag to be used while synchronizing this port with the multi-chassis peer.
- **application application** — Specifies a particular multi-chassis peer synchronization protocol application.
  
  **Values**
  
  - dhcp-server: local dhcp server
  - igmp: Internet group management protocol
  - igmp-snooping: igmp-snooping
  - mc-ring: multi-chassis ring
  - mld-snooping: multicast listener discovery-snooping
  - srrp: simple router redundancy protocol
  - sub-host-trk: subscriber host tracking
  - sub-mgmt: subscriber management

- **type type** — Indicates the locally deleted or alarmed deleted entries in the MCS database per multi-chassis peer.
  
  **Values**
  
  - alarm-deleted, local-deleted

- **detail** — Displays detailed information.

srrp-sync-data

Syntax  
```
srrp-sync-database [instance instance-id] [peer ip-address]
```

Context  
tools>dump>redundancy>multi-chassis

Description  
This command dumps SRRP database information.

- **peer ip-address** — Specifies the peer’s IP address.
- **instance instance-id** — Dumps information for the specified Subscriber Router Redundancy Protocol instance configured on this system.

**Values**

1 — 4294967295

mixed-mode-upgrade
System Commands

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 IOMs or IMMs located in the specified slot-list are not IOM3-XP or later, 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.

Default  capability ess on a 7450 chassis and capability sr on a 7750 chassis

Parameters  slot-list — List of slots to be upgraded to 7750 IOM3/IMM functionality. This parameter is required to modify the mode in which the IOM3/IMMs function and will require a reboot of the IOM3/IMMs in the designated slot.

now — This optional keyword can be added to the interactive command to force 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.
Clear Commands

application-assurance

Syntax application-assurance

Context clear

Description This command clears application assurance commands.

group

Syntax group isa-aa-group-id statistics
     group isa-aa-group-id status

Context clear>app-assure

Description This command clears application assurance group data.

Parameters isa-aa-group-id — Specifies the ISA-AA group index.

   Values
   status — Specifies that application assurance system statistics are cleared.
   statistics — Specifies that application assurance statistics are cleared.

cron

Syntax cron action completed [action-name] [owner action-owner]

Context clear

Description This command clears completed CRON action run history entries.

Parameters action-name — Specifies the action name.

   Values
   maximum 32 characters

owner action-owner — Specifies the owner name.

   Default TiMOS CLI

redundancy

Syntax redundancy
System Commands

**clear**

**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.

- **endpoint** \(mcep-id\) — Clears information for the specified multi-chassis endpoint ID.
  - **Values**
    - 1 — 4294967295
- **peer** \(ip-address\) — Clears information for the specified peer IP address.
- **statistics** — Clears statistics for this multi-chassis endpoint.

**mc-lag**

**Syntax**
mc-lag \[peer ip-address [lag lag-id]]

**Context**
clear>redundancy>multi-chassis

**Description**
This command clears multi-chassis Link Aggregation Group (LAG) information.

**Parameters**
- **peer** \(ip-address\) — Clears the specified address of the multi-chassis peer.
- **lag** \(lag-id\) — Clears the specified LAG on this system.
  - **Values**
    - 1 — 100

**mc-ring**

**Syntax**
mc-ring

**Context**
clear>redundancy>multi-chassis
Description
This command clears multi-chassis ring data.

debounce

Syntax
debounce peer ip-address ring sync-tag

Context
clear>redundancy>multi-chassis

Description
This command clears multi-chassis ring operational state debounce history.

Parameters
ip-address — Clears debounce history for the specified IP address.
ring sync-tag — Clears debounce history for the specified sync tag.

ring-nodes

Syntax
ring-nodes peer ip-address ring sync-tag

Context
clear>redundancy>multi-chassis>mcr

Description
This command clears multi-chassis ring unreferenced ring nodes.

Parameters
ip-address — Clears ring statistics for the specified IP address.
ring sync-tag — Clears ring statistics for the specified sync tag.

statistics

Syntax
statistics

Context
clear>redundancy>multi-chassis>mcr

Description
This command clears multi-chassis ring global statistics.

global

Syntax
global

Context
clear>redundancy>multi-chassis>mcr>statistics

Description
This command clears multi-chassis ring global statistics.

peer

Syntax
peer ip-address
System Commands

Context: clear>redundancy>multi-chassis>mcr>statistics

**Description:** This command clears multi-chassis ring peer statistics.

**Parameters:**
- `ip-address` — Clears ring peer statistics for the specified IP address.

**ring**

**Syntax:**
```plaintext
ring peer ip-address ring sync-tag
```

**Context:** clear>redundancy>multi-chassis>mcr>statistics

**Description:** This command clears multi-chassis ring statistics.

**Parameters:**
- `ip-address` — Clears ring statistics for the specified IP address.
- `ring sync-tag` — Clears ring statistics for the specified sync tag.

**ring-node**

**Syntax:**
```plaintext
ring-node peer ip-address ring sync-tag node ring-node-name
```

**Context:** clear>redundancy>multi-chassis>mcr>statistics

**Description:** This command clears multi-chassis ring statistics.

**Parameters:**
- `peer ip-address` — Clears ring-node peer statistics for the specified IP address.
- `ring sync-tag` — Clears ring-node peer statistics for the specified sync tag.
- `node ring-node-name` — Clears ring-node peer statistics for the specified ring node name.

**sync-database**

**Syntax:**
```plaintext
sync-database peer ip-address all application application
sync-database peer ip-address { port port-id | lag-id | sync-tag sync-tag } application
sync-database peer ip-address port port-id | lag-id sync-tag sync-tag application
```

**Context:** clear>redundancy>multi-chassis

**Description:** This command clears multi-chassis sync database information.

**Parameters:**
- `peer ip-address` — Clears the specified address of the multi-chassis peer.
- `port port-id` — Clears the specified port ID of the multi-chassis peer.
- `port lag-id` — Clears the specified Link Aggregation Group (LAG) on this system.
- `all` — Clears all ports and/or sync tags.
**System Management**

**sync-tag**

— Clears the synchronization tag used while synchronizing this port with the multi-chassis peer.

**application**

— Clears the specified application information that was synchronized with the multi-chassis peer.

<table>
<thead>
<tr>
<th>Values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>all</td>
<td>All supported applications</td>
</tr>
<tr>
<td>igmp-snooping</td>
<td>igmp-snooping</td>
</tr>
<tr>
<td>mc-ring</td>
<td>multi-chassis ring</td>
</tr>
<tr>
<td>mld-snooping</td>
<td>multicast listener discovery-snooping</td>
</tr>
<tr>
<td>sub-host-trk</td>
<td>subscriber host tracking</td>
</tr>
<tr>
<td>sub-mgmt</td>
<td>subscriber management</td>
</tr>
</tbody>
</table>

**screen**

**Syntax**

```
screen
```

**Context**

```
clear
```

**Description**

This command allows an operator to clear the Telnet or console screen.

**system**

**Syntax**

```
system sync-if-timing {ref1 | ref2 | bits}
```

**Context**

```
clear
```

**Description**

This command allows an operator to individually clear (re-enable) a previously failed reference. As long as the reference is one of the valid options, this command is always executed. An inherent behavior enables the revertive mode which causes a re-evaluation of all available references.

**sync-if-timingtrace**

**Syntax**

```
trace log
```

**Context**

```
clear
```

**Description**

This command allows an operator to clear the trace log.
Standards and Protocol Support

Standards Compliance
IEEE 802.1ab-REV/D3 Station and Media Access Control Connectivity Discovery
IEEE 802.1d Bridging
IEEE 802.1p/Q VLAN Tagging
IEEE 802.1s Multiple Spanning Tree
IEEE 802.1w Rapid Spanning Tree Protocol
IEEE 802.1x Port Based Network Access Control
IEEE 802.1ad Provider Bridges
IEEE 802.1ah Provider Backbone Bridges
IEEE 802.1ag Service Layer OAM
IEEE 802.3ah Ethernet in the First Mile
IEEE 802.1ak Multiple MAC Registration Protocol
IEEE 802.3 10BaseT
IEEE 802.3ad Link Aggregation
IEEE 802.3ae 10Gbps Ethernet
IEEE 802.3ah Ethernet OAM
IEEE 802.3u 100BaseTX
IEEE 802.3x Flow Control
IEEE 802.3z 1000BaseSX/LX
ITU-T Y.1731 OAM functions and mechanisms for Ethernet based networks
ITU-T G.8031 Ethernet linear protection switching
ITU-T G.8032 Ethernet Ring Protection Switching (version 2)

Protocol Support
OSPF
RFC 1765 OSPF Database Overflow
RFC 2328 OSPF Version 2
RFC 2370 Opaque LSA Support
RFC 2740 OSPF for IPv6 (OSPFv3)
draft-ietf-ospf-ospfv3-update-14.txt
RFC 3101 OSPF NSSA Option
RFC 3137 OSPF Stub Router Advertisement
RFC 3623 Graceful OSPF Restart – GR helper
RFC 3630 Traffic Engineering (TE) Extensions to OSPF Version 2
RFC 4203 - Shared Risk Link Group (SRLG) sub-TLV
RFC 5185 OSPF Multi-Area Adjacency
RFC 3623 Graceful OSPF Restart — GR helper
RFC 3630 Traffic Engineering (TE) Extensions to OSPF Version 2
RFC 4203 for Shared Risk Link Group (SRLG) sub-TLV

BGP
RFC 1397 BGP Default Route Advertisement
RFC 1772 Application of BGP in the Internet
RFC 1965 Confederations for BGP
RFC 1997 BGP Communities Attribute
RFC 2385 Protection of BGP Sessions via MD5
RFC 2439 BGP Route Flap Dampening
RFC 2547bis BGP/MPLS VPNs
RFC 2918 Route Refresh Capability for BGP
RFC 3107 Carrying Label Information in BGP
RFC 3392 Capabilities Advertisement with BGP
RFC 4271 BGP-4 (previously RFC 1771)
RFC 4360 BGP Extended Communities Attribute
RFC 4364 BGP/MPLS IP Virtual Private Networks (VPNs)(previously RFC 2547bis BGP/MPLS VPNs)
RFC 4456 BGP Route Reflection: Alternative to Full-mesh IBGP (previously RFC 1966 & 2796)
RFC 4724 Graceful Restart Mechanism for BGP — GR helper
RFC 4760 Multi-protocol Extensions for BGP
RFC 4893 BGP Support for Four-octet AS Number Space
RFC 5065 Confederations for BGP (obsoletes 3065)

IS-IS
RFC 1142 OSI IS-IS Intra-domain Routing Protocol (ISO 10589)
RFC 1195 Use of OSI IS-IS for routing in TCP/IP & dual environments
RFC 2763 Dynamic Hostname Exchange for IS-IS
RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS
RFC 2973 IS-IS Mesh Groups
RFC 3373 Three-Way Handshake for Intermediate System to Intermediate System (IS-IS) Point-to-Point Adjacencies
RFC 3567 Intermediate System to Intermediate System (ISIS) Cryptographic Authentication
RFC 3719 Recommendations for Interoperable Networks using IS-IS
RFC 3784 Intermediate System to Intermediate System (IS-IS) Extensions for Traffic Engineering (TE)
RFC 3787 Recommendations for Interoperable IP Networks
RFC 3847 Restart Signaling for IS-IS — GR helper
RFC 4205 for Shared Risk Link Group (SRLG) TLV
draft-ietf-isis-igp-p2p-over-lan-05.txt

IPSec
RFC 2401 Security Architecture for the Internet Protocol
RFC 2409 The Internet Key Exchange (IKE)
RFC 3706 IKE Dead Peer Detection
RFC 3947 Negotiation of NAT-Traversal in the IKE
RFC 3948 UDP Encapsulation of IPSec ESP Packets
draft-ietf-ipsec-iskmp-xauth-06.txt – Extended Authentication within ISAKMP/Oakley (XAUTH)
Standards and Protocols

to-Multipoint TE Label Switched Paths (LSPs)
RFC 5151 Inter-domain MPLS and GMPLS Traffic Engineering – RSVP-TE Extensions
RFC 5712 MPLS Traffic Engineering Soft Preemption
draft-newton-mpls-te-dynamic-overbooking-00 A Diffserv-TE Implementation Model to dynamically change booking factors during failure events
RFC 5817 Graceful Shutdown in GMPLS Traffic Engineering Networks

MPLS — OAM
RFC 4379 Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures
draft-ietf-mpls-p2mp-lsp-ping-06 Detecting Data Plane Failures in Point-to-Multipoint Multiprotocol Label Switching (MPLS) - Extensions to LSP Ping

RIP
RFC 1058 RIP Version 1
RFC 2082 RIP-2 MDS Authentication
RFC 2453 RIP Version 2

TCP/IP
RFC 768 UDP
RFC 1350 The TFTP Protocol (Rev. RFC 791 IP
RFC 792 ICMP
RFC 793 TCP
RFC 826 ARP
RFC 854 Telnet
RFC 951 BootP (rev)
RFC 1519 C IDR
RFC 1542 Clarifications and Extensions for the Bootstrap Protocol
RFC 1812 Requirements for IPv4 Routers
RFC 2347 TFTP option Extension
RFC 2328 TFTP Blocksize Option
RFC 2349 TFTP Timeout Interval and Transfer Size option
RFC 2401 Security Architecture for Internet Protocol
draft-ietf-bfd-mib-00.txt Bidirectional Forwarding Detection Management Information Base
RFC 5880 Bidirectional Forwarding Detection
RFC 5881 BFD IPv4 and IPv6 (Single Hop)
RFC 5883 BFD for Multipath Paths

VRP
RFC 2787 Definitions of Managed Objects for the Virtual Router Redundancy Protocol
RFC 3768 Virtual Router Redundancy Protocol

PPP
RFC 1332 PPP IPCP
RFC 1377 PPP OSINLCP
RFC 1638/2878PPP BCP
RFC 1661 PPP (rev RFC2151)
RFC 1662 PPP in HDLC-like Framing
RFC 1877 PPP Internet Protocol Control Protocol Extensions for Name Server Addresses
RFC 1989 PPP Link Quality Monitoring
RFC 1990 The PPP Multilink Protocol (MP)
RFC 1994 "PPP Challenge Handshake Authentication Protocol (CHAP)
RFC 2516 A Method for Transmitting PPP Over EthernetRFC 2615 PPP over SONET/SDH
RFC 2686 The Multi-Class Extension to Multi-Link PPP

Frame Relay
FRF.1.2 - PVC User-to-Network Interface (UNI) Implementation Agreement
FRF.5 - Frame Relay/ATM PVC Network Interworking Implementation
FRF2.2 - PVC Network-to- Network Interface (NNI) Implementation Agreement.
FRF.12 Frame Relay Fragmentation Implementation Agreement
FRF.16.1 Multilink Frame Relay UNI/NNI Implementation Agreement
ITU-T Q.933 Annex A - Additional procedures for Permanent Virtual Connection (PVC) status management

ATM
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