Alcatel-Lucent 7705

SERVICE AGGREGATION ROUTER OS | RELEASE 4.0

BASIC SYSTEM CONFIGURATION GUIDE

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List of Acronyms

Acronym	Expansion
2G	second generation wireless telephone technology
3DES	triple DES (data encryption standard)
3G	third generation mobile telephone technology
5620 SAM	5620 Service Aware Manager
7705 SAR	7705 Service Aggregation Router
7710 SR	7710 Service Router
7750 SR	7750 Service Router
9500 MPR	9500 Microwave Packet Radio
ABR	available bit rate area border router
AC	alternating current attachment circuit
ACK	acknowledge
ACL	access control list
ACR	adaptive clock recovery
ADP	automatic discovery protocol
AFI	authority and format identifier
AIS	alarm indication signal
ANSI	American National Standards Institute
Apipe	ATM VLL
APS	automatic protection switching
ARP	address resolution protocol
A/S	active/standby
AS	autonomous system

Acronym	Expansion
ASAP	any service, any port
ASBR	autonomous system boundary router
ASN	autonomous system number
ATM	asynchronous transfer mode
ATM PVC	ATM permanent virtual circuit
B3ZS	bipolar with three-zero substitution
Batt A	battery A
B-bit	beginning bit (first packet of a fragment)
Bellcore	Bell Communications Research
BFD	bidirectional forwarding detection
BGP	border gateway protocol
BITS	building integrated timing supply
BMCA	best master clock algorithm
BMU	broadcast, multicast, and unknown traffic Traffic that is not unicast. Any nature of multipoint traffic: • broadcast (that is, all 1s as the destination IP to represent all destinations within the subnet) • multicast (that is, traffic typically identified by the destination address, uses special destination address); for IP, the destination must be 224.0.0.0 to 239.255.255.255 • unknown (that is, the destination is typically a valid unicast address but the destination port/interface is not yet known; therefore, traffic needs to be forwarded to all destinations; unknown traffic is treated as broadcast)
BOF	boot options file
BPDU	bridge protocol data unit
BRAS	Broadband Remote Access Server
BSC	Base Station Controller
BSTA	Broadband Service Termination Architecture

Acronym	Expansion
BTS	base transceiver station
CAS	channel associated signaling
CBN	common bonding networks
CBS	committed buffer space
CC	control channel continuity check
CCM	continuity check message
CE	customer edge circuit emulation
CEM	circuit emulation
CES	circuit emulation services
CESoPSN	circuit emulation services over packet switched network
CFM	connectivity fault management
CIDR	classless inter-domain routing
CIR	committed information rate
CLI	command line interface
CLP	cell loss priority
CoS	class of service
CPE	customer premises equipment
Cpipe	circuit emulation (or TDM) VLL
CPM	Control and Processing Module (CPM is used instead of CSM when referring to CSM filtering to align with CLI syntax used with other SR products). CSM management ports are referred to as CPM management ports in the CLI.
CPU	central processing unit
CRC	cyclic redundancy check
CRON	a time-based scheduling service (from chronos = time)

Acronym	Expansion
CSM	Control and Switching Module
CSNP	complete sequence number PDU
CSPF	constrained shortest path first
C-TAG	customer VLAN tag
CV	connection verification customer VLAN (tag)
CW	control word
DC	direct current
DC-C	DC return - common
DCE	data communications equipment
DC-I	DC return - isolated
DCO	digitally controlled oscillator
DDoS	distributed DoS
DES	data encryption standard
DF	do not fragment
DHB	decimal, hexadecimal, or binary
DHCP	dynamic host configuration protocol
DHCPv6	dynamic host configuration protocol for IPv6
DIS	designated intermediate system
DM	delay measurement
DNS	domain name server
DoS	denial of service
dot1p	IEEE 802.1p bits, found in Ethernet or VLAN ingress packet headers and used to map traffic to up to eight forwarding classes
dot1q	IEEE 802.1q encapsulation for Ethernet interfaces
DPI	deep packet inspection

Acronym	Expansion
DPLL	digital phase locked loop
DSCP	differentiated services code point
DSL	digital subscriber line
DSLAM	digital subscriber line access multiplexer
DTE	data termination equipment
DU	downstream unsolicited
DUID	DHCP unique identifier
DV	delay variation
e911	enhanced 911 service
EAP	Extensible Authentication Protocol
EAPOL	EAP over LAN
E-bit	ending bit (last packet of a fragment)
ECMP	equal cost multi-path
EFM	Ethernet in the first mile
EGP	exterior gateway protocol
EIA/TIA-232	Electronic Industries Alliance/Telecommunications Industry Association Standard 232 (also known as RS-232)
ELER	egress label edge router
E&M	ear and mouth earth and magneto exchange and multiplexer
Epipe	Ethernet VLL
EPL	Ethernet private line
ERO	explicit route object
ESD	electrostatic discharge
ESMC	Ethernet synchronization message channel
ETE	end-to-end

Acronym	Expansion
ETH-CFM	Ethernet connectivity fault management (IEEE 802.1ag)
EVDO	evolution - data optimized
EVPL	Ethernet virtual private link
EXP bits	experimental bits (currently known as TC)
FC	forwarding class
FCS	frame check sequence
FDB	forwarding database
FDL	facilities data link
FEAC	far-end alarm and control
FEC	forwarding equivalence class
FF	fixed filter
FIB	forwarding information base
FIFO	first in, first out
FNG	fault notification generator
FOM	figure of merit
FRR	fast reroute
FTN	FEC-to-NHLFE
FTP	file transfer protocol
GFP	generic framing procedure
GigE	Gigabit Ethernet
GRE	generic routing encapsulation
GSM	Global System for Mobile Communications (2G)
HCM	high capacity multiplexing
HDB3	high density bipolar of order 3
HEC	header error control
HMAC	hash message authentication code

Acronym	Expansion
HSDPA	high-speed downlink packet access
HSPA	high-speed packet access
HVPLS	hierarchical virtual private line service
IANA	internet assigned numbers authority
IBN	isolated bonding networks
ICMP	Internet control message protocol
ICMPv6	Internet control message protocol for IPv6
ICP	IMA control protocol cells
IEEE	Institute of Electrical and Electronics Engineers
IEEE 1588v2	Institute of Electrical and Electronics Engineers standard 1588-2008
IES	Internet Enhanced Service
IETF	Internet Engineering Task Force
IGP	interior gateway protocol
ILER	ingress label edge router
ILM	incoming label map
IMA	inverse multiplexing over ATM
IOM	input/output module
IP	Internet Protocol
IPCP	Internet Protocol Control Protocol
IPIP	IP in IP
Ipipe	IP interworking VLL
IPoATM	IP over ATM
IS-IS	Intermediate System-to-Intermediate System
IS-IS-TE	IS-IS-traffic engineering (extensions)
ISO	International Organization for Standardization

Acronym	Expansion
LB	loopback
lbf-in	pound force inch
LBM	loopback message
LBO	line buildout
LBR	loopback reply
LCP	link control protocol
LDP	label distribution protocol
LER	label edge router
LFIB	label forwarding information base
LIB	label information base
LLDP	link layer discovery protocol
LLDPDU	link layer discovery protocol data unit
LLF	link loss forwarding
LLID	loopback location ID
LM	loss measurement
LSA	link-state advertisement
LSDB	link-state database
LSP	label switched path link-state PDU (for IS-IS)
LSR	label switch router link-state request
LSU	link-state update
LT	linktrace
LTE	line termination equipment
LTM	linktrace message
LTN	LSP ID to NHLFE

Acronym	Expansion
LTR	linktrace reply
MA	maintenance association
MAC	media access control
MA-ID	maintenance association identifier
MBB	make-before-break
MBS	maximum buffer space maximum burst size media buffer space
MBSP	mobile backhaul service provider
MC-MLPPP	multi-class multilink point-to-point protocol
MD	maintenance domain
MD5	message digest version 5 (algorithm)
MDA	media dependent adapter
MDDB	multidrop data bridge
MDL	maintenance data link
ME	maintenance entity
MED	multi-exit discriminator
MEF	Metro Ethernet Forum
MEG	maintenance entity group
MEG-ID	maintenance entity group identifier
MEN	Metro Ethernet network
MEP	maintenance association end point
MFC	multi-field classification
MHF	MIP half function
MIB	management information base
MIP	maintenance association intermediate point

Acronym	Expansion
MIR	minimum information rate
MLPPP	multilink point-to-point protocol
MP	merge point multilink protocol
MP-BGP	multiprotocol border gateway protocol
MPLS	multiprotocol label switching
MPR	see 9500 MPR
MRRU	maximum received reconstructed unit
MRU	maximum receive unit
MSDU	MAC Service Data Unit
MS-PW	multi-segment pseudowire
MTIE	maximum time interval error
MTSO	mobile trunk switching office
MTU	maximum transmission unit multi-tenant unit
M-VPLS	management virtual private line service
MW	microwave
N·m	newton meter
NBMA	non-broadcast multiple access (network)
NE	network element
NET	network entity title
NHLFE	next hop label forwarding entry
NHOP	next-hop
NLRI	network layer reachability information
NNHOP	next next-hop
NNI	network-to-network interface

Acronym	Expansion
Node B	similar to BTS but used in 3G networks — term is used in UMTS (3G systems) while BTS is used in GSM (2G systems)
NSAP	network service access point
NSSA	not-so-stubby area
NTP	network time protocol
OAM	operations, administration, and maintenance
OAMPDU	OAM protocol data units
OC3	optical carrier, level 3
ORF	outbound route filtering
OS	operating system
OSI	Open Systems Interconnection (reference model)
OSINLCP	OSI Network Layer Control Protocol
OSPF	Open Shortest Path First
OSPF-TE	OSPF-traffic engineering (extensions)
OSS	operations support system
OSSP	Organization Specific Slow Protocol
OTP	one time password
PADI	PPPoE active discovery initiation
PADR	PPPoE active discovery request
PAE	port authentication entities
PCP	priority point code
PDU	protocol data units
PDV	packet delay variation
PDVT	packet delay variation tolerance
PE	provider edge router
PHB	per-hop behavior

Acronym	Expansion
PHY	physical layer
PID	protocol ID
PIR	peak information rate
PLCP	Physical Layer Convergence Protocol
PLR	point of local repair
POP	point of presence
POS	packet over SONET
PPP	point-to-point protocol
PPPoE	point-to-point protocol over Ethernet
PRC	primary reference clock
PSN	packet switched network
PSNP	partial sequence number PDU
PTP	precision time protocol performance transparency protocol
PVC	permanent virtual circuit
PVCC	permanent virtual channel connection
PW	pseudowire
PWE	pseudowire emulation
PWE3	pseudowire emulation edge-to-edge
QL	quality level
QoS	quality of service
RADIUS	Remote Authentication Dial In User Service
RAN	Radio Access Network
RBS	robbed bit signaling
RD	route distinguisher
RDI	remote defect indication

Acronym	Expansion
RED	random early discard
RESV	reservation
RIB	routing information base
RJ-45	registered jack 45
RNC	Radio Network Controller
RRO	record route object
RS-232	Recommended Standard 232 (also known as EIA/TIA-232)
RSHG	residential split horizon group
RSTP	Rapid Spanning Tree Protocol
RSVP-TE	resource reservation protocol - traffic engineering
RT	receive/transmit
RTM	routing table manager
RTN	battery return
RTP	real-time protocol
R&TTE	Radio and Telecommunications Terminal Equipment
RTU	remote terminal unit
RU	rack unit
SAA	service assurance agent
SAP	service access point
SAR-8	7705 Service Aggregation Router - 8-slot chassis
SAR-18	7705 Service Aggregation Router - 18-slot chassis
SAR-F	7705 Service Aggregation Router - fixed form-factor chassis
SAToP	structure-agnostic TDM over packet
SCADA	surveillance, control and data acquisition
SCP	secure copy
SD	signal degrade

Acronym	Expansion
SDH	synchronous digital hierarchy
SDI	serial data interface
SDP	service destination point
SE	shared explicit
SF	signal fail
SFP	small form-factor pluggable (transceiver)
SGT	self-generated traffic
SHA-1	secure hash algorithm
SHG	split horizon group
SIR	sustained information rate
SLA	Service Level Agreement
SNMP	Simple Network Management Protocol
SNPA	subnetwork point of attachment
SNTP	simple network time protocol
SONET	synchronous optical networking
S-PE	switching provider edge router
SPF	shortest path first
SPT	shortest path tree
SR	service router (includes 7710 SR, 7750 SR)
SRLG	shared risk link group
SSH	secure shell
SSM	synchronization status messaging
SSU	system synchronization unit
S-TAG	service VLAN tag
STM1	synchronous transport module, level 1
SVC	switched virtual circuit

Acronym	Expansion
SYN	synchronize
TACACS+	Terminal Access Controller Access-Control System Plus
TC	traffic class (formerly known as EXP bits)
TCP	transmission control protocol
TDEV	time deviation
TDM	time division multiplexing
TE	traffic engineering
TFTP	trivial file transfer protocol
TLDP	targeted LDP
TLV	type length value
ToS	type of service
T-PE	terminating provider edge router
TPID	tag protocol identifier
TPMR	two-port MAC relay
TTL	time to live
TTM	tunnel table manager
U-APS	unidirectional automatic protection switching
UBR	unspecified bit rate
UDP	user datagram protocol
UMTS	Universal Mobile Telecommunications System (3G)
UNI	user-to-network interface
V.35	V-series Recommendation 35
VC	virtual circuit
VCC	virtual channel connection
VCCV	virtual circuit connectivity verification
VCI	virtual circuit identifier

Acronym	Expansion
VID	VLAN ID
VLAN	virtual LAN
VLL	virtual leased line
VoIP	voice over IP
Vp	peak voltage
VP	virtual path
VPC	virtual path connection
VPI	virtual path identifier
VPLS	virtual private LAN service
VPN	virtual private network
VPRN	virtual private routed network
VRF	virtual routing and forwarding table
VSE	vendor-specific extension
VSO	vendor-specific option
WCDMA	wideband code division multiple access (transmission protocol used in UMTS networks)
WRED	weighted random early discard
WTR	wait to restore

Preface

About This Guide

This guide describes system concepts and provides configuration explanations and examples to configure the 7705 SAR boot option file (BOF) and perform system and file management functions.

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

Audience

This guide is intended for network administrators who are responsible for configuring 7705 SAR routers. It is assumed that the network administrators have an understanding of networking principles and configurations. Protocols, standards, and processes described in this guide 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 7705 SAR OS documentation set is composed of the following guides:

- 7705 SAR OS Basic System Configuration Guide

  This guide describes basic system configurations and operations.
- 7705 SAR OS System Management Guide

  This guide describes system security and access configurations as well as event logging and accounting logs.
- 7705 SAR OS Interface Configuration Guide

  This guide describes card and port provisioning.
- 7705 SAR OS Router Configuration Guide

  This guide describes logical IP routing interfaces, IP-based filtering, and routing policies.
- 7705 SAR OS MPLS Guide

  This guide describes how to configure Multiprotocol Label Switching (MPLS), Resource Reservation Protocol for Traffic Engineering (RSVP-TE), and Label Distribution Protocol (LDP).
- 7705 SAR OS Services Guide

  This guide describes how to configure service parameters such as service access points (SAPs), service destination points (SDPs), customer information, and user services.
- 7705 SAR OS Quality of Service Guide

  This guide describes how to configure Quality of Service (QoS) policy management.
- 7705 SAR OS Routing Protocols Guide

  This guide provides an overview of dynamic routing concepts and describes how to configure them.
- 7705 SAR OS OAM and Diagnostics Guide

  This guide provides information on Operations, Administration and Maintenance (OAM) tools.

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Getting Started

In This Chapter

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

Alcatel-Lucent 7705 SAR System Configuration Process

Table 1 lists the tasks necessary to perform system and file management functions and to configure boot option files (BOF).

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.

Table 1: Basic Configuration Process

Area	Task	Chapter
CLI Usage	Learning the CLI structure	CLI Usage on page 35
	Basic CLI commands	Basic CLI Commands on page 40
	Configure environment commands	CLI Environment Commands on page 43
	Configure monitor commands	CLI Monitor Commands on page 43
Operational functions	Directory and file management	File System Management on page 97
Boot options	Configure boot option files (BOF)	Boot Options on page 121

Table 1: Basic Configuration Process (Continued)

Area	Task	Chapter
System configuration	Configure system functions, including host name, address, domain name, and time parameters	System Management on page 175
Reference	List of IEEE, IETF, and other proprietary entities	Standards and Protocol Support on page 393

Notes on 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F

The 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F run the same operating system software. The main difference between the products is their hardware platforms.

The 7705 SAR-8 is an 8-slot chassis that supports 2 CSMs, a Fan module, and 6 adapter cards. The 7705 SAR-18 chassis has 18 slots; in Release 4.0, it supports 2 CSMs, a Fan module, an Alarm module, and 12 adapter cards.

The 7705 SAR-F chassis has a fixed hardware configuration. The 7705 SAR-F replaces the CSM, Fan module, and the 16-port T1/E1 ASAP Adapter card and 8-port Ethernet Adapter card with an all-in-one unit that provides comparable functional blocks, as detailed in Table 2.

The fixed configuration of the 7705 SAR-F means that provisioning the router at the "card slot" and "type" levels is preset and is not user-configurable. Operators begin configurations at the port level.

Note: Unless stated otherwise, references to the terms "Adapter card" and "CSM" throughout the 7705 SAR OS documentation set include the equivalent functional blocks on the 7705 SAR-F.

Table 2: 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F Comparison

7705 SAR-8, 7705 SAR-18	7705 SAR-F	Notes
CSM	Control and switching functions	The control and switching functions include the console and management interfaces, the alarm and fan functions, the synchronization interfaces, system LEDs, and so on.
Fan module	Integrated with the control and switching functions	

Table 2: 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F Comparison (Continued)

7705 SAR-8, 7705 SAR-18	7705 SAR-F	Notes
16-port T1/E1 ASAP Adapter card	16 individual T1/E1 ports on the faceplate	The T1/E1 ports on the 7705 SAR-F are equivalent to the T1/E1 ports on the 16-port T1/E1 ASAP Adapter card, version 1, except that the 16 T1/E1 ports on the 7705 SAR-F support multiple synchronization sources to support two timing references. The 16-port T1/E1 ASAP Adapter card, version 2, also supports two timing references. On the 7705 SAR-8 and 7705 SAR-18, the CLI indicates the MDA type for the 16-port T1/E1 ASAP Adapter card as `a16-chds1` for version 1 and `a16-chds1v2` for version 2. On the 7705 SAR-F, the CLI indicates the MDA type for the 7705 SAR-F ports as `i16-chds1`.
8-port Ethernet Adapter card	8 individual Ethernet ports on the faceplate	The –48 VDC versions of the 7705 SAR-8 support two versions of the 8-port Ethernet Adapter card, with version 2 having additional support for Synchronous Ethernet. The +24 VDC version of the 7705 SAR-8 supports only version 2 of the 8-port Ethernet Adapter card. The 7705 SAR-18 supports only version 2 of the card. The Ethernet ports on the 7705 SAR-F are functionally equivalent to the Ethernet ports on version 2 of the 8-port Ethernet Adapter card and support multiple synchronization sources to support two timing references. On the 7705 SAR-8, the CLI indicates the MDA type for the 8-port Ethernet Adapter card as `a8-eth` or `a8-ethv2`. On the 7705 SAR-18, the CLI indicates the MDA type as `a8-ethv2`. On the 7705 SAR-F, the CLI indicates the MDA type for the 7705 SAR-F Ethernet ports as `i8-eth`.
Requires user configuration at card (IOM) and MDA (adapter card) levels	Configuration at card (IOM) and MDA (adapter card) levels is preset and users cannot change these types	

CLI Usage

In This Chapter

This chapter provides information about using the Command Line Interface (CLI).

Topics in this chapter include:

CLI Structure

Alcatel-Lucent's 7705 SAR 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 7705 SAR routers.

The 7705 SAR 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 that related commands with the same scope are at the same level or in the same context. Sublevels or subcontexts have related commands with a more refined scope.

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

Figure 1: Root Commands

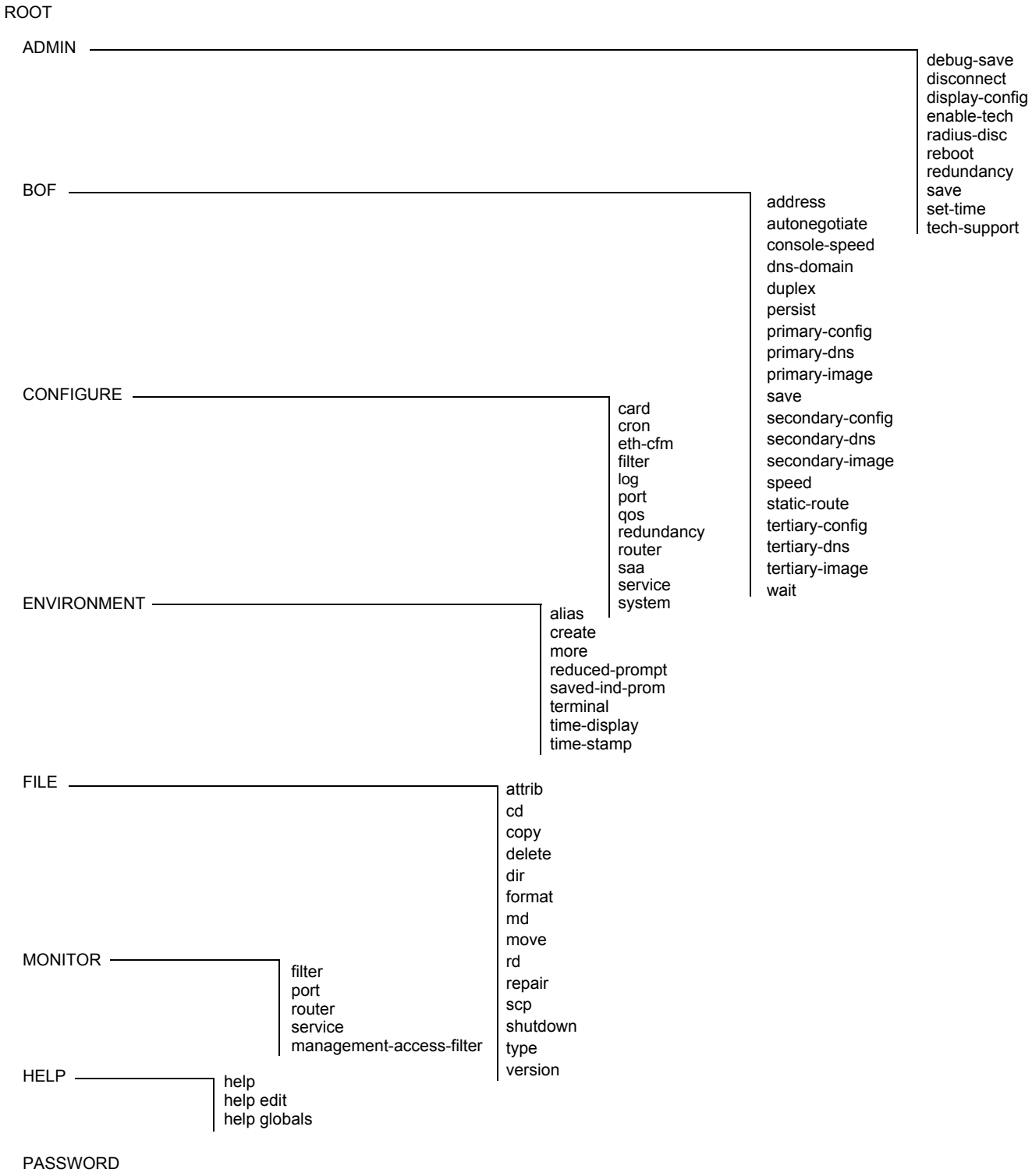
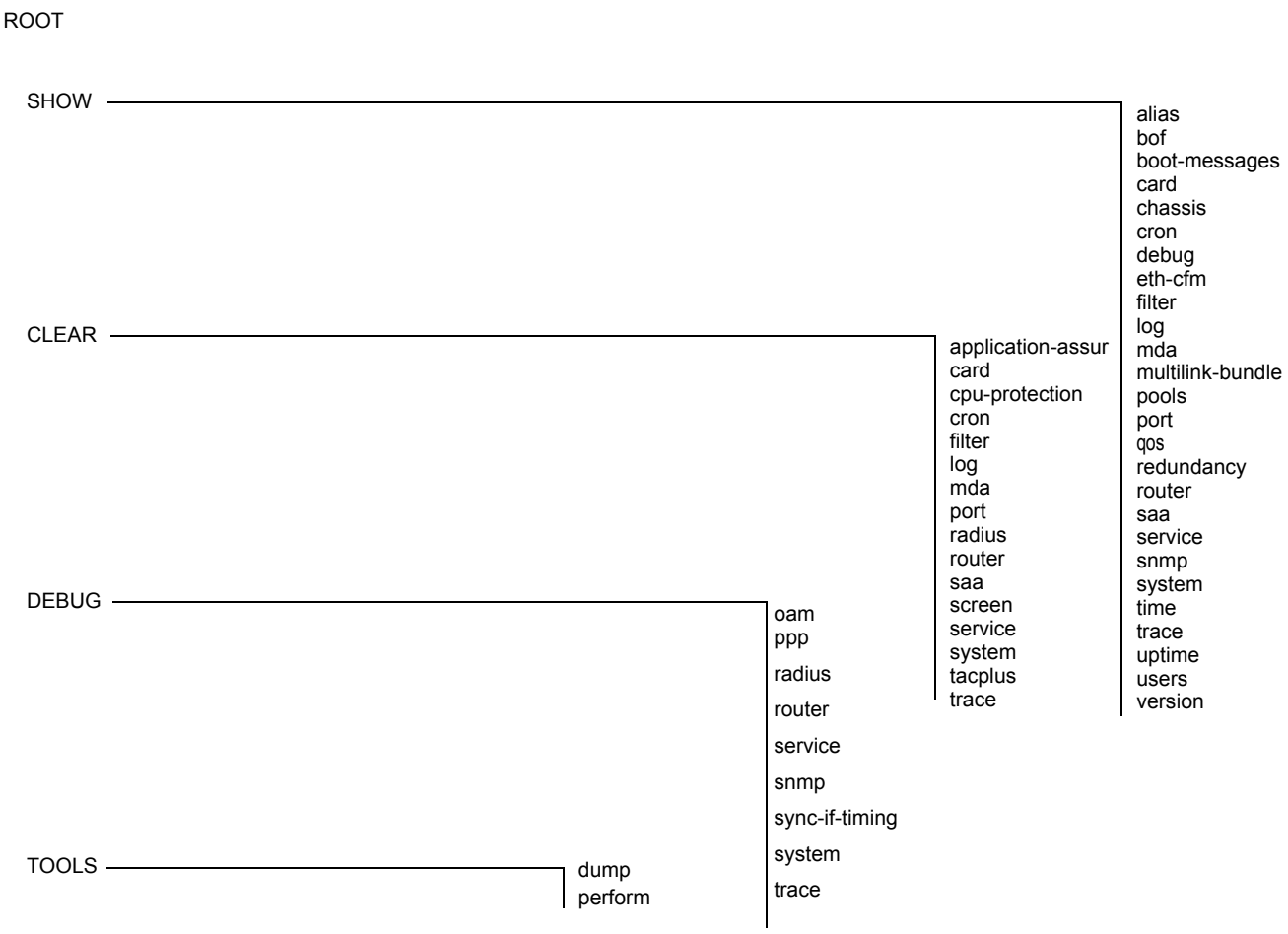


Figure 2: Operational Root Commands



Navigating in the CLI

The following sections describe additional navigational and syntax information:

- CLI Contexts
- Basic CLI Commands
- CLI Environment Commands
- CLI Monitor Commands

CLI Contexts

Use the CLI to access, configure, and manage Alcatel-Lucent's 7705 SAR 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 CSM slot displays in the command prompt at the beginning of the CLI context.

```
A:ALU-12# config
    A:ALU-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 of navigating to a service SDP ingress level:

Method 1: Enter all commands on a single line.

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

Method 2: Enter each command on a separate line.

```
A:ALU-12>config# service
A:ALU-12>config>service# cpipe 6
*A:ALU-12>config>service>cpipe# spoke-sdp 2:6
*A:ALU-12>config>service>cpipe>spoke-sdp# ingress
*A:ALU-12>config>service>cpipe>spoke-sdp>ingress#
```

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

```
*A:ALU-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 3.

Table 3: Console Control Commands

Command	Description	Page
`<Ctrl-c>`	Aborts the pending command	
`<Ctrl-z>`	Terminates the pending command line and returns to the ROOT context	
`back`	Navigates the user to the parent context	63
`clear`	Clears statistics for a specified entity or clears and resets the entity	63
`echo`	Echoes the text that is typed in. Primary use is to display messages to the screen within an `exec` file.	64
`exec`	Executes the contents of a text file as if they were CLI commands entered at the console	64
`exit`	Returns the user to the previous higher context	64
`exit all`	Returns the user to the ROOT context	66
`help`	Displays help in the CLI	66
`?`	Displays all available options	
`history`	Displays a list of the most recently entered commands	67
`info`	Displays the running configuration for a configuration context	68
`logout`	Terminates the CLI session	69
`oam`	Provides OAM test suite options. See the 7705 SAR OS OAM and Diagnostics Guide.	
`password`	Changes the user CLI login password. The password can only be changed at the ROOT level.	69
`ping`	Verifies the reachability of a remote host	70

Table 3: Console Control Commands (Continued)

Command	Description	Page
pwc	Displays the present or previous working context of the CLI session	72
sleep	Causes the console session to pause operation (sleep) for 1 second or for the specified number of seconds. Primary use is to introduce a pause within the execution of an exec file.	72
ssh	Opens a secure shell connection to a host	73
telnet	Telnets to a host	73
traceroute	Determines the route to a destination address	74
tree	Displays a list of all commands at the current level and all sublevels	75
write	Sends a console message to a specific user or to all users with active console sessions	75

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

```
*A:ALU-12>config>service# help globals
    back            - Go back a level in the command tree
    echo            - Echo the text that is typed in
    enable-admin    - Enable the user to become a system administrator
    exec            - Execute a file - use -echo to show the commands and
    prompts on the screen
    exit            - Exit to intermediate mode - use option all to exit to
     root prompt
    help            - Display help
    history         - Show command history
    info            - Display configuration for the present node
    logout          - Log off this system
    oam             + OAM Test Suite
    ping            - Verify the reachability of a remote host
    pwc             - Show the present working context
    sleep           - Sleep for specified number of seconds
    ssh             - SSH to a host
    telnet          - Telnet to a host
    traceroute      - Determine the route to a destination address
    tree            - Display command tree structure from the context of
                      execution
    write           - Write text to another user
*A:ALU-12>config>service#
```

Table 4 lists command syntax symbols. Where the syntax differs between the CLI and the Command Reference sections of the 7705 SAR guides is noted in the table.

Table 4: Command Syntax Symbols

Symbol	Description	Example
|	A vertical line (pipe) indicates that one of the parameters within the brackets or braces is required	`tcp-ack {true | false}`
[ ]	Brackets indicate optional parameters	`router [router-name]`
< >	Angle brackets indicate that the user must enter a value for the parameter inside the brackets (**Note**: angle brackets are not used in the Command Reference section but are used on the CLI; italics are used in the Command Reference section to indicate the same rule)	`interface <interface-name>`
{ }	Braces indicate that one of the parameters must be selected	`default-action {drop | forward}`
[{ }]	Braces within square brackets indicate that the parameters are optional, but if one is selected, the information within the braces is required; for example, if you select the peer parameter, you must enter the keyword "peer" (ip-address is optional)	`discovery [{peer [ip-address]} | {interface [ip-int-name]}]`
Bold	In the Command Reference section (not on the CLI), bold indicates commands and keywords that the user must enter exactly as shown	**`scope {inclusive | template}`**
Italic	In the Command Reference section (not on the CLI), italics indicate parameters that the user must enter a value for	**`dscp`** *`dscp-name`*
n/a	In the Command Reference section, **n/a** in the Default field of a command indicates that a default value is not applicable for the command	

CLI Environment Commands

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

Table 5: CLI Environment Commands

Command	Description	Page
`alias`	Enables the substitution of a command line by an alias	76
`create`	Enables or disables the use of a `create` parameter check	76
`more`	Configures whether CLI output should be displayed one screen at a time awaiting user input to continue	77
`reduced-prompt`	Configures the maximum number of higher-level CLI context nodes to display by name in the CLI prompt for the current CLI session	77
`saved-ind-prompt`	Saves the indicator in the prompt	78
`terminal`	Configures the terminal screen length for the current CLI session	78
`time-display`	Specifies whether time should be displayed in local time or UTC	79
`time-stamp`	Specifies whether a timestamp should be displayed before the prompt	79

CLI Monitor Commands

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

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

The `<Ctrl-c>` keystroke interrupts a monitoring process. Monitor command configurations cannot be saved. You must enter the command for each monitoring session. If the maximum limits are configured, you can monitor the statistical information for a maximum of 60 × 999 s (approximately 1000 minutes, or 16.6 hours).

The CLI monitor commands are listed in Table 6.

Table 6: CLI Monitor Commands

Command	Description	Page
`filter`	Enables IP and MAC filter monitoring at a configurable interval until that count is reached	80
`management-access-filter`	Monitors commands for management access filters	82
`port`	Enables port traffic monitoring. The specified port(s) statistical information displays at the configured interval until the configured count is reached.	84
`router`	Enables virtual router instance monitoring at a configurable interval until that count is reached	87
`service`	Monitors commands for a particular service	92

Getting Help in the CLI

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

Table 7: Online Help Commands

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

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

Figure 3 displays a partial list of the `tree` and `tree detail` command output entered at the `config` level.

Figure 3: CLI Display for CLI Tree Help

```
*A:ALU-12>config# tree
configure
+---card
|  +---card-type
|  +---mda
|  |  +---clock-mode
|  |  +---mda-type
|  |  +---network
|  |  |  +---ingress
|  |  |  |  +---queue-policy
|  |  +---shutdown
|  +---shutdown
+---cron
|  +---action
|  |  +---expire-time
|  |  +---lifetime
|  |  +---max-completed
|  |  +---results|
|  |  +---script
|  |  +---shutdown
|  +---schedule
|  |  +---action|
|  |  +---count
|  |  +---day-of-month
|  |  +---description
|  |  +---end-time
|  |  +---hour
|  |  +---interval
|  |  +---minute
|  |  +---month
|  |  +---shutdown
|  |  +---type
|  |  +---weekday
|  +---script
|  |  +---description
|  |  +---location
|  |  +---shutdown
+---filter
|  +---ip-filter
|  |  +---default-action
|  |  +---description
|  |  +---entry
|  |  |  +---action
|  |  |  +---description
|  |  |  +---match
|  |  |  |  +---dst-ip
|  |  |  |  +---dst-port
|  |  |  |  +---icmp-code
|  |  |  |  +---icmp-type
|  |  |  |  +---src-ip
|  |  |  |  +---src-port
|  |  +---renum
|  |  +---scope
```

```
*A:ALU-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>
|  |  +---clock-mode adaptive
|  |  +---mda-type <mda-type>
|  |  |  no mda-type
|  |  +---network
|  |  |  +---ingress
|  |  |  |  +---no queue-policy
|  |  |  |  |  queue-policy <name>
|  |  +---no shutdown
|  |  |  shutdown
|  +---no shutdown
|  |  shutdown
+---cron
|  +---action <action-name> [owner <action-owner>]
|  |  no action <action-name> [owner <action-owner>]
|  |  +---expire-time {<seconds>|forever}
|  |  +---lifetime {<seconds>|forever}
|  |  +---max-completed <unsigned>
|  |  +---no results
|  |  |  results <file-url>
|  |  +---no script
|  |  |  script <script-name> [owner <script-owner>]
|  |  +---no shutdown
|  |  |  shutdown
|  +---no schedule <schedule-name> [owner <schedule-owner>]
|  |  schedule <schedule-name> [owner <schedule-owner>]
|  |  +---action <action-name> [owner <action-owner>]
|  |  |  no action
|  |  +---count <number>
|  |  |  no count
|  |  +---day-of-month {<day-number> [..<day-number>]|all}
|  |  |  no day-of-month
|  |  +---description <description-string>
|  |  |  no description
|  |  +---end-time [<date>|<day-name>] <time>
|  |  |  no end-time
|  |  +---hour {<hour-number> [..<hour-number>]|all}
|  |  |  no hour
|  |  +---interval <seconds>
|  |  |  no interval
|  |  +---minute {<minute-number> [..<minute-number>]|all}
|  |  |  no minute
```

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:ALU-1>config>router# indicates that the active CSM is CSM A, the user is on the device with hostname ALU-1, and the current context is configure router. 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 that the context is an existing context. A $ at the end of the prompt indicates that 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 system command reduced-prompt #_of_levels allows the user to control the number of levels displayed in the prompt.

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

```
*A:ALU-1>config>router>mpls# authentication-key "router#1"
```

This example shows a security configuration over a network link. Because the string "router#1" is enclosed within double quotes, it is recognized as a password for the link.

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

Displaying Configuration Contexts

The `info` and `info detail` commands display the 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:ALU-1>config>router# interface system
*A:ALU-1>config>router>if# info
----------------------------------------------
            address 10.221.221.72/32
----------------------------------------------
*A:ALU-1>config>router>if#


*A:ALU-1>config>router>if# info detail
----------------------------------------------
            address 10.221.221.72/32
            no description
            no arp-timeout
            icmp
                mask-reply
                unreachables 100 10
                ttl-expired 100 10
            exit
            no ntp-broadcast
            no shutdown
            no bfd
----------------------------------------------
*A:ALU-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 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

The following sections describe additional information on 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 spacebar is pressed. When typing a command, the <Tab> key or spacebar invokes auto-completion. If the keystrokes entered are sufficient to identify a specific command, auto-completion completes the command. If the letters are not sufficient to identify a specific command, pressing the <Tab> key or spacebar displays 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:ALU-12>config>router# static-route ?
- [no] static-route {<ip-prefix/prefix-length> | <ip-prefix> <netmask>} [metric
<metric>] [enable | disable] next-hop <ip-address | ip-int-name> [bfd-enable]
- [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:ALU-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 8 lists the command editing keystrokes.

Table 8: Command Editing Keystrokes

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

Absolute Paths

CLI commands can be executed in any context by specifying the full path from the CLI root. To execute an out-of-context command, enter a forward slash "/" or backward slash "\" at the beginning of the command line. The commands are interpreted as absolute paths. Spaces between the slash and the first command will return an error.

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

or

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

History

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

```
*A:ALU-1# history
    1 environment terminal length 48
    2 show version
    3 configure port 1/1/1
    4 info
    5 show port 1/1/1
    6 \con port 1/1/1
    7 \configure router mpls
    8 info
    9 \configure system login-control
    10 info
    11 history
*A:ALU-1# !2
*A:ALU-1# show version
TiMOS-B-0.0.I322 both/hops ALCATEL SAR 7705
Copyright (c) 2000-2008 Alcatel-Lucent.All rights reserved.
All use subject to applicable license agreements.
Built on Wed Jan 16 01:05:13 EST 2008 by csabuild in /rel0.0/I322/panos/main
*A:ALU-1#
```

Entering Numerical Ranges

The 7705 SAR 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 on MDA 1. A port is denoted with "*slot/mda/port*", where *slot* identifies the IOM card slot ID (always 1), *mda* is the MDA number and *port* is the port number. To shut down ports 1 through 10 on Slot 1 and MDA 1, the command is entered as follows:

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

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

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

Table 9: CLI Range Use Limitations

Limitation	Description
Only a single range can be specified	It is not possible to shut down ports 1 through 10 on MDA 1 and MDA 2, as the command would look like `configure port 1/[1..2]/[1..10]` and requires two ranges in the command: [1..2] for the MDA and [1..10] for the port number

Ranges within quotation marks are interpreted literally	In the 7705 SAR OS 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 7705 SAR OS CLI allow the configuration of a descriptive string. If the string is more than one word and includes spaces, it must be enclosed in quotation marks. A range that is enclosed in quotes is also treated literally. For example,
	`configure router interface "A[1..10]" no shutdown`
	creates a single router interface with the name "A[1..10]". However, a command such as:
	`configure router interface A[1..10] no shutdown`
	creates 10 interfaces with names A1, A2 .. A10.

Table 9: CLI Range Use Limitations (Continued)

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

Pipe/Match

The 7705 SAR OS supports the pipe feature to search one or more files for a given character string or pattern.

Match syntax:

`match [ignore-case] [invert-match] [post-lines` *num-lines*`] [max-count` *num-matches*`] [expression]` *pattern*

where:

num-lines: 1 to 2147483647

num-matches: 1 to 2147483647

pattern:string or regular expression

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:ALU-1# admin display-config | match post-lines 5 max-count 2 expression "snmp"

        snmp
        exit
        login-control
            idle-timeout disable
            pre-login-message "csasim2 - " name
        exit
            snmp
                view "testview" subtree "1"
                    mask ff
                exit
                view "testview" subtree "1.3.6.1.2"
                    mask ff type excluded
*A:ALU-1#
```

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

Table 10: Pipe/Match Characters

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

Table 10: Pipe/Match Characters (Continued)

String	Description
+	The preceding item is matched one or more times
-	Used between start and end of a range
\	An escape character to indicate that the following character is a match criteria and not a grouping delimiter

Table 11 identifies the special character options.

Table 11: Special Characters

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

Redirection

The 7705 SAR 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> > cf3:/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+" > cf3:/ping/time.txt
```

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

Basic Command Reference

Command Hierarchies

Basic CLI Commands

— **back**
— **clear**
— **echo** [*text-to-echo*] [*extra-text-to-echo*] [*more-text*]
— **exec** [**-echo**] [**-syntax**] {*filename* | <<[*eof-marker-string*]}
— **enable-admin**
— **exit** [**all**]
— **help**
— **help edit**
— **help globals**
— **help special-characters**
— **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*] [**-l** *username*] [**-v** *SSH-version*] [**router** *router-instance*]
— **telnet** [*ip-address* | *dns-name*] [*port*] [**router** *router-instance*]
— **traceroute** {*ip-address* | *dns-name*}[**ttl** *ttl*] [**wait** *milliseconds*] [**no-dns**] [**source** *ip-address*] [**tos** *type-of-service*] [**router** *router-instance*]
— **tree** [**detail**]
— **write** {*user* | **broadcast**} *message-string*

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}
        — [no] time-stamp
```

Monitor Commands

```
monitor
    — filter
        — ip ip-filter-id entry entry-id [interval seconds] [repeat repeat] [absolute | rate]
        — ipv6 ip-filter-id entry entry-id [interval seconds] [repeat repeat] [absolute | rate]
    — management-access-filter
        — ip entry entry-id [interval seconds] [repeat repeat] [absolute | rate]
        — ipv6 entry entry-id [interval seconds] [repeat repeat] [absolute | rate]
    — port port-id [port-id...(up to 5 max)] [interval seconds] [repeat repeat] [absolute | rate]
    — router router-instance
        — ldp
            — session ldp-id [ldp-id...(up to 5 max)] [interval seconds] [repeat repeat] [absolute
              | rate]
            — statistics [interval seconds] [repeat repeat] [absolute | rate]
    — service
        — id service-id
            — sap sap-id [interval seconds] [repeat repeat] [absolute | rate]
            — sdp {sdp-id | far-end ip-address} [interval seconds] [repeat repeat] [absolute |
              rate]
```

Show Commands

```
show
    — alias
```

Command Descriptions

Basic CLI Commands

enable-admin

Syntax **enable-admin**

Context <global>

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

The **enable-admin** command 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 an example of the **password** command usage.

Example:
```
config>system>security#password
security>password# admin-password test1234 hash
security>password# aging 365
security>password# minimum-length 8
security>password# attempts 5 time 5 lockout 20
security>password# authentication-order radius tacplus
local
security>password# enable-admin
Password: test1234
security>password#
```

The following example displays the password configuration:

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

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

- **show users** – administrator can learn which users are in this mode
- enter the **enable-admin** command again at the root prompt and an error message will be returned

```
A:ALU-1# show users
===============================================================================
User              Type    Login time                          Idle time
  From
===============================================================================
admin             Console        --                           0d 19:42:22
  --
admin             Telnet  08APR2008 08:35:23                  0d 00:00:00
  138.120.141.147
-------------------------------------------------------------------------------
Number of users : 2
===============================================================================
A:ALU-1#
A:ALU-1# enable-admin
MINOR: CLI Already in admin mode.
A:ALU-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 mpls** 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 an I/O module in a specified slot

cron — clears CRON history

filter — clears IP filter counters

log — closes and reinitializes the log specified by log-id

mda — reinitializes the specified MDA in a particular slot

port — clears port statistics

radius — clears the RADIUS server state

router — clears router commands affecting the router instance in which they are entered

Values arp, authentication, bfd, forwarding-table, interface, ldp, mpls

saa — clears the SAA test results

screen — clears the console or Telnet screen

service — clears service ID and statistical entities

system — clears (re-enables) a previously failed reference

tacplus — clears the TACACS+ server state

trace — clears the trace log

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-marker-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 —** echoes the contents of the **exec** file to the session screen as it executes

Default echo disabled

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

Default execute file commands

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-marker-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 279 — Use this command to configure a URL for a CLI script to exec following a failed configuration boot.

boot-good-exec command on page 280 — 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.

```
ALU-1# configure
ALU-1>config# router
ALU-1>config>router# mpls
ALU-1>config>router>mpls# exit
ALU-1>config>router# exit
ALU-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.

```
ALU-1# configure router mpls
ALU-1>config>router>mpls# exit
ALU-1#
```

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

```
ALU-1# configure
ALU-1>config# router
ALU-1>config>router# mpls
ALU-1>config>router>mpls# exit all
ALU-1#
```

Parameters **all —** exits back to the root CLI context

help

Syntax **help**
help edit
help globals
help special-characters

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

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:

```
ALU-1# history
    68 info
    69 exit
    70 info
```

```
    71 filter
    72 exit all
    73 configure
    74 router
    75 info
    76 interface "test"
    77 exit
    79 info
    80 interface "test"
    81 exit all
    82 configure router
    83 interface
    84 info
    85 interface "test"
    86 info
    87 exit all
    88 configure
    89 card 1
    91 exit
    92 router
    93 exit
    94 history
ALU-1# !88
ALU-1# configure
ALU-1>config#
```

info

Syntax **info [detail]**

Context <global>

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

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

For example:

```
ALU-1>config>router>mpls# info
----------------------------------------
     mpls
            interface "system"
            exit
            interface "to_1/2/1"
                label-map 131
                    pop
                    no shutdown
                exit
            exit
            static-lsp "to121"
                to 10.8.8.8
                push 121 nexthop 10.1.3.1
                no shutdown
            exit
```

```
            no shutdown
        exit
    exit
-------------------------------------------
ALU-1>config>router>mpls#
```

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

Parameters **detail —** displays all configuration parameters, including parameters at their default values

logout

Syntax **logout**

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* — the IP address of the remote host to ping

Values

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

dns-name — the DNS name (if DNS name resolution is configured) of the remote host to ping

Values 128 characters maximum

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.

```
ALU-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
ALU-1#
```

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

Values 0 to 128

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

Values 0 to 255

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 to 65507

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

Values 0 to 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 to 255.255.255.255

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

Default 1

Values 1 to 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-name — specifies the interface name

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

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

Default 5

Values 1 to 10000

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

router-instance — specifies the router name or service ID

Default Base

Values

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

timeout — specifies the timeout in seconds

Default 5

Values 1 to 10

pwc

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

Context <global>

Description This command displays the present or previous working context of the CLI session.

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

For example:

```
A:ALU>config>router>mpls# pwc
-----------------------------------------------
Present Working Context :
-----------------------------------------------
 <root>
  configure
  router "Base"
  mpls
-----------------------------------------------
A:ALU>config>router>mpls#
```

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

Parameters **previous —** displays the previous 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* — specifies the number of seconds for the console session to sleep, expressed as a decimal integer

Default 1

Values 1 to 100

ssh

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

Context <global>

Description This command opens a Secure Shell (SSH) session with another host.

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 the SSH session.

Parameters *ip-addr* | *dns-name* | *username@ip-addr* — the remote host to open an SSH session with. The IP address, DNS name (providing DNS name resolution is configured), or the user name at the IP address can be specified.

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

-v *SSH-version* — the version of the SSH session to use, 1, 2 or 1-2

router-instance — the router name or service ID

Values

router-name:	Base, management
service-id:	1 to 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 7705 SAR networks limit a Telnet client to three retries to log in. The Telnet server disconnects the Telnet client session after three retries. The number of retry attempts for a Telnet client session is not user-configurable.

Parameters *ip-address* — the IP address of the remote host

Values

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

dns-name — the DNS name (if DNS name resolution is configured) of the remote host

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 to 65535

router-instance — the router name or service ID

Values *router-name*: Base, management
service-id: 1 to 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.

```
ALU-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
ALU-1#
```

Parameters *ip-address* — the IP address to trace

Values *ipv4-address* a.b.c.d (host bits must be 0)

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

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

Values 128 characters maximum

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

Values 1 to 255

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

Default 5000

Values 1 to 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.

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

Values 0 to 255

router-instance — the router name or service ID

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

Default Base

tree

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

Context <global>

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

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

write

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

Context <global>

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

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

Values any valid CLI username

broadcast — specifies that the *message-string* is to be sent to all users logged in to the router

message-string — the message string to send, 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.

Environment Commands

alias

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

Context environment

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

Use the **alias** command to create alternative names for an entity or command string that are easier to understand and remember. 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 MPLS interfaces, enter:

alias soi "show router mpls 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-name — 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**

more

Syntax **[no] more**

Context environment

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

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

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

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

Default **more**

reduced-prompt

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

Context environment

Description This command configures the maximum number of higher CLI context levels to display in the CLI prompt for the current CLI session. This command is useful when configuring features that are several node levels deep, which can cause 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 ("…").

```
ALU-1>environment# reduced-prompt 2
ALU-1>config>router# interface to-103
ALU-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**

Parameters *no-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 to 15

saved-ind-prompt

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

Context environment

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

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

terminal

Syntax **terminal**

Context environment

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

length

Syntax **length** *lines*

Context environment>terminal

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

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 to 512

time-display

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

Context environment

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

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

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

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

Default **time-display local**

time-stamp

Syntax [**no**] **time-stamp**

Context environment

Description This command displays timestamps before the CLI prompt, indicating the last time that the command was completed. The date and time are displayed; the time format is either local or UTC, depending on how it was set with the **time-display** command.

Default **no time-stamp**

Monitor CLI Commands

filter

Syntax **filter**

Context monitor

Description This command enables the context to configure criteria to monitor IP 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 to 65535

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

Values 1 to 65535

seconds — configures the interval for each display in seconds

Default 10

Values 3 to 60

repeat — configures how many times the command is repeated

Default 10

Values 1 to 999

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

rate — displays the rate per second for each statistic instead of the delta

Sample Output

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


ALU-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
===============================================================================
ALU-1>monitor#
```

ipv6

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

Context monitor>filter

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

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

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

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

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

Values 1 to 65535

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

Values 1 to 65535

seconds — configures the interval for each display in seconds

Default 10

Values 3 to 60

repeat — configures how many times the command is repeated

Default 10

Values 1 to 999

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

rate — displays the rate per second for each statistic instead of the delta

management-access-filter

Syntax **management-access-filter**

Context monitor

Description This command enables the context to configure criteria to monitor management access filters. Management access filters control all traffic. They can be used to restrict management of the 7705 SAR by other nodes outside specific (sub)networks or through designated ports.

ip

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

Context monitor>management-access-filter

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

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

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

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

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

Values 1 to 9999

seconds — configures the interval for each display in seconds

Default 10

Values 3 to 60

repeat — configures how many times the command is repeated

Default 10

Values 1 to 999

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

rate — displays the rate per second for each statistic instead of the delta

ipv6

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

Context monitor>management-access-filter

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

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

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

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

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

Values 1 to 9999

seconds — configures the interval for each display in seconds

Default 10

Values 3 to 60

repeat — configures how many times the command is repeated

Default 10

Values 1 to 999

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

rate — displays the rate per second for each statistic 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. The percentage of the port being utilized is also displayed. For Ethernet ports, the utilization includes inter-frame gap and preamble.

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

Parameters *port-id* — specifies up to 5 port IDs

Syntax: *port-id* slot/mda/port[.channel]

seconds — configures the interval for each display in seconds

Default 10

Values 3 to 60

repeat — configures how many times the command is repeated

Default 10

Values 1 to 999

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

rate — displays the rate per second for each statistic instead of the delta

Sample Output

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

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

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

router

Syntax **router** *router-instance*

Context monitor

Description This command enables the context to configure criteria to monitor statistical information for LDP and MPLS protocols.

Parameters *router-instance* — specifies the router name or service ID

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

Default Base

session

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

Context monitor>router>ldp

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

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

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

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

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

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

seconds — configures the interval for each display in seconds

Default 10

Values 3 to 60

repeat — configures how many times the command is repeated

Default 10

Values 1 to 999

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

rate — displays the rate per second for each statistic instead of the delta

Sample Output

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

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


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

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

statistics

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

Context monitor>router>ldp

Description This command displays statistics for an LDP instance at the configured interval until the configured count is reached.

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

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

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

Parameters *seconds* — configures the interval for each display in seconds

Default 10

Values 3 to 60

repeat — configures how many times the command is repeated

Default 10

Values 1 to 999

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

rate — displays the rate per second for each statistic instead of the delta

Sample Output

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


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

```
-------------------------------------------------------------------------------
At time t = 6 sec (Mode: Rate)
-------------------------------------------------------------------------------
Addr FECs Sent    : 0                   Addr FECs Recv     : 0
Serv FECs Sent    : 0                   Serv FECs Recv     : 0
...
-------------------------------------------------------------------------------
At time t = 9 sec (Mode: Rate)
-------------------------------------------------------------------------------
Addr FECs Sent    : 0                   Addr FECs Recv     : 0
Serv FECs Sent    : 0                   Serv FECs Recv     : 0
...
===============================================================================
ALU-12>monitor>router>ldp#
```

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* — 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 displays 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

The *sap-id* can be configured in one of the following formats:.

Type	Syntax	Example
port-id	*slot*/*mda*/*port*[.*channel*]	1/1/5
null	[*port-id* | *bundle-id*]	*port-id*: 1/1/3 *bundle-id*: bundle-ppp-1/1.1
dot1q	[*port-id* | *bundle-id*]:qtag1	*port-id*:qtag1: 1/1/3:100 *bundle-id*: bundle-ppp-1/1.1
atm	[*port-id* | *bundle-id*][:vpi/vci | vpi]	port-id: 1/1/1.1 *bundle-id*: bundle-ima-1/1.1 bundle-ppp-1/1.1 vpi/vci: 16/26 vpi: 16
cem	slot/mda/port.channel	1/1/1.3

Values

sap-id:

null	[*port-id* | *bundle-id*]
dot1q	[*port-id* | *bundle-id*]:*qtag1*
atm	[*port-id* | *bundle-id*][:*vpi/vci* | *vpi* | *vpi1.vpi2*]
port-id	*slot/mda/port*[.*channel*]
bundle-*type-slot/mda.bundle-num*	
bundle	keyword
type	ima, ppp
bundle-num	1 to 128

qtag1	0 to 4094	
vpi	NNI	0 to 4095
	UNI	0 to 255
vci	1, 2, 5 to 65535	

port-id — specifies the physical port ID in the *slot/mda/port* format

If the card in the slot has an adapter card installed, the *port-id* must be in the slot_number/MDA_number/port_number format. For example 1/2/3 specifies port 3 on MDA 2 in slot 1.

The *port-id* must reference a valid port type. When the *port-id* parameter represents 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.

bundle-id — specifies the multilink bundle to be associated with this IP interface. The **bundle** keyword must be entered at the beginning of the parameter. The command syntax must be configured as follows:

bundle-id:	**bundle**-type-slot-id/mda-slot.bundle-num
bundle-id value range:	1 to 128

For example:

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

qtag1 — specifies the encapsulation value used to identify the SAP on the port or sub-port. If this parameter is not specificially defined, the default value is 0.

Values qtag1: 0 to 4094

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

Port Type	Encap-Type	Allowed Values	Comments
Ethernet	Null	0	The SAP is identified by the port.
Ethernet	Dot1q	0 to 4094	The SAP is identified by the 802.1Q tag on the port. Note that a 0 qtag1 value also accepts untagged packets on the dot1q port.

seconds — configures the interval for each display in seconds

Default 11

Values 11 to 60

repeat — configures how many times the command is repeated

Default 10

Values 1 to 999

absolute — displays the absolute rate per second value for each statistic

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

sdp

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

Context monitor>service>id *service-id*

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

Parameters *sdp-id* — specifies the SDP identifier

Values 1 to 17407

ip-address — the system address of the far-end 7705 SAR for the SDP in dotted-decimal notation

seconds — configures the interval for each display in seconds

Default 11

Values 11 to 60

repeat — configures how many times the command is repeated

Default 10

Values 1 to 999

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

rate — displays the rate per second for each statistic instead of the delta

Sample Output

```
ALU-12# monitor service id 100 sdp 10 repeat 2
===============================================================================
Monitor statistics for Service 100 SDP binding 10
===============================================================================
-------------------------------------------------------------------------------
At time t = 0 sec (Base Statistics)
-------------------------------------------------------------------------------
I. Fwd. Pkts.   : 0                    I. Dro. Pkts.   : 0
E. Fwd. Pkts.   : 0                    E. Fwd. Octets  : 0
-------------------------------------------------------------------------------
At time t = 11 sec (Mode: Delta)
-------------------------------------------------------------------------------
I. Fwd. Pkts.   : 0                    I. Dro. Pkts.   : 0
E. Fwd. Pkts.   : 0                    E. Fwd. Octets  : 0
-------------------------------------------------------------------------------
At time t = 22 sec (Mode: Delta)
-------------------------------------------------------------------------------
I. Fwd. Pkts.   : 0                    I. Dro. Pkts.   : 0
E. Fwd. Pkts.   : 0                    E. Fwd. Octets  : 0
-------------------------------------------------------------------------------
===============================================================================
ALU-12#
```

Show Commands

alias

Syntax **alias**

Context show

Description This command displays a list of existing aliases.

Output The following output is an example of alias information, and Table 12 describes the fields.

Sample Output

```
ALU-103>config>system# show alias
===============================================================================
Alias-Name                    Alias-command-name
===============================================================================
sri                           show router interface
sse                           show service service-using cpipe
ssvll                         show service service-using vll
-------------------------------------------------------------------------------
Number of aliases : 3
===============================================================================
ALU-103>config>system#
```

Table 12: Show Alias Output Fields

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

File System Management

In This Chapter

This chapter provides information about file system management.

Topics in this chapter include:

The File System

The 7705 SAR 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, and display file or directory contents and the image version.

Compact Flash Device

The file system is based on a DOS file system. On the 7705 SAR, each CSM has an integrated compact flash device. The names for these devices are:

- cf3:
- cf3-A:
- cf3-B:

The first device name above (cf3:) is a *relative* device name in that it refers to the device local to the control processor on the CSM running the current console session. As in the DOS file system, the colon (":") at the end of the name indicates that it is a device.

The second and third device names (cf3-A: and cf3-B:) are absolute device names that refer directly to the device on CSM A or CSM B.

On the 7705 SAR-18, cf3: is used to store the software image required for system startup and operation, including the application load. The 7705 SAR-18 CSM also has two optional compact flash slots for two compact flash devices (cf1: and cf2:). These compact flash devices are also referred to as cf1-A:/cf1-B: and cf2-A:/cf2-B: to indicate whether they are on CSM A or CSM B. All the compact flash devices can be used to store software upgrades, statistics, logging files, accounting files, scripts, and configuration data.

With the exception of cf3: on the 7705 SAR-F, all compact flash devices are field-replaceable and have an administrative state (shutdown/no shutdown).

Note: To prevent corruption of open files in the file system, compact flashes should be removed only when they are administratively shut down. The 7705 SAR OS gracefully closes any open files on the device so that it can be safely removed.

URLs

The arguments for the 7705 SAR OS file commands are modeled after the standard universal resource locator (URL).

A URL can refer to a file (a *file-url*) or a directory (a *directory-url*).

The 7705 SAR 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 is listed in Table 13.

Table 13: URL Types and Syntax

URL Type	Syntax	Notes
local-url	[*cflash-id***:**\]*path*	*cflash-id* is the compact flash device name Values: cf3: (for all platforms), cf1: and cf2: (for the 7705 SAR-18 only)
ftp-url	**ftp://**[*username*[**:***password*]**@**]*host*/*path*	An absolute ftp path from the root of the remote file system: *username* is the ftp user name *password* is the ftp user password *host* is the remote host *path* is the path to the directory or file
	ftp://[*username*[**:***password*]**@**]*host*/**.**/*path*	A relative ftp path from the user's home directory. Note the period and slash ("**./**") in this syntax, as compared to the absolute path.
tftp-url	**tftp://***host*[/*path*]/*filename*	tftp is only supported for operations on file-urls

Table 14 lists the commands that are supported both locally and remotely.

Table 14: File Command Local and Remote File System Support

Command	local-url	ftp-url	tftp-url
`attrib`	X		
`cd`	X	X	
`copy`	X	X	X
`delete`	X	X	

Table 14: File Command Local and Remote File System Support (Continued)

Command	local-url	ftp-url	tftp-url
dir	X	X	
md		X	
move	X	X	
rd		X	
repair			
scp	source only		
type	X	X	X
version	X	X	X

The 7705 SAR OS accepts either forward slash ("/") or backslash ("\") characters to delimit directory and/or filenames in URLs. Similarly, the 7705 SAR 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 interpret the backslash character as an "escape" character. This can cause problems when using an external SCP client application to send files to the 7705 SAR OS 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 7705 SAR OS SCP server.

For example, a destination directory specified as "cf3:\dir1\file1" will be transmitted to the 7705 SAR OS SCP server as "cf3: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

The 7705 SAR 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:

```
ALU-1>file cf3:\ # copy test*.cfg siliconvalley
     cf3:\testfile.cfg
     1 file(s) copied.
     ALU-1>file cf3:\ # cd siliconvalley
     ALU-1>file cf3:\siliconvalley\ # dir
      Volume in drive cf3 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.
     ALU-1>file cf3:\siliconvalley\ #
```

As in a DOS file system, the 7705 SAR wildcard characters can only be used in some of the file commands.

Common Configuration Tasks

The following sections describe the basic system tasks that can be performed.

- Modifying File Attributes
- Creating and Navigating Directories
- Copying Files
- Moving Files
- Deleting Files and Removing Directories
- Displaying Directory and File Information
- Repairing the File System

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

Modifying File Attributes

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

Use the CLI syntax displayed below to modify file attributes:

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

The following displays an example of the command syntax:

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

The following displays the file configuration:

```
ALU-1>file cf3:\ # attrib
cf3:\bootlog.txt
cf3:\bof.cfg
cf3:\boot.ldr
cf3:\bootlog_prev.txt
cf3:\BOF.SAV
```

```
ALU-1>file cf3:\ # attrib +r BOF.SAV
    ALU-1>file cf3:\ # attrib
    cf3:\bootlog.txt
    cf3:\bof.cfg
    cf3:\boot.ldr
    cf3:\bootlog_prev.txt
    R cf3:\BOF.SAV
```

Creating and Navigating Directories

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

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

Use the CLI syntax displayed below to create a new directory:

CLI Syntax:
```
file>
     md file-url
```

The following displays an example of the command syntax:

Example:
```
file cf3:\ # md test1
file cf3:\ # cd test1
file cf3:\test1\ # md test2
file cf3:\test1\ # cd test2
file cf3:\test1\test2\ # md test3
file cf3:\test1\test2\ # cd test3
file cf3:\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 7705 SAR router. The destination file must be in 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:
```
ALU-1>file cf3::\ # copy 104.cfg cf3::\test1\test2\test3\test.cfg
ALU-1>file cf3::\ # scp file1 admin@192.168.x.x:cf3::\file1
ALU-1>file cf3::\ # scp file2 user2@192.168.x.x:/user2/file2
ALU-1>file cf3::\ # scp cf3::/file3 admin@192.168.x.x:cf3::\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:
```
ALU-1>file cf3::\test1\test2\test3\ # move test.cfg cf3::\test1
     cf3::\test1\test2\test3\test.cfg
ALU-1>file cf3::\test1\test2\test3\ # cd ..
ALU-1>file cf3::\test1\test2\ # cd ..
ALU-1>file cf3::\test1\ # dir

 Directory of cf3::\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.
ALU-1>file cf3::\test1\ #
```

Deleting Files and Removing Directories

Use the `delete` and `rd` commands to delete files and remove directories. Directories must be empty in order to remove them. When files 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:

```
ALU-1>file cf3::\test1\ # delete test.cfg
ALU-1>file cf3::\test1\ # delete abc.cfg
ALU-1>file cf3::\test1\test2\ # cd test3
ALU-1>file cf3::\test1\test2\test3\ # cd ..
ALU-1>file cf3::\test1\test2\ # rd test3
ALU-1>file cf3::\test1\test2\ # cd ..
ALU-1>file cf3::\test1\ # rd test2
ALU-1>file cf3::\test1\ # cd ..
ALU-1>file cf3::\ # rd test1
ALU-1>file cf3::\ #
```

Displaying Directory and File Information

Use the `dir` command to display a list of files on a file system.

Use the `type` command to display the contents of a file.

Use the `version` command to display the version of a 7705 SARboth.tim file.

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

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

The following displays an example of the command syntax:

```
A:ALU-1# file
A:ALU-1>file cf3::\ # dir

 Volume in drive cf3: on slot A has no label.

 Volume in drive cf3: on slot A is formatted as FAT32.
```

```
Directory of cf3::\

02/08/2008  11:23a              140584 boot.ldr
02/07/2008  12:19p                 786 bof.cfg
02/13/2008  05:42p                2058 bootlog.txt
01/13/2008  05:42p                2434 bootlog_pre.txt
01/30/2008  05:17p                 797 bof.cfg.arash
01/25/2008  04:11p      <DIR>          TXT
01/30/2008  11:36a                 787 bof.cfg.ftp
01/30/2008  01:11p                 736 bof.cfg.root
01/30/2008  11:35a                 886 bof.cfg.deep
01/30/2008  11:35a                 483 bof.cfg.JC
               8 File(s)                411097 bytes.
               1 Dir(s)                1043456 bytes free.
A:ALU-1>file cf3::\ # type bof.cfg
# TiMOS-B-1.1.R1 both/hops ALCATEL-LUCENT SAR 7705
# Copyright (c) 2000-2008 Alcatel-Lucent.
# All rights reserved. All use subject to applicable license agreements.
# Built on Wed Apr 9 09:53:01 EDT 2008 by csabuild in /rel2.0/b1/R1/panos/main

# Generated WED APR 09 20:18:06 2008 UTC

    primary-image    ftp://*:*@xxx.xxx.xxx.xx/home/csahwreg17/images/both.tim
    primary-config   ftp://*:*@ xxx.xxx.xxx.xx /home/csahwreg17/images/dut-a.cfg
    address          xxx.xxx.xxx.xx /24 active
    address          xxx.xxx.xxx.xx /24 standby
    primary-dns      xxx.xxx.xxx.xx
    dns-domain       labs.ca.alcatel-lucent.com
    static-route     xxx.xxx.0.0/16 next-hop xxx.xxx.xxx.x
    autonegotiate
    duplex           full
    speed            100
    wait             3
    persist          off
    console-speed    115200

A:ALU-1>file cf3::\ #
```

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:

```
ALU-1>file cf3:\ # repair
Checking drive cf3: on slot A for errors...
Drive cf3: on slot A is OK.
```

File System 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*]
- — **format** [*cflash-id*] [**reliable**]
- — **md** *file-url*
- — **move** *old-file-url new-file-url* [**force**]
- — **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**]

Command Descriptions

Configuration Commands

file

Syntax **file**

Context root

Description This command enters the context to perform file system operations.

When entering the **file** context, the prompt changes to reflect the present working directory. Navigating the file system with the **cd ..** command results in a changed prompt.

The **exit all** command leaves the file system/file operation context and returns to the <ROOT> CLI context. The state of the present working directory is maintained for the CLI session. Entering the **file** command returns the cursor to the working directory where the **exit** command was issued.

attrib

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

Context file

Description This command sets or clears/resets the read-only attribute for a file in the local file system.

To list all files and their current attributes, enter **attrib** or **attrib x** where **x** is either the filename or a wildcard (*).

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

```
ALU-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*]

cf3:,cf3-A:,cf3-B: (for all platforms); cf1:, cf1-A:, cf1-B: and cf2:, cf2-A:, cf2-B: (for the 7705 SAR-18)

+r — sets the read-only attribute on the specified file

-r — clears/resets the read-only attribute on the specified file

cd

Syntax **cd** [*file-url*]

Context file

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

Parameters *file-url* — Syntax: [*local-url* | *remote-url* (255 chars max)
local-url - [*cflash-id*/][*file-path*]
remote-url - [{ftp:// | tftp://}*login*:*pswd@remote-locn*/][*file-path*]
cf3:,cf3-A:,cf3-B: (for all platforms); cf1:, cf1-A:, cf1-B: and cf2:, cf2-A:, cf2-B: (for the 7705 SAR-18)

<*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 cf3: in slot CSM B to a file called destfile in a directory called production on cf3: in slot CSM A, the syntax is:

```
sr1>file cf3:\ # copy cf3-B:/test/srcfile cf3-A:/production/destfile
```

To FTP a file named 121201.cfg in directory mydir stored on cf3: in slot CSM 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 cf3-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)?"

Parameters *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*]	

cf3:,cf3-A:,cf3-B: (for all platforms); cf1:, cf1-A:, cf1-B: and cf2:, cf2-A:, cf2-B: (for the 7705 SAR-18)

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

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

dir

Syntax **dir** [*file-url*]

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

format

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

Context file

Description This command formats the compact flash. The compact flash must be shut down before formatting.

Parameters *cflash-id* — the compact flash type

Values cf3:,cf3-A:,cf3-B: (for all platforms); cf1:, cf1-A:, cf1-B: and cf2:, cf2-A:, cf2-B: (for the 7705 SAR-18)

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*]

cf3:,cf3-A:,cf3-B: (for all platforms); cf1:, cf1-A:, cf1-B: and cf2:, cf2-A:, cf2-B: (for the 7705 SAR-18):

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*]	

cf3:,cf3-A:,cf3-B: (for all platforms); cf1:, cf1-A:, cf1-B: and cf2:, cf2-A:, cf2-B: (for the 7705 SAR-18)

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*]	

cf3:,cf3-A:,cf3-B: (for all platforms); cf1:, cf1-A:, cf1-B: and cf2:, cf2-A:, cf2-B: (for the 7705 SAR-18):

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* [**force**]

Context file

Description This command removes (deletes) a directory in a file system. The following message displays:

Are you sure (y/n)?

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*]	

cf3:,cf3-A:,cf3-B: (for all platforms); cf1:, cf1-A:, cf1-B: and cf2:, cf2-A:, cf2-B: (for the 7705 SAR-18)

force — forces an immediate deletion of the specified directory

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* — the compact flash slot ID to be shut down or enabled. When a specific *cflash-id* is specified, then that drive is shut down. If no *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 CSM is assumed.

Default the current compact flash device

Values cf3:,cf3-A:,cf3-B: (for all platforms); cf1:, cf1-A:, cf1-B: and cf2:, cf2-A:, cf2-B: (for the 7705 SAR-18)

scp

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

Context file

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

"Are you sure (y/n)?"

The destination must specify a user and a host.

Parameters *local-file-url* — the local source file or directory

Values [*cflash-id*/][*file-path*]: up to 256 characters

destination-file-url — the destination file

Values user@hostname:destination-file

user — the SSH user

host — the remote host IP address of DNS name

file-path — the destination path

router-instance — specifies the router name or service ID

Values *router-name*: Base , management
service-id: 1 to 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.

shutdown

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

Context file

Description This command shuts down (unmounts) the specified CSM(s).

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

Use the **no shutdown** *cflash-id* command to enable a compact flash (cf3: on all platforms; cf1: or cf2: on the 7705 SAR-18) on the CSM. The **no shutdown** command can be issued for a specific slot when no compact flash is present. When a compact flash is installed in the slot, the device will be activated upon detection.

In redundant systems, use the **no shutdown** command on cf3: on both CSMs in order to facilitate synchronization. See the synchronize command in the **configure>redundancy** context.

The **shutdown** command must be issued prior to removing a compact flash. If no parameters are specified, 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. 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 is present, the LED is lit amber. In this state, the compact flash can be ejected.

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

No compact flash present, drive shut down: If no compact flash is present and the drive is shut down, the LED is unlit.

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

No compact flash present, drive enabled: If no compact flash is present and the drive is not shut down, the LED is unlit.

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

Ejecting a compact flash: The compact flash drive should be shut down before ejecting a compact flash. The LED should turn to solid (not blinking) amber. This is the only way to safely remove the compact flash. If a compact flash drive is not shut down before a compact flash is ejected, the LED blinks amber for approximately 5 s 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 is administratively enabled**

Parameters *cflash-id* — the compact flash slot ID to be shut down or enabled. If a *cflash-id* is specified, the drive is shut down or enabled. If no *cflash-id* is specified, the drive referred to by the current working directory is assumed. If a slot number is not specified, the active CSM is assumed.

Values cf3:, cf3-A:, cf3-B: (all platforms); cf1:, cf1-A:, cf1-B:, cf2:, cf2-A:, cf2-B: (for the 7705 SAR-18)

active — all drives on the active CSM are shut down or enabled

standby — all drives on the standby CSM are shut down or enabled

If both **active** and **standby** keywords are specified, all drives on both CSMs are shut down or enabled.

type

Syntax **type** *file-url*

Context file

Description This command displays the contents of a text file.

Parameters *file-url* — the file contents to display

version

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

Context file

Description This command displays the version of a TiMOS both.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:	cf3:,cf3-A:,cf3-B: (for all platforms); cf1:, cf1-A:, cf1-B: and cf2:, cf2-A:, cf2-B: (for the 7705 SAR-18)

check — validates the .tim file

Sample Output

```
A:ALU-1# file version cf3:/both.tim
TiMOS-B-0.0.R1 for ALCATEL-LUCENT SAR 7705

A:ALU-1# file version ftp://timos:timos@xxx.xxx.xx.xx/./both.tim check
Validation successful
TiMOS-I-0.0.R1 for ALCATEL-LUCENT SAR 7705
B:Performance#
```

Boot Options

In This Chapter

This chapter provides information about configuring boot option parameters.

Topics in this chapter include:

System Initialization

The primary copy of 7705 SAR OS software is located on a Compact Flash card. The removable media is shipped with each 7705 SAR router and contains a copy of the 7705 SAR OS image.

Notes:

- The 7705 SAR uses a Compact Flash card (cf3) on the CSM to store configurations and executable images. These images can also be stored on an FTP file location.
- The compact Flash card also contains the bootstrap and boot option files.
- In most cases you must have a console connection in order to talk to the node when there is no network connectivity to the node. Some commands can be given to the node through the ACO/LT button before there is network connectivity. See Automatic Discovery Protocol. Also refer to the 7705 SAR-8 Installation Guide, the 7705 SAR-18 Installation Guide, or the 7705 SAR-F Installation Guide, “Automatic Discovery Protocol”.

Starting a 7705 SAR begins with hardware initialization (a reset or power cycle). By default, the system searches the Compact Flash (**cf3**) for the **boot.ldr** file (also known as the boot loader or 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**.

```
...
Alcatel-Lucent 7705 Boot ROM. Copyright 2010 Alcatel-Lucent.
All rights reserved. All use is subject to applicable license agreements.
Build: X-2.1.R1 on Tue Oct 5 16:25:56 EDT 2010 by csabuild
Version: 0x1D
Performing Data Bus Test... Passed.
Performing Local RAM Test (1st 2MB)... Passed.
COLD boot on processor #1
?Preparing for jump to RAM...
Starting bootrom RAM code...
Boot rom version is v29
CPU BIST check passed.
Testing SDRAM from 0x02200000 to 0x40000000
Testing Compact Flash ... Slot Empty
Board Serial Number is 'NS080940085'
Chassis Serial Number is 'NS000000064'
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.

Rebooting...ÿ

Alcatel-Lucent 7705 Boot ROM. Copyright 2000-2010 Alcatel-Lucent.
```

```
All rights reserved. All use is subject to applicable license agreements.
Build: X-2.1.R1 on Tue Oct 5 16:25:56 EDT 2010 by csabuild
Version: 0x1D
Performing Data Bus Test... Passed.
Performing Local RAM Test (1st 2MB)... Passed.
COLD boot on processor #1
?Preparing for jump to RAM...
Starting bootrom RAM code...
Boot rom version is v29
CPU BIST check passed.
Testing SDRAM from 0x02200000 to 0x40000000
Testing Compact Flash ... OK (SMART CF)
Board Serial Number is 'NS080940085'
Chassis Serial Number is 'NS000000064'
Searching for boot.ldr on local drives:
Searching cf3 for boot.ldr...
*****************************************

Total Memory: 992MB  Chassis Type: sar8  Card Type: corona_r1
TiMOS-L-2.1.R1 boot/hops ALCATEL-LUCENT SAR 7705
Copyright (c) 2000-2010 Alcatel-Lucent.
All rights reserved. All use subject to applicable license agreements.
Built on Tue Oct 5 16:35:12 EDT 2010 by csabuild in /rel2.0/b1/R1/panos/main
```

When the bootstrap image is loaded, the BOF is read to obtain the location of the image and configuration files. The BOF must be located on the same compact flash drive as the **boot.ldr** file.

Figure 4 displays the system initialization sequence.

Figure 4: System Initialization - Part 1

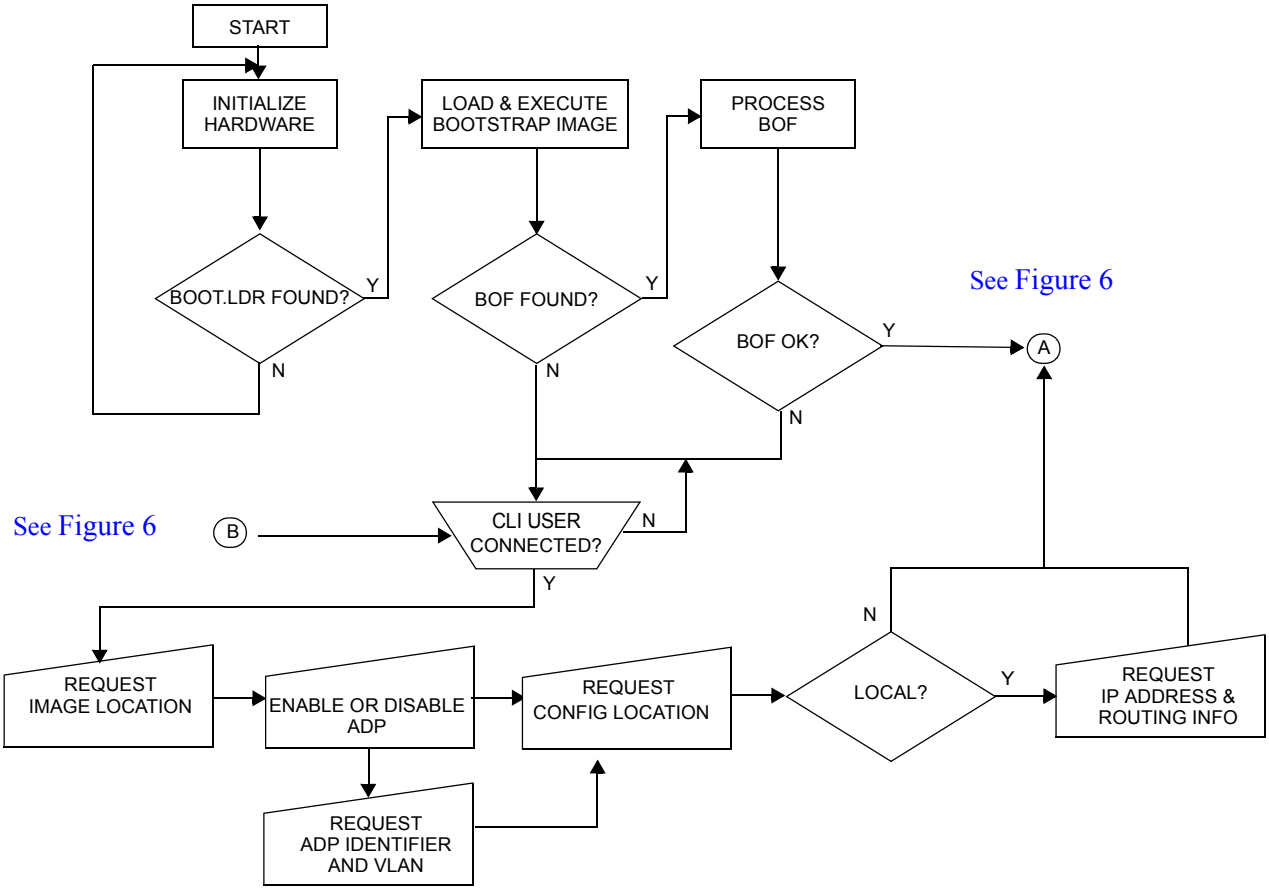
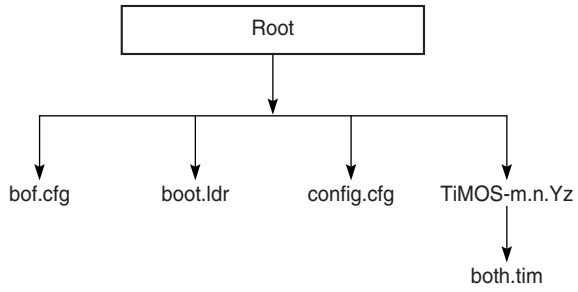


Figure 5 displays the compact flash directory structure and file names.

Figure 5: 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 — CSM 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 contain the runtime image. The locations can be local or remote. The first location searched is the primary image location. If not found, the secondary image location is searched, and lastly, the tertiary image location is searched.

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. Depending on the options in the BOF file, the runtime image loads the configuration in one of two ways.

If ADP is enabled, no configuration files are processed at startup. Instead, ADP discovers the node configuration from the network and the **primary-config** file is generated based on the configuration discovered by ADP. Any existing **primary-config** file is backed up, then overwritten.

If ADP is not enabled, the runtime image attempts to locate the configuration file as configured in the BOF. Like the runtime image, three locations can be configured for the system to search for the configuration file. The locations can be local or remote. The first location searched is the primary configuration location. If not found, the secondary configuration location is searched, and lastly, the tertiary configuration location is searched.

The configuration file includes chassis, CSM, adapter card and port configurations, as well as system, routing, and service configurations.

Figure 6 displays the boot sequence.

Figure 6: System Initialization - Part 2

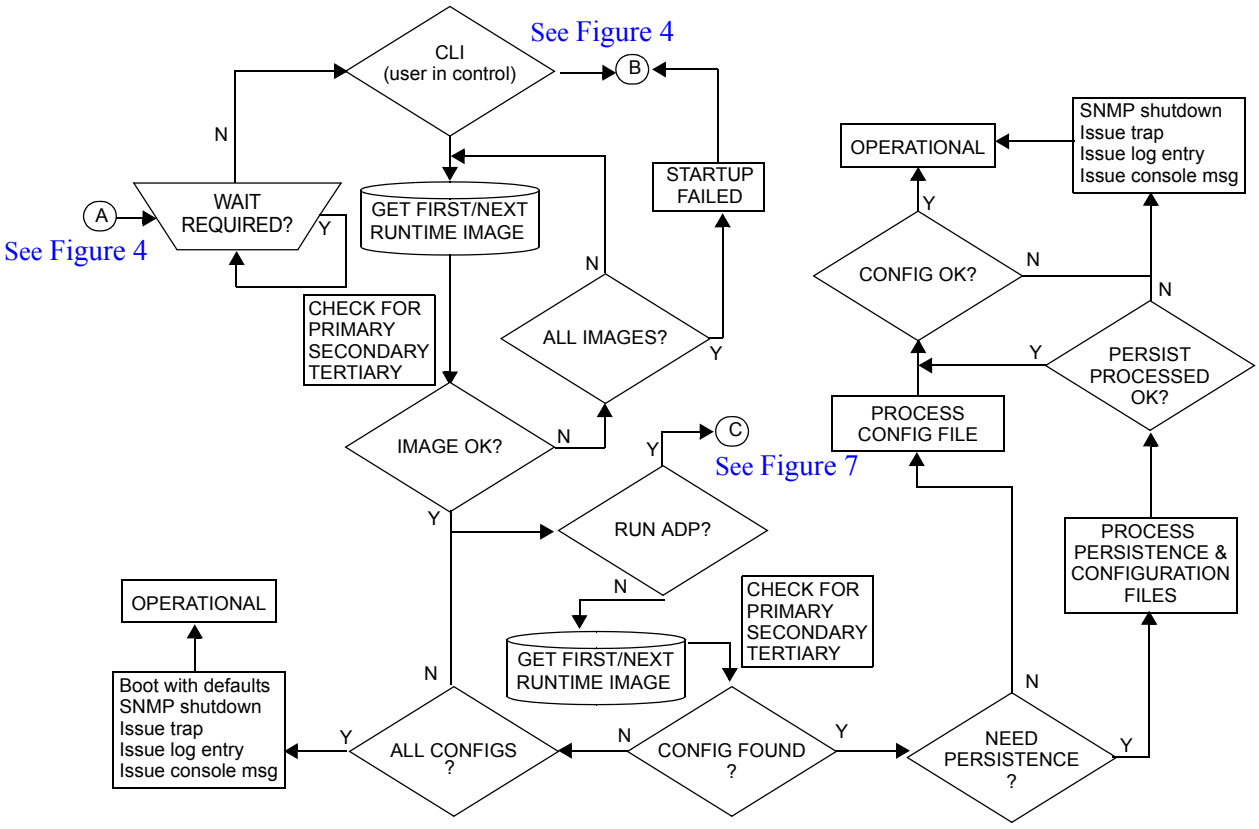
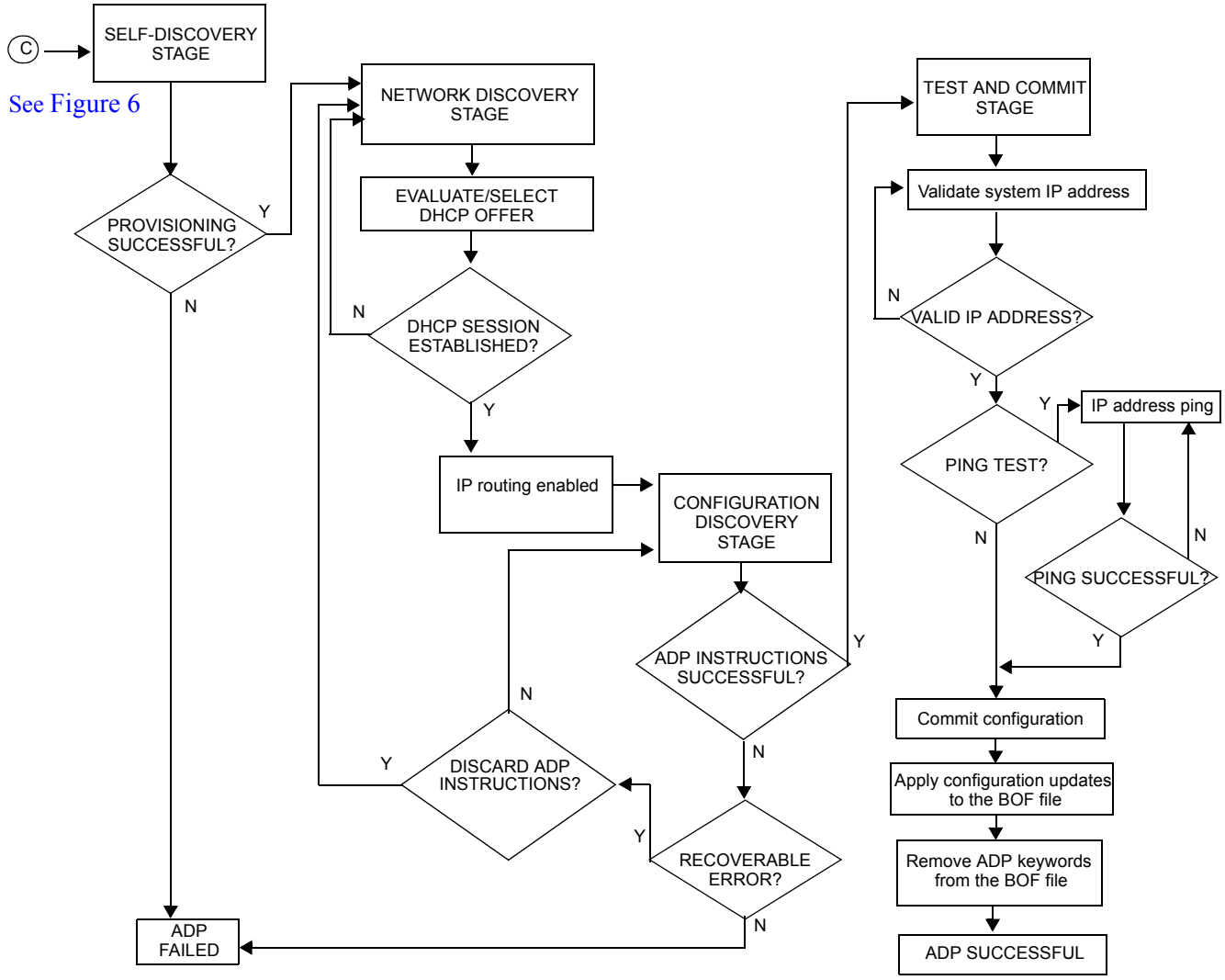


Figure 7 shows the boot sequence if Automatic Discovery Protocol (ADP) is run on the system.

Figure 7: System Initialization With ADP



The following displays an example of BOF output.

```
A:ALU-1> show bof
===============================================================================
BOF (Memory)
===============================================================================
    primary-image     ftp://*:*@xxx.xxx.xxx.xx/home/csahwreg17/images/both.tim
    primary-config    ftp://*:*@ xxx.xxx.xxx.xx /home/csahwreg17/images/dut-a.cfg
```

```
    address           xxx.xxx.xxx.xx /24 active
    address           xxx.xxx.xxx.xx /24 standby
    primary-dns       xxx.xxx.xxx.xx
    dns-domain        labs.ca.alcatel-lucent.com
    static-route      xxx.xxx.0.0/16 next-hop xxx.xxx.xxx.x
    autonegotiate
    duplex            full
    speed             100
    wait              3
    persist           off
    console-speed     115200
===============================================================================
A:ALU-1>
```

Persistence

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, and path IDs. If persistence is not required and the configuration file is successfully processed, then the system becomes operational. If persistence 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. 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.

Automatic Discovery Protocol

Automatic Discovery Protocol (ADP) is triggered by a factory-installed boot option and automates the initial commissioning of 7705 SAR nodes. When the 7705 SAR is started for the first time, an ADP keyword in the BOF causes automatic discovery to run as part of the TiMOS application image. Refer to the 7705 SAR-8 Installation Guide, the 7705 SAR-18 Installation Guide, or the 7705 SAR-F Installation Guide, “Automatic Discovery Protocol”, for more information on ADP.

ADP supports both null and dot1q encapsulation on all ports on the 8-port Ethernet Adapter card version 1 and version 2 on the 7705 SAR-8 and on the 8-port Ethernet Adapter card version 2 on the 7705 SAR-18, and all Ethernet ports on the 7705 SAR-F.

When run on the system, ADP goes through four basic stages:

- self-discovery
- network discovery
- configuration discovery
- test and commit

During the self-discovery stage, all supported adapter cards and CSMs are detected and automatically provisioned. The 7705 SAR then brings up all Ethernet ports. Depending on the physical connectivity of the port, some ports may fail to come up. If at least one port connected to the transport network becomes operationally up, ADP moves to the next stage.

During the network discovery stage, the 7705 SAR sends a DHCP DISCOVER message from all operational ports. Table 15 describes the DHCP DISCOVER message options.

Table 15: DHCP DISCOVER Message Options

Option	Name	Description
chaddr	Client HW Address	The MAC address of the port
51	Lease Time	Always set to Infinite
60	Class Identifier	The class of 7705 SAR router: ALU-AD | SAR-8 ALU-AD | SAR-18 ALU-AD | SAR-F
61	Client Identifier	Not sent by default, but can be configured to be the chassis MAC address or an operator-defined string
82	Relay Agent Information	Network uplink information, such as circuit ID and gateway address, added by the relay agent, if applicable

No client identifier is sent by default, but you can configure this option during boot-up, or with the `auto-discover` command, to be the chassis MAC address or a unique string. During boot-up, you can also configure the VLAN ID for ADP with 802.1q encapsulation.

During the configuration discovery stage, the DHCP server receives the DHCP DISCOVER message and replies with a DHCP OFFER message that contains an IP address assigned to the network interface. Table 16 describes the options included in the DHCP OFFER. If any of the required options are not included, the packet may be dropped and not processed.

Table 16: DHCP OFFER Message Options

Option	Name	Description	Required
yiaddr	Client Ip-Address	The network interface IP address For network consistency, it is recommended that this IP address be a fixed IP address, not assigned randomly from a DHCP server IP pool	Yes
1	Subnet Mask	The network interface subnet mask	Yes
3	Router	The network interface default gateway Only the first router is used – all others are ignored	No
12	Host Name	The network interface host name	No
51	Lease Time	The least time, validated as infinite	Yes
54	Server Address	Identifies the DHCP server	No
67	Bootfile Name	Contains the ADP instructions or a URL to an ADP instructions file	No

Option 67 contains further configuration information in the form of keyword text files interpreted by ADP as instructions and executed during the Configuration and Test phases. For basic reachability, option 67 is not mandatory; however, it can be used to send the system IP address of a newly discovered node, making it possible to communicate with the 5620 SAM and complete ADP.

If a system IP address is made available with the DHCP OFFER and a template configuration file is also executed using the `load-cfg` keyword, then the system IP address specified in the template configuration file is used instead of the one in the DHCP OFFER.

Table 17 describes the keywords used in ADP instructions. A DHCP offer message can contain a maximum of 15 instructions in either the Bootfile Name option, or in an external file referenced by the `include` keyword. If more than 15 instructions are included, ADP fails to complete and the system generates an error message in the ADP log.

Table 17: ADP Instructions

Keyword	Description	Format
sys-addr	Specifies the system interface IP address and the system base routing instance subnet	sys-addr 10.10.10.1/32
sys-name	Specifies the chassis name	sys-name SITE43_7705
sys-loc	Specifies the chassis location	sys-loc 600_MARCH_ROAD
load-cfg	Specifies the URL of a template configuration file to load into the router's runtime configuration	load-cfg ftp://.....@.../7705.cfg
test-ip	Specifies an IP address that must be successfully pinged before committing configuration and declaring ADP a success	test-ip 100.20.2.30
include	Specifies the URL of a file containing additional ADP instructions	include ftp://.....@.../7705.tmp
Any BOF keyword	Interpreted as instructions to update the specified field in the BOF	As per BOF

In order for ADP to be declared successful during the test and commit stage, the discovered configuration must contain an IP address. If the optional `test-ip` keyword is included in the ADP instructions, the node pings the IP address included in the DHCP OFFER message. If ADP is successful, the system stores the configuration and opens an SSH session to provide remote operators access to the router.

ADP can be controlled, without a connected PC or ASCII terminal, by the ACO/LT button on the Fan module. You can use the ACO/LT button to terminate or restart ADP, or reboot the chassis.

ADP runs in the background to allow continued CLI access for status queries and troubleshooting. Periodic progress updates are sent to the console and can be viewed through a connected PC. Additionally, dump commands are available to display information and detailed logs about ADP during and after running on the system. The logs are not retained over a chassis reboot.

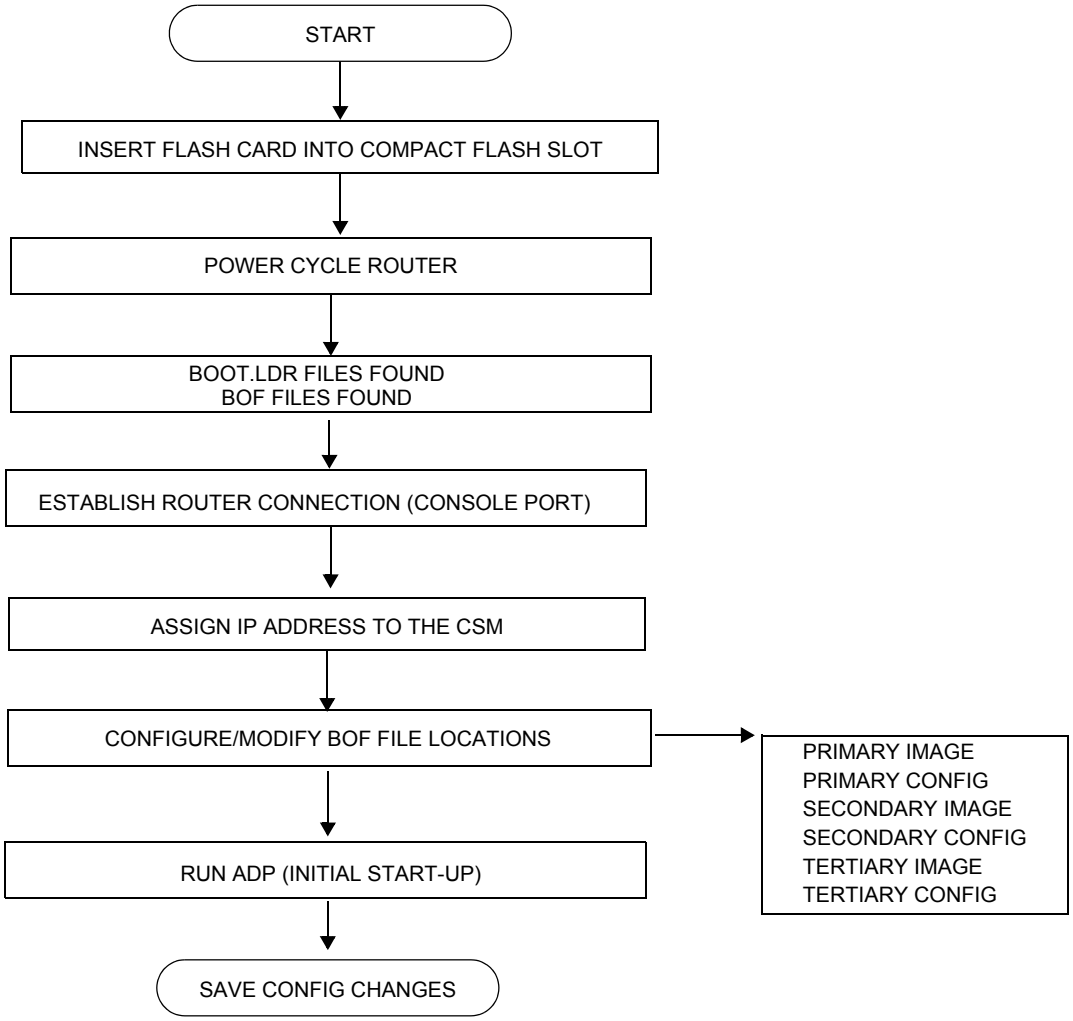
ADP runs only once on a router during initial startup if the automatic discovery is successful. The learned network interface configuration is retained in the local database. On subsequent reboots, the router uses its local database to reload its network configuration. After ADP successfully completes, or if it is manually terminated, the system sends a command to the BOF to remove the ADP keyword. You can terminate ADP at any time while it is running by using the CLI or the ACO/LT button.

Any temporary configuration done by ADP is not stored; however, network configuration and remote access remain enabled to allow the router to be manually provisioned remotely. ADP does not run again on future system reboots unless it is re-enabled via the CLI. If a standby CSM with ADP enabled is inserted into a running system that does not have the ADP keyword in its BOF file, the ADP keyword is automatically removed from the inactive card's BOF file during reconcile.

Initial System Startup Process Overview

Figure 8 displays the process to start the system. This example assumes that the boot loader and BOF image and configuration files are successfully located.

Figure 8: System Startup Flow



Configuration Notes

The following describes BOF configuration caveats.

- For router initialization, the compact flash card must be installed in the compact flash slot.
- The loading sequence is based on the order in which it is placed in the configuration file (not based on service ID, for example) and it is loaded as it is read in at boot time.

Reference Sources

For information on supported IETF drafts and standards as well as standard and proprietary MIBs, refer to Standards and Protocol Support on page 393.

Configuring Boot File Options with CLI

This section provides information to configure BOF parameters with CLI.

Topics in this section include:

BOF Configuration Overview

Alcatel-Lucent 7705 SAR 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 CSM Management port (speed, duplex, auto)
2. Assigns the IP address for the CSM Management port
3. Creates static routes for the CSM Management 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

Note: The CSM Management port is referred to as the CPM Management port in the CLI to align with the CLI syntax used with other SR products.

Basic BOF Configuration

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

The most basic BOF configuration should have the following:

- primary address
- primary image location
- primary configuration location

The following displays a sample of a basic BOF configuration.

```
A:ALU-1# show bof
===============================================================================
BOF (Memory)
===============================================================================

    primary-image    ftp://*:*@xxx.xxx.xxx.xx/home/csahwreg17/images/both.tim
    primary-config   ftp://*:*@ xxx.xxx.xxx.xx /home/csahwreg17/images/dut-a.cfg
    address          xxx.xxx.xxx.xx /24 active
    address          xxx.xxx.xxx.xx /24 standby
    primary-dns      xxx.xxx.xxx.xx
    dns-domain       labs.ca.alcatel-lucent.com
    static-route     xxx.xxx.0.0/16 next-hop xxx.xxx.xxx.x
    autonegotiate
    duplex           full
    speed            100
    wait             3
    persist          off
    console-speed    115200
===============================================================================
A:ALU-1#
```

Common Configuration Tasks

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

- Searching for the BOF
- Accessing the CLI
  → Console Connection
- Configuring BOF Parameters

For details about hardware installation and initial router connections, refer to the specific 7705 SAR 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, the system checks whether the boot sequence was manually interrupted. The system prompts for a different image and configuration location.

The following example displays 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 existing values.

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

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

   Here are some examples
      cf3:/timos2.0R1
      ftp://user:passwd@192.168.xx.xxx/./timos2.0R1
      tftp://192.168.xx.xxx/./timos2.0R1

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

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

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

The existing Config URL is 'cf3:/config.cfg'
Press ENTER to keep it, or the word 'none' for no Config URL.
Config File URL:
Using: 'cf3:/config.cfg'

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

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

Displays on Non-Redundant Models I

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

Display on Redundant models

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

The existing Standby IP address is 192.168.xx.xxx/20. Press ENTER to keep it.
Enter Standby IP Address (Type 0 if none desired):
Using: 192.168.xx.xxx/20



Would you like to add a static route? (yes/no) y

Static Routes
-------------
   You specified network locations which require
   static routes to reach. You will be asked to
   enter static routes until all the locations become
   reachable.

   Static routes should be entered in the following format:
   prefix/mask next-hop ip-address
       example:     192.168.xx.xxx/16 next-hop 192.168.xx.xxx

Enter route: 1.x.x.0/24 next-hop 192.168.xx.xxx
OK

Would you like to add another static route? (yes/no) n
```

```
New Settings
------------
    primary-image    ftp://*.*@192.168.xx.xx/./rel/0.0/xx
    primary-config   cf3:/config.cfg
    address          192.168.xx.xx/20 active
    primary-dns      192.168.xx.xx
    dns-domain       xxx.xxx.com
    static-route     1.x.x.0/24 next-hop 192.168.xx.xxx
    autonegotiate
    duplex           full
    speed            100
    wait             3
    persist          off


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

Successfully saved the new settings in cf3:/bof.cfg
```

Accessing the CLI

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

1. Ensure that the CSM is installed and power to the chassis is turned on. The 7705 SAR software then automatically begins the boot sequence.
2. 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 Table 18
- a standard serial cable with a male DB9 connector

Table 18: Console Configuration Parameter Values

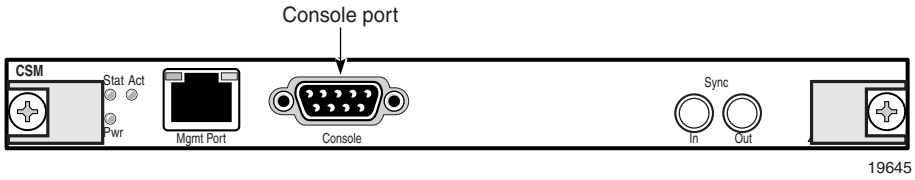
Parameter	Value
Baud Rate	115 200
Data Bits	8
Parity	None

Table 18: Console Configuration Parameter Values (Continued)

Parameter	Value
Stop Bits	1
Flow Control	None

Figure 9 displays an example of the Console port on a 7705 SAR front panel.

Figure 9: 7705 SAR Console Port



To establish a console connection:

Step 1. Connect the terminal to the Console port on the front panel (Figure 9) 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

Use the CLI syntax displayed below to configure BOF components:

CLI Syntax:
```
bof
    address ip-address/mask [active | standby]
    autonegotiate
    console-speed baud-rate
    dns-domain dns-name
    duplex {full | half}
    persist {on | off}
    primary-config file-url
    primary-dns ip-address
    primary-image file-url
    save [cflash-id]
    secondary-config file-url
    secondary-dns ip-address
    secondary-image file-url
    speed speed
    static-route ip-address/mask next-hop ip-address
    tertiary-config file-url
    tertiary-dns ip-address
    tertiary-image file-url
    wait seconds
```

The following example displays BOF command usage:

Example:
```
ALU-1# bof
ALU-1>bof# address 10.10.10.103/20 active
ALU-1>bof# dns-domain ca.alcatel.com
ALU-1>bof# duplex full
ALU-1>bof# persist on
ALU-1>bof# wait 3
ALU-1>bof# primary-image cf3:\TIMOS.5.0.R0
ALU-1>bof# primary-config cf3:\test123.cfg
ALU-1>bof# primary-dns 10.10.10.103
ALU-1>bof# save cf3:
```

```
A:ALU-1# show bof
===============================================================================
BOF (Memory)
===============================================================================

    primary-image    ftp://*:*@xxx.xxx.xxx.xx/home/csahwreg17/images/both.tim
    primary-config   ftp://*:*@ xxx.xxx.xxx.xx /home/csahwreg17/images/dut-a.cfg
    address          xxx.xxx.xxx.xx /24 active
    address          xxx.xxx.xxx.xx /24 standby
    primary-dns      xxx.xxx.xxx.xx
    dns-domain       labs.ca.alcatel-lucent.com
    static-route     xxx.xxx.0.0/16 next-hop xxx.xxx.xxx.x
    autonegotiate
    duplex           full
    speed            100
    wait             3
    persist          off
    console-speed    115200
===============================================================================
A:ALU-1#
```

Service Management Tasks

This section discusses the following service management tasks:

System Administration Commands

Use the following administrative commands to perform management tasks.

CLI Syntax:
```
ALU-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 indexes. 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:ALU-1# admin display-config
# TiMOS-B-0.0.R3 both/hops ALCATEL-LUCENT SAR 7705
# Copyright (c) 2000-2008 Alcatel-Lucent.
# All rights reserved. All use subject to applicable license agreements.
# Built on Wed Jan 16 01:05:13 EST 2008 by csabuild in /rel0.0/I297/panos/main

# Generated THU JAN 17 21:21:21 2008 UTC

exit all
configure
#--------------------------------------------------
echo "System Configuration"
#--------------------------------------------------
    system
        name "ALU-1"
exit
        login-control
            idle-timeout disable
            pre-login-message "CSAxxx - 7705" name
        exit
        time
            sntp
                server-address 128.120.118.37 preferred
                server-address 128.120.210.200
                no shutdown
            exit
            zone EST
        exit
        thresholds
            rmon
            exit
        exit
    exit
#--------------------------------------------------
echo "System Security Configuration"
#--------------------------------------------------
    system
        security
            telnet-server
            ftp-server
            snmp
    exit
...exit all

# Finished THU JAN 17 21:57:11 2008 UTC
A:ALU-1#
```

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.

Use either of the following CLI syntaxes to save a configuration:

CLI Syntax: `bof# save [cflash-id]`

Example:
```
ALU-1# bof
ALU-1>bof# save cf3:
ALU-1>bof#
```

or

CLI Syntax: `admin# save [file-url] [detail] [index]`

Example:
```
ALU-1# admin save cf3:\test123.cfg
Saving config.# Saved to cf3:\test123.cfg
... complete
ALU-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 remove BOF configuration parameters:

CLI Syntax:
```
bof# save [cflash-id]
```

Example:
```
ALU-1# bof
ALU-1>bof# save cf3:
ALU-1>bof#
```

CLI Syntax:
```
bof#
    no address ip-address/mask [active | standby]
    no autonegotiate
    no console-speed
    no dns-domain
    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:
```
ALU-1# bof
ALU-1>bof# save cf3:
ALU-1>bof#
```

or

CLI Syntax:
```
admin# save [file-url] [detail] [index]
```

Example:
```
ALU-1>admin# save cf3:\testABC.cfg
Saving config.# Saved to cf3:\testABC.cfg
... complete
ALU-1#
```

Rebooting

When an admin>reboot command is issued, routers with redundant CSMs are rebooted. 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:
```
ALU-1>admin# reboot
A:DutA>admin# reboot

Are you sure you want to reboot (y/n)? y

Resetting...OK

Alcatel-Lucent 7705 Boot ROM. Copyright 2000-2008
Alcatel-Lucent.

All rights reserved. All use is subject to applicable
license agreements.

....
```

BOF Command Reference

Command Hierarchies

Configuration Commands

bof
- — [**no**] **address** *ip-prefix/prefix-length* [**active** | **standby**]
- — [**no**] **autonegotiate**
- — **auto-discover** [**id** *client-identifier*] [**vlan** *vlan-id*]
- — [**no**] **auto-discover**
- — **console-speed** *baud-rate*
- — **no console-speed**
- — **dns-domain** *dns-name*
- — **no dns-domain**
- — **duplex** {**full** | **half**}
- — **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**
- — **secondary-dns** *ip-address*
- — **no secondary-dns**
- — **secondary-image** *file-url*
- — **no secondary-image**
- — **speed** *speed*
- — [**no**] **static-route** *ip-prefix/prefix-length* **next-hop** *ip-address*
- — **tertiary-config** *file-url*
- — **no tertiary-config**
- — **tertiary-dns** *ip-address*
- — **no tertiary-dns**
- — **tertiary-image** *file-url*
- — **no tertiary-image**
- — **wait** *seconds*

Show Commands

show
- **bof** [*cflash-id* | **booted**]
- **boot-messages**

Command Descriptions

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 CSM 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.

The pound (#) sign is used at the beginning of the File syntax. Using the command `file type bof.cfg` displays the # character as a comment delimiter at the top of the raw file. 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 directory of the compact flash drives local to the system and have the mandatory filename of **bof.cfg**.

The BOF is saved to the compact flash drive associated with the active CSM. 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:) associated with the active CSM (either in slot A or B)
- **bof save cf3:** — saves the BOF to cf3: associated with the active CSM (either in slot A or B)

To save the BOF to a compact flash drive associated with the standby CSM (for example, the redundant (standby) CSM is installed in slot B), specify the -A or -B option.

Command usage:

- **bof save cf3-A:** — saves the BOF to cf3: associated with the CSM in slot A whether it is active or standby
- **bof save cf3-B:** — saves the BOF to cf3: associated with the CSM 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 CSM. Use the **show card** command to determine the active and standby CSM (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 cf3:, cf3-A:, cf3-B:

Default cf3:

BOF Processing Control Commands

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 to 10

Console Port Configuration Commands

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 b/s operation

Parameters *baud-rate* — the console port baud rate, expressed as a decimal integer

Values 9600, 19200, 38400, 57600, 115200

Image and Configuration Management Commands

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, and path IDs. This reduces resynchronizations of the Network Management System (NMS) with the affected network element.

In the event that persist is **on** and the reboot with the appropriate index file fails, SNMP is operationally shut down to prevent the management system from accessing and possibly synchronizing with a partially booted or incomplete network element. To enable SNMP access, enter the **config>system>snmp>no shutdown** command.

If **persist** is enabled and the **admin save** <*url*> command is executed with an FTP path used as the <*url*> parameter, two FTP sessions simultaneously open to the FTP server. The FTP server must be configured to allow multiple sessions from the same login; otherwise, the configuration and index files will not be saved correctly.

Notes:

- Persistency files (.pst) should not be saved on the same disk as the configuration files and the image files.
- When an operator sets the location for the persistency file, the system checks to ensure that the disk has enough free space. If there is not enough free space, the persistency will not become active and a trap is generated. The operator must free up adequate disk space before persistency will become active. The system performs a space availability check every 30 seconds. As soon as the space is available the persistency becomes active on the next 30-second check.

Default **off**

Parameters **on —** preserves the system index when saving the configuration

off — disables the system index saves between reboots

primary-config

Syntax **primary-config** *file-url*
no primary-config

Context bof

Description This command specifies the name and location of the primary configuration file.

The system attempts to use the configuration specified in **primary-config**. If the specified file cannot be located, the system automatically attempts to obtain the configuration from the location specified in **secondary-config** and then in **tertiary-config**.

If an error in the configuration file is encountered, the boot process aborts.

The **no** form of the command removes the **primary-config** configuration.

Default **none**

Parameters *file-url* — the primary configuration file location, expressed as a file URL

Values

file-url	[*local-url* | *remote-url*] (up to 180 characters)	
local-url	*[cflash-id/*][*file-path*]	
remote-url	[{ftp:// | tftp://} *login:pswd@remote-locn/*][*file-path*]	
cflash-id	cf3:, cf3-A:, cf3-B:	

primary-image

Syntax **primary-image** *file-url*
no primary image

Context bof

Description This command specifies the primary directory location for runtime image file loading.

The system attempts to load all runtime image files configured in the **primary-image** first. If this fails, the system attempts to load the runtime images from the location configured in the **secondary-image**. If the secondary image load fails, the tertiary image specified in **tertiary-image** is used.

The **no** form of the command removes the **primary-image** configuration.

Default **none**

Parameters *file-url* — the *location-url* can either be local (this CSM) 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	cf3:, cf3-A:, cf3-B:	

secondary-config

Syntax **secondary-config** *file-url*
no secondary-config

Context bof

Description This command specifies the name and location of the secondary configuration file.

The system attempts to use the configuration as specified in **secondary-config** if the primary config cannot be located. If the **secondary-config** file cannot be located, the system attempts to obtain the configuration from the location specified in the **tertiary-config**.

If an error in the configuration file is encountered, the boot process aborts.

The **no** form of the command removes the **secondary-config** configuration.

Default **none**

Parameters *file-url* — the secondary configuration file location, expressed as a file URL

Values

file-url	[*local-url* | *remote-url*] (up to 180 characters)
local-url	[*cflash-id*/][*file-path*]
remote-url	[{ftp:// | tftp://} *login:pswd@remote-locn*/][*file-path*]
cflash-id	cf3:, cf3-A:, cf3-B:

secondary-image

Syntax **secondary-image** *file-url*
no secondary-image

Context bof

Description This command specifies the secondary directory location for runtime image file loading.

The system attempts to load all runtime image files configured in the **primary-image** first. If this fails, the system attempts to load the runtime images from the location configured in the **secondary-image**. If the secondary image load fails, the tertiary image specified in **tertiary-image** is used.

The **no** form of the command removes the **secondary-image** configuration.

Default **none**

Parameters *file-url* — the *file-url* can either be local (this CSM) 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	cf3:, cf3-A:, cf3-B:

tertiary-config

Syntax **tertiary-config** *file-url*
no tertiary-config

Context bof

Description This command specifies the name and location of the tertiary configuration file.

The system attempts to use the configuration specified in **tertiary-config** if both the primary and secondary config files cannot be located. If this file cannot be located, the system boots with the factory default configuration.

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	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 (both.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 either be local (this CSM) 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	cf3:, cf3-A:, cf3-B:

CSM Management Configuration Commands

address

Syntax [**no**] **address** *ip-prefix/prefix-length* [**active** | **standby**]

Context bof

Description This command assigns an IP address to the CSM Management port in the running configuration and the Boot Option File (BOF) on the active CSM, or the CSM Management port on the standby CSM for systems using redundant CSMs. Deleting a BOF address entry is not allowed from a Telnet session.

The BOF must have an IPv4 address if an IPv6 address is configured in the same BOF for use on the CSM Management port.

The **no** form of the command deletes the IP address from the CSM Management port.

Default **no address** — there are no IP addresses assigned to CSM Management ports

Parameters *ip-prefix/prefix-length* — the IP address for the CSM Management port

Values	*ipv4-prefix*	a.b.c.d (host bits must be 0)
	ipv4-prefix-length	0 to 32
Values	*ipv6-prefix*	x:x:x:x:x:x:x:x (eight 16-bit pieces) x:x:x:x:x:x:d.d.d.d x: [0 to FFFF]H d: [0 to 255]D
	ipv6-prefix-length	0 to 128

active | **standby —** specifies which CSM Management port address is being configured: the active CSM Management port or the standby CSM Management port

Default active

autonegotiate

Syntax [**no**] **autonegotiate**

Context bof

Description This command enables speed and duplex autonegotiation on the CSM Management 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.

Default **autonegotiate**

auto-discover

Syntax **[no] auto-discover [id** *client-identifier*] **[vlan** *vlan-id*]
[no] auto-discover

Context bof

Description This command enables ADP as part of the boot-up sequence by adding an ADP keyword to the BOF file. ADP will run the next time the chassis is rebooted. You can also use this command to specify an optional unique identifier to use in the automatic discovery broadcast. You can use any unique identifier of up to 16 characters. If you specify *mac*, the chassis MAC address is used. If you run ADP with 802.1q encapsulation, you can specify the VLAN ID.

Parameters *client-identifier* — indicates the unique system identifier to use in the auto-discovery broadcast. If you use *mac* as the client identifier, the chassis MAC address is used.

Values any combination of up to 16 alphanumeric characters with no spaces

vlan-id — indicates the VLAN ID for ADP with 802.1q encapsulation

Values 0 to 4094

duplex

Syntax **duplex** {**full** | **half**}

Context bof

Description This command configures the duplex mode of the CSM Management 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 CSM Management port. 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

speed

Syntax **speed** *speed*

Context bof

Description This command configures the speed for the CSM Management 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 Mb/s operation

Parameters **10 —** sets the link to 10 Mb/s speed

100 — sets the link to 100 Mb/s speed

static-route

Syntax [**no**] **static-route** *ip-prefix/prefix-length* **next-hop** *ip-address*

Context bof

Description This command creates a static route entry for the CSM Management 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 CSM Management port. To reduce configuration, manual address aggregation should be applied where possible.

A static default route (0.0.0.0/0) cannot be configured on the CSM Management port. A maximum of 10 IPv4 and 10 IPv6 static routes can be configured on the CSM Management port.

Each unique next hop of active static routes configured on both the active and standby CSM Management ports are tested every 60 seconds. If the next hop is unreachable, an alarm is raised. The alarm condition is cleared when the preferred static route becomes reachable.

The **no** form of the command deletes the static route.

Default No default routes are configured.

Parameters *ip-prefix/prefix-length* — the destination address requiring the static route

Values	*ipv4-prefix*	a.b.c.d (host bits must be 0)
	ipv4-prefix-length	0 to 32
Values	*ipv6-prefix*	x:x:x:x:x:x:x:x (eight 16-bit pieces) x:x:x:x:x:x:d.d.d.d x: [0 to FFFF]H d: [0 to 255]D
	ipv6-prefix-length	0 to 128

next-hop *ip-address* — the next hop IP address used to reach the destination

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

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* — the DNS domain name

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 (host bits must be 0)
ipv6-address	x:x:x:x:x:x:x:x (eight 16-bit pieces) x:x:x:x:x:x:d.d.d.d x: [0 to FFFF]H d: [0 to 255]D

secondary-dns

Syntax **secondary-dns** *ip-address*
no secondary-dns

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 (host bits must be 0)
ipv6-address	x:x:x:x:x:x:x:x (eight 16-bit pieces) x:x:x:x:x:x:d.d.d.d x: [0 to FFFF]H d: [0 to 255]D

tertiary-dns

Syntax **tertiary-dns** *ip-address*
no tertiary-dns

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 (host bits must be 0)
ipv6-address	x:x:x:x:x:x:x:x (eight 16-bit pieces) x:x:x:x:x:x:d.d.d.d x: [0 to FFFF]H d: [0 to 255]D

Show Commands

bof

Syntax **bof** [*cflash-id* | **booted**]

Context show

Description This command displays the Boot Option File (BOF) executed on the 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 uppercase or lowercase "A" or "B" for the slot name.

Values cf3:, cf3-A:, cf3-B:

booted — displays the boot option file used to boot the system

Output The following output is an example of BOF information, and Table 19 describes the fields.

Sample Output

```
A:ALU-1# show bof cf3:
===============================================================================
BOF on cf3:
===============================================================================
    primary-image     ftp://*:*@xxx.xxx.xxx.xx/home/csahwreg17/images/both.tim
    primary-config    ftp://*:*@ xxx.xxx.xxx.xx /home/csahwreg17/images/dut-a.cfg
    address           xxx.xxx.xxx.xx /24 active
    address           xxx.xxx.xxx.xx /24 standby
    primary-dns       xxx.xxx.xxx.xx
    dns-domain        labs.ca.alcatel-lucent.com
    static-route      xxx.xxx.0.0/16 next-hop xxx.xxx.xxx.x
    autonegotiate
    duplex            full
    speed             100
    wait              3
    persist           off
    console-speed     115200

===============================================================================
A:ALU-1#
```

```
A:ALU-1# show bof booted
===============================================================================
System booted with BOF
===============================================================================
    primary-image    ftp://*:*@xxx.xxx.xxx.xx/home/csahwreg17/images/both.tim
    primary-config   ftp://*:*@ xxx.xxx.xxx.xx /home/csahwreg17/images/dut-a.cfg
    address          xxx.xxx.xxx.xx /24 active
    address          xxx.xxx.xxx.xx /24 standby
    primary-dns      xxx.xxx.xxx.xx
    dns-domain       labs.ca.alcatel-lucent.com
    static-route     xxx.xxx.0.0/16 next-hop xxx.xxx.xxx.x
    autonegotiate
    duplex           full
    speed            100
    wait             3
    persist          off
    console-speed    115200

===============================================================================
A:ALU-1#
```

Table 19: Show BOF Output Fields

Label	Description
primary-image	The primary location of the directory that contains the runtime images of the CSM card
primary-config	The primary location of the file that contains the configuration
primary-dns	The primary DNS server for resolution of host names to IP addresses
secondary-image	The secondary location of the directory that contains the runtime images of the CSM card
secondary-config	The secondary location of the file that contains the configuration
secondary-dns	The secondary DNS server for resolution of host names to IP addresses
tertiary-image	The tertiary location of the directory that contains the runtime images of the CSM card
tertiary-config	The tertiary location of the file that contains the configuration
address	The IP address and mask associated with the CSM Management port or the secondary CSM Management port
tertiary-dns	The tertiary DNS server for resolution of host names to IP addresses

Table 19: Show BOF Output Fields (Continued)

Label	Description
persist	on — persistent indexes between system reboots is enabled
	off — persistent indexes between system reboots is disabled
wait	The time configured for the boot to pause while waiting for console input
autonegotiate	No autonegotiate — autonegotiate not enabled
	Autonegotiate — autonegotiate is enabled
duplex	half — specifies that the system uses half duplex
	full — specifies that the system uses full duplex
speed	The speed of the CSM Ethernet interface
console speed	The console port baud rate
dns domain	The domain name used when performing DNS address resolution

boot-messages

Syntax **boot-messages**

Context show

Description This command displays boot messages generated during the last system boot.

Output The following output is an example of boot messages.

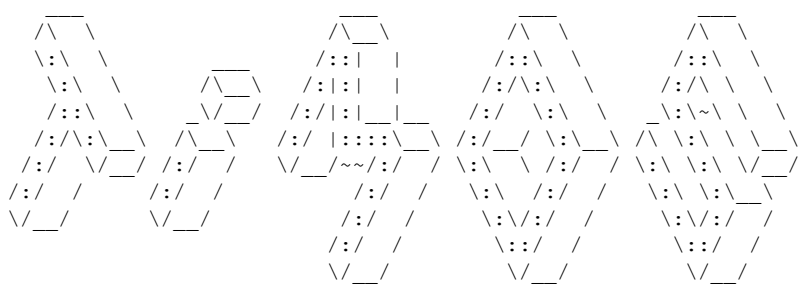
Sample Output

```
A:ALU-1# show boot-messages
===============================================================================
cf3:/bootlog.txt
===============================================================================
Boot log started on CPU#0
  Build: X-2.1.R1 on Tue Apr 1 16:25:56 EDT 2008 by csabuild

Total Memory: 992MB  Chassis Type: sar8  Card Type: corona_r1
TiMOS-L-2.1.R1 boot/hops ALCATEL-LUCENT SAR 7705
Copyright (c) 2000-2008 Alcatel-Lucent.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Apr 9 09:36:02 EDT 2008 by csabuild in /rel2.0/b1/R1/panos/main

TiMOS BOOT LOADER
Time from clock is FRI APR 11 13:31:16 2008 UTC
Switching serial output to sync mode...
Total Memory: 992MB  Chassis Type: sar8  Card Type: corona_r1
```

```
TiMOS-B-2.1.R1 both/hops ALCATEL-LUCENT SAR 7705
Copyright (c) 2000-2008 Alcatel-Lucent.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Apr 9 09:53:01 EDT 2008 by csabuild in /rel2.0/b1/R1/panos/main
```



```
Time from clock is FRI APR 11 13:31:57 2008 UTC
Initial DNS resolving preference is ipv4-only

CRITICAL: CLI #1001 Cannot locate the configuration file -
Using default configuration values.

MAJOR: CLI #1008 The SNMP daemon is disabled.  To enable SNMP, execute the comma
nd 'config>system>snmp no shutdown'.
TiMOS-B-2.1.R1 both/hops ALCATEL-LUCENT SAR 7705
Copyright (c) 2000-2008 Alcatel-Lucent.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Apr 9 09:53:01 EDT 2008 by csabuild in /rel2.0/b1/R1/panos/main


Login:
===============================================================================
cf3:/bootlog_prev.txt
===============================================================================
Boot log started on CPU#0
  Build: X-2.1.R1 on Tue Apr 1 16:25:56 EDT 2008 by csabuild

Total Memory: 992MB  Chassis Type: sar8  Card Type: corona_r1
TiMOS-L-2.1.R1 boot/hops ALCATEL-LUCENT SAR 7705
Copyright (c) 2000-2008 Alcatel-Lucent.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Apr 9 09:36:02 EDT 2008 by csabuild in /rel2.0/b1/R1/panos/main

TiMOS BOOT LOADER
Time from clock is FRI APR 11 13:30:38 2008 UTC
Switching serial output to sync mode...

reboot
```

System Management

In This Chapter

This chapter provides information about configuring basic system management parameters.

Topics in this chapter include:

System Management Parameters

System management commands allow you to configure basic system management functions such as the system name, the router's location and coordinates, and CLLI code as well as time zones, Network Time Protocol (NTP), Simple Network Time Protocol (SNTP) properties, CRON, and synchronization properties.

System Information

System information components include:

- System Name
- System Contact
- System Location
- System Coordinates
- Common Language Location Identifier

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:

⟨direction, hours, minutes, seconds⟩

where:
direction is one of the four basic values: N, S, W, E
hours ranges from 0 to 180 (for latitude) and 0 to 90 (for longitude)
minutes and *seconds* range from 0 to 60

<W, 122, 56, 89> is an example of longitude and <N, 85, 66, 43> is an example of latitude.

System coordinates can be expressed in different notations, for example:

- N 45 58 23, W 34 56 12
- N37 37' 00 latitude, W122 22' 00 longitude
- N36 × 39.246' W121 × 40.121

The system coordinates can be any ASCII printable text string up to 80 characters.

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

The 7705 SAR 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 7705 SAR OS software has options for local time translation as well as system clock synchronization.

System time parameters include:

- Time Zones
- NTP
- SNTP Time Synchronization
- CRON

Time Zones

Setting a time zone in the 7705 SAR OS allows for times to be displayed in the local time rather than in UTC. The 7705 SAR 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 that is different from the system-defined time zones. For user-defined time zones, the offset from UTC is configured as well as any summer time adjustment for the time zone.

The 7705 SAR OS system-defined time zones are listed in Table 20, which includes both time zones with and without summer time correction.

Table 20: System-defined Time Zones

Acronym	Time Zone Name	UTC Offset
Europe:		
GMT	Greenwich Mean Time	UTC
BST	British Summer Time	UTC +1
IST	Irish Summer Time	UTC +1*
WET	Western Europe Time	UTC
WEST	Western Europe Summer Time	UTC +1
CET	Central Europe Time	UTC +1
CEST	Central Europe Summer Time	UTC +2
EET	Eastern Europe Time	UTC +2

Table 20: System-defined Time Zones (Continued)

Acronym	Time Zone Name	UTC Offset
EEST	Eastern Europe Summer Time	UTC +3
MSK	Moscow Time	UTC +3
MSD	Moscow Summer Time	UTC +4
US and Canada:		
AST	Atlantic Standard Time	UTC -4
ADT	Atlantic Daylight Time	UTC -3
EST	Eastern Standard Time	UTC -5
EDT	Eastern Daylight Saving Time	UTC -4
ET	Eastern Time	Either as EST or EDT, depending on place and time of year
CST	Central Standard Time	UTC -6
CDT	Central Daylight Saving Time	UTC -5
CT	Central Time	Either as CST or CDT, depending on place and time of year
MST	Mountain Standard Time	UTC -7
MDT	Mountain Daylight Saving Time	UTC -6
MT	Mountain Time	Either as MST or MDT, depending on place and time of year
PST	Pacific Standard Time	UTC -8
PDT	Pacific Daylight Saving Time	UTC -7
PT	Pacific Time	Either as PST or PDT, depending on place and time of year
HST	Hawaiian Standard Time	UTC -10
AKST	Alaska Standard Time	UTC -9
AKDT	Alaska Standard Daylight Saving Time	UTC -8
Australia:		
AWST	Western Standard Time	UTC +8

Table 20: System-defined Time Zones (Continued)

Acronym	Time Zone Name	UTC Offset
ACST	Central Standard Time	UTC +9.5
AEST	Eastern Standard/Summer Time	UTC +10

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 maintain time in a more synchronized fashion among 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 7705 SAR device cannot act as a stratum-1 server but can act as a 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:

- authentication keys — both DES and MD5 authentication are supported as well as multiple keys, to provide increased security support in carrier and other networks
- 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 CSM Management 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 a major (128 ms or more) adjustment must 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 CSM takes over from the active CSM, it is required that the time on the secondary CSM be synchronized with the clock of the active CSM
- in order to avoid the generation of too many events and traps, the NTP module will rate limit the generation of events and 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 7705 SAR 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 ms of the time source. SNTP can only receive the time from NTP servers; it cannot be used to provide time services to other systems. SNTP is a compact, client-only version of NTP. SNTP does not authenticate traffic.

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.

The 7705 SAR SNTP client can be configured for either broadcast or unicast client mode.

CRON

The CRON feature supports the Service Assurance Agent (SAA) functions. 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, and service assurance agent tests can 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 that contains information on a script

High Availability

This section discusses the high availability 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/MPLS networks.

High availability is an important feature in service provider routing and switching systems. High availability is gaining momentum due to the unprecedented growth of IP/MPLS 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/MPLS 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/MPLS services, which dictate 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 189.

High Availability 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 the 7705 SAR. Most of these features only apply to routers with two Control and Switching Modules (CSMs).

- Redundancy
  - → Software Redundancy
  - → Configuration Redundancy
  - → Component Redundancy
  - → Accounting Configuration Redundancy
- Nonstop Routing (NSR)
- In-service Upgrade
- CSM Switchover
- Synchronization
  - → Configuration and boot-env Synchronization
  - → State Database Synchronization

Redundancy

The redundancy features enable the duplication of data elements and software functionality to maintain service continuation in case of outages or component failure.

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 throughout the service provider network and externally to other connected networks possibly belonging to other service providers. This could affect customers on a broad scale. There are several software availability features that contribute to the percentage of time that a router is available to process and forward traffic.

Configuration Redundancy

Features configured on the active CSM are saved on the standby CSM as well. When the active CSM fails, these features are brought up on the standby CSM that takes over the mastership.

Even with modern modular and stable software, the failure of 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 7705 SAR supports hot standby. With hot standby, the router image, configuration, and network state are already loaded on the standby; it receives continual updates from the active route processor and the swap over is immediate. Newer-generation service routers like the 7705 SAR have extra processing built into the system so that router performance is not affected by frequent synchronization, which consumes system resources.

Component Redundancy

7705 SAR component redundancy is critical to reducing MTTR for the routing system. Component redundancy consists of the following features:

- dual Control and Switching modules — for a highly available architecture, redundant Control and Switching Modules (CSMs) are essential
- redundant power supply feed — a power feed can be removed without impact on traffic
- redundant fan — if one fan fails, the others will continue to operate and provide cooling to the system 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 or from other modules

Accounting Configuration Redundancy

When there is a switchover and the standby CSM becomes active, the accounting servers will be checked, and if they are administratively up and capable of coming online (media present and so on), then 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 CSM.

Nonstop Routing (NSR)

With NSR on the 7705 SAR, 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 7705 SAR applies to all supported routing protocols. NSR makes it possible to keep the existing sessions (such as LDP) during a CSM switchover, including support for MPLS signaling protocols. Peers will not see any change.

Traditionally, high availability issues have been patched through non-stop forwarding solutions. NSR overcomes these limitations by delivering an intelligent hitless failover solution.

The following NSR entities remain intact after a switchover:

- ATM/IMA VPs/VCs
- LDP
- PPP and MLPPP sessions

In-service Upgrade

In-service upgrades allow new routing engine software and microcode to be installed on the 7705 SAR while existing services continue to operate. Software upgrades can be performed only for certain maintenance releases (generally r4 loads and higher). Software upgrades also require NSR. If software or microcode on the CSM needs to be upgraded, CSM redundancy is required.

Note: The in-service upgrade requires the adapter cards to be reset. This will cause a short outage.

Follow the steps below to upgrade routing engine software on the 7705 SAR without affecting existing services:

1. Install new software on the standby CSM.
2. Reboot the standby CSM for the new software to take effect.

3. Perform a manual switchover on the active CSM by using the force-switchover command on the CLI. The standby CSM becomes the active CSM, placing the formerly active CSM into standby.
4. Repeat steps 1 and 2 to upgrade the standby CSM.

CSM Switchover

During a switchover, system control and routing protocol execution are transferred from the active to the standby CSM. A switchover may occur automatically or manually.

An automatic switchover may occur under the following conditions:

- a fault condition arises that causes the active CSM to crash or reboot
- the active CSM is declared down (not responding)
- online removal of the active CSM

Users can manually force the switchover from the active CSM to the standby by using the `admin redundancy force-switchover now` CLI command or the `admin reboot active [now]` CLI command.

With the 7705 SAR, the `admin reboot active [now]` CLI command does not causes both CSMs to reboot.

Synchronization

Synchronization between the CSMs includes the following:

- Configuration and boot-env Synchronization
- State Database Synchronization

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 CSM is inserted into the system, it synchronizes with the active CSM upon a successful boot process.

If the standby CSM is rebooted, it synchronizes with the active CSM upon a successful boot process.

When configuration or state changes occur, an incremental synchronization is conducted from the active CSM to the standby CSM.

If the synchronization fails, the standby does not reboot automatically. The `show redundancy synchronization` command displays synchronization output information.

If the active and standby CSMs are not synchronized for some reason, users can manually synchronize the standby CSM by rebooting the standby by issuing the `admin reboot standby` command.

Synchronization and Redundancy

The 7705 SAR uses a 1:1 redundancy scheme. Redundancy methods facilitate system synchronization between the active and standby CSMs so that they maintain identical operational parameters to prevent inconsistencies in the event of a CSM 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 CSM file system are mirrored in the standby CSM file system.

Although software configurations and images can be copied or downloaded from remote locations, synchronization can only occur locally between compact flash drives (cf3-A and cf3-B:).

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 with persistence on 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.

```
ALU-1>admin>redundancy# synchronize config

Syncing configuration......

Syncing configuration.....Completed.
ALU-1#
```

Active and Standby Designations

Typically, the first CSM installed in a 7705 SAR chassis assumes the role as active, regardless of being inserted in Slot A or B. The next CSM installed in the same chassis then assumes the role as the standby CSM. If two CSMs are inserted simultaneously (or almost simultaneously) and are booting at the same time, then preference is given to the CSM installed in Slot A.

If only one CSM is installed in a 7705 SAR, then it becomes the active CSM regardless of the slot it is installed in.

To visually determine the active and standby designations, the MS/CTL LED on the faceplate is lit green (steady) to indicate the active designation. The MS/CTL LED on the second CSM faceplate is flashing green to indicate the standby designation.

The following output shows that the CSM installed in Slot A is acting as the active CSM and the CSM installed in Slot B is acting as the standby.

```
ALU-1# show card
===============================================================================
Card State
===============================================================================
Slot/  Provisioned      Equipped         Admin Operational   Num   Num Comments
Id     Type             Type             State State         Ports MDA
-------------------------------------------------------------------------------
1      iom-sar          iom-sar          up    up                    6
A      csm-1g           csm-1g           up    up                        Active
B      csm-1g           csm-1g           up    up                        Standby
===============================================================================

...
```

When the Active CSM Goes Offline

When an active CSM goes offline (due to reboot, removal, or failure), the standby CSM takes control without rebooting or initializing itself. It is assumed that the CSMs are synchronized; therefore, there is no delay in operability. When the CSM that went offline boots and then comes back online, it becomes the standby CSM.

Administrative Tasks

This section contains information to perform administrative tasks:

- Saving Configurations
- Specifying Post-Boot Configuration Files

Saving Configurations

Whenever configuration changes are made, the modified configuration must be saved so that it will not be lost when the system is rebooted.

Configuration files are saved by executing explicit command syntax that 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 chapter on Boot Options of this guide.

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.

Automatic Synchronization

Use the CLI syntax displayed below to configure synchronization components relating to active-to-standby CSM switchover. In redundant systems, synchronization ensures that the active and standby CSMs have identical operational parameters, including the active configuration, CSM, and IOM images in the event of a failure or reset of the active CSM. The `force-switchover` command forces a switchover to the standby CSM 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, **boot.ldr**, config, and image 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 with persistence on 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 CSM (in redundant systems).
   Note: The synchronization parameters on the standby CSM are preserved.
2. The primary, secondary, and tertiary images (provided they are locally stored on the active CSM) are copied to the same compact flash on the standby CSM.
3. The primary, secondary, and tertiary configuration files (provided they are locally stored on the active CSM) are copied to the same compact flash on the standby CSM.

Config Option

The `config` option synchronizes configuration files by copying the files specified in the active CSM BOF file to the same compact flash on the standby CSM.

Manual Synchronization

The `admin redundancy synchronize` command performs manual CSM 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 CSM card.

If the active and standby CSMs are not synchronized for some reason, users can manually synchronize the standby CSM by rebooting the standby by issuing the `admin reboot standby` command on the active CSM.

Node Timing

The 7705 SAR supports a centralized synchronization system with an SSU in each CSM. The SSU can be synchronized to a traceable primary reference clock through an external timing port, line interface, or timing-over-packet technology. The transmit clock of each T1/E1, DS3/E3, SONET/SDH port or Synchronous Ethernet-capable port (referred to as a Synchronous Ethernet port in this guide) can then be configured to use the node clock or alternatives.

The 7705 SAR supports three timing references — one external and two internal. The timing references can be configured as an ordered list of highest to lowest priority. The system uses an available valid timing reference with the highest priority. If a failure on the current timing reference occurs, the next highest timing reference takes over. The reference switching can be configured to operate in a revertive or non-revertive manner with the `sync-if-timing revert` command. Revertive switching always selects the highest-priority valid timing reference as the current source. If a reference with a higher priority becomes valid, the system automatically switches to that timing reference. Non-revertive switching means that the active timing reference remains selected while it is valid, even if a higher-priority timing reference becomes available. If the current timing reference becomes invalid, then a switch to the highest-priority available timing reference is initiated. If all the timing references fail or have not been configured, the SSU enters holdover mode of its Stratum 3 oscillator (if it was previously synchronized) or free-run mode.

The external timing reference input with a 2.048 MHz G.703 signal, 5 or 10 MHz sine wave, is available from the external timing input port on each CSM in the 7705 SAR-8 or directly on the 7705 SAR-F. On the 7705 SAR-18, the external timing reference input with a 2.048 MHz G.703, T1 (100 Ω), or E1 (120 Ω), is supported by the BITS ports 1 and 2 located on the Alarm module.

The two internal timing references originate from timing extracted from interface ports. This timing can be recovered directly from physical layer framing on a T1/E1 port, from adaptive timing recovery for TDM pseudowires, or from a Synchronous Ethernet port.

On the 7705 SAR-F, both Synchronous Ethernet ports or two T1/E1 ports can supply a timing reference. For T1/E1 ports, one reference must be from ports 1 to 8 and the other from ports 9 to 16.

On the 7705 SAR-8 and 7705 SAR-18, a timing reference can come from a single DS3/E3 port on the 4-port DS3/E3 Adapter card, a single SONET/SDH port on a 2-port OC3/STM1 Channelized Adapter card or 4-port OC3/STM1 Clear Channel Adapter card, a single Synchronous Ethernet port on an 8-port Ethernet Adapter card version 2, or a single T1/E1 port on the 16-port T1/E1 ASAP Adapter Card version 1. On the 16-port T1/E1 ASAP Adapter card version 2 and 32-port T1/E1 ASAP Adapter card version 2, up to two T1/E1 ports can be configured to be a timing reference.

These two references must be from different framers on the cards. The framers each have 8 ports and are split into groups of 1 to 8 and 9 to 16 on the 16-port T1/E1 ASAP Adapter card, and groups of 1 to 8, 9 to 16, 17 to 24, and 25 to 32 on the 32-port T1/E1 ASAP Adapter card.

Each T1/E1 port on the 16-port T1/E1 ASAP Adapter card and 32-port T1/E1 ASAP Adapter card can be independently configured to be loop-timed or node-timed, and each T1/E1 CES circuit can be independently configured for adaptive timing (clocking is derived from incoming TDM pseudowire packets). Up to two loop-timed or adaptive-timed T1/E1 ports on a 16-port T1/E1 ASAP Adapter card and 32-port T1/E1 ASAP Adapter card can be configured to be a timing source for the node.

Each SONET/SDH port and each T1/E1 CES circuit on a 2-port OC3/STM1 Channelized Adapter card can be independently configured to be loop-timed or node-timed; a loop-timed SONET/SDH port can be configured to be a timing source for the node.

Each SONET/SDH port on a 4-port OC3/STM1 Clear Channel Adapter card can be independently configured to be loop-timed or node-timed; a loop-timed SONET/SDH port can be configured to be a timing source for the node.

On the 4-port DS3/E3 Adapter card, each DS3/E3 port can be independently configured to be loop-timed or node-timed; a loop-timed DS3/E3 port can be configured to be a timing source for the node.

External Timing Mode

The external input and output timing ports are located on the CSM on the 7705 SAR-8 and directly on the 7705 SAR-F. The external input timing port allows the SSU to be synchronized to an external timing reference. The external output timing port provides a synchronization output signal from the 7705 SAR to an external device. These external timing references typically would come from a GPS, BITS (Building Integrated Timing System), or the external output timing ports from other telecom equipment. The timing ports can be configured for the following:

- 2.048 MHz G.703 section 13 signal
- 5 MHz sine wave
- 10 MHz sine wave

On the 7705 SAR-18, the BITS ports 1 and 2 can be configured for the following:

- 2.048 MHz G.703 section 13 signal
- T1 (ESF or SF)
- E1 (PCM30CRC or PCM31CRC)

When redundant CSMs are used on the 7705 SAR-8, the external synchronization inputs in each CSM must come from the same synchronization source; that is, you cannot select each input of the two CSMs as two of the three timing references. A Y-cable can be used to connect to a single reference connector. The synchronization output on each CSM is clocked by its own SSU clock.

On the 7705 SAR-18, either BITS port 1 or port 2 is available as an input and output source. When both inputs are connected and available, then the quality level (QL) from Synchronization Status Messaging (SSM) is used to determine which port is used by the CSMs as the BITS input. If SSM is not available, then BITS port 1 is the preferred input. BITS port 2 is used if BITS port 1 is not available. In this case, the operation is non-revertive. The BITS output port 1 and port 2 are clocked by the active CSM's SSU clock.

Line Timing Mode

Line timing from a synchronous port, such as a T1/E1 port or Synchronous Ethernet port, provides the best synchronization performance through a synchronization distribution network. Line timing mode derives an 8 KHz clock from the framing of T1/E1, DS3/E3, and SONET/SDH signaling that can be used as an accurate reference between nodes in a network. Line timing mode is immune to any packet delay variation (PDV) occurring on Layer 2 or Layer 3 links.

On the 7705 SAR-F, line timing is supported on the T1/E1 ports and on Ethernet SFP ports equipped with SFPs that support Synchronous Ethernet. On the 7705 SAR-8 and 7705 SAR-18, line timing is supported on the following adapter cards:

- 16-port T1/E1 ASAP Adapter card (versions 1 and 2)
- 32-port T1/E1 ASAP Adapter card
- 8-port Ethernet Adapter card (version 2)
- 4-port DS3/E3 Adapter card
- 2-port OC3/STM1 Channelized Adapter card
- 4-port OC3/STM1 Clear Channel Adapter card

Adaptive Clock Recovery (ACR)

Adaptive Clock Recovery (ACR) is a timing-over-packet technology that transports timing information via periodic packet delivery over a pseudowire. ACR may be used when there is no other Stratum 1 traceable clock available. On the 7705 SAR-F, ACR is supported on the T1/E1 ports. On the 7705 SAR-8 and 7705 SAR-18, ACR is supported on the 16-port T1/E1 ASAP Adapter card (versions 1 and 2) and on the 32-port T1/E1 ASAP Adapter card.

There is no extra equipment cost to implement ACR in a network because this technique utilizes the packet arrival rate of a TDM pseudowire within the 7705 SAR to regenerate a clock signal. Additionally, the nodes in the network that are traversed between endpoints do not need special ACR capabilities. However, because the TDM pseudowire is transported over Layer 2 links, the packet flow is susceptible to PDV.

To achieve the best ACR performance, follow these recommendations:

- use a packet rate between 1000 pps and 4000 pps. Lower packet rates cause ACR to be more susceptible to PDV in the network.
- limit the number of nodes traversed between the source-end and the ACR-end of the TDM pseudowire
- enable QoS in the network with the TDM pseudowire enabled for ACR classified as NC (network control)
- maintain a constant temperature, as much as possible, because temperature variations will affect the natural frequency on the internal oscillators in the 7705 SAR
- ensure that the network does not contain a timing loop when it is designed

ACR States

There are five potential ACR states:

- normal
- phase tracking
- frequency tracking
- holdover
- free-run

When a port's ACR state is normal, phase tracking, or frequency tracking, the recovered ACR clock is considered to be a qualified reference source for the SSU. If this reference source is being used, then transitions between any of these three states will not affect SSU operation.

When a port's ACR state is free-run or holdover, the recovered ACR clock is disqualified as a reference source for the SSU. If this reference source is being used, then transitions to either of these two states cause the SSU to drop the reference and switch to the next highest prioritized reference source. This can potentially be SSU holdover.

ACR Statistics

The system collects statistics on all ACR-capable ports. ACR statistics detail how the digital phase locked loop (DPLL) is functioning in one or more ACR instances in the adapter card. ACR statistics assist with isolating a problem during degraded synchronization performance or with anticipating future issues.

Within the DPLL, there are two values that contribute to ACR statistics:

- DCO frequency
- input phase error of each 2-second update interval

The DCO is the digitally controlled oscillator that produces the regenerated clock signal. The input phase error is the correction signal that provides feedback to the DPLL in order to tune the DCO output. The input phase error should approach zero as the DPLL locks in to the source timing information and stabilizes the output.

The continuous 2-second updates to the output DCO frequency are directly applied as the clock output of the ACR instance. ACR statistics allow you to view the mean frequency and the standard deviation of the output DCO frequency.

During every 2-second update interval, the input phase error and the output DCO frequency are recorded. The input phase error mean, input phase error standard deviation, output DCO mean (Hz and ppb), and output DCO standard deviation are calculated every 60 seconds.

Entering a `show` CLI command on a port with ACR displays the mean and standard deviation values for the previous 60-second interval. A `show detail` command on the same port displays the previous 15 sets of 60-second intervals and a list of state and event counts. An SNMP MIB is also available with these statistics.

IEEE 1588v2 PTP

Precision Time Protocol (PTP) is a timing-over-packet protocol defined in the IEEE 1588v2 standard *1588 PTP 2008*.

PTP may be deployed as an alternative timing-over-packet option to ACR. PTP provides the capability to synchronize network elements to a Stratum-1 clock or primary reference clock (PRC) traceable source over a network that may or may not be PTP-aware. PTP has several advantages over ACR. It is a standards-based protocol, has lower bandwidth requirements, can transport both frequency and time, and can potentially provide better performance.

There are five basic types of PTP devices, as listed below:

- ordinary clock
- boundary clock
- end-to-end transparent clock
- peer-to-peer transparent clock
- management node

In Release 4.0, the 7705 SAR supports the ordinary clock and boundary clock in slave or master mode for frequency recovery. The PTP capability is supported on the 7705 SAR-18, on both the -48 VDC and +24 VDC variants of the 7705 SAR-8, and on both the -48 VDC and +24 VDC variants of the 7705 SAR-F.

A nodal clock is equipped in each CSM on the 7705 SAR-8 and 7705 SAR-18, or directly on the 7705 SAR-F control unit. Up to two PTP ordinary or boundary clocks can be configured per node as references to the nodal clock. On the 7705 SAR-8, a PTP slave clock can be configured on any Ethernet port on an Ethernet v2 Adapter card. If two slave clocks are used, they must be configured on different Ethernet v2 Adapter cards. One PTP slave clock can be configured on any Ethernet port on the 7705 SAR-F.

Each PTP slave clock can be configured to receive timing from up to two PTP master clocks in the network.

IP messaging between the PTP master clock and PTP slave clock over the PTP-enabled IP interface is done using IPv4 unicast mode.

Each PTP instance supports up to 128 synchronization messages per second. The default is 64 synchronization messages per second.

Each master clock has its own configuration for IP address, packet rate, and messaging timeouts, and for statistics, alarms, and events. Each available master clock advertises its presence and information using announce messages. If both master clocks are available, the slave clock uses the Best Master Clock Algorithm (BMCA) to dynamically compare the information in the announce messages of each master clock to determine to which of the two master clocks it should synchronize. This master clock is known as the best master. After the slave clock has determined which is the best master, it may begin to negotiate with it for unicast synchronization communication.

If the `profile` setting for the clock is `ieee1588-2008`, the precedence order for the best master selection algorithm is as follows:

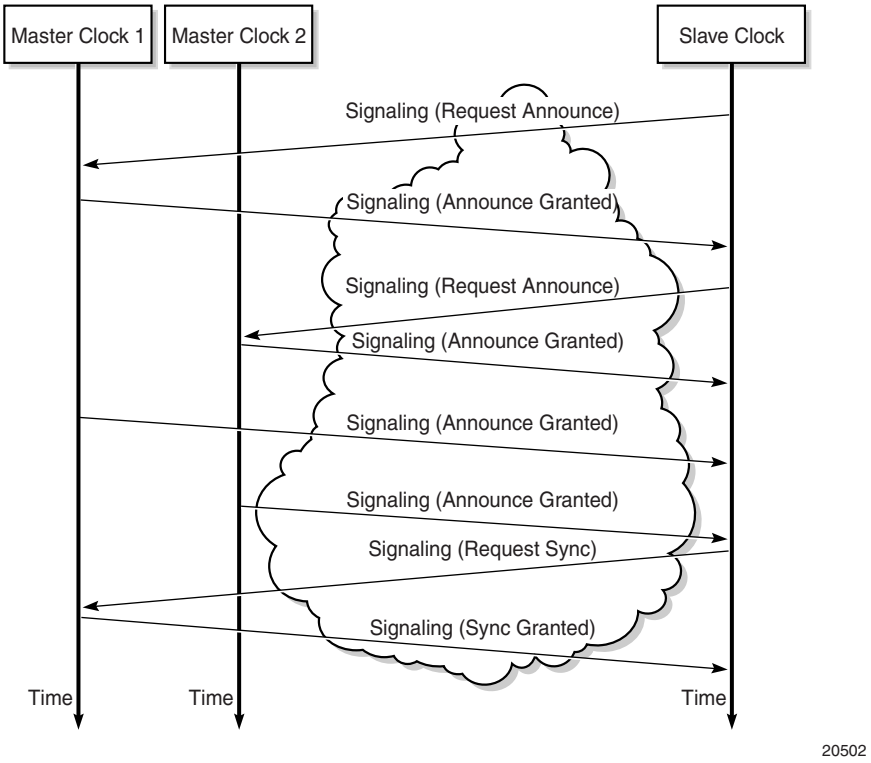
- priority1 (user-configurable on the master clock side)
- clock class
- clock accuracy
- PTP variance
- priority2 (user-configurable on the master clock side)
- clock identity
- distance (number of boundary clocks)

If the `profile` setting for the clock is `itu-telecom-freq` (ITU G.8265.1 profile), the precedence order for the best master selection algorithm is as follows:

- clock class
- peer ID

Figure 10 shows an example of the messaging sequence between the PTP slave clock and the two PTP master clocks.

Figure 10: Messaging Sequence Between the PTP Slave Clock and PTP Master Clocks



PTP Clock Synchronization

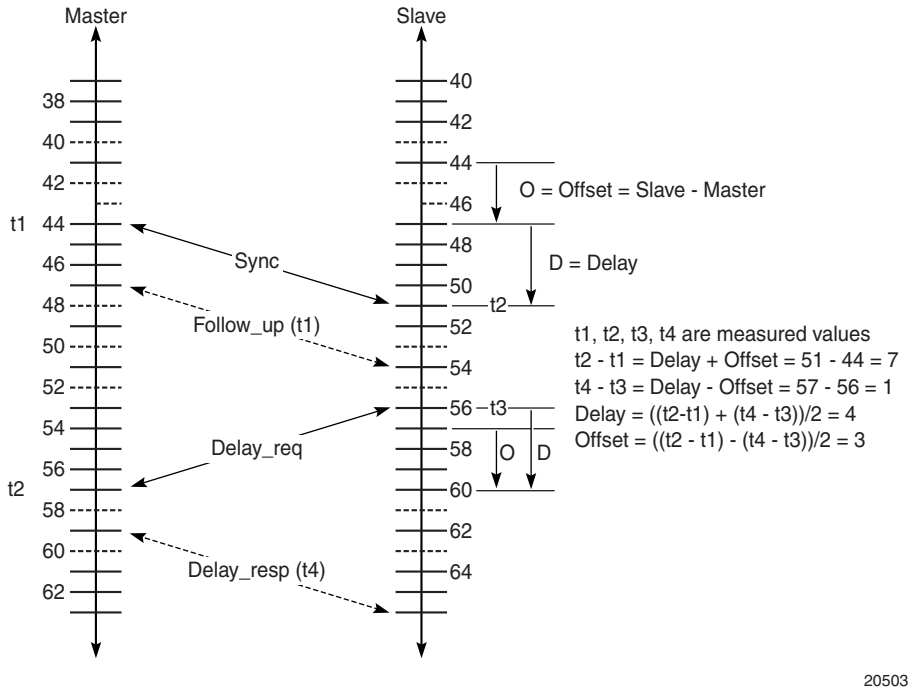
The IEEE 1588v2 standard synchronizes the frequency and time from a master clock to one or more slave clocks over a packet stream. This packet-based synchronization can be over UDP/IP or Ethernet and can be multicast or unicast. In Release 4.0, only IPv4 unicast mode with unicast negotiation is supported.

As part of the basic synchronization timing computation, a number of event messages are defined for synchronization messaging between the PTP slave clock and PTP master clock. A one-step or two-step synchronization operation can be used, with the two-step operation requiring a follow-up message after each synchronization message. Currently, only one-step operation is supported on the 7705 SAR.

During startup, the PTP slave clock receives the synchronization messages from the PTP master clock before a network delay calculation is made. Prior to any delay calculation, the delay is assumed to be zero. A drift compensation is activated after a number of synchronization message intervals occur. The expected interval between the reception of synchronization messages is user-configurable.

The basic synchronization timing computation between the PTP slave clock and PTP best master is illustrated in Figure 11. This figure illustrates the offset of the slave clock referenced to the best master signal during startup.

Figure 11: PTP Slave Clock and Master Clock Synchronization Timing Computation



Performance Considerations

Although IEEE 1588v2 can be used on a network that is not PTP-aware, the use of PTP-aware network elements (boundary clocks) within the packet switched network improves synchronization performance by reducing the impact of PDV between the grand master clock and the slave clock.

Note: The grand master clock is the master clock for the network. The best master clock is the clock that the slave clock selects as its master. For example, the slave clock's best master clock might be a boundary clock, which is connected to a grand master clock.

The performance objective is to meet the synchronization interface maximum time interval error (MTIE) mask. Similar to ACR, the number of factors with the PSN will contribute to how well PTP can withstand, and still meet, those requirements.

The 1588v2 slave for clock frequency recovery complies with the G.823 (03/2000) clause 6.2.3 "SEC interface output wander limit". This compliance meets the Test Cases defined in G.8261 (04/2008) Appendix VI, with one modification: over the operational temperature of the 7705 SAR, the PTP recovered clock achieves a frequency accuracy of better than 15 ppb.

PTP Capabilities

PTP messages are supported via IPv4 unicast with a fixed IP header size.

Table 21 describes the support message rates for slave and master states. The ordinary clock can be either in the slave or master state. The boundary clock can be in both of these states.

Table 21: Support Message Rates for Slave and Master Clock States

Support Message	Slave State			Master State	
	Minimum Request Rate	Maximum Request Rate	Default Request Rate	Minimum Allowed Rate	Maximum Allowed Rate
Announce	1/8 s	1/s	1/2 s	1/16 s	8/s
Sync	64 sync/s	128 sync/s	64 sync/s	1 sync/16 s	128 sync/s
Relay Response	64 delay/s	128 delay/s	64 delay/s	1 delay/16 s	128 delay/s

State and statistics data for each master clock are available to assist in the detection of failures or unusual situations.

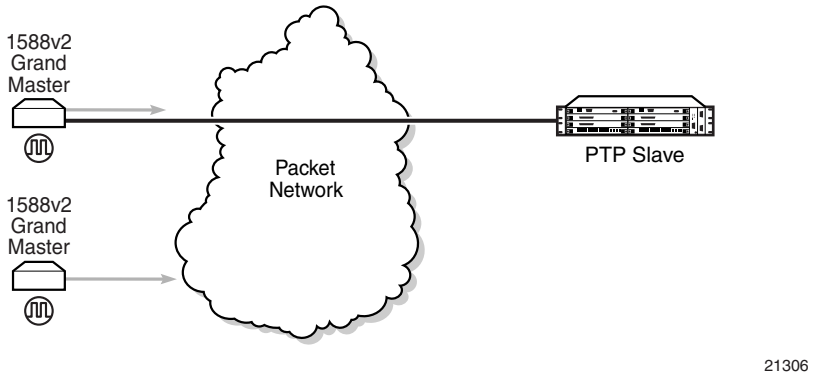
In Release 4.0, the PTP algorithm is able to recover the clock using both the upstream and downstream directions in both ordinary slave and boundary clock modes. The ability to perform bidirectional clock recovery will improve the performance of networks where the upstream and downstream load is not symmetrical.

PTP Ordinary Slave Clock For Frequency

Traditionally, only clock frequency is required to ensure smooth transmission in a synchronous network. The PTP ordinary clock with slave capability on the 7705 SAR provides another option to reference a Stratum-1 traceable clock across a packet switched network. The recovered clock can be referenced by the internal SSU and distributed to all slots and ports.

Figure 12 shows a PTP ordinary slave clock network configuration.

Figure 12: Slave Clock

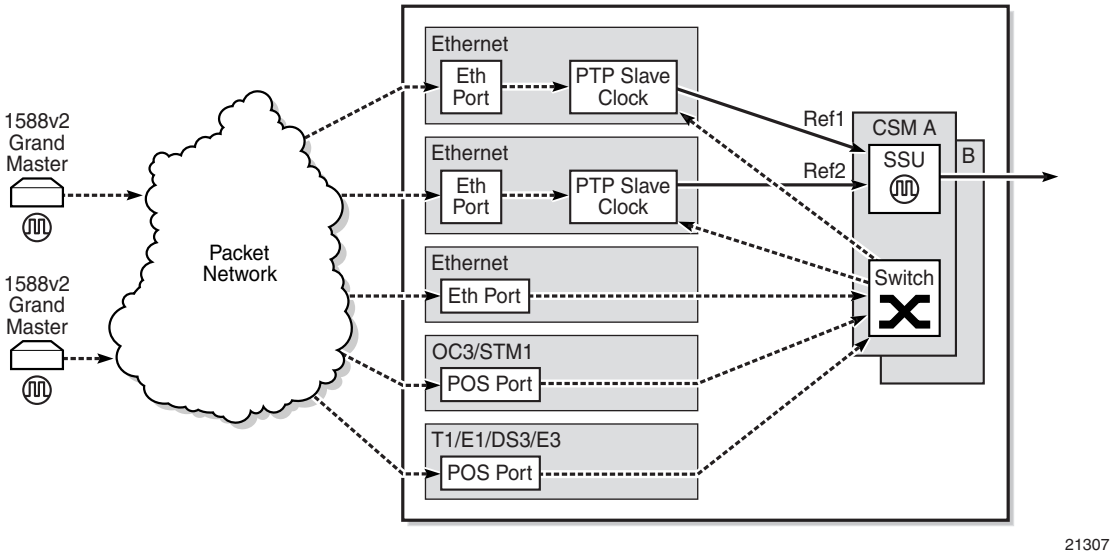


The PTP slave capability is implemented on the Ethernet v2 Adapter card (or on the Ethernet ports on the 7705 SAR-F). The 7705 SAR-8 and 7705 SAR-18 can support up to two slave clocks. The 7705 SAR-F can support one slave clock.

Each slave clock can provide a separate frequency reference to the SSU.

Figure 13 shows the operation of an ordinary PTP clock in slave mode.

Figure 13: Ordinary Slave Clock Operation



Each PTP slave clock is configured for a specific slot where the Ethernet v2 Adapter card or port will perform the slave function (on the 7705 SAR-F, this slot is always 1/2). Each slave is also associated with an IP interface on a specific port, adapter card, or loopback address for the router.

For best performance, the network should be designed so that the IP messaging between the master clock and the slave clock will ingress and egress through a port where the slave is configured. If the ingress and egress flow of the PTP messages is via a different port or adapter card on the 7705 SAR, then the packets will be routed through the fabric to the Ethernet card with the PTP slave.

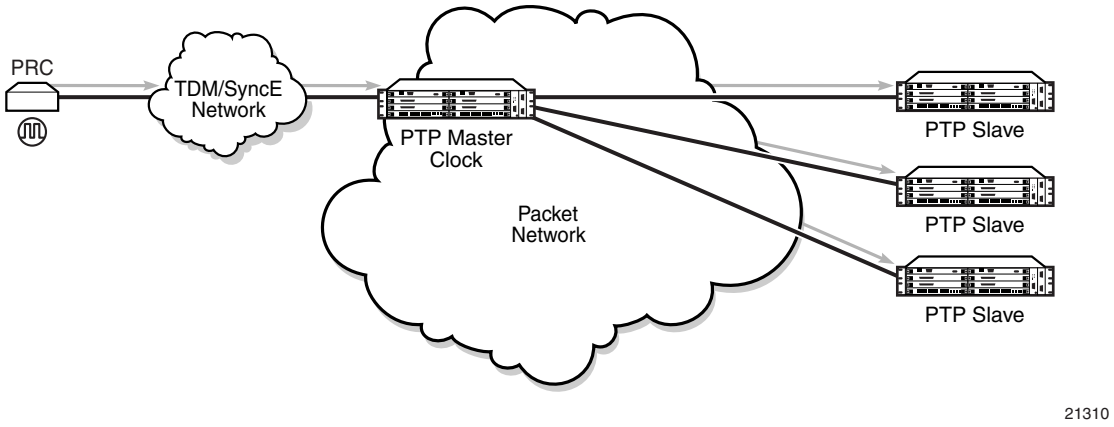
It is possible that the PTP IP packets may be routed through another Ethernet (v1 or v2) port/VLAN, OC3/STM1 clear channel POS, OC3/STM1 channelized MLPPP, DS3/E3 PPP or DS1/E1 MLPPP. The PTP slave performance may be slightly worse in this case because of the extra PDV experienced through the fabric. Packets will be routed this way only if the clock is configured with a loopback address. If the clock is configured with an address tied to a physical port, the packets will arrive on that physical port as described above.

PTP Ordinary Master Clock For Frequency

The 7705 SAR supports the PTP ordinary clock in master mode. Normally, a 1588v2 grand master is used to support many slaves and boundary clocks in the network. In cases where only a small number of slaves and boundary clocks exist and only frequency is required, a PTP integrated master clock can greatly reduce hardware and management costs to implement PTP across the network. It also provides an opportunity to achieve better performance by placing a master clock deeper into the network, as close to the slave clocks as possible.

Figure 14 shows a PTP master clock network configuration.

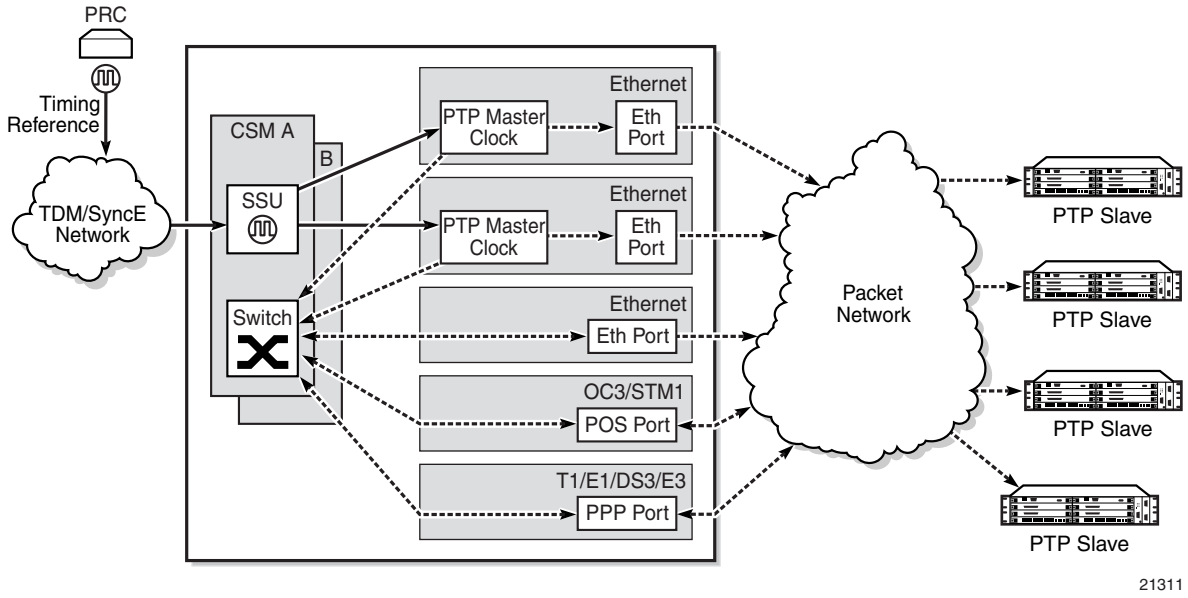
Figure 14: PTP Master Clock



The PTP master clock capability is implemented on the Ethernet v2 Adapter card (or on the Ethernet ports on the SAR-F). The 7705 SAR-8 and 7705 SAR-18 can support up to two master clocks. The 7705 SAR-F can support one master clock.

Figure 15 shows the operation of an ordinary PTP clock in master mode.

Figure 15: Ordinary Master Clock Operation



Each PTP master clock is configured for a specific slot where the Ethernet v2 Adapter card or port will perform the master function (on the 7705 SAR-F, this slot is always 1/2). Each master is also associated with an IP interface on a specific port, adapter card, or loopback address for the router. All packets that ingress or egress through a port where the master is configured are routed to their destination via the best route as determined in the route table.

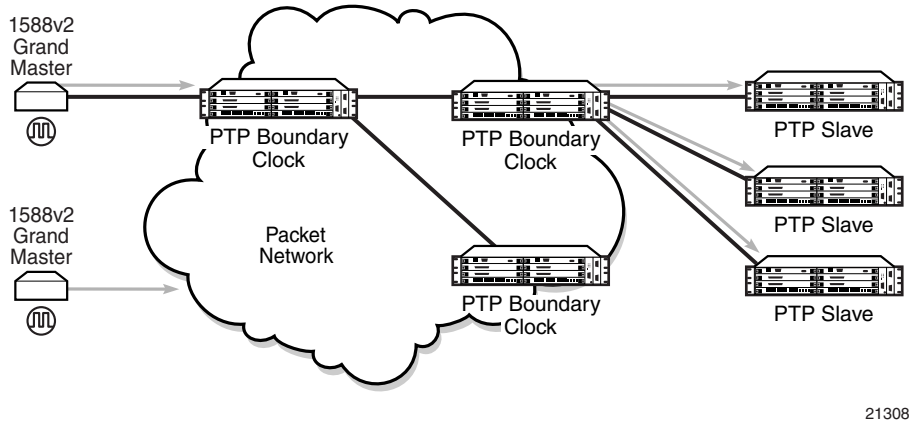
Each master clock can peer with up to 10 slaves or boundary clocks. The IP addresses of these peers can be statically configured via CLI or dynamically accepted via PTP signaling messages. A statically configured peer may displace a dynamic peer on a particular PTP port. If there are fewer than 10 peers, then that dynamic peer can signal back and be granted a different PTP-port instance.

PTP Boundary Clock For Frequency

The 7705 SAR supports boundary clock PTP devices in both master and slave states. IEEE 1588v2 can function across a packet network that is not PTP-aware; however, the performance may be unsatisfactory and unpredictable. PDV across the packet network varies with the number of hops, link speeds, utilization rates, and the inherent behavior of the routers. By using routers with boundary clock functionality in the path between the grand master clock and the slave clock, one long path over many hops is split into multiple shorter segments, allowing better PDV control and improved slave performance. This allows PTP to function as a valid timing option in more network deployments and allows for better scalability and increased robustness in certain topologies, such as rings.

Boundary clocks can simultaneously function as a PTP slave of an upstream grand master (ordinary clock) or boundary clock, and as a PTP master of downstream slaves (ordinary clock) and/or boundary clocks.

Figure 16: Boundary Clock



The PTP boundary clock capability is implemented on the Ethernet v2 Adapter card (or on the Ethernet ports on the 7705 SAR-F). Both the 7705 SAR-8 and the 7705 SAR-18 can support up to two boundary clocks. The 7705 SAR-F can support one boundary clock.

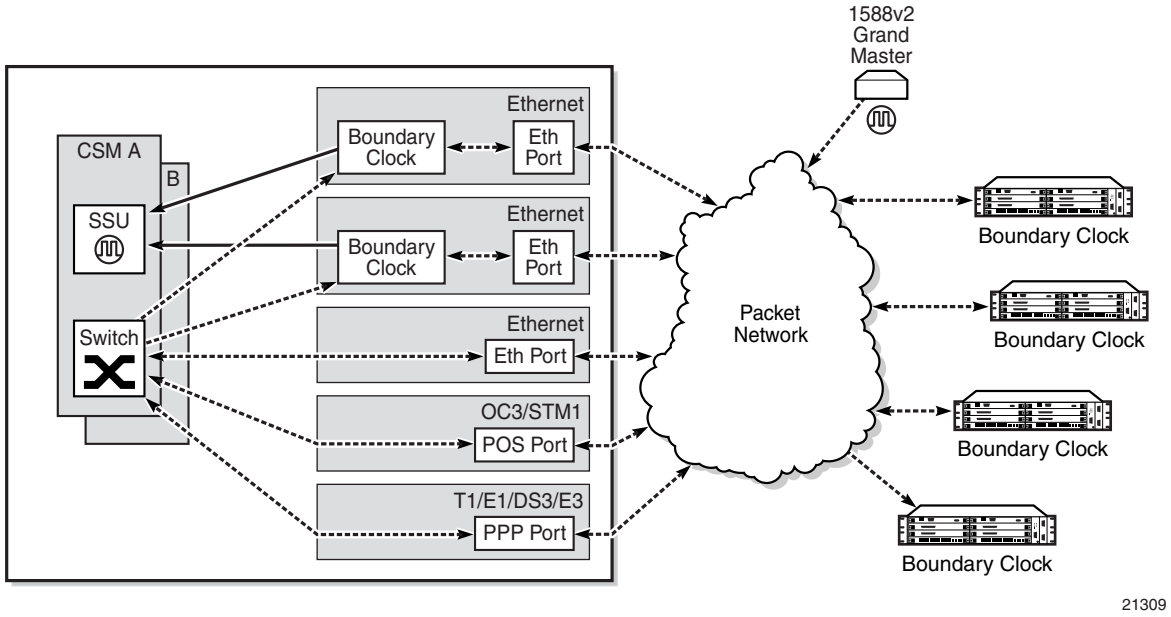
Each PTP boundary clock is configured for a specific slot where the Ethernet v2 Adapter card or port will perform the boundary clock function (on the 7705 SAR-F, this slot is always 1/2). Each boundary clock is also associated with a loopback address for the router.

For best performance, the network should be designed so that the IP messaging between the slave or boundary clocks and the 7705 SAR boundary clock will ingress and egress over a port on its corresponding adapter card. If the ingress or egress flow of the PTP messages is through a different 7705 SAR port or adapter card, then the packets will be routed through the fabric to the Ethernet card with PTP boundary clock. It is possible that the PTP IP packets are routed through another Ethernet (v1 or v2) port/VLAN, OC3/STM1 clear channel POS, OC3/STM1 channelized MLPPP, DS3/E3 PPP or DS1/E1 MLPPP. The performance seen on the PTP slaves or boundary clocks may be slightly worse in this case because of the extra PDV experienced through the fabric.

Each boundary clock can be peered with up to 10 slaves, boundary clocks, or grand master clocks. The IP addresses of these peers can be statically configured via CLI or dynamically accepted via PTP signaling messages. A statically configured peer may displace a dynamic peer on a particular PTP port. If there are fewer than 10 peers, then that dynamic peer can signal back and be granted a different PTP-port instance.

Figure 17 shows an example of boundary clock operation.

Figure 17: Boundary Clock Operation



PTP Clock Redundancy

Each PTP slave clock can be configured to receive timing from up to two PTP master clocks. If two PTP master clocks are configured, and if communication to the best master is lost or if the BMCA determines that the other PTP master clock is better, then the PTP slave clock switches to the other PTP master clock.

For a redundant or simple CSM configuration on the 7705 SAR-8 and 7705 SAR-18, a maximum of two PTP slave clocks can be configured as the source of references (ref1 and ref2) to the SSU. If a failure occurs between the PTP slave clock and the master clock, the SSU detects that ref1 or ref2 is unavailable and automatically switches to the other reference source. This provides PTP hot redundancy for hardware (Ethernet v2 Adapter card) failures or port or facility (SFP or cut fiber) failures. If a loopback address is used, PTP packets may arrive on any router network interface and the PTP clock will remain up.

On the 7705 SAR-F, only one PTP slave clock is supported. This slave clock can be configured as the source of reference (ref1 or ref2) to the SSU.

PTP Statistics

The 7705 SAR provides the capability to collect statistics, state, and events data for the PTP slave clock's interaction with PTP peer clock 1 and PTP peer clock 2. This data is collected separately for each peer clock and can be displayed using the `show system ptp clock ptp-port` command. This data can be used to monitor the PTP Slave clock performance in relation to the peer clocks and to diagnose a problem or analyze the performance of a packet switched network for the transport of synchronization messages. The following data is collected:

PTP peer-1/PTP peer-2 statistics:

- number of signaling packets
- number of unicast request announce packets
- number of unicast request announce timeouts
- number of unicast request announce packets rejected
- number of unicast request synchronization packets
- number of unicast request synchronization timeouts
- number of unicast request synchronization packets rejected
- number of unicast request delay response packets
- number of unicast request delay response packets timeouts
- number of unicast request delay response packets rejected
- number of unicast grant announce packets

- number of unicast grant announce packets rejected
- number of unicast grant synchronization packets
- number of unicast grant synchronization packets rejected
- number of unicast grant delay response packets
- number of unicast grant delay response packets rejected
- number of unicast cancel announce packets
- number of unicast cancel synchronization packets
- number of unicast cancel delay response packets
- number of unicast acknowledge cancel announce packets
- number of unicast acknowledge cancel synchronization packets
- number of unicast acknowledge cancel delay response packets
- number of announce packets
- number of synchronization packets
- number of delay response packets
- number of delay request packets
- number of follow-up packets
- number of out-of-order synchronization packets
- total number of UDP (port 320) packets
- total number of UDP (port 319) packets
- number of alternate master packets discarded
- number of bad domain packets discarded
- number of bad version packets discarded
- number of duplicate messages packets discarded
- number of step RM greater than 255 discarded

PTP master-1/PTP master-2 algorithm state statistics (in seconds):

- number of free-run states
- number of acquiring states
- number of phase-tracking states
- number of hold-over states
- number of locked states

PTP master-1/PTP master-2 algorithm event statistics:

- number of excessive frequency errors detected
- number of excessive packet losses detected

- number of packet losses spotted
- number of excessive phase shifts detected
- number of high PDVs detected
- number of synchronization packet gaps detected

Synchronous Ethernet

Synchronous Ethernet is a variant of line timing that derives the physical layer transmitter clock from a high-quality timing reference, traceable to a primary reference clock. Synchronous Ethernet uses the physical layer of the Ethernet link to distribute a common clock signal to all nodes in the network. Each node has a local or system clock that determines the outgoing clock rate of each interface. The system clock of each node in the network is derived from the incoming clock at an input interface or from a dedicated timing interface; for example a BITS port.

Synchronous Ethernet works at Layer 1 and is concerned only with the precision of the timing of signal transitions to relay and recover accurate frequencies. It is not impacted by traffic load and is therefore not affected by packet loss or PDV that occurs with timing methods that use higher layers of the networking technology.

Synchronous Ethernet is automatically enabled on ports and SFPs that support Synchronous Ethernet. The operator can select an Ethernet optical SFP port as a candidate timing reference. The recovered timing from this port is distributed to the nodes in the network over the physical layer of the Ethernet link. This allows the operator to ensure that any of the system outputs are locked to a stable, traceable frequency source. The transmit timing of all SFP ports with SFPs that support Synchronous Ethernet is then derived from the node's SSU.

Synchronous Ethernet can only be used for end-to-end network synchronization when all intermediate switching nodes in the network have hardware and software support for Synchronous Ethernet.

Synchronous Ethernet is supported on the 7705 SAR-8 and 7705 SAR-18 on the 8-port Ethernet Adapter card version 2 and on optical SFP ports on the 7705 SAR-F. Refer to the 7705 SAR 8-port Ethernet Adapter Card Installation Guide for a list of the SFPs that support Synchronous Ethernet.

If an SFP that does not support Synchronous Ethernet is installed, the Ethernet card will use its local oscillator for transmit timing and an event is logged. If the Ethernet port is configured as a source of node synchronization and an SFP that does not support Synchronous Ethernet is installed, a clock will not be supplied to the SSU and an event is logged.

Each Synchronous Ethernet port can be configured to recover received timing and send it to the SSU. On the 7705 SAR-F, both Synchronous Ethernet ports can be used as available references. On the 7705 SAR-8, only one reference is available per 8-port Ethernet Adapter card version 2. On the 7705 SAR-8, up to two references are available per 8-port Ethernet Adapter card version 2.

Synchronous Ethernet ports can be configured to use either node timing from the SSU or free-run timing. Configuration of one port automatically configures the other port.

If timing is recovered from a Synchronous Ethernet port from an upstream non-Synchronous Ethernet free-running port and selected as the reference to the SSU, then this clock may not be of sufficient quality or accuracy for node operations. This reference may be disqualified because the frequency may not be within the pull-in range of the SSU's Stratum 3 oscillator.

Synchronization Status Messaging with Quality Level Selection

Synchronization Status Messaging (SSM) provides clock source quality level values that are carried in the downstream network elements for SONET/SDH and Synchronous Ethernet interfaces. These quality level values are processed by the system timing module at the beginning of the network timing synchronization trail to track the network timing flow and select the highest-quality source for the central clock. This selection process is described in Timing Reference Selection Based on Quality Level. Also see Figure 18. SSM also allows the network elements to autonomously reconfigure the timing path to select the best possible source for timing and to avoid timing loops. This function is especially useful in a ring topology where network timing may be passed in both directions around the ring.

Synchronization status messages containing the quality level values are placed in prescribed overhead bytes for SONET and SDH signals and in bit-oriented messages within the data link for DS1s (ESF) and E1s physical ports for interaction with the central clock.

For Synchronous Ethernet interfaces, there is no equivalent fixed location to convey synchronization status messages; therefore, the quality level values are transported using Ethernet frames over a message channel. This channel, called the Ethernet Synchronization Message Channel (ESMC), uses an Ethernet protocol based on an IEEE Organization Specific Slow Protocol (OSSP). The 4-bit quality level value is carried within a Type-Length-Value (TLV) byte of an Ethernet OAM Protocol Data Unit (PDU) that uses the OSSP subtype.

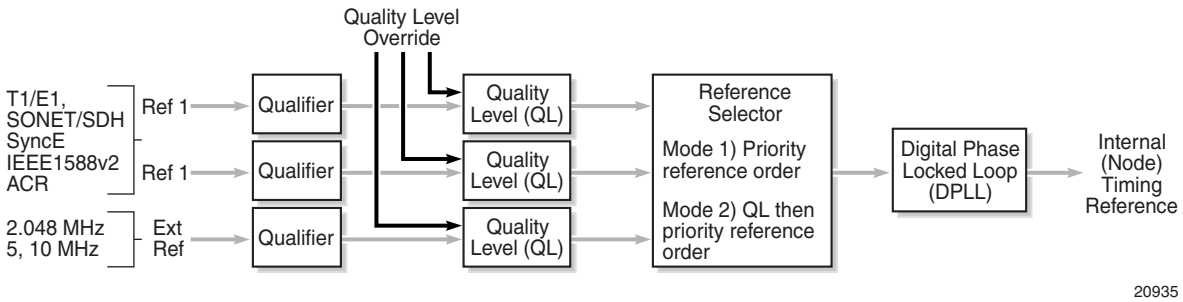
The clock source quality levels identified for the purpose of tracking network timing flow are listed below. They make up all of the defined network deployment options given in Recommendations G.803 and G.781 (option I pertains to the SDH model and Option II pertains to the SONET model).

The received quality level values for the two network options based on the specific interfaces within these options are provided in the first two columns of Table 22. The transmitted quality level values are shown in the last two columns of Table 22.

- 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
- smc — SONET Minimum Clock Traceable
- eec1 — SDH Ethernet Equipment Clock Option 1 Traceable
- eec2 — SONET Ethernet Equipment Clock Option 2 Traceable
- 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

The user may override the received quality level value of the system synchronization reference input by using the `ql-override` command to configure one of the above values as a static value. This in turn may affect the transmitted quality level value on each SSM-capable port. Also, the user may use the `tx-dus` command to force the quality level value transmitted on the SSM channel of the SONET/SDH port or the Synchronous Ethernet port to be set to dnu (do not use) or dus (do not use for synchronization). This capability is provided to block the interface from being a timing source for the 7705 SAR. The dus/dnu quality level value cannot be overridden.

Figure 18: Timing Reference Selection Based on Quality Level



The G.803 and G.781 standards also define additional codes for internal use.

- QL-INVx is generated internally by the system when an unallocated synchronization status message value is received; x represents the binary value of this synchronization status message. Within the 7705 SAR, all these independent values are assigned a single value of QL-INVALID.
- QL-FAILED is generated internally by the system when the terminated network synchronization distribution trail is in the signal fail state.
- QL-UNKNOWN is generated internally by the system to differentiate from a received QL-STU code. It is equivalent to QL-STU for the purposes of quality level selection.
- If the node clock is in a holdover state, a holdover message is generated internally by the system and the transmitted SSM quality level value on an SSM-capable port is either st3, eec1, eec2, or ssub, depending on the type of interface (as shown in Table 22).

Table 22: Quality Level Values by Interface Type

SSM Quality Level Value Received on Port		Internal Relative Quality Level	SSM Quality Level Value to be Transmitted	
SDH interface **SyncE interface in SDH mode**	**SONET interface** **SyncE interface in SONET mode**		**SDH interface** **SyncE interface in SDH mode**	**SONET interface** **SyncE interface in SONET mode**
0010 (prc)	0001 (prs)	Best quality	0010 (prc)	0001 (prs)
	0000 (stu)		0100 (ssua)	0000 (stu)
	0111 (st2)		0100 (ssua)	0111 (st2)
0100 (ssua)	0100 (tnc)		0100 (ssua)	0100 (tnc)
	1101 (st3e)		1000 (ssub)	1101 (st3e)
1000 (ssub)			1000 (ssub)	1010 (st3/eec2)
	1010 (st3/eec2)		1011 (sec/eec1)	1010 (st3/eec2)
1011 (sec/eec1)		Lowest quality qualified in QL-enabled mode	1011 (sec/ eec1)	1100 (smc)
	1100 (smc)	See note	1111 (dnu)	1100 (smc)
1111 (dnu)	1111 (dus)	See note	1111 (dnu)	1111 (dus)
Any other	Any other	QL-INVALID	1111 (dnu)	1111 (dus)
		QL-FAILED	1111 (dnu)	1111 (dus)
		QL-UNC	1011 (sec/eec1)	1010 (st3/eec2)

Note: These quality level indications are considered to be lower than the internal clock of the system. They are relayed to the line interfaces when ql-selection is disabled. When ql-selection is enabled, these inputs are never selected. If there is no valid reference available for the internal clock, then the clock enters holdover mode and the quality level is QL-UNC.

Timing Reference Selection Based on Quality Level

For a SONET/SDH or Synchronous Ethernet interface that supports SSM or ESMC, a timing input provides a quality level value to indicate the source of timing of the far-end transmitter. These values provide input to the selection processes on the nodal timing subsystem. This selection process determines which input to use to generate the signal on the SSM egress ports and the reference to use to synchronize the nodal clock, as described below.

- For the two reference inputs (ref1 and ref2) and for the BITS input ports, if the interface configuration supports the reception of a QL over SSM or ESMC, then the quality level value is associated with the timing derived from that input.
- For the two reference inputs and for the BITS input ports, if the interface configuration is T1 with SF framing, then the quality level associated with the input is QL-UNKNOWN.
- For the two reference inputs, if they are Synchronous Ethernet ports and the ESMC is disabled, then the quality level value associated with that input is QL-UNKNOWN.
- For the two reference inputs and for the BITS input ports, if the interface configuration supports the reception of a QL over SSM (and not ESMC), and no SSM value has been received, then the quality level value associated with the input is QL-STU.
- For the two reference inputs and for the BITS input ports, if the interface configuration supports the reception of a QL over SSM or ESMC, but the quality level value received over the interface is not valid for the type of interface, then the quality level value associated with that input is QL-INVALID.
- For the two reference inputs, if they are external synchronization, DS3, or E3 ports, then the quality level value associated with the input is QL-UNKNOWN.
- For the two reference inputs, if they are Synchronous Ethernet ports and the ESMC is enabled but no valid ESMC Information PDU has been received within the previous 5 s, then the quality level value associated with that input is QL-FAILED.
- If the user has configured an override for the quality level associated with an input, the node displays both the received and override quality level value for the input. If no value has been received, then the associated value is displayed instead.

After the quality level values have been associated with the system timing inputs, the two reference inputs and the external input timing ports are processed by the system timing module to select a source for the SSU. This selection process is described below.

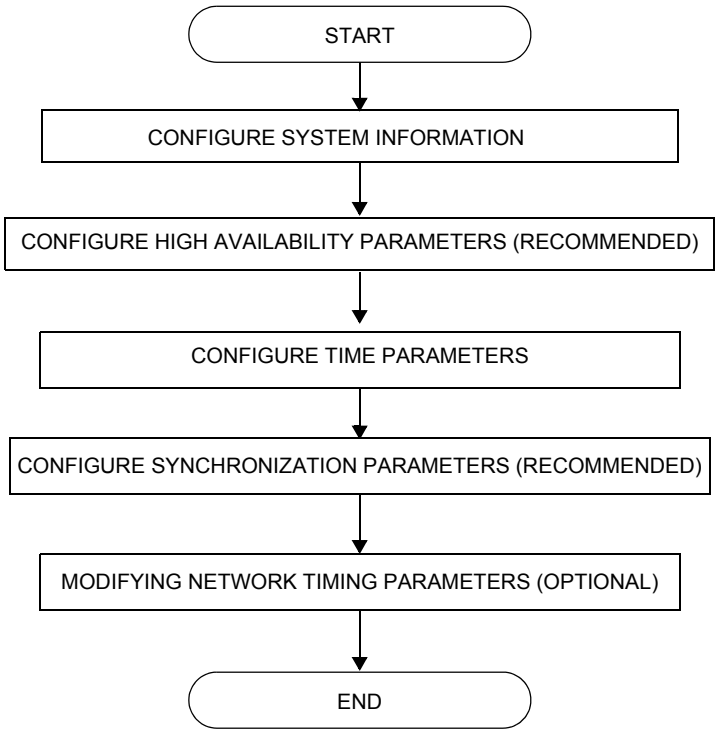
- Before an input can be used as a potential timing source, it must be enabled using the `ql-selection` command. If `ql-selection` is disabled, then the priority order of the inputs for the Synchronous Equipment Timing Generator (SETG) is the priority order configured under the `ref-order` command.

- If `ql-selection` is enabled, then the priority of the inputs is calculated using the associated quality level value of the input and the priority order configured under the `ref-order` command. The inputs are ordered by the internal relative quality level (shown in the middle row in Table 22) based on their associated quality level values. If two or more inputs have the same quality level value, then they are placed in order based on where they appear in the `ref-order` priority. The priority order for the SETG is based on both the reference inputs and the external synchronization input ports.
- Once a prioritized list of inputs is calculated, the SETG and the external synchronization output ports are configured to use the inputs in their respective orders.
- Once the SETG and external synchronization output ports priority lists are programmed, then the highest-qualified priority input is used. To be qualified, the signal is monitored to ensure that it has the expected format and that its frequency is within the pull-in range of the SETG.

System Configuration Process Overview

Figure 19 displays the process to provision basic system parameters.

Figure 19: System Configuration and Implementation Flow



Configuration Notes

This section describes system configuration caveats.

- The 7705 SAR must be properly initialized and the boot loader and BOF files successfully executed in order to access the CLI.

Reference Sources

For information on supported IETF drafts and standards as well as standard and proprietary MIBs, refer to Standards and Protocol Support on page 393.

Configuring System Management with CLI

This section provides information about configuring system management features with CLI.

Topics in this section include:

System Management Configuration

Saving Configurations

Whenever configuration changes are made, the modified configuration must be saved so that the changes will not be lost when the system is rebooted. The system uses the configuration and image files, as well as other operational parameters necessary for system initialization, according to the locations specified in the boot option file (BOF) parameters. For more information about boot option files, see Boot Options.

Configuration files are saved by executing explicit or implicit 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, and path IDs. This reduces resynchronizations of the Network Management System (NMS) with the affected network element.

If the save attempt fails at the destination, an error occurs and is logged. The system does not try to save the file to the secondary or tertiary configuration sources unless the path and filename are explicitly named with the `save` command.

Basic System Configuration

This section provides information to configure system parameters and provides configuration examples of common configuration tasks. The minimal system parameters that should be configured are:

- System Information Parameters
- System Time Elements

The following example displays a basic system configuration:

```
ALU-1>config>system# info
#------------------------------------------
echo "System Configuration "
#------------------------------------------
        name "ALU-1"
        coordinates "Unknown"
        snmp
        exit
        security
            snmp
                community "private" rwa version both
            exit
        exit
        time
            ntp
                server 192.168.15.221
                no shutdown
            exit
            sntp
                shutdown
            exit
            zone GMT
        exit
------------------------------------------------
ALU-1>config>system#
```

Common Configuration Tasks

This section provides a brief overview of the tasks that must be performed to configure system parameters and provides the CLI commands.

System Information

This section covers the basic system information parameters to configure the physical location of the 7705 SAR, contact information, router location information such as an address, floor, room number, global positioning system (GPS) coordinates, and system name.

Use the CLI syntax displayed below to configure the following system components:

- System Information Parameters
- System Time Elements

System Information Parameters

General system parameters include:

- Name
- Contact
- Location
- CLLI Code
- Coordinates

CLI Syntax:
```
config>system
    name system-name
    contact contact-name
    location location
    clli-code clli-code
    coordinates coordinates
```

Name

Use the `system name` command to configure a name for the device. The name is used in the prompt string. Only one system name can be configured. If multiple system names are configured, the last one encountered overwrites the previous entry.

Use the following CLI syntax to configure the system name:

CLI Syntax:
```
config>system
    name system-name
```

Example:
```
alcatel>config>system# name ALU-1
```

The following example displays the system name:

```
ALU-1>config>system# info
#------------------------------------------
echo "System Configuration "
#------------------------------------------
        name "ALU-1"
. . .
        exit
-------------------------------------------
ALU-1>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 7705 SAR.

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 spaces, 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:

```
ALU-1>config>system# info
#------------------------------------------
echo "System Configuration "
#------------------------------------------
     name "ALU-1"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"

. . .
        exit
----------------------------------------------
ALU-1>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
- Summer Time Conditions
- NTP
- SNTP
- CRON

CLI Syntax:
```
config>system
time
    dst-zone zone-name
       end {first | second | third | fourth | last} {sunday
         | monday | tuesday | wednesday | thursday |
         friday | saturday} {january | february | march |
         april | may | june | july | august | september |
         october | november | december} hours-minutes
       offset offset
       start {first | second | third | fourth | last}
         {sunday | monday | tuesday | wednesday | thursday
         | friday |saturday} {january | february | march
         | april | may | june | july | august | september
         | october | november | december} hours-minutes
    ntp
       authentication-check
       authentication-key key-id {key key} [hash | hash2]
         {type des | message-digest}
       broadcastclient [router router-name] {interface
         ip-int-name} [authenticate]
       multicastclient [authenticate]
       server ip-address [key-id key-id] [version
         version] [prefer]
       no shutdown
    sntp
       broadcast-client
       server-address ip-address [version version-number]
         [normal | preferred] [interval seconds]
       no shutdown
    zone std-zone-name | non-std-zone-name [hh[:mm]]
```

Zone

The `zone` command sets the time zone and/or time zone offset for the router. The 7705 SAR supports system-defined and user-defined time zones. The system-defined time zones are listed in Table 23.

CLI Syntax:
```
config>system>time
                zone std-zone-name | non-std-zone-name
                   [hh [:mm]]
```

Example:
```
config>system>time#
config>system>time# zone GMT
```

The following example displays the zone output:

```
ALU-1>config>system>time# info
----------------------------------------------
         ntp
               server 192.168.15.221
               no shutdown
         exit
         sntp
               shutdown
         exit
         zone UTC
----------------------------------------------
ALU-1>config>system>time#
```

Table 23: System-defined Time Zones

Acronym	Time Zone Name	UTC Offset
Europe:		
GMT	Greenwich Mean Time	UTC
WET	Western Europe Time	UTC
WEST	Western Europe Summer Time	UTC +1 hour
CET	Central Europe Time	UTC +1 hour
CEST	Central Europe Summer Time	UTC +2 hours
EET	Eastern Europe Time	UTC +2 hours
EEST	Eastern Europe Summer Time	UTC +3 hours
MSK	Moscow Time	UTC +3 hours
MSD	Moscow Summer Time	UTC +4 hours
US and Canada:		
AST	Atlantic Standard Time	UTC -4 hours
ADT	Atlantic Daylight Time	UTC -3 hours
EST	Eastern Standard Time	UTC -5 hours
EDT	Eastern Daylight Saving Time	UTC -4 hours
CST	Central Standard Time	UTC -6 hours
CDT	Central Daylight Saving Time	UTC -5 hours
MST	Mountain Standard Time	UTC -7 hours

Table 23: System-defined Time Zones (Continued)

Acronym	Time Zone Name	UTC Offset
MDT	Mountain Daylight Saving Time	UTC -6 hours
PST	Pacific Standard Time	UTC -8 hours
PDT	Pacific Daylight Saving Time	UTC -7 hours
HST	Hawaiian Standard Time	UTC -10 hours
AKST	Alaska Standard Time	UTC -9 hours
AKDT	Alaska Standard Daylight Saving Time	UTC -8 hours
Australia and New Zealand:		
AWST	Western Standard Time	UTC +8 hours
ACST	Central Standard Time	UTC +9.5 hours
AEST	Eastern Standard/Summer Time	UTC +10 hours
NZT	New Zealand Standard Time	UTC +12 hours
NZDT	New Zealand Daylight Saving Time	UTC +13 hours

Summer Time Conditions

The `config>system>time>dst-zone` context configures the start and end dates and offset for summer time or daylight savings time to override system defaults or for user-defined time zones.

When configured, the time will be adjusted by adding the configured offset when summer time starts and subtracting the configured offset when summer time ends.

CLI Syntax:
```
config>system>time
dst-zone zone-name
     end {end-week} {end-day} {end-month} [hours-minutes]
     offset offset
     start {start-week} {start-day} {start-month} [hours-
        minutes]
```

Example:
```
config>system# time
config>system>time# dst-zone pt
config>system>time>dst-zone# start second sunday april
02:00
end first sunday october 02:00
config>system>time>dst-zone# offset 0
```

If the time zone configured is listed in Table 23, 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 23 or entered as optional parameters in this command.

The following example displays the configured parameters.

```
A:ALU-1>config>system>time>dst-zone# info
----------------------------------------------
                start second sunday april 02:00
                end first sunday october 02:00
                offset 0
----------------------------------------------
A:ALU-1>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
- Authentication-key
- Broadcastclient
- Multicastclient
- Server

CLI Syntax:

```
config>system
time
    ntp
       authentication-check
       authentication-key key-id {key key} [hash | hash2]
         {type des | message-digest}
       broadcastclient [router router-name] {interface
         ip-int-name} [authenticate]
       multicastclient [authenticate]
       peer ip-address [key-id key-id] [version version]
       server ip-address [key-id key-id] [version
         version][prefer]
       no shutdown
```

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:
```
config>system>time>ntp
        authentication-check
```

Example:
```
config>system>time>ntp#
config>system>time>ntp# authentication-check
config>system>time>ntp# no shutdown
```

Authentication-key

This command configures an authentication key-id, key type, and key used to authenticate NTP PDUs sent to and received from other network elements participating in the NTP protocol. For authentication to work, the authentication key-id, authentication type, and authentication key value must match.

CLI Syntax:
```
config>system>time>ntp
        authentication-key key-id {key key} [hash | hash2]
          type
        {des | message-digest}
```

Example:
```
config>system>time>ntp#
config>system>time>ntp# authentication-key 1 key A type
des
config>system>time>ntp# no shutdown
```

The following example shows NTP disabled with the `authentication-key` parameter enabled.

```
A:ALU-1>config>system>time>ntp# info
----------------------------------------------
               shutdown
               authentication-key 1 key "OAwgNUlbzgI" hash2 type des
----------------------------------------------
A:ALU-1>config>system>time>ntp#
```

Broadcastclient

The `broadcastclient` command enables listening to NTP broadcast messages on the specified interface.

CLI Syntax: `config>system>time>ntp`
`broadcastclient[router router-name]`
`{interface ip-int-name} [authenticate]`

Example:
```
config>system>time>ntp#
config>system>time>ntp# broadcastclient interface int11
config>system>time>ntp# no shutdown
```

The following example shows NTP enabled with the `broadcastclient` parameter enabled.

```
ALU-1>config>system>time# info
----------------------------------------------
            ntp
                broadcastclient interface int11
                no shutdown
            exit
            dst-zone PT
                start second sunday april 02:00
                end first sunday october 02:00
                offset 0
            exit
            zone UTC
----------------------------------------------
ALU-1>config>system>time#
```

Multicastclient

This command is used to configure an address to receive multicast NTP messages on the CSM Management 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.

```
ALU-1>config>system>time# info
----------------------------------------------
             server 192.168.15.221
             multicastclient
             no shutdown
----------------------------------------------
ALU-1>config>system>time##
```

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
- Server-address

CLI Syntax:
```
config>system
time
    sntp
       broadcast-client
       server-address ip-address [version version-number]
         [normal | preferred] [interval seconds]
       no shutdown
```

Broadcast-client

The `broadcast-client` command enables listening at the global device level to SNTP broadcast messages on interfaces with broadcast client enabled.

CLI Syntax:
```
config>system>time>sntp
                  broadcast-client
```

Example:
```
config>system>time>sntp#
config>system>time>sntp# broadcast-client
config>system>time>sntp# no shutdown
```

The following example shows SNTP enabled with the `broadcast-client` parameter enabled.

```
ALU-1>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
----------------------------------------------
ALU-1>config>system>time#
```

Server-address

The `server-address` command configures an SNTP server for SNTP unicast client mode.

CLI Syntax: `config>system>time>sntp#`
`config>system>time>sntp# server-address` *`ip-address`*
`version` *`version-number`*`] [normal | preferred] [interval`
`seconds``]`

Example: `config>system>time>sntp#`
`config>system>time# server-address 10.10.0.94 version`
`1 preferred interval 100`

The following example shows SNTP enabled with the `server-address` parameter configured.

```
ALU-1>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
----------------------------------------------
ALU-1>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

CLI Syntax:
```
config
cron
    action action-name [owner action-owner]
       expire-time {seconds | forever}
       lifetime {seconds | forever}
       max-completed unsigned
       results file-url
       script script-name [owner owner-name]
       no shutdown
    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}
    script script-name [owner script-owner]
       description description-string
       location file-url
       no shutdown
```

Action

Use this command to configure the parameters for a script, including the maximum amount of time to keep the results from a script run, the maximum amount of time a script may run, the maximum number of script runs to store, and the location to store the results.

CLI Syntax:
```
config>cron
    action action-name [owner action-owner]
       expire-time {seconds | forever}
       lifetime {seconds | forever}
       max-completed unsigned
       results file-url
       script script-name [owner script-owner]
       shutdown
```

Example:
```
config>cron# action test
config>cron>action# results ftp://172.22.184.249/./
 sim1/test-results
config>cron>action# no shutdown
```

The following example shows a script named “test” receiving an action to store its results in a file called “test-results”:

```
A:ALU-1>config>cron# info
----------------------------------------------
        script "test"
            location "ftp://172.22.184.249/./sim1/test.cfg"
            no shutdown
        exit
        action "test"
            results "ftp://172.22.184.249/./sim1/test-results"
            no shutdown
        exit
```

Schedule

The schedule function configures the type of schedule to run, including one-time-only (oneshot), periodic, or calendar-based runs. All runs are determined by month, day of month or weekday, hour, minute and interval (seconds). If end-time and interval are both configured, whichever condition is reached first is applied.

CLI Syntax:

```
config>cron
     schedule schedule-name [owner schedule-owner]
        action action-name [owner owner-name]
        count number
        day-of-month {day-number [..day-number] | all}
        description description-string
        end-time [date | day-name] time
        hour {hour-number [..hour-number] | all}
        interval seconds
        minute {minute-number [..minute-number] | all}
        month {month-number [..month-number] | month-name
        [..month-name] | all}
        no shutdown
        type {periodic | calendar | oneshot}
        weekday {weekday-number [..weekday-number] | day-
          name [..day-name] | all}
        shutdown
```

Example:

```
config>cron# schedule test2
config>cron>sched# day-of-month 17
config>cron>sched# end-time 2010/09/17 12:00
config>cron>sched# minute 0 15 30 45
config>cron>sched# weekday friday
config>cron>sched# shutdown
```

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 September 17, 2010:

```
*A:ALU-1>config>cron# info
----------------------------------------------
        schedule "test2"
            shutdown
            day-of-month 17
            minute 0 15 30 45
            weekday friday
            end-time 2010/09/17 12:00
        exit
----------------------------------------------
*A:ALU-1>config>cron#
```

Script

The `script` command opens a new nodal context which contains information on a script.

CLI Syntax: `config>cron`
`script` *`script-name`* `[owner` *`script-owner`*`]`
`description` *`description-string`*
`location` *`file-url`*
`shutdown`

Example:
```
config>cron# script test
config>cron>script#
```

The following example names a script “test”:

```
A:sim1>config>cron# info
----------------------------------------------
        script "test"
            location "ftp://172.22.184.249/./sim1/test.cfg"
            no shutdown
        exit
----------------------------------------------
A:sim1>config>cron#
```

Configuring Synchronization and Redundancy

Use the CLI syntax displayed below to configure various synchronization and redundancy parameters:

- Configuring Synchronization
- Configuring Manual Synchronization
- Forcing a Switchover
- Configuring Synchronization Options

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 CSM card.

CLI Syntax:
```
config>system
switchover-exec file-url
```

Configuring Manual Synchronization

Automatic synchronization can be configured in the `config>system>synchronization` context.

Manual synchronization can be configured with the following command:

CLI Syntax:
```
admin
redundancy
     synchronize {boot-env | config}
```

Example: `admin>redundancy# synchronize config`

The following shows the output that displays during a manual synchronization:

```
ALU-1>admin# synchronize config

Syncing configuration......

Syncing configuration.....Completed.
ALU-1#
```

Forcing a Switchover

The `force-switchover now` command forces an immediate switchover to the standby CSM card.

CLI Syntax: `admin>redundancy`
`force-switchover [now]`

Example: `admin>redundancy# force-switchover now`

```
ALU-1# admin redundancy force-switchover now
ALU-1y#
Resetting...
?
```

If the active and standby CSMs are not synchronized for some reason, users can manually synchronize the standby CSM by rebooting the standby by issuing the `admin reboot standby` command on the active or the standby CSM.

Configuring Synchronization Options

Network operators can specify the type of synchronization operation to perform between the primary and secondary CSMs 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 command to configure the boot-env option:

CLI Syntax: `config>redundancy`
`synchronize {boot-env | config}`

Example: `config>system# synchronize boot-env`

The following displays the configuration:

```
*ALU-1>config>redundancy# synchronize boot-env
*ALU-1>config>redundancy# 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        : Boot Environment
Boot/Config Sync Status      : No synchronization
Last Config File Sync Time   : Never
Last Boot Env Sync Time      : Never
===============================================================================
```

Use the following CLI command to configure the config option:

CLI Syntax: `config>system`
`synchronize {boot-env | config}`

Example: `config>system# synchronize config`

The following example displays the configuration.

```
ALU-1>config>system# synchronize config
ALU-1>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
===================================================
ALU-1>config>system#
```

Configuring ATM Parameters

The ATM context configures system-wide ATM parameters.

CLI Syntax: `config>system#`
`atm`
`atm-location-id` *`location-id`*

Example: `config>system# atm`
`config>system>atm# atm-location-id`
`03:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00`

The following example shows the ATM configuration.

```
ALU-1>config>system>atm# info
----------------------------------------------
            atm-location-id 03:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
exit
----------------------------------------------
ALU-1>config>system>atm#
```

Configuring Backup Copies

The config-backup command allows you to specify the maximum number of backup versions of configuration and index files kept in the primary location.

For example, if the config-backup *count* is set to **5** and the configuration file is called **xyz.cfg**, the file **xyz.cfg** is saved with a .1 extension when the save command is executed. 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 CSMs 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.

```
ALU-1>config>system> info
#------------------------------------------
echo "System Configuration"
#------------------------------------------
        name "ALU-1"
        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
...
-------------------------------------------------
ALU-1>config>system>
```

Configuring System Administration Parameters

Use the CLI syntax displayed below to configure various system administration parameters.

Administrative parameters include:

- Disconnect
- Set-time
- Display-config
- Tech-support
- Save
- Reboot
- Post-Boot Configuration Extension Files

CLI Syntax:
```
admin
disconnect [address ip-address | username user-name |
{console | telnet | ftp | ssh}]
display-config [detail | index]
reboot [active | standby][upgrade][now]
set-time date time
save [file-url] [detail] [index]
```

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`

The following example displays the disconnect command results.

```
ALU-1>admin# disconnect
ALU-1>admin# Logged out by the administrator
Connection to host lost.
```

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 2010/09/24 14:10:00`

The following example displays the `set-time` command results.

```
ALU-1# admin set-time 2010/09/24 14:10:00
ALU-1# show time
Fri Sept 24 14:10:25 UTC 2010
ALU-1#
```

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.

```
ALU-1>admin# display-config detail
# TiMOS-B-0.0.current both/i386 ALCATEL-LUCENT SAR 7705
# Copyright (c) 2000-2010 Alcatel-Lucent.
# All rights reserved. All use subject to applicable license agreements.
# Built on Fri Sept 24 01:32:43 EDT 2010 by csabuild in /rel0.0/I270/panos/main

# Generated FRI SEPT 24 14:48:31 2010 UTC

exit all
configure
#------------------------------------------
```

```
echo "System Configuration"
#------------------------------------------
    system
        name "ALU-1"
        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://*:*@xxx.xxx.xxx.xx/home/csahwreg17/images/env.cfg”
        no boot-bad-exec
        no switchover-exec
        snmp
            engineID "0000197f00006883ff000000"
            packet-size 1500
            general-port 161
            no shutdown
        exit
        login-control
            ftp
                inbound-max-sessions 3
            exit
            telnet
                inbound-max-sessions 5
                outbound-max-sessions 5
            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"
            login-banner
            no exponential-backoff
        exit
        atm
            no atm-location-id
        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 1/1/10:0 create
                egress
                    qos 1
                exit
            exit
            no slice-size
            no shutdown
        exit
...
ALU-1>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.

```
ALU-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.
ALU-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.
ALU-1>admin#
```

Reboot

The `reboot` command reboots the router, including redundant CSMs 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 a reboot.

CLI Syntax:
```
admin
reboot [active | standby] | [upgrade] [now]
```

Example:
```
admin# reboot now
```

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://t:t@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:

```
ALU-1>config>system# info
#------------------------------------------
echo "System Configuration"
#------------------------------------------
        name "ALU-1"
        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"
        sync-if-timing
            begin
            ref-order ref1 ref2 bits
..
------------------------------------------
ALU-1>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:ALU-1# show system information

===============================================================================
System Information
===============================================================================
System Name            : ALU-1
System Type            : 7705 SAR-8
System Version         : B-5.0.R3
System Contact         : Fred 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         : 1 days, 02:03:17.62 (hr:min:sec)

SNMP Port              : 161
SNMP Engine ID         : 0000197f000000164d3c3910
SNMP Max Message Size  : 1500
SNMP Admin State       : Enabled
SNMP Oper State        : Enabled
SNMP Index Boot Status : Not Persistent
SNMP Sync State        : OK

Telnet/SSH/FTP Admin : Enabled/Enabled/Disabled
Telnet/SSH/FTP Oper  : Up/Up/Down

BOF Source             : cf3:
Image Source           : primary
Config Source          : primary
Last Booted Config File: cf3:/config.cfg
Last Boot Cfg Version  : FRI APR 20 16:24:27 2007 UTC
Last Boot Config Header: # TiMOS-B-0.0.I346 both/i386 ALCATEL-LUCENT SAR 7705
                         # Copyright (c) 2000-2008 Alcatel-Lucent. # All rights
                         reserved. All use subject to applicable license
                         agreements. # Built on Tue Mar 11 01:43:47 EDT 2008 by
                         csabuild in /rel0.0/I346/panos/main # Generated TUE
                         MAR 11 20:00:37 2008 UTC
Last Boot Index Version: N/A
Last Boot Index Header : # TiMOS-B-0.0.I346 both/i386 ALCATEL-LUCENT SAR 7705
                         # Copyright (c) 2000-2008 Alcatel-Lucent. # All rights
                         reserved. All use subject to applicable license
                         agreements. # Built on Tue Mar 11 01:43:47 EDT 2008 by
                         csabuild in /rel0.0/I346/panos/main # Generated TUE
                         MAR 11 20:00:37 2008 UTC
Last Saved Config      : N/A
Time Last Saved        : N/A
Changes Since Last Save: Yes
Time Last Modified     : 2008/03/25 10:03:09
Max Cfg/BOF Backup Rev : 5
Cfg-OK Script          : N/A
```

```
Cfg-OK Script Status   : not used
Cfg-Fail Script        : N/A
Cfg-Fail Script Status : not used

Management IP Addr     : 192.168.1.202/24
DNS Server            : 192.168.x.x
DNS Domain            : domain.com
BOF Static Routes      :
  To                   Next Hop
  192.168.0.0/16       192.168.1.1
ATM Location ID        : 01:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
ATM OAM Retry Up       : 2
ATM OAM Retry Down     : 4
ATM OAM Loopback Period: 10

ICMP Vendor Enhancement: Disabled
===============================================================================
A:ALU-1#
```

When executing a post-boot configuration extension file, status messages are output to the console screen prior to the “Login” prompt.

The following is an example of a failed boot-up configuration that caused a boot-bad-exec file containing another error to be executed:

```
Attempting to exec configuration file:
'ftp://test:test@192.168.xx.xxx/./12.cfg' ...
System Configuration
Log Configuration
MAJOR: CLI #1009 An error occurred while processing a CLI command -
File ftp://test:test@192.168.xx.xxx/./12.cfg, Line 195: Command "log" failed.
CRITICAL: CLI #1002 An error occurred while processing the configuration file.
The system configuration is missing or incomplete.
MAJOR: CLI #1008 The SNMP daemon is disabled.
If desired, enable SNMP with the 'config>system>snmp no shutdown' command.
Attempting to exec configuration failure extension file:
'ftp://test:test@192.168.xx.xxx/./fail.cfg' ...
Config fail extension
Enabling SNMP daemon
MAJOR: CLI #1009 An error occurred while processing a CLI command -
File ftp://test:test@192.168.xx.xxx/./fail.cfg, Line 5: Command "abc log" failed.
TiMOS-B-5.0.R3 both/hops Alcatel-Lucent 7705 SAR Copyright (c) 2000-2009 Alcatel-
Lucent.
All rights reserved. All use subject to applicable license agreements.
Built on Wed Feb 18 12:45:00 EST 2009 by builder in /rel5.0/b1/R3/panos/main
```

System Timing

If network timing is required for the synchronous interfaces in a 7705 SAR, a timing subsystem is utilized to provide a Stratum 3 quality clock to all synchronous interfaces within the system. The clock source is specified in the `config>port>tdm>ds1 | e1> clock-source` context.

This section describes the commands used to configure and control the timing subsystem.

- Entering Edit Mode
- Configuring Timing References
- Configuring IEEE 1588v2 PTP
- Configuring QL Values for SSM
- Using the Revert Command
- Other Editing Commands
- Forcing a Specific Reference

CLI Syntax:

```
config>system>sync-if-timing
        abort
        begin
        commit
        external
           input-interface
              impedance {high-impedance | 50-ohm | 75-ohm}
              type {2048khz-G703 | 5mhz | 10mhz}
           output-interface
              type {2048khz-G703 | 5mhz | 10mhz}
        ref-order first second [third]
        ref1
           source-port port-id [adaptive]
           no shutdown
        ref2
           source-port port-id [adaptive]
           no shutdown
        revert
```

Entering Edit Mode

To enter the mode to edit timing references, you must enter the `begin` keyword at the `config>system>sync-if-timing#` prompt.

Use the following CLI syntax to enter the edit mode:

CLI Syntax:
```
config>system>sync-if-timing
begin
```

The following error message displays when the you try to modify `sync-if-timing` parameters without entering `begin` first.

```
ALU-1>config>system>sync-if-timing>ref1# source-port 1/1/1
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 1/1/1.
ALU-1>config>system>sync-if-timing>ref1#
```

Configuring Timing References

The following example shows the command usage:

Example:
```
config>system# sync-if-timing
config>system>sync-if-timing# begin
config>system>sync-if-timing# ref1
config>system>sync-if-timing>ref1# source-port 1/1/1
config>system>sync-if-timing>ref1# no shutdown
config>system>sync-if-timing>ref1# exit
config>system>sync-if-timing# ref2
config>system>sync-if-timing>ref2# source-port 1/1/2
config>system>sync-if-timing>ref2# no shutdown
config>system>sync-if-timing>ref2# exit
config>system>sync-if-timing>commit
```

The following displays the timing reference parameters:

```
ALU-1>config>system>sync-if-timing# info
----------------------------------------------
            ref-order ref2 ref1
            ref1
                source-port 1/1/1
                no shutdown
            exit
            ref2
                no shutdown
                source-port 1/1/2
            exit
----------------------------------------------
ALU-1>config>system>sync-if-timing#
```

Configuring IEEE 1588v2 PTP

Use the following CLI syntax to configure basic IEEE 1588v2 PTP parameters.

CLI Syntax:
```
config>system>ptp
     clock clock-id [create]
        clock-mda mda-id
        clock-type {ordinary [master | slave] | boundary}
        domain domain-value
        dynamic-peers
        priority1 priority-value
        priority2 priority-value
        profile ieee1588-20008
        profile itu-telecom-freq
        ptp-port port-id
           anno-rx-timeout number-of-timeouts
           log-anno-interval log-anno-interval
           log-sync-interval log-sync-interval
           peer peer-id ip-address ip-address
           [no] shutdown
           unicast-negotiate
        [no] shutdown
        source-interface ip-if-name
```

CLI Syntax:
```
config>system>sync-if-timing
     ref1
        source-ptp-clock clock-id
     ref2
        source-ptp-clock clock-id
```

The following example shows the command usage:

Example:
```
config>system# ptp clock 1 create
config>system>ptp>clock# clock-type ordinary slave
config>system>ptp>clock# source-interface ptp-loop
config>system>ptp>clock# clock-mda 1/2
config>system>ptp>clock# domain 0
config>system>ptp>clock# no dynamic-peers
config>system>ptp>clock# priority1 128
config>system>ptp>clock# priority2 128
config>system>ptp>clock# profile ieee1588-2008
config>system>ptp>clock# ptp-port 1
config>system>ptp>clock>ptp-port# anno-rx-timeout 3
config>system>ptp>clock>ptp-port# log-anno-interval 1
config>system>ptp>clock>ptp-port# log-sync-interval -6
config>system>ptp>clock>ptp-port# unicast-negotiate
config>system>ptp>clock>ptp-port# peer 1
config>system>ptp>clock>ptp-port>peer# description "Peer
to Boundary Clock"
```

```
config>system>ptp>clock>ptp-port>peer# ip-address
10.222.222.10
config>system>ptp>clock>ptp-port>peer# exit
config>system>ptp>clock>ptp-port# peer 2
config>system>ptp>clock>ptp-port>peer# description ToGM
config>system>ptp>clock>ptp-port>peer# ip-address
192.168.2.10
config>system>ptp>clock>ptp-port>peer# exit
config>system>ptp>clock>ptp-port# no shutdown
config>system>ptp>clock>ptp-port# exit
config>system>ptp>clock# no shutdown
config>system>ptp>clock# exit
config>system>ptp# exit
config>system# sync-if-timing begin
config>system>sync-if-timing# ref1
config>system>sync-if-timing>ref1# source-ptp-clock 1
config>system>sync-if-timing>ref1# no shutdown
config>system>sync-if-timing>ref1# exit
```

The following display shows a basic IEEE 1588v2 PTP configuration:

```
ALU-1>config>system>ptp># info
#------------------------------------------------
echo "System IEEE 1588 PTP Configuration"
#------------------------------------------------
    system
        ptp
            clock 1 create
                clock-type ordinary slave
                source-interface "ptp loop"
                clock-mda 1/2
                domain 0
                no dynamic-peers
                priority1 128
                priority2 128
                profile ieee1588-2008
                ptp-port 1
                    anno-rx-timeout 3
                    log-anno-interval 1
                    log-sync-interval -6
                    unicast-negotiate
                    peer 1
                        description "Peer to Boundary Clock"
                        ip-address 10.222.222.10
                    exit
                    peer 2
                        description "ToGM"
                        ip-address 192.168.2.10
                    exit
                    no shutdown
                exit
                no shutdown
            exit
        exit
    exit
```

Configuring QL Values for SSM

Use the following syntax to configure the quality level (QL) values for Synchronization Status Messaging (SSM).

CLI Syntax:

```
config>system>sync-if-timing
        abort
        begin
        external
           input-interface
              impedance {high-impedance | 50-ohm | 75-ohm}
              no shutdown
              ql-override {prs | stu | st2 | tnc | st3e |
              st3 | smc | prc | ssu-a | ssu-b | sec | eec1 |
              eec2}
              type {2048khz-G703 | 5mhz | 10mhz}
        commit
        bits
           input
              [no] shutdown
           interface-type {ds1[{esf|sf}] | e1[{pcm30crc |
             pcm31crc}] | 2048khz-G703}
           output
              line-length {110|220|330|440|550|660}
              [no] shutdown
           ql-override {prs | stu | st2 | tnc | st3e | st3 |
             smc | prc | ssu-a | ssu-b | sec | eec1 | eec2}
           ssm-bit sa-bit
              [no] shutdown
        ql-selection
        ref-order first second [third]
        ref1
           ql-override {prs | stu | st2 | tnc | st3e | st3 |
             smc | prc | ssu-a | ssu-b | sec | eec1 | eec2}
           source-port port-id adaptive
           no shutdown
        ref2
           ql-override {prs | stu | st2 | tnc | st3e | st3 |
             smc | prc | ssu-a | ssu-b | sec | eec1 | eec2}
           source-port port-id adaptive
           no shutdown
```

The following example shows the command usage:

Example:

```
config>system# sync-if-timing
config>system>sync-if-timing# begin
config>system>sync-if-timing# external
config>system>sync-if-timing>external# input-interface
config>system>sync-if-timing>external>input-interface#
impedance 50-Ohm
config>system>sync-if-timing>external>input-interface# no
shutdown
config>system>sync-if-timing>external>input-interface#
ql-override prs
config>system>sync-if-timing>external>input-interface#
exit
config>system>sync-if-timing>external# exit
config>system>sync-if-timing# commit
config>system>sync-if-timing# bits
config>system>sync-if-timing>bits# interface-type
2048khz-G703
config>system>sync-if-timing>bits# ssm-bit 8
config>system>sync-if-timing>bits# output
config>system>sync-if-timing>bits>output# line-length 220
config>system>sync-if-timing>bits>output# no shutdown
config>system>sync-if-timing>bits>output# exit
config>system>sync-if-timing>bits# ql-override prs
config>system>sync-if-timing>bits# exit
config>system>sync-if-timing# ql-selection
config>system>sync-if-timing# ref1
config>system>sync-if-timing>ref1# shutdown
config>system>sync-if-timing>ref1# ql-override prs
config>system>sync-if-timing>ref1# exit
config>system>sync-if-timing# ref2
config>system>sync-if-timing>ref2# no shutdown
config>system>sync-if-timing>ref2# ql-override prs
config>system>sync-if-timing>ref2# exit
config>system>sync-if-timing# exit
```

The following display shows a basic SSM QL configuration for the 7705 SAR-8:

```
ALU-1>config>system>sync-if-timing# info
----------------------------------------------
ref-order external ref1 ref2
           ql-selection
           external
              input-interface
                  no shutdown
                  impedance 50-Ohm
                  type 2048Khz-G703
                  ql-override prs
              exit
              output-interface
```

```
                type 2048Khz-G703
             exit
          exit
          ref1
              no shutdown
              no source-port
              ql-override prs
          exit
          ref2
              no shutdown
              no source-port
              ql-override prs
          exit
          no revert
-----------------------------------------------
*ALU-1>>config>system>sync-if-timing#
```

The following display shows a basic SSM QL configuration for the 7705 SAR-18:

```
ALU-1>config>system>sync-if-timing# info
-----------------------------------------------
ref-order external ref1 ref2
          ql-selection
          exit
          bits
             interface-type 2048Khz-G703
             ssm-bit 8
             ql-override prs
             output
                 line-length 220
                 no shutdown
             exit
          ref1
              no shutdown
              no source-port
              ql-override prs
          exit
          ref2
              no shutdown
              no source-port
              ql-override prs
          exit
          no revert
-----------------------------------------------
*ALU-1>>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. With revertive switching enabled, the highest-priority valid timing reference will be used. If a reference with a higher priority becomes valid, a reference switchover to that reference will be initiated. If a failure on the current reference occurs, the next highest reference takes over.

With non-revertive switching, the active reference will always remain selected while it is valid, even if a higher-priority reference becomes available. If this reference becomes invalid, a reference switchover to a valid reference with the highest priority will be initiated. When the failed reference becomes operational, it is eligible for selection.

CLI Syntax:
```
config>system>sync-if-timing
      revert
```

Other Editing Commands

Other editing commands include:

- `commit` — saves changes made to the timing references during a session. Modifications are not persistent across system boots unless this command is entered.
- `abort` — discards changes that have been made to the timing references during a session

CLI Syntax:
```
config>system>sync-if-timing
      abort
      commit
```

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. Once the system timing reference input has been forced, it will not revert back to another reference unless explicitly reconfigured.

When the command is executed, the current system synchronous timing output is immediately referenced from the specified reference input. If the specified input is not available (shut down), or in a disqualified state, the timing output will enter a holdover state based on the previous input reference.

Debug configurations are not saved between reboots.

CLI Syntax: `debug>sync-if-timing`
`force-reference {external | ref1 | ref2}`

Example: `debug>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 will be created to record the occurrence of the event. It can also specify whether an SNMP notification (trap) will 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 7705 SAR 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 7705 SAR event logs and that is distributed to whatever 7705 SAR log destinations are configured: console, session, memory, file, syslog, or SNMP trap destination. The 7705 SAR 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 functions. In particular, the preconfigured commands do not require the user to know the SNMP object identifier to be sampled. The preconfigured threshold configurations include memory warnings, alarms, and compact flash usage warnings and alarms.

To create events, use the following CLI:

CLI Syntax:
```
config>system
thresholds
    cflash-cap-alarm cflash-id rising-threshold threshold
       [falling-threshold threshold] interval seconds
       [rmon-event-type] [startup-alarm alarm-type]
    cflash-cap-warn cflash-id rising-threshold threshold
       [falling-threshold threshold] interval seconds
       [rmon-event-type] [startup-alarm alarm-type]
    memory-use-alarm rising-threshold threshold
       [falling-threshold threshold] interval seconds [
       rmon-event-type] [startup-alarm alarm-type]
    memory-use-warn rising-threshold threshold
       [falling-threshold threshold] interval seconds
       [rmon-event-type] [startup-alarm alarm-type]
    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]
       event rmon-event-id [event-type] [description
         description-string] [owner owner-string]
```

Example:
```
config>system>thresholds# cflash-cap-warn cf3-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>thresholds# rmon
```

Example:
```
config>system>thresholds>rmon# event 5 both description "alarm testing" owner "Timos CLI"
```

The following example displays the command output:

```
A:ALU-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:ALU-49>config>system>thresholds#
```

Configuring LLDP

Use the following syntax to configure LLDP:

CLI Syntax:
```
config>system>lldp
    message-fast-tx time
    message-fast-tx-init count
    notification-interval time
    reinit-delay time
    tx-credit-max count
    tx-hold-multiplier multiplier
    tx-interval interval
```

Example:
```
config>system# lldp
config>system>lldp# message-fast-tx 100
config>system>lldp# notification-interval 10
config>system>lldp# reinit-delay 5
config>system>lldp# tx-credit-max 20
config>system>lldp# tx-hold-multiplier 2
config>system>lldp# tx-interval 10
```

The following example shows the system LLDP configuration:

```
A:ALU-49>config>system>lldp# info
----------------------------------------------
tx-interval 10
tx-hold-multiplier 2
reinit-delay 5
notification-interval 10
tx-credit-max 20
message-fast-tx 100
----------------------------------------------
A:ALU-49>config>system>lldp#
```

System Command Reference

Command Hierarchies

Configuration Commands

System Information Commands

```
config
    — system
        — atm
            — atm-location-id location-id
            — no atm-location-id
        — boot-bad-exec file-url
        — no boot-bad-exec
        — boot-good-exec file-url
        — no boot-good-exec
        — clli-code clli-code
        — no clli-code
        — config-backup count
        — no config-backup
        — contact contact-name
        — no contact
        — coordinates coordinates
        — no coordinates
        — 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
```

System Time Commands

```
root
    — admin
        — set-time [date] [time]

config
    — system
        — time
            — [no] ntp
                — [no] authentication-check
                — authentication-key key-id key key [hash | hash2] type {des | message-digest}
                — no authentication-key key-id
                — [no] broadcastclient [router router-name] {interface ip-int-name} [authenticate]
                — multicastclient [authenticate]
                — no multicastclient
                — server ip-address [version version] [key-id key-id] [prefer]
                — no server ip-address
                — [no] shutdown
            — [no] sntp
                — [no] broadcast-client
                — server-address ip-address [version version-number] [normal | preferred] [interval seconds]
                — no server-address ip-address
                — [no] shutdown
            — [no] dst-zone [std-zone-name | non-std-zone-name]
                — end {end-week} {end-day} {end-month} [hours-minutes]
                — offset offset
                — start-{start-week} {start-day} {start-month} [hours-minutes]
            — zone {std-zone-name | non-std-zone-name} [hh [:mm]]
            — no zone
```

CRON Commands

```
config
    — [no] cron
        — [no] action action-name [owner owner-name]
            — expire-time {seconds | forever}
            — lifetime {seconds | forever}
            — max-completed unsigned
            — [no] results file-url
            — [no] script script-name [owner owner-name]
            — [no] shutdown
        — [no] schedule schedule-name [owner owner-name]
            — [no] action action-name [owner owner-name]
            — [no] day-of-month {day-number [..day-number] | all}
            — count number
            — description description-string
            — no description
            — [no] end-time [date | day-name] time
            — [no] hour {..hour-number [..hour-number] | all}
            — [no] interval seconds
            — [no] minute {minute-number [..minute-number] | all}
            — [no] month {month-number [..month-number] | month-name [..month-name] | all}
            — [no] shutdown
            — type schedule-type
            — [no] weekday {weekday-number [..weekday-number] | day-name [..day-name] |
              all}
        — [no] script script-name [owner owner-name]
            — description description-string
            — no description
            — [no] location file-url
            — [no] shutdown
```

System Synchronization Commands

```
config
    — system
        — sync-if-timing
            — abort
            — begin
            — bits
                — input
                    — [no] shutdown
                — interface-type {ds1 [{esf | sf}] | e1 [{pcm30crc | pcm31crc}]
                  | 2048khz-G703}
                — no interface-type
                — output
                    — line-length {110 | 220 | 330 | 440 | 550 | 660}
                    — [no] shutdown
                — ql-override {prs | stu | st2 | tnc | st3e | st3 | smc | prc | ssu-a
                  | ssu-b | sec | eec1 | eec2}
                  no ql-override
                — ssm-bit sa-bit
            — commit
            — external
                — input-interface
                    — impedance {high-impedance | 50-Ohm | 75-Ohm}
                    — [no] shutdown
                    — type {2048khz-G703 | 5mhz | 10mhz}
                    — no type
                — output-interface
                    — type {2048khz-G703 | 5mhz | 10mhz}
                    — no type
                — ql-override {prs | stu | st2 | tnc | st3e | st3 | smc | prc | ssu-a
                  | ssu-b | sec | eec1 | eec2}
                — no ql-override
            — [no] ql-selection
            — ref-order first second [third]
            — no ref-order
            — ref1
                — ql-override {prs | stu | st2 | tnc | st3e | st3 | smc | prc | ssu-a
                  | ssu-b | sec | eec1 | eec2}
                — no ql-override
                — [no] shutdown
                — source-port port-id [adaptive]
                — no source-port
                — source-ptp-clock clock-id
                — no source-ptp-clock
            — ref2
                — ql-override {prs | stu | st2 | tnc | st3e | st3 | smc | prc | ssu-a
                  | ssu-b | sec | eec1 | eec2}
                — no ql-override
                — [no] shutdown
                — source-port port-id [adaptive]
                — no source-port
                — source-ptp-clock clock-id
                — no source-ptp-clock
```

— [no] revert

System LLDP Commands

```
config
    — 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
            — tx-credit-max count
            — no tx-credit-max
            — tx-hold-multiplier multiplier
            — no tx-hold-multiplier
            — tx-interval interval
            — no tx-interval
```

System PTP commands

```
config
    — system
        — ptp
            — clock clock-id [create]
            — [no] clock
                — clock-mda mda-id
                — no clock-mda
                — clock-type {ordinary [master | slave] | boundary}
                — no clock-type
                — domain domain-value
                — no domain
                — [no] dynamic-peers
                — priority1 priority-value
                — no priority1
                — priority2 priority-value
                — no priority2
                — profile ieee1588-2008
                — profile itu-telecom-freq
                — no profile
                — ptp-port port-id
                    — anno-rx-timeout number-of-timeouts
                    — no anno-rx-timeout
                    — log-anno-interval log-anno-interval
                    — no log-anno-interval
                    — log-sync-interval log-sync-interval
                    — no log-sync-interval
                    — peer peer-id ip-address ip-address
                    — peer peer-id no ip-address
                    — [no] shutdown
                    — [no] unicast-negotiate
                — [no] shutdown
                — source-interface ip-if-name
                — no source-interface
```

Administration Commands

System Administration Commands

```
root
    — admin
        — 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]
        — save [file-url] [detail] [index]
        — synchronize [boot-env | config]
        — tech-support [file-url]
```

High Availability (Redundancy) Commands

```
root
    — admin
        — redundancy
            — force-switchover [now]
            — synchronize {boot-env | config}

config
    — system
        — switchover-exec file-url
        — no switchover-exec
    — redundancy
        — synchronize {boot-env | config}
```

Show Commands

```
show
    — chassis [environment] [power-feed]
    — cron
        — action [action-name] [owner owner-name] run-history run-state
        — schedule [schedule-name] [owner owner-name]
        — script [script-name] [owner owner-name]
    — redundancy
        — synchronization
    — time
    — system
        — connections [address ip-address [interface interface-name]] [port port-number] [detail]
        — cpu [sample-period seconds]
        — information
        — memory-pools
        — ntp
        — ptp
            — clock clock-id [summary] [detail]
            — clock clock-id ptp-port port-id
                — peer peer-id [detail]
        — sntp
        — sync-if-timing
        — thresholds
        — time
    — uptime
```

Debug Commands

```
debug
    — sync-if-timing
        — force-reference {external | ref1 | ref2}
        — no force-reference
    — [no] system
        — http-connections [host-ip-address/mask]
        — no http-connections
        — ntp [router router-name] [interface ip-int-name]
        — no ntp
```

Clear Commands

```
clear
    — cron action completed [action-name] [owner action-owner]
    — screen
    — system sync-if-timing {external | ref 1| ref2}
    — trace log
```

Command Descriptions

Configuration Commands

Generic Commands

shutdown

Syntax [**no**] **shutdown**

Context config>system>time>ntp
config>system>time>sntp
config>cron>action
config>cron>schedule
config>cron>script
config>system>ptp>clock
config>system>ptp>clock>ptp-port
config>system>sync-if-timing>external
config>system>sync-if-timing>bits>input
config>system>sync-if-timing>bits>output
config>system>sync-if-timing>ref1
config>system>sync-if-timing>ref2
config>system>lldp

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 can 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>schedule
config>cron>script

Description This command creates a text description stored in the configuration file for a configuration context.

The **description** command associates a text string with a configuration context to help identify the content in the configuration file.

The **no** form of this command removes the string from the configuration.

Default **none** — no description is associated with the configuration context

Parameters *string* — the description character string. Allowed values are any string up to 80 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, $, spaces, etc.), the entire string must be enclosed within double quotes.

System Information Commands

atm

Syntax **atm**

Context config>system

Description This command enables the context to configure system-wide ATM parameters.

atm-location-id

Syntax **atm-location-id** *location-id*
no atm-location-id

Context config>system>atm

Description This command indicates the location ID for ATM OAM.

Refer to the 7705 SAR OS Quality of Service Guide, "ATM QoS Traffic Descriptor Profiles", for information on ATM QoS policies and the 7705 SAR OS Services Guide, "VLL Services" for information on ATM-related service parameters.

Default **no atm-location-id**

Parameters *location-id* — specifies the 16 octets that identifies the system loopback location IDas required by the ATM OAM Loopback capability. This textual convention is defined in ITU-T standard I.610.

Invalid values include a location ID where the first octet is : 00, FF, 6A
Acceptable *location-ids* include values where the first octet is: 01, 03
Other values are not accepted.

Values 01:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00

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 execute 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:// | tftp://} login:pswd@remote-locn/][file-path]
cflash-id:	cf3:, cf3-A:, cf3-B:

Related Commands **exec command on page 64 —** 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 execute 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:// | tftp://} login:pswd@remote-locn/][file-path]
cflash-id:	cf3:, cf3-A:, cf3-B:

Related Commands **exec command on page 64 —** This command executes the contents of a text file as if they were CLI commands entered at the console.

clli-code

Syntax **clli-code** *clli-code*
no clli-code

Context config>system

Description This command creates a Common Language Location Identifier (CLLI) code string for the 7705 SAR. 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 11 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, 7-bit ASCII characters can be used within the string. If the string contains spaces, the entire string must be enclosed within double quotes. If more than 11 characters are entered, the string is truncated. If fewer than 11 characters are entered, the string is padded with spaces.

config-backup

Syntax **config-backup** *count*
no config-backup

Context config>system

Description This command configures the maximum number of backup versions maintained for configuration files and BOF.

For example, if the **config-backup** *count* is set to 5 and the configuration file is called **xyz.cfg**, the file **xyz.cfg** is saved with a .1 extension. when the **save** command is executed. 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 CSM 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 to 9

contact

Syntax **contact** *contact-name*
no contact

Context config>system

Description This command creates a text string that identifies the contact name for the device.

Only one contact can be configured. If multiple contacts are configured, the last one entered will overwrite the previous entry.

The **no** form of the command reverts to the 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, 7-bit ASCII characters can be used within the string. If the string contains spaces, 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, 7-bit ASCII characters can be used within the string. If the string contains spaces, 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.

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* — the location as a character string. The string may be up to 80 characters long. Any printable, 7-bit ASCII characters can be used within the string. If the string contains spaces, 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 ALU-1 for the **name** command configures the device name as ALU-1.

```
ABC>config>system# name ALU-1
ALU-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* — the system name as a character string. The string may be up to 32 characters long. Any printable, 7-bit ASCII characters can be used within the string. If the string contains spaces, the entire string must be enclosed within double quotes.

System Alarm Commands

alarm

Syntax **alarm** *rmon-alarm-id* **variable-oid** *oid-string* **interval** *seconds* [*sample-type*] [**startup-alarm** *alarm-type*] [**rising-event** *rmon-event-id* **rising-threshold** *threshold*] [**falling-event** *rmon-event-id* **falling threshold** *threshold*] [**owner** *owner-string*]
no alarm *rmon-alarm-id*

Context config>system>thresholds>rmon

Description The alarm command configures an entry in the RMON-MIB alarmTable. The alarm command controls the monitoring and triggering of threshold crossing events. In order for notification or logging of a threshold crossing event to occur, there must be at least one associated **rmon>event** configured.

The agent periodically takes statistical sample values from the MIB variable specified for monitoring and compares them to thresholds that have been configured with the alarm command. The alarm command configures the MIB variable to be monitored, the polling period (interval), sampling type (absolute or delta value), and rising and falling threshold parameters. If a sample has crossed a threshold value, the associated event is generated.

Use the **no** form of this command to remove an rmon-alarm-id from the configuration.

Parameters *rmon-alarm-id* — the rmon-alarm-id is a numerical identifier for the alarm being configured. The number of alarms that can be created is limited to 1200.

Default None

Values 1 to 65535

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

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 to 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

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 **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 to 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 to 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 to 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** *threshold* value.

Default 0

Values -2147483648 to 2147483647

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 cf3:, cf3-A:, cf3-B:

rising-threshold *threshold* — specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated "startup-alarm" is equal to "rising" or "either".

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal to the 'falling-threshold' value.

Default 0

Values -2147483648 to 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 to the rising-threshold value.

Default 0

Values -2147483648 to 2147483647

seconds **—** specifies the polling period, in seconds, over which the data is sampled and compared with the rising and falling thresholds

Values 1 to 2147483647

rmon-event-type — specifies the type of notification action to be taken when this event occurs

Values log — an entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — a TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations, which may be CONSOLE, telnet session , memory log, cflash file, syslog, or SNMP trap destinations logs.

both — both an entry in the RMON-MIB logTable and a TiMOS logger event are generated

none — no action is taken

Default both

alarm-type **—** specifies the alarm that may be sent when this alarm is first created

If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, 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 cf3:, cf3-A:, cf3-B:

rising-threshold *threshold* — specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to “rising” or “either”.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal to the falling-threshold value.

Default 0

Values -2147483648 to 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 to the rising-threshold value.

Default 0

Values -2147483648 to 2147483647

seconds — specifies the polling period over which the data is sampled and compared with the rising and falling thresholds

Values 1 to 2147483647

rmon-event-type — specifies the type of notification action to be taken when this event occurs

Values log — an entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the s**how>system>thresholds** CLI command.

trap — a TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations, which may be CONSOLE, telnet session , memory log, cflash file, syslog, or SNMP trap destinations logs.

both — both an entry in the RMON-MIB logTable and a TiMOS logger event are generated

none — no action is taken

Default both

alarm-type — specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to "falling" or "either", a single falling threshold crossing event is generated.

Values rising, falling, either

Default either

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 config>system>thresholds>rmon

Description The event command configures an entry in the RMON-MIB event table. The event command controls the generation and notification of threshold crossing events configured with the alarm command. When a threshold crossing event is triggered, the **rmon>event** configuration optionally specifies if an entry in the RMON-MIB log table should be created to record the occurrence of the event. It may also specify that an SNMP notification (trap) should be generated for the event. The RMON-MIB defines two notifications for threshold crossing events: Rising Alarm and Falling Alarm.

Creating an event entry in the RMON-MIB log table does not create a corresponding entry in the TiMOS event logs. However, when the <event-type> is set to trap, the generation of a Rising Alarm or Falling Alarm notification creates an entry in the TiMOS event logs and that is distributed to whatever TiMOS log destinations are configured: CONSOLE, session, memory, file, syslog, or SNMP trap destination.

The TiMOS logger message includes a rising or falling threshold crossing event indicator, the sample type (absolute or delta), the sampled value, the threshold value, the RMON-alarm-id, the associated RMON-event-id and the sampled SNMP object identifier.

Use the **no** form of this command to remove an rmon-event-id from the configuration.

Parameters *rmon-event-id [event-type]* — the rmon-event-type specifies the type of notification action to be taken when this event occurs

Values log — an entry is made in the RMON-MIB log table for each event occurrence

This does **not** create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — a TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations, which may be CONSOLE, telnet session , memory log, cflash file, syslog, or SNMP trap destinations logs.

both — both an entry in the RMON-MIB logTable and a TiMOS logger event are generated

none — no action is taken

Default both

description-string — 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-string — 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:

```
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 to the falling-threshold value.

Default 0

Values -2147483648 to 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 to the rising-threshold threshold value.

Default 0

Values -2147483648 to 2147483647

seconds — specifies the polling period over which the data is sampled and compared with the rising and falling thresholds

Values 1 to 2147483647

rmon-event-type — specifies the type of notification action to be taken when this event occurs

Values log — an entry is made in the RMON-MIB log table for each event occurrence

This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the CLI command.

trap — a TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations, which may be CONSOLE, telnet session , memory log, cflash file, syslog, or SNMP trap destinations logs.

both — both an entry in the RMON-MIB logTable and a TiMOS logger event are generated.

none — no action is taken

Default both

alarm-type — specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

Values rising, falling, either

Default either

Configuration example:

```
memory-use-alarm rising-threshold 50000000 falling-threshold 45999999 interval 500
rmon-event-type both start-alarm either
```

memory-use-warn

Syntax **memory-use-warn rising-threshold** *threshold* [**falling-threshold** *threshold*] **interval** *seconds* [*rmon-event-type*] [**startup-alarm** *alarm-type*]
no memory-use-warn

Context config>system>thresholds

Description The memory thresholds are based on monitoring the MemoryUsed object. This object contains the amount of memory currently used by the system. The severity level is Alarm.

The absolute sample type method is used.

The **no** form of this command removes the configured compact flash threshold warning.

Parameters **rising-threshold** *threshold* — specifies a threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single threshold crossing event will be generated. A single threshold crossing event will also be generated if the first sample taken is greater than or equal to this threshold and the associated startup-alarm is equal to rising or either.

After a rising threshold crossing event is generated, another such event will not be generated until the sampled value falls below this threshold and reaches less than or equal to the falling-threshold value.

Default 0

Values -2147483648 to 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 to the rising-threshold threshold value.

Default 0

Values -2147483648 to 2147483647

seconds — specifies the polling period over which the data is sampled and compared with the rising and falling thresholds

Values 1 to 2147483647

rmon-event-type — specifies the type of notification action to be taken when this event occurs

Values log — an entry is made in the RMON-MIB log table for each event occurrence

This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command.

trap — a TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations, which may be CONSOLE, telnet session , memory log, cflash file, syslog, or SNMP trap destinations logs.

both — both an entry in the RMON-MIB logTable and a TiMOS logger event are generated

none — no action is taken

Default both

Values log, trap, both, none

alarm-type — specifies the alarm that may be sent when this alarm is first created. If the first sample is greater than or equal to the rising threshold value and startup-alarm is equal to rising or either, then a single rising threshold crossing event is generated. If the first sample is less than or equal to the falling threshold value and startup-alarm is equal to falling or either, a single falling threshold crossing event is generated.

Default either

Values rising, falling, either

Configuration example:

```
memory-use-warn rising-threshold 500000 falling-threshold 400000 interval 800 rmon-
event-type log start-alarm falling
```

rmon

Syntax **rmon**

Context config>system>thresholds

Description This command creates the context to configure generic RMON alarms and events.

Generic RMON alarms can be created on any SNMP object-ID that is valid for RMON monitoring (for example, an integer-based datatype).

The configuration of an event controls the generation and notification of threshold crossing events configured with the alarm command.

thresholds

Syntax **thresholds**

Context config>system

Description This command enables the context to configure monitoring thresholds.

Date and Time Commands

set-time

Syntax **set-time** [*date*] [*time*]

Context admin

Description This command sets the local system time.

The time entered should be accurate for the time zone configured for the system. The system will convert the local time to UTC before saving to the system clock, which is always set to UTC. This command does not take into account any daylight saving offset if defined.

Parameters *date* — the local date and time accurate to the minute in the YYYY/MM/DD format

Values *YYYY* is the 4-digit year
MM is the 2-digit month
DD is the 2-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 2-digit hour in 24 hour format (00=midnight, 12=noon)
mm is the 2-digit minute

time

Syntax **time**

Context config>system

Description This command enables the context to configure the system time zone and time synchronization parameters.

Network Time Protocol Commands

ntp

Syntax [**no**] **ntp**

Context config>system>time

Description This command enables the context to configure Network Time Protocol (NTP) and its operation. This protocol defines a method to accurately distribute and maintain time for network elements. Furthermore, this capability allows for the synchronization of clocks between the various network elements. Use the **no** form of the command to stop the execution of NTP and remove its configuration.

Default **none**

authentication-check

Syntax [**no**] **authentication-check**

Context config>system>time>ntp

Description This command provides the option to skip the rejection of NTP PDUs that do not match the authentication key-id, type or key requirements. The default behavior when authentication is configured is to reject all NTP protocol PDUs that have a mismatch in either the authentication key-id, type or key.

When **authentication-check** is enabled, NTP PDUs are authenticated on receipt. However, mismatches cause a counter to be increased – one counter for type, one for key-id, and one for type value mismatches. These counters are visible in a show command.

The **no** form of this command allows authentication mismatches to be accepted; the counters however are maintained.

Default **authentication-check —** rejects authentication mismatches

authentication-key

Syntax **authentication-key** *key-id* **key** *key* [**hash** | **hash2**] **type** {**des** | **message-digest**}
no authentication-key *key-id*

Context config>system>time>ntp

Description This command sets the authentication key-id, type and key used to authenticate NTP PDUs sent to or received by other network elements participating in the NTP protocol. For authentication to work, the authentication key-id, type and key value must match.

The **no** form of the command removes the authentication key.

Default **none**

Parameters *key-id* — configures the authentication key-id that will be used by the node when transmitting or receiving Network Time Protocol packets

Entering the authentication-key command with a key-id value that matches an existing configuration key will result in overriding the existing entry.

Recipients of the NTP packets must have the same authentication key-id, type, and key value in order to use the data transmitted by this node. This is an optional parameter.

Default none

Values 1 to 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 8 characters in length (unencrypted). If spaces are used in the string, enclose the entire string in quotation marks (“ ”).

hash — specifies that the key is entered in an encrypted form. If the hash or hash2 parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the hash or hash2 parameter specified.

hash2 — specifies that the key is entered in a more complex encrypted form that involves more variables then the key value alone. This means that hash2 encrypted variable cannot be copied and pasted. If the hash or hash2 parameter is not used, the key is assumed to be in a non-encrypted, clear text form. For security, all keys are stored in encrypted form in the configuration file with the hash or hash2 parameter specified.

type — 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.

broadcastclient

Syntax [**no**] **broadcastclient** [**router** *router-name*] {**interface** *ip-int-name*} [**authenticate**]

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-name* — specifies the router name used to receive NTP packets

Values Base, management

Default Base

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.

multicastclient

Syntax **multicastclient** [**authenticate**]
no multicastclient

Context config>system>time>ntp

Description This command configures the node to receive multicast NTP messages on the CSM Management 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 —** 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.

server

Syntax **server** *ip address* [**version** *version*] [**key-id** *key-id*] [**prefer**]
no server *ip-address*

Context config>system>time>ntp

Description This command is used when the node should operate in client mode with the NTP server specified in the address field of this command. The **no** construct of this command removes the server with the specified address from the configuration.

Up to five NTP servers can be configured.

Parameters *ip-address* — configures the IP address of a node that acts as an NTP server to this network element. This is a required parameter.

Values Any valid IP address

version — the NTP version number that is expected by this node. This is an optional parameter.

Default 4

Values 2 to 4

key-id — the key-id that identifies the configured authentication key and authentication type used by this node to transmit NTP packets to an NTP server. If an NTP packet is received by this node, the authentication key-id, type, and key value must be valid; otherwise, the packet will be rejected and an event/trap generated. This is an optional parameter.

Values 1 to 255

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.

Simple Network Time Protocol 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 shut down prior to changing either to or from broadcast mode.

The **no** form of the command disables broadcast client mode.

Default **no broadcast-client**

server-address

Syntax **server-address** *ip-address* [**version** *version-number*] [**normal** | **preferred**] [**interval** *seconds*]
no server-address *ip-address*

Context config>system>time>sntp

Description This command creates an SNTP server for unicast client mode.

Parameters *ip-address* — specifies the IP address of the SNTP server

version-number — specifies the SNTP version supported by this server

Values 1 to 3

Default 3

normal | preferred — specifies the preference value for this SNTP server. When more than one time-server is configured, one server can have preference over others. The value for that server should be set to **preferred**. Only one server in the table can be a preferred server.

Default normal

seconds — specifies the frequency at which this server is queried

Values 64 to 1024

Default 64

Time Zone 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 20, 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 20 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 20. 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 using the zone command.

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 the end of summer time settings.

Parameters *end-week* — specifies the starting week of the month when the summer time will end

Values first, second, third, fourth, last

Default first

end-day — specifies the starting day of the week when the summer time will end

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday

Default sunday

end-month — specifies the starting month of the year when the summer time will end

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 to 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 to 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 to 60

start

Syntax **start** {*start-week*} {*start-day*} {*start-month*} [*hours-minutes*]

Context config>system>time>dst-zone

Description This command configures start of summer time settings.

Parameters *start-week* — specifies the starting week of the month when the summer time will take effect

Values first, second, third, fourth, last

Default first

start-day — specifies the starting day of the week when the summer time will take effect

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday

Default sunday

start-month — the starting month of the year when the summer time will take effect

Values january, february, march, april, may, june, july, august, september, october, november, december

Default january

hours — specifies the hour at which the summer time will take effect

Default 0

minutes — specifies the number of minutes, after the hours defined by the *hours* parameter, when the summer time will take effect

Default 0

zone

Syntax **zone** {*std-zone-name* | *non-std-zone-name*} [*hh* [*:mm*]]
no zone

Context config>system>time

Description This command sets the time zone and/or time zone offset for the device.

The 7705 SAR supports system-defined and user-defined time zones. The system-defined time zones are listed in Table 20.

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 20. 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. Some system-defined time zones have implicit summer time settings which causes the switchover to summer time to occur automatically; in this case, configuring the dst-zone parameter is not required.

A user-defined time zone name is case-sensitive and can be up to 5 characters in length.

Values A user-defined value can be up to 5 characters or one of the following values: GMT, BST, IST, WET, WEST, CET, CEST, EET, EEST, MSK, MSD, AST, ADT, EST, EDT, ET, CST, CDT, CT, MST, MDT, MT, PST, PDT, PT, HST, AKST, AKDT, WAST, CAST, EAST

non-std-zone-name — the non-standard time zone name

Values Up to 5 characters maximum.

hh [*:mm*] — the hours and minutes offset from UTC time, expressed as integers. Some time zones do not have an offset that is an integral number of hours. In these instances, the *minutes-offset* must be specified. For example, the time zone in Pirlanngimpi, Australia is UTC + 9.5 hours.

Default hours: 0
minutes: 0

Values hours: -11 to 11
minutes: 0 to 59

CRON Commands

cron

Syntax **cron**

Context config

Description This command creates the context to create scripts, script parameters and schedules that 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** *owner-name*]

Context config>cron
config>cron>schedule

Description This command configures action parameters for a script.

Default **none**

Parameters *action-name* — specifies the action name

Values Maximum 32 characters.

owner-name — specifies the owner name

Default TiMOS CLI

expire-time

Syntax **expire-time** {**seconds** | **forever**}

Context config>cron>action

Description This command configures the maximum amount of time to keep the results from a script run.

Parameters **seconds —** specifies the maximum amount of time to keep the results from a script run

Values 1 to 21474836

Default 3600 (1 hour)

forever — specifies to keep the results from a script run forever

lifetime

Syntax **lifetime** {**seconds** | **forever**}

Context config>cron>action

Description This command configures the maximum amount of time a script may run.

Parameters **seconds —** specifies the maximum amount of time a script may run

Values 1 to 21474836

Default 3600 (1 hour)

forever — specifies to allow a script to 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 by 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 to 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

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

Parameters *script-name* — connects an event to the script that will run when the event is triggered

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-name — owner name of the schedule

count

Syntax **count** *number*

Context config>cron>schedule

Description This command configures the total number of times a CRON "interval" schedule is run. For example, if the interval is set to 600 and the count is set to 4, the schedule runs 4 times at 600 second intervals.

Parameters *number* — the number of times the schedule is run

Values 1 to 65535

Default 65535

day-of-month

Syntax **[no] day-of-month** {*day-number* [*..day-number*] | **all**}

Context config>cron>schedule

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* — positive integers specify the day of the month counting from the first of the month. The negative integers specify the day of the month counting from the last day of the month. For example, configuring **day-of-month -5, 5** in a month that has 31 days will specify the schedule to occur on the 27th and 5th of that month.

Integer values must map to a valid day for the month in question. For example, February 30 is not a valid date.

Values 1 to 31, -31 to -1 (maximum 62 day-numbers)

all — specifies all days of the month

end-time

Syntax **[no] end-time** [*date* | *day-name*] *time*

Context config>cron>schedule

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>schedule

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 to 23 (maximum 24 hour-numbers)

all — specifies all hours

interval

Syntax **[no] interval** *seconds*

Context config>cron>schedule

Description This command specifies the interval between runs of an event.

Parameters *seconds* — the interval, in seconds, between runs of an event

Values 30 to 4294967295

minute

Syntax [**no**] **minute** {*minute-number* [*..minute-number*] | **all**}

Context config>cron>schedule

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 to 59 (maximum 60 minute-numbers)

all — specifies all minutes

month

Syntax [**no**] **month** {*month-number* [*..month-number*] | *month-name* [*..month-name*] | **all**}

Context config>cron>schedule

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 to 12 (maximum 12 month-numbers)

month-name — specifies a month by name

Values january, february, march, april, may, june, july, august, september, october, november, december (maximum 12 month names)

all — specifies all months

type

Syntax **type** *schedule-type*

Context config>cron>schedule

Description This command specifies how the system should interpret the commands contained within the schedule node.

Parameters *schedule-type* — specifies the type of schedule for the system to interpret the commands contained within the schedule node

Values **periodic** — specifies a schedule that runs at a given interval. The interval value must be specified for this feature to run successfully.
calendar — specifies a schedule that runs based on a calendar. The values, weekday, month, day-of-month, hour, and minute, must be specified for this feature to run successfully.
oneshot — specifies a schedule that runs one time only. As soon as the first event specified in these parameters takes place and the associated event occurs, the schedule enters a shutdown state. 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>schedule

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 *weekday-number* — specifies a weekday number

Values 1 to 7 (maximum 7 week-day-numbers)

day-name — specifies a day by name

Values sunday, monday, tuesday, wednesday, thursday, friday, saturday (maximum 7 weekday names)

all — specifies all days of the week

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

owner-name — specifies the owner of the script

location

Syntax [**no**] **location** *file-url*

Context config>cron>script

Description This command configures the location of script to be scheduled.

Parameters *file-url* — specifies the location where the system writes the output of an event script's execution

Values

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

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.

Default **not enabled** (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.

begin

Syntax **begin**

Context config>system>sync-if-timing

Description This command is required in order to enter the mode to create or edit the system synchronous interface timing configuration.

bits

Syntax **bits**

Context config>system>sync-if-timing

Description This command enables the context to configure parameters for BITS timing on the 7705 SAR-18. The BITS input and output ports can be configured for T1/E1 or 2 MHz G.703 signals.

input

Syntax **input**

Context config>system>sync-if-timing>bits

Description This command enables the context to configure BITS input timing ports parameters on the 7705 SAR-18.

interface-type

Syntax **interface-type** {**ds1** [{**esf** | **sf**}] | **e1** [{**pcm30crc** | **pcm31crc**}] | **2048khz-G703**}
no interface-type

Context config>system>sync-if-timing>bits

Description This command specifies the signal type for the BITS input and output ports. If you configure the signal type as **ds1**, the system automatically defaults to **esf**. If you configure the signal type as **e1,** the system automatically defaults to **pcm30crc**.

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

Default **ds1 esf**

Parameters **ds1 esf —** specifies Extended Super Frame (ESF). ESF is a framing type used on DS1 circuits. ESF consists of 24 192-bit frames. The 193rd bit provides timing and other functions.

ds1 sf — specifies Super Frame (SF), also called D4 framing. SF 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 PCM30CRC as the pulse code modulation (PCM) type. PCM30CRC uses PCM to separate the signal into 30 user channels with Cyclic Redundancy Check (CRC) protection.

e1 pcm31crc — specifies PCM31CRC as the PCM type. PCM31CRC uses PCM to separate the signal into 31 user channels with CRC protection.

output

Syntax **output**

Context config>system>sync-if-timing>bits

Description This command enables the context to configure BITS output port parameters on the 7705 SAR-18.

line-length

Syntax **line-length** {**110** | **220** | **330** | **440** | **550** | **660**}

Context config>system>sync-if-timing>bits>output

Description This command configures the line length, in feet, between the network element and the central clock (BITS/SSU).

This command is only applicable when the interface-type is DS1.

Default **110**

Parameters **110** — specifies a line length from 0 to 110 ft

220 — specifies a line length from 111 to 220 ft

330 — specifies a line length from 221 to 330 ft

440 — specifies a line length from 331 to 440 ft

550 — specifies a line length from 441 to 550 ft

660 — specifies a line length from 551 to 660 ft

ql-override

Syntax **ql-override** {**prs** | **stu** | **st2** | **tnc** | **st3e** | **st3** | **smc** | **prc** | **ssu-a** | **ssu-b** | **sec** | **eec1** | **eec2**}
no ql-override

Context config>system>sync-if-timing>external
config>system>sync-if-timing>bits
config>system>sync-if-timing>ref1
config>system>sync-if-timing>ref2

Description This command configures a static quality level value. This value overrides any dynamic quality level value received by the Synchronization Status Messaging (SSM) process.

Default **no ql-override**

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

smc — SONET Minimum Clock Traceable

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

eec1 — Ethernet Equipment Clock Option 1 Traceable (SDH)

eec2 — Ethernet Equipment Clock Option 2 Traceable (SONET)

ssm-bit

Syntax **ssm-bit** *sa-bit*

Context config>system>sync-if-timing>bits

Description This command configures which Sa-bit to use for conveying Synchronization Status Messaging (SSM) information when the interface type is E1.

Default **Sa8**

Parameters *sa-bit* — specifies the Sa-bit value

Values Sa4 to Sa8

commit

Syntax **commit**

Context config>system>sync-if-timing

Description This command is required in order to save the changes made to the system synchronous interface timing configuration.

external

Syntax **external**

Context config>system>sync-if-timing

Description This command enables the context to configure parameters for external timing via the port on the CSM. This can be used to reference external synchronization signals.

input-interface

Syntax **input-interface**

Context config>system>sync-if-timing>external

Description This command enables the context to configure parameters for external input timing interface via the port on the CSM.

impedance

Syntax **impedance** {**high-impedance** | **50-Ohm** | **75-Ohm**}

Context config>system>sync-if-timing>external>input-interface

Description This command configures the impedance of the external input timing port.

Default **50-Ohm**

Parameters **high-impedance** — specifies a high input impedance value

50-Ohm — specifies a 50 Ω input impedance value

75-Ohm — specifies a 75 Ω input impedance value

type

Syntax **type** {**2048khz-G703** | **5mhz** | **10mhz**}
no type

Context config>system>sync-if-timing>external>input-interface
config>system>sync-if-timing>external>output-interface

Description This command configures the interface type of the external timing port.

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

Default **2048 kHz-G703**

Parameters **2048khz-G703** — specifies G703 2048 kHz clock

5mhz — specifies a 5 mHz sine clock

10mhz — specifies a 10 mHz sine clock

output-interface

Syntax **output-interface**

Context config>system>sync-if-timing>external

Description This command enables the context to configure parameters for external output timing interface via the port on the CSM.

Default **none**

ql-selection

Syntax **[no] ql-selection**

Context config>system>sync-if-timing

Description This command enables 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 three different timing reference inputs, those specified in the ref1, ref2, and external and begin 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 the reference sources are disabled, then clocking is derived from a local oscillator.

If a sync-if-timing reference is linked to a source port that is operationally down, the port will no longer be qualified as a valid reference.

The **no** form of the command resets the reference order to the default values.

Default **external, ref1 ref2**

Parameters *first* — specifies the first timing reference to use in the reference order sequence

Values ref1, ref2, external, bits

second — specifies the second timing reference to use in the reference order sequence

Values ref1, ref2, external, bits

third — specifies the third timing reference to use in the reference order sequence

Values ref1, ref2, external, bits

ref1

Syntax **ref1**

Context config>system>sync-if-timing

Description This command enables the context to configure parameters for the first timing reference.

ref2

Syntax **ref2**

Context config>system>sync-if-timing

Description This command enables the context to configure parameters for the second timing reference.

source-port

Syntax **source-port** *port-id* [**adaptive**]
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**.

The timing reference can either be timing extracted from the receive port (line-timed) or packetized data of a TDM PW (adaptive-timed). If the adaptive option is not selected, the system uses line timing mode. If the line timing is from a port that becomes unavailable or the link goes down, then the reference sources are re-evaluated according to the reference order configured by the ref-order command.

Line timing is supported on the 7705 SAR-F on T1/E1 ports and Ethernet SFP ports with SFPs that support Synchronous Ethernet. On the 7705 SAR-8 and 7705 SAR-18, line timing is supported on:

- T1/E1 ports on the 16-port T1/E1 ASAP Adapter card (version 1 and version 2) and 32-port T1/E1 ASAP Adapter card
- Ethernet SFP ports with SFPs that support Synchronous Ethernet on the 8-port Ethernet Adapter card (version 2)
- SONET/SDH ports on the 4-port OC3/STM1 Clear Channel Adapter card and 2-port OC3/STM1 Channelized Adapter card
- DS3/E3 ports on the 4-port DS3/E3 Adapter card

Adaptive timing is supported on the T1/E1 ports on the 7705 SAR-F; on the 7705 SAR-8 and 7705 SAR-18, adaptive timing is supported on the 16-port T1/E1 ASAP Adapter card (version 1 and version 2) and 32-port T1/E1 ASAP Adapter card configured with one or more TDM PWs.

Note: The PW terminated on channel group 1 will be used to extract the ACR timing.

On the 7705 SAR-F, both Synchronous Ethernet ports or two T1/E1 ports can supply a timing reference. For T1/E1 ports, one reference must be from ports 1 to 8 and the other from ports 9 to 16.

On the 7705 SAR-8 and 7705 SAR-18, a timing reference can come from a single DS3/E3 port on the 4-port DS3/E3 Adapter card, a single SONET/SDH port on the 2-port OC3/STM1 Channelized Adapter card or 4-port OC3/STM1 Clear Channel Adapter card, a single Synchronous Ethernet port on an 8-port Ethernet Adapter card (version 2), or a single T1/E1 port on the16-port T1/E1 ASAP Adapter card (version 1). On the 16-port T1/E1 ASAP Adapter card (version 2) and 32-port T1/E1 ASAP Adapter card, up to two T1/E1 ports can be configured to be a timing reference. These two references must be from different framers on the cards. The framers each have 8 ports and are split into groups of 1 to 8 and 9 to 16 on the 16-port T1/E1 ASAP Adapter card (version 2), and groups of 1 to 8, 9 to 16, 17 to 24, and 25 to 32 on the 32-port T1/E1 ASAP Adapter card.

The **no** form of this command deletes the source port from the reference. An example of when the **no** form would be used is if the user wants to change the reference to a source IP interface in order to enable PTP. In this case, the user would first delete the PTP using the **no source-port** command, and then configure the source IP interface using the source-ptp-clock command.

Parameters *port-id* — identifies the port in the *slot/mda/port* format

adaptive — clock recovery is adaptive, rather than line-timed

source-ptp-clock

Syntax **source-ptp-clock** *clock-id*
no source-ptp-clock

Context config>system>sync-if-timing>ref1
config>system>sync-if-timing>ref2

Description This command configures the reference source clock using the clock ID configured by the PTP clock command.

Default **no source-ptp-clock**

Parameters *clock-id* — identifies the PTP clock to use as the reference source clock

Values 1 to 2

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. With revertive switching enabled, the highest-priority valid timing reference will be used. If a reference with a higher priority becomes valid, a reference switchover to that reference will be initiated. If a failure on the current reference occurs, the next highest reference takes over.

With non-revertive switching, the active reference will always remain selected while it is valid, even if a higher-priority reference becomes available. If this reference becomes invalid, a reference switchover to a valid reference with the highest priority will be initiated. When the failed reference becomes operational, it is eligible for selection.

Default **no revert**

LLDP System Commands

Refer to the 7705 SAR OS Interface Configuration Guide, "7705 SAR Interfaces", for LLDP Ethernet port commands.

lldp

Syntax **lldp**

Context config>system

Description This command enables the context to configure system-wide Link Layer Discovery Protocol (LLDP) parameters.

message-fast-tx

Syntax **message-fast-tx** *time*
no message-fast-tx

Context config>system>lldp

Description This command configures the interval between LLDPDU transmissions by the LLDP agent during a fast transmission period.

The fast transmission period begins when a new neighbor is detected. During the fast transmission period, LLDPDUs are transmitted at shorter intervals than the standard tx-interval to ensure that more than one LLDPDU is sent to the new neighbor. The first transmission occurs as soon as the new neighbor is detected. The length of the fast transmission period is determined by the number of LLDPDU transmissions (configured by the message-fast-tx-init command) and the interval between them.

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

Default **1**

Parameters *time* — specifies the interval between LLDPDU transmissions in seconds

Values 1 to 3600

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 a fast transmission period.

The fast transmission period begins when a new neighbor is detected. During the fast transmission period, LLDPDUs are transmitted at shorter intervals than the standard tx-interval to ensure that more than one LLDPDU is sent to the new neighbor. The first transmission occurs as soon as the new neighbor is detected. The length of the fast transmission period is determined by the number of LLDPDU transmissions and the interval between them (configured by the message-fast-tx command).

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

Default **4**

Parameters *count* — specifies the number of LLDPDUs to send during the fast transmission period

Values 1 to 8

notification-interval

Syntax **notification-interval** *time*
no notification-interval

Context config>system>lldp

Description This command configures the minimum time between change notifications. A change notification is a trap message sent to SNMP whenever a change occurs in the database of LLDP information.

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

Default **5**

Parameters *time* — specifies the minimum time, in seconds, between change notifications

Values 5 to 3600

reinit-delay

Syntax **reinit-delay** *time*
no reinit-delay

Context config>system>lldp

Description This command configures the time before reinitializing LLDP on a port.

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

Default **2**

Parameters *time* — specifies the time, in seconds, before reinitializing LLDP on a port

Values 1 to 10

tx-credit-max

Syntax **tx-credit-max** *count*
no tx-credit-max

Context config>system>lldp

Description This command configures the maximum number of consecutive LLDPDUs that can be transmitted at any time.

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

Default **5**

Parameters *count* — specifies the maximum number of consecutive LLDPDUs transmitted

Values 1 to 100

tx-hold-multiplier

Syntax **tx-hold-multiplier** *multiplier*
no tx-hold-multiplier

Context config>system>lldp

Description This command configures the multiplier of the transmit interval defined by the tx-interval command.

The transmit interval time multiplied by the **tx-hold-multiplier** is the TTL value in the LLDPDU. The TTL value determines the amount of time the receiving device retains LLDP packet information in local information databases before discarding it.

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

Default **4**

Parameters *multiplier* — specifies the multiplier of the transmit interval

Values 2 to 10

tx-interval

Syntax **tx-interval** *interval*
no tx-interval

Context config>system>lldp

Description This command configures the LLDP transmit interval time.

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

Default **30**

Parameters *interval* — specifies the LLDP transmit interval time in seconds

Values 5 to 32768

System PTP commands

ptp

Syntax **ptp**

Context config>system

Description This command creates or edits the context to create or modify PTP timing parameters.

clock

Syntax **clock** *clock-id* [**create**]
no clock *clock-id*

Context config>system>ptp

Description This command creates a PTP clock, which can be set to a master, slave, or boundary clock using the clock-type command.

Parameters *clock-id* — specifies the clock ID of this PTP instance

Values 1 to 2

create — keyword required when first creating the configuration context. When the context is created, you can navigate into the context without the **create** keyword.

clock-mda

Syntax **clock-mda** *mda-id*
no clock-mda

Context config>system>ptp>clock

Description This command configures the adapter card slot that performs the IEEE 1588v2 clock recovery (on the 7705 SAR-F, this slot is always 1/2). The **no** form of this command clears the clock recovery adapter card.

Default **n/a**

Parameters *mda-id* — slot/mda

clock-type

Syntax **clock-type** {**ordinary** [**master** | **slave**] | **boundary**}
no clock-type

Context config>system>ptp>clock

Description This command configures the type of clock. The **no** form of the command reverts to the default configuration (ordinary slave). The clock type can only be changed when PTP is shut down.

Default **ordinary slave**

Parameters **ordinary —** configures the clock as either a PTP master or slave

master — configures the clock as a PTP master only

slave — configures the clock as a PTP slave only

boundary — configures the clock as a boundary clock capable of functioning as both a master and slave concurrently

domain

Syntax **domain** *domain-value*
no domain

Context config>system>ptp>clock

Description This command defines the PTP device domain, defined as an integer. A domain consists of one device or multiple PTP devices communicating with each other as defined by the protocol. A PTP domain defines the scope of PTP message communication, state, operations, data sets and timescale. A domain is configured since it is possible that a deployment could require the two PTP instances within a single network element to be programmed with different domain values.

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

Default **0**

Parameters *domain-value* — specifies the PTP device domain value

Values 0 to 127

dynamic-peers

Syntax **[no] dynamic-peers**

Context config>system>ptp>clock

Description This command allows a slave clock to connect to the master clock without the master being aware of it. Once connected, the master clock or boundary clock assigns the slave a PTP port and/or peer ID dynamically.

Dynamic peers are not stored in the configuration file. If a master clock with dynamic peers goes down and comes back up, the slave clocks renegotiate to it and are reassigned resources on the master clock or boundary clock.

The **no** form of this command disables dynamic peers. In this case, the user must manually program any slave peer clocks into the master clock or boundary clock in order for those clocks to accept those slaves.

Default **no dynamic-peers**

priority1

Syntax **priority1** *priority-value*
no priority1

Context config>system>ptp>clock

Description This command configures the first priority value of the local clock. This value is used by the Best Master Clock Algorithm (BMCA) to determine which clock should provide timing for the network. It is also used as the advertised value in announce messages and as the local clock value in data set comparisons.

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

Default **128**

Parameters *priority* — specifies the priority1 value of the local clock

Values 0 to 255

priority2

Syntax **priority2** *priority-value*
no priority2

Context config>system>ptp>clock

Description This command configures the second priority value of the local clock. This value is used by the BMCA to determine which clock should provide timing for the network. It is also used as the advertised value in announce messages and as the local clock value in data set comparisons.

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

Default **128**

Parameters *priority* — specifies the priority2 value of the local clock

Values 0 to 255

profile

Syntax **profile ieee1588-2008**
profile itu-telecom-freq
no profile

Context config>system>ptp>clock

Description This command defines the specification rules to be used by PTP. Configuring the profile changes the BMCA and SSM/QL mappings to match the settings in the specification.

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

Default **ieee1588-2008**

Parameters **ieee1588-2008 —** configures the PTP profile to follow the IEEE 1588-2008 specification rules

itu-telecom-freq — configures the PTP profile to follow the ITU G.8265.1 specification rules

ptp-port

Syntax **ptp-port** *port-id*

Context config>system>ptp>clock

Description This command configures an IEEE 1588v2 logical port in the system. It also creates the context to configure parameters for IEEE 1588v2. PTP ports are created when the clock type is set with the clock-type command.

When the clock type is set to ordinary slave, one port with two peers is created. When the clock type is set to ordinary master, one port with 10 peers is created. When the clock type is set to boundary clock, 10 ports each with one peer are created.

Default **n/a**

Parameters *port-id* — specifies the PTP port ID

Values 1 to 10

anno-rx-timeout

Syntax **anno-rx-timeout** *number-of-timeouts*
no anno-rx-timeout

Context config>system>ptp>clock>ptp-port

Description This command defines the number of announce timeouts that need to occur on a PTP slave port or boundary clock port in slave mode before communication messages with a master clock are deemed lost and the master clock is considered not available. One timeout in this context is equal to the announce interval in seconds, calculated using the logarithm 2^log-anno-interval.

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

Default **3**

Parameters *number-of-timeouts* — specifies the number of timeouts that need to occur before communication messages to a master clock are deemed lost and the master clock is considered not available

Values 2 to 10

log-anno-interval

Syntax **log-anno-interval** *log-anno-interval*
no log-anno-interval

Context config>system>ptp>clock>ptp-port

Description This command defines the expected interval between the reception of announce messages for a PTP slave port or boundary clock port in slave mode.

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

Default **1**

Parameters *log-anno-interval* — specifies the expected interval between the reception of announce messages

Values 0 to 3, where 0 = 1 s, 1 = 2 s, 2 = 4 s, 3 = 8 s

log-sync-interval

Syntax **log-sync-interval** *log-sync-interval*
no log-sync-interval

Context config>system>ptp>clock>ptp-port

Description This command defines the expected interval between the reception of synchronization messages.

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

Default **-6**

Parameters *log-sync-interval* — specifies the expected interval between the reception of synchronization messages

Values -6 or -7, where -6 is 64 packets/s and -7 is 128 packets/s

peer

Syntax **peer** *peer-id* **ip-address** *ip-address*
peer *peer-id* **no ip-address**

Context config>system>ptp>clock>ptp-port

Description This command configures a remote PTP peer and provides the context to configure parameters for the remote PTP peer.

Up to two remote PTP peers may be configured on a PTP port.

The **no** form of the command removes the IP address from the PTP peer.

Default **n/a**

Parameters *peer-id* — specifies the PTP peer ID

Values 1 to 10

ip-address — specifies the IP address of the remote peer

Values a.b.c.d

unicast-negotiate

Syntax [**no**] **unicast-negotiate**

Context config>system>ptp>clock>ptp-port

Description This command specifies whether the slave clock is to initiate a unicast request to the master clock or wait for announce and synchronization messages from the master clock.

The **no** form of this command disables **unicast-negotiate**. In this case, the user must specify the slave clock information when configuring the 7705 SAR master node in order for communication between the slave clock and master clock to take place.

Default **unicast-negotiate**

source-interface

Syntax **source-interface** *ip-if-name*
no source-interface

Context config>system>ptp>clock

Description This command defines the IP interface that provides the source IP address for packets sent by the IEEE 1588v2 clock. The system interface cannot be used as the source address.

If the *ip-if-name* refers to a loopback address, then the remote peer must send packets to ingress on this particular loopback address via any network IP interface on the node. If the *ip-if-name* refers to an interface that is associated with a physical port or VLAN, then the remote peer must send packets to ingress on this particular IP interface.

Default **n/a**

Parameters *ip-if-name* — specifies the IP interface used by the PTP slave clock

Administration Commands

System Administration Commands

admin

Syntax **admin**

Context <ROOT>

Description This command enables the context to configure administrative system commands. Only authorized users can execute the commands in the **admin** context.

Default **none**

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*]
remote-url:	[{ftp://} login:pswd@remote-locn/][file-path]
cflash-id:	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 *ip-address* — the IP address to disconnect, specified in dotted-decimal notation

Values 1.0.0.0 to 223.255.255.255

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 CSMs or upgrades the boot ROMs.

If no options are specified, the user is prompted to confirm the reboot operation. For example:

```
ALU-1>admin# reboot
Are you sure you want to reboot (y/n)?
```

If the **now** option is specified, no boot confirmation messages appear.

Parameters **active —** keyword to reboot the active CSM

Default active

standby — keyword to reboot the standby CSM

Default active

upgrade — enables card firmware to be upgraded during chassis reboot. The 7705 SAR and the BOOT.LDR support functionality to perform automatic firmware upgrades on CSMs. The automatic upgrade must be enabled in the 7705 SAR 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 7705 SAR on the chassis, any firmware images on CSMs requiring upgrading will be upgraded automatically.

If a 7705 SAR is rebooted with the "admin reboot" command (without the "upgrade" keyword), the firmware images are left intact.

Any CSMs 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 7705 SAR) to 8 minutes (for a fully loaded 7705 SAR chassis), 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:

```
ALU-1>admin# save ftp://test:test@192.168.x.xx/./100.cfg
Saving configuration .........Completed.
```

By default, the running configuration is saved to the primary configuration file.

Parameters *file-url* — the file URL location to save the configuration file

Default the primary configuration file location

Values

file-url:	*local-url* | *remote-url* (255 characters max)
local-url:	[*cflash-id/*] [*file-path*]
remote-url:	[{ftp:// | tftp://}*login*:*pswd*@*remote-locn*/][*file-path*]
	cf3:, cf3-A:, cf3-B:

detail — saves both default and non-default configuration parameters

Default saves 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 *service-id* — specifies an existing service ID

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.

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:	cf3:, cf3-A:, cf3-B:

High Availability (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 CSM card. The primary CSM reloads its software image and becomes the secondary CSM.

Parameters **now —** forces the switchover to the redundant CSM card immediately

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 CSM 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:	cf3:, cf3-A:, cf3-B:

synchronize

Syntax **synchronize** {**boot-env** | **config**}

Context admin>redundancy
config>redundancy

Description This command performs a synchronization of the standby CSM's images and/or config files to the active CSM. Either the **boot-env** or **config** parameter must be specified.

In the **admin>redundancy** context, this command performs a manually triggered standby CSM synchronization.

In the **config>redundancy** context, this command performs an automatically triggered standby CSM synchronization.

When the standby CSM takes over operation following a failure or reset of the active CSM, it is important to ensure that the active and standby CSMs have identical operational parameters. This includes the saved configuration and CSM images.

The active CSM ensures that the active configuration is maintained on the standby CSM. However, to ensure smooth operation under all circumstances, runtime images and system initialization configurations must also be automatically synchronized between the active and standby CSM.

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 — for admin>redundancy context**

enabled — for config>redundancy context

Parameters **boot-env —** synchronizes all files required for the boot process (loader, BOF, images, and configuration files

config — synchronizes only the primary, secondary, and tertiary configuration files

Default config

Show 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

Values ipv4-address: a.b.c.d (host bits must be 0)

interface-name — displays connection information only for the specified interface

port-number — displays only the connection information for the specified port number

Values 0 to 65535

detail — appends TCP statistics to the display output

Output The following output is an example of UDP and TCP connection information, and Table 24 describes the fields.

Sample Output

```
A:ALU-1# show system connections
===============================================================================
Connections :
===============================================================================
Proto    RecvQ    TxmtQ Local Address                                  State
                       Remote Address                                     vRtrID
-------------------------------------------------------------------------------
TCP          0        0 0.0.0.0.21                                     LISTEN
                        0.0.0.0.0                                          0
TCP          0        0 0.0.0.0.23                                     LISTEN
                        0.0.0.0.0                                          0
TCP          0        0 0.0.0.0.179                                    LISTEN
                        0.0.0.0.0                                          0
TCP          0        0 10.0.0.xxx.51138                               SYN_SENT
                        10.0.0.104.179                                   4095
TCP          0        0 10.0.0.xxx.51139                               SYN_SENT
                        10.0.0.91.179                                    4095
TCP          0        0 10.10.10.xxx.646                               LISTEN
                        0.0.0.0.0                                          0
TCP          0        0 10.10.10.xxx.646                               ESTABLISH
                        10.10.10.104.49406                               4095
TCP          0        0 11.1.0.1.51140                                 SYN_SENT
                        11.1.0.2.179                                     4095
TCP          0        993 192.168.x.xxx.23                             ESTABLISHED
                        192.168.x.xx.xxxx                                4095
```

```
UDP          0        0 0.0.0.0.123                                 ---
                        0.0.0.0.0                                      0
UDP          0        0 0.0.0.0.646                                 ---
                        0.0.0.0.0                                      0
UDP          0        0 0.0.0.0.17185                               ---
                        0.0.0.0.0                                      0
UDP          0        0 10.10.10.xxx.646                            ---
                        0.0.0.0.0                                      0
UDP          0        0 127.0.0.1.50130                             ---
                        127.0.0.1.17185                              4095
-------------------------------------------------------------------------------
No. of Connections: 14
===============================================================================
A:ALU-1#
```

Sample Detailed Output

```
A:ALU-1# show system connections detail
-------------------------------------------------------------------------------
 TCP Statistics
-------------------------------------------------------------------------------
packets sent                                  : 659635
data packets                                  : 338982 (7435146 bytes)
data packet retransmitted                     : 73 (1368 bytes)
ack-only packets                              : 320548 (140960 delayed)
URG only packet                               : 0
window probe packet                           : 0
window update packet                          : 0
control packets                               : 32
packets received                              : 658893
acks                                          : 338738 for (7435123 bytes)
duplicate acks                                : 23
ack for unsent data                           : 0
packets received in-sequence                  : 334705 (5568368 bytes)
completely duplicate packet                   : 2 (36 bytes)
packet with some dup. data                    : 0 (0 bytes)
out-of-order packets                          : 20 (0 bytes)
packet of data after window                   : 0 (0 bytes)
window probe                                  : 0
window update packet                          : 3
packets received after close                  : 0
discarded for bad checksum                    : 0
discarded for bad header offset field         : 0
discarded because packet too short            : 0
connection request                            : 4
connection accept                             : 24
connections established (including accepts)   : 27
connections closed                            : 26 (including 2 drops)
embryonic connections dropped                 : 0
segments updated rtt                          : 338742 (of 338747 attempts)
retransmit timeouts                           : 75
connections dropped by rexmit timeout         : 0
persist timeouts                              : 0
keepalive timeouts                            : 26
keepalive probes sent                         : 0
connections dropped by keepalive              : 1
pcb cache lookups failed                      : 0
connections dropped by bad md5 digest         : 0
```

```
connections dropped by enhanced auth        : 0
===============================================================================
A:ALU-1#
```

Table 24: Show System Connections Output Fields

Label	Description
Proto	The socket protocol, either TCP or UDP
RecvQ	The number of input packets received by the protocol
TxmtQ	The number of output packets sent by the application
Local Address	The local address of the socket. The socket port is separated by a period.
Remote Address	The remote address of the socket. The socket port is separated by a period.
State	Listen — the protocol state is in the listen mode
	Established — the protocol state is established

cpu

Syntax **cpu** [**sample-period** *seconds*]

Context show>system

Description This command displays CPU utilization per task over a sample period.

Parameters *seconds* — the number of seconds over which to sample CPU task utilization

Default 1

Values 1 to 10

Output The following output is an example of system CPU information, and Table 25 describes the fields.

Sample Output

```
A:ALU-1# show system cpu sample-period 2
=========================================
CPU Utilization (Test time 2001135 uSec)
=========================================
Name              CPU Time     CPU Usage
                  (uSec)
-----------------------------------------
System                3465         0.34%
Icc                   1349         0.13%
RTM/Policies             0         0.00%
OSPF                    61        ~0.00%
MPLS/RSVP             2113         0.21%
LDP                     19        ~0.00%
IS-IS                    0         0.00%
RIP                     21        ~0.00%
VRRP                     0         0.00%
BGP                      0         0.00%
Services               155         0.01%
IOM                  24337          2.43%
SIM                   4892         0.49%
IP Stack              2865         0.14%
MBUF                     0         0.00%
IGMP/MLD Snpg          351         0.01%
TLS MFIB              2522         0.12%
WEB Redirect             0         0.00%
BFD                      0         0.00%
MCPATH                   0         0.00%
Idle                961064        96.34%
=========================================
A:ALU-1#
```

Table 25: Show System CPU Output Fields

Label	Description
CPU Utilization	The total amount of CPU time
Name	The process or protocol name
CPU Time (uSec)	The CPU time each process or protocol has used in the specified time
CPU Usage	The sum of CPU usage of all the processes and protocols

cron

Syntax **cron**

Context show>cron

Description This command enters the show CRON context.

action

Syntax **action** [*action-name*] [**owner** *owner-name*] **run-history** *run-state*

Context show>cron

Description This command displays cron action parameters.

Parameters *action-name* — specifies the action name

Values maximum 32 characters

owner-name — specifies the owner name

Default TiMOS CLI

run-state — specifies the state of the test to be run

Values executing, initializing, terminated

Output The following output is an example of cron action information, and Table 26 describes the fields.

Sample Output

```
*A:Redundancy# show cron action run-history terminated
===============================================================================
CRON Action Run History
===============================================================================
Action "test"
Owner "TiMOS CLI"
-------------------------------------------------------------------------------
Script Run #17
-------------------------------------------------------------------------------
Start time    : 2006/11/06 20:30:09     End time      : 2006/11/06 20:35:24
Elapsed time  : 0d 00:05:15             Lifetime      : 0d 00:00:00
State         : terminated              Run exit code : noError
Result time   : 2006/11/06 20:35:24     Keep history  : 0d 00:49:57
Error time    : never
Results file  : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-203008.
                out
Run exit      : Success
-------------------------------------------------------------------------------
Script Run #18
-------------------------------------------------------------------------------
Start time    : 2006/11/06 20:35:24     End time      : 2006/11/06 20:40:40
Elapsed time  : 0d 00:05:16             Lifetime      : 0d 00:00:00
State         : terminated              Run exit code : noError
Result time   : 2006/11/06 20:40:40     Keep history  : 0d 00:55:13
Error time    : never
Results file  : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-203523.
                out
Run exit      : Success
===============================================================================
-------------------------------------------------------------------------------
*A:Redundancy#
```

```
*A:Redundancy# show cron action run-history executing

===============================================================================
CRON Action Run History
===============================================================================
Action "test"
Owner "TiMOS CLI"
-------------------------------------------------------------------------------
Script Run #20
-------------------------------------------------------------------------------
Start time    : 2006/11/06 20:46:00     End time      : never
Elapsed time  : 0d 00:00:56             Lifetime      : 0d 00:59:04
State         : executing               Run exit code : noError
Result time   : never                   Keep history  : 0d 01:00:00
Error time    : never
Results file  : ftp://*:*@192.168.15.18/home/testlab_bgp/cron/_20061106-204559.
                out
===============================================================================
-------------------------------------------------------------------------------
*A:Redundancy#


*A:Redundancy# show cron action run-history initializing

===============================================================================
CRON Action Run History
===============================================================================
Action "test"
Owner "TiMOS CLI"
-------------------------------------------------------------------------------
Script Run #21
-------------------------------------------------------------------------------
Start time    : never                   End time      : never
Elapsed time  : 0d 00:00:00             Lifetime      : 0d 01:00:00
State         : initializing            Run exit code : noError
Result time   : never                   Keep history  : 0d 01:00:00
Error time    : never
Results file  : none
-------------------------------------------------------------------------------
Script Run #22
-------------------------------------------------------------------------------
Start time    : never                   End time      : never
Elapsed time  : 0d 00:00:00             Lifetime      : 0d 01:00:00
State         : initializing            Run exit code : noError
Result time   : never                   Keep history  : 0d 01:00:00
Error time    : never
Results file  : none
-------------------------------------------------------------------------------
Script Run #23
-------------------------------------------------------------------------------
Start time    : never                   End time      : never
Elapsed time  : 0d 00:00:00             Lifetime      : 0d 01:00:00
State         : initializing            Run exit code : noError
Result time   : never                   Keep history  : 0d 01:00:00
Error time    : never
Results file  : none
===============================================================================
-------------------------------------------------------------------------------
*A:Redundancy#
```

Table 26: Show Cron Run History Output Fields

Label	Description
Action	The name of the action
Action owner	The name of the action owner
Administrative status	Enabled — administrative status is enabled
	Disabled — administrative status is disabled
Operational status	Enabled — operational status is enabled
	Disabled — operational status is disabled
Script	The name of the script
Script owner	The name of the script owner
Script source location	The location of scheduled script
Max running allowed	The maximum number of allowed sessions
Max completed run histories	The maximum number of sessions previously run
Max lifetime allowed	The maximum amount of time the script may run
Completed run histories	The number of completed sessions
Executing run histories	The number of sessions in the process of executing
Initializing run histories	The number of sessions ready to run/queued but not executed
Max time run history saved	The maximum amount of time to keep the results from a script run
Last change	The system time a change was made to the configuration

schedule

Syntax **schedule** [*schedule-name*] [**owner** *owner-name*]

Context show>cron

Description This command displays cron schedule parameters.

Parameters *schedule-name* — displays information for the specified scheduler name

owner-name — displays information for the specified scheduler owner

Output The following output is an example of cron schedule information, and Table 27 describes the fields.

Sample Output

```
A:ALU-1>show>cron schedule test
===============================================================================
CRON Schedule Information
===============================================================================
Schedule                      : test
Schedule owner                : TiMOS CLI
Description                   : none
Administrative status         : enabled
Operational status            : enabled
Action                        : test
Action owner                  : TiMOS CLI
Script name                   : test
Script Owner                  : TiMOS CLI
Script source location        : ftp://*****:******@192.168.15.1/home/testlab_bgp
                                /cron/test1.cfg
Script results location       : ftp://*****:******@192.168.15.1/home/testlab_bgp
                                /cron/res
Schedule type                 : periodic
Interval                      : 0d 00:01:00 (60 seconds)
Repeat count                  : infinite
Next scheduled run            : 0d 00:00:42
Weekday                       : none
Month                         : none
Day of month                  : none
Hour                          : none
Minute                        : none
Number of schedule runs       : 10
Last schedule run             : 2006/11/07 17:20:52
Number of schedule failures   : 0
Last schedule failure         : no error
Last failure time             : never
===============================================================================
A:ALU-1>show>cron
```

Table 27: Show Cron Schedule Output Fields

Label	Description
Schedule	The name of the schedule
Schedule owner	The name of the schedule owner
Description	The description of the schedule
Administrative status	Enabled — administrative status is enabled
	Disabled — administrative status is disabled
Operational status	Enabled — operational status is enabled
	Disabled — operational status is disabled
Action	The name of the action
Action owner	The name of the action owner
Script	The name of the script
Script owner	The name of the script owner
Script source location	The location of the scheduled script
Script results location	The location where the script results have been sent
Schedule type	Periodic — displays a schedule which ran at a given interval
	Calendar — displays a schedule which ran based on a calendar
	Oneshot — displays a schedule which ran one time only
Interval	Displays the interval between runs of an event
Next scheduled run	The time for the next scheduled run
Weekday	The configured weekday
Month	The configured month
Day of Month	The configured day of month
Hour	The configured hour
Minute	The configured minute
Number of scheduled runs	The number of scheduled sessions

Table 27: Show Cron Schedule Output Fields (Continued)

Label	Description
Last scheduled run	The last scheduled session
Number of scheduled failures	The number of scheduled sessions that failed to execute
Last scheduled failure	The last scheduled session that failed to execute
Last failure time	The system time of the last failure

script

Syntax **script** [*script-name*] [**owner** *owner-name*]

Context show>cron

Description This command displays cron script parameters.

Parameters *script-name* — displays information for the specified script

owner-name — displays information for the specified script owner

Output The following output is an example of cron script information, and Table 28 describes the fields.

Sample Output

```
A:ALU-1>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:ALU-1>show>cron#
```

Table 28: Show Cron Script Output Fields

Label	Description
Script	The name of the script
Script owner	The owner name of script
Administrative status	Enabled — administrative status is enabled
	Disabled — administrative status is disabled
Operational status	Enabled — operational status is enabled
	Disabled — operational status is disabled
Script source location	The location of the scheduled script
Last script error	The system time of the last error
Last change	The system time of the last change

information

Syntax **information**

Context show>system

Description This command displays general system information including basic system, SNMP server, last boot and DNS client information.

Output The following output is an example of general system information, and Table 29 describes the fields.

Sample Output

```
A:ALU-1# show system information
===============================================================================
System Information
===============================================================================
System Name            : ALU-1
System Type            : 7705 SAR-8
System Version         : B-0.0.I323
System Contact         : Fred 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         : 1 days, 02:03:17.62 (hr:min:sec)

SNMP Port              : 161
SNMP Engine ID         : 0000197f00006883ff000000
SNMP Max Message Size  : 1500
SNMP Admin State       : Enabled
```

```
SNMP Oper State        : Enabled
SNMP Index Boot Status : Not Persistent
SNMP Sync State        : OK

Tel/SSH/FTP Admin : Enabled/Enabled/Disabled
Tel/SSH/FTP Oper  : Up/Up/Down

BOF Source             : cf3:
Image Source           : primary
Config Source          : primary
Last Booted Config File: cf3:/config.cfg
Last Boot Cfg Version  : FRI APR 20 16:24:27 2007 UTC
Last Boot Config Header: # TiMOS-B-5.0.R3 both/hops ALCATEL-LUCENT 7705 SAR #
                         Copyright (c) 2000-2008 Alcatel-Lucent. All rights
                         reserved. # All use subject to applicable license
                         agreements. # Built on Wed Feb 13 19:45:00 EST 2008 by
                         builder in /rel5.0/R3/panos/main # Generated TUE
                         MAR 11 16:24:27 2008 UTC
Last Boot Index Version: N/A
Last Boot Index Header : # TiMOS-B-5.0.R3 both/hops ALCATEL-LUCENT 7705 SAR #
                         Copyright (c) 2000-2008 Alcatel-Lucent. All rights
                         reserved. # All use subject to applicable license
                         agreements. # Built on Wed Feb 13 19:45:00 EST 2008 by
                         builder in /rel5.0/R3/panos/main # Generated TUE
                         MAR 11 16:24:27 2008 UTC
Last Saved Config      : N/A
Time Last Saved        : N/A
Changes Since Last Save: Yes
Time Last Modified     : 2008/03/19 10:03:09
Max Cfg/BOF Backup Rev : 5
Cfg-OK Script          : N/A
Cfg-OK Script Status   : not used
Cfg-Fail Script        : N/A
Cfg-Fail Script Status : not used

Management IP Addr     : 138.120.52.131/24
DNS Server             : 138.120.118.196
DNS Domain             : ca.alcatel.com
BOF Static Routes      :
  To                   Next Hop
  192.168.0.0/16       192.168.1.1
ATM Location ID        : 01:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
ATM OAM Retry Up       : 2
ATM OAM Retry Down     : 4
ATM OAM Loopback Period: 10

ICMP Vendor Enhancement: Disabled
===============================================================================
A:ALU-1#
```

Table 29: Show System Information Output Fields

Label	Description
System Name	The configured system name
System Contact	A text string that describes the system contact information
System Location	A text string that describes the system location
System Coordinates	A text string that describes the system coordinates
System Up Time	The time since the last boot
SNMP Port	The port number used by this node to receive SNMP request messages and to send replies
SNMP Engine ID	The SNMP engineID to uniquely identify the SNMPv3 node
SNMP Max Message Size	The maximum SNMP packet size generated by this node
SNMP Admin State	Enabled — SNMP is administratively enabled and running
	Disabled — SNMP is administratively shut down and not running
SNMP Oper State	Enabled — SNMP is operationally enabled
	Disabled — SNMP is operationally disabled
SNMP Index Boot Status	Persistent — system indexes are saved between reboots
	Not Persistent — system indexes are not saved between reboots
Telnet/SSH/FTP Admin	The administrative state of the Telnet, SSH, and FTP sessions
Telnet/SSH/FTP Oper	The operational state of the Telnet, SSH, and FTP sessions
BOF Source	The location of the BOF
Image Source	Primary — Indicates that the directory location for runtime image file was loaded from the primary source
	Secondary — Indicates that the directory location for runtime image file was loaded from the secondary source
	Tertiary — Indicates that the directory location for runtime image file was loaded from the tertiary source

Table 29: Show System Information Output Fields (Continued)

Label	Description
Config Source	Primary — Indicates that the directory location for configuration file was loaded from the primary source
	Secondary — Indicates that the directory location for configuration file was loaded from the secondary source
	Tertiary — Indicates that the directory location for configuration file was loaded from the tertiary source
Last Booted Config File	The URL and filename of the last loaded configuration file
Last Boot Cfg Version	The date and time of the last boot
Last Boot Config Header	The header information such as image version, date built, date generated
Last Boot Index Version	The version of the persistence index file read when this CSM card was last rebooted
Last Boot Index Header	The header of the persistence index file read when this CSM card was last rebooted
Last Saved Config	The location and filename of the last saved configuration file
Time Last Saved	The date and time of the last time configuration file was saved
Changes Since Last Save	Yes — There are unsaved configuration file changes
	No — There are no unsaved configuration file changes
Time Last Modified	The date and time of the last modification
Max Cfg/BOF Backup Rev	The maximum number of backup revisions maintained for a configuration file. This value also applies to the number of revisions maintained for the BOF file.
Cfg-OK Script	URL — the location and name of the CLI script file executed following successful completion of the boot-up configuration file execution
	N/A — no CLI script file is executed
Cfg-OK Script Status	Successful/Failed — the results from the execution of the CLI script file specified in the Cfg-OK Script location
	Not used — no CLI script file was executed

Table 29: Show System Information Output Fields (Continued)

Label	Description
Cfg-Fail Script	URL — the location and name of the CLI script file executed following a failed boot-up configuration file execution
	Not used — no CLI script file was executed
Cfg-Fail Script Status	Successful/Failed — the results from the execution of the CLI script file specified in the Cfg-Fail Script location
	Not used — no CLI script file was executed
Management IP Addr	The management IP address and mask
DNS Server	The IP address of the DNS server
DNS Domain	The DNS domain name of the node
BOF Static Routes	To — the static route destination
	Next Hop — the next hop IP address used to reach the destination
	Metric — displays the priority of this static route versus other static routes
	None — no static routes are configured
ICMP Vendor Enhancement	Enabled — inserts one-way timestamp in outbound SAA ICMP ping packets
	Disabled — one-way timestamping is not performed on outbound SAA ICMP ping packets

memory-pools

Syntax **memory-pools**

Context show>system

Description This command displays system memory status.

Output The following output is an example of system memory information, and Table 30 describes the fields.

Sample Output

```
A:ALU-1# show system memory-pools

===============================================================================
Memory Pools
===============================================================================
Name                Max Allowed    Current Size      Max So Far           In Use
-------------------------------------------------------------------------------
System                No limit     308,145,416     316,100,296     300,830,200
Icc                 16,777,216       2,097,152       2,097,152         773,920
RTM/Policies          No limit       2,097,152       2,097,152       1,027,792
OSPF                  No limit       1,048,576       1,048,576         437,904
MPLS/RSVP             No limit      21,145,848      21,145,848      19,562,376
LDP                   No limit       1,048,576       1,048,576         224,848
IS-IS                 No limit               0               0               0
RIP                   No limit               0               0               0
VRRP                  No limit       1,048,576       1,048,576           1,144
BGP                   No limit       2,097,152       2,097,152       1,176,560
Services              No limit       5,685,504       5,685,504       3,884,512
IOM                   No limit     249,068,424     249,068,424     245,119,136
SIM                   No limit       1,048,576       1,048,576         129,808
IP Stack              No limit       4,295,184       4,295,184       3,189,048
MBUF                  No limit       1,048,576       1,048,576         151,520
IGMP/MLD Snpg         No limit       1,048,576       1,048,576          71,192
TLS MFIB              No limit       1,048,576       1,048,576       1,027,312
WEB Redirect        16,777,216               0               0               0
BFD                   No limit       1,048,576       1,048,576         828,448
MCPATH                No limit       1,048,576       1,048,576             472
-------------------------------------------------------------------------------
Current Total Size :    604,069,016 bytes
Total In Use       :    578,436,192 bytes
Available Memory   :     78,909,496 bytes
===============================================================================
*A:ALU-1#
```

Table 30: Show Memory Pool Output Fields

Label	Description
Name	The name of the system or process
Max Allowed	Integer — the maximum allocated memory size
	No Limit — no size limit
Current Size	The current size of the memory pool
Max So Far	The largest amount of memory pool used
In Use	The current amount of the memory pool currently in use
Current Total Size	The sum of the Current Size column
Total In Use	The sum of the In Use column
Available Memory	The amount of available memory

ntp

Syntax **ntp**

Context show>system

Description This command displays NTP protocol configuration and state.

Output The following output is an example of NTP information, and Table 31 describes the fields.

Sample Output

```
A:pc-40>config>system>time>ntp# show system ntp
===============================================================================
NTP Status
===============================================================================
Enabled            : Yes                Stratum              : 3
Admin Status       : up                 Oper Status          : up
Server enabled     : No                 Server keyId         : none
System Ref Id      : 192.168.15.221     Auth Check           : Yes
===============================================================================
A:pc-40>config>system>time>ntp# show system ntp all
===============================================================================
NTP Status
===============================================================================
Enabled            : Yes                Stratum              : 3
Admin Status       : up                 Oper Status          : up
Server enabled     : No                 Server keyId         : none
System Ref Id      : 192.168.15.221     Auth Check           : Yes
===============================================================================

===============================================================================
NTP Active Associations
===============================================================================
State      Remote          Reference ID   St Type   A    Poll  Reach Offset(ms)
-------------------------------------------------------------------------------
reject     192.168.15.221  192.168.14.50  2  srvr   none  64   y     0.901
chosen     192.168.15.221  192.168.14.50  2  mclnt  none  64   y     1.101
===============================================================================
A:pc-40>config>system>time>ntp#
A:pc-40>config>system>time>ntp# show system ntp detail
===============================================================================
NTP Status
===============================================================================
Enabled            : Yes                Stratum              : 3
Admin Status       : up                 Oper Status          : up
Server enabled     : No                 Server keyId         : none
System Ref Id      : 192.168.15.221     Auth Check           : Yes
Auth Errors        : 0                  Auth Errors Ignored  : 0
Auth Key Id Errors : 0                  Auth Key Type Errors : 0
===============================================================================
A:pc-40>config>system>time>ntp#
A:pc-40>config>system>time>ntp# show system ntp detail all
===============================================================================
NTP Status
===============================================================================
Enabled            : Yes                Stratum              : 3
```

```
Admin Status       : up                 Oper Status          : up
Server enabled     : No                 Server keyId         : none
System Ref Id      : 192.168.15.221     Auth Check           : Yes
Auth Errors        : 0                  Auth Errors Ignored  : 0
Auth Key Id Errors : 0                  Auth Key Type Errors : 0
===============================================================================

===============================================================================
NTP Active Associations
===============================================================================
State      Remote          Reference ID    St  Type   A     Poll  R  Offset(ms)
-------------------------------------------------------------------------------
reject     192.168.15.221  192.168.14.50   2   srvr   none  64    y  0.901
chosen     192.168.15.221  192.168.1.160   4   mclnt  none  64    y  1.101
===============================================================================
```

Table 31: Show System NTP Output Fields

Label	Description
Enabled	NTP enabled or disabled state. Output is yes or no.
Admin Status	Administrative state. Output is up or down.
NTP Server	The NTP server state of this node. Output is yes or no.
Stratum	The stratum level of this node
Oper Status	The operational state, either up or down.
Auth Check	Displays authentication requirement. Output is yes or no.
System Ref. ID	IP address of this node or a 4-character ASCII code showing the state.
Auth Error	Authentication errors
Auth Errors Ignored	Authentication errors ignored
Auth key ID Errors	Authentication key identification errors
Auth Key Type Errors	Authentication key type errors
Peer Status/State	The operational status of the peer
Reject	The peer is rejected and will not be used for synchronization. Rejection reasons could be the peer is unreachable, the peer is synchronized to this local server so synchronizing with it would create a sync loop, or the synchronization distance is too large. This is the normal startup state.
Invalid	The peer is not maintaining an accurate clock. This peer will not be used for synchronization.

Table 31: Show System NTP Output Fields (Continued)

Label	Description
Excess	The peer's synchronization distance is greater than ten other peers. This peer will not be used for synchronization.
Outlyer	The peer is discarded as an outlyer. This peer will not be used for synchronization.
Candidate	The peer is accepted as a possible source of synchronization
Selected	The peer is an acceptable source of synchronization, but its synchronization distance is greater than six other peers
Chosen	The peer is chosen as the source of synchronization
ChosenPPS	The peer is chosen as the source of synchronization, but the actual synchronization is occurring from a pulse-per-second (PPS) signal
Remote	The ip address of the remote NTP server or peer with which this local host is exchanging NTP packets
Reference ID	When stratum is between 0 and 15 this field shows the IP address of the remote NTP server or peer with which the remote is exchanging NTP packets. For reference clocks, this field shows the identification assigned to the clock, such as, ".GPS." For an NTP server or peer, if the client has not yet synchronized to a server/peer, the status cannot be determined and displays the following codes: Peer Codes: ACST — The association belongs to any cast server. AUTH — Server authentication failed. Please wait while the association is restarted. AUTO — Autokey sequence failed. Please wait while the association is restarted. BCST — The association belongs to a broadcast server. CRPT — Cryptographic authentication or identification failed. The details should be in the system log file or the cryptostats statistics file, if configured. No further messages will be sent to the server. DENY — Access denied by remote server. No further messages will be sent to the server. DROP — Lost peer in symmetric mode. Please wait while the association is restarted. RSTR — Access denied due to local policy. No further messages will be sent to the server. INIT — the association has not yet synchronized for the first time MCST — the association belongs to a manycast server NKEY — No key found. Either the key was never installed or is not trusted. RATE — Rate exceeded. The server has temporarily denied access because the client exceeded the rate threshold.

Table 31: Show System NTP Output Fields (Continued)

Label	Description
Reference ID (Cont)	RMOT – the association from a remote host running ntpdc has had unauthorized attempted access STEP – a step change in system time has occurred, but the association has not yet resynchronized system codes INIT – the system clock has not yet synchronized for the first time STEP – a step change in system time has occurred, but the system clock has not yet resynchronized
Auth	Authentication
Poll	Polling interval in seconds
R	Yes – the NTP peer or server has been reached at least once in the last 8 polls
	No – the NTP peer or server has not been reached at least once in the last 8 polls
Offset	The time between the local and remote UTC time, in milliseconds

ptp

Syntax **ptp**

Context show>system

Description This command enters the show PTP context.

clock

Syntax **clock** *clock-id* [**summary** | **detail**]

Context show>system>ptp

Description This command displays PTP clock information.

Parameters *clock-id* — specifies the clock ID of this PTP instance

Values 1 or 2

Output The following outputs are examples of PTP clock information:

- PTP clock summary information (Sample Output, Table 32)
- PTP clock detailed information (Sample Output, Table 33)

Sample Output

```
A:# show system ptp clock 1 summary
===============================================================================
Prt/ Peer IP        Slave Port   Dyn/ In/ Anno        Sync        Delay
Peer                      State  Stat Out                         Req/Resp
===============================================================================
1/1  10.222.222.10   yes  slave   sta in  623         82990       82988
                               sta out 0           0           82988
1/2                  no   slave   sta in  0           0           0
                               sta out 0           0           0
===============================================================================
Prt/ Peer IP         In/ Anno   Sync   Delay  Anno       Sync       Delay
Peer                 Out Lease  Lease  Lease  Rate       Rate       Rate
                         (sec)  (sec)  (sec)  (pkt/s)    (pkt/s)    (pkt/s)
===============================================================================
1/1  10.222.222.10   in  174    182    182    1 pkt/2 s  64 pkt/s   64 pkt/s
                     out -      -      -      -          -          -
1/2                  -   -      -      -      -          -          -
                     out -      -      -      -          -          -
===============================================================================
Prt/ Peer IP         Slave Pri1 GM    GM    GM     Pri2 GM ClockId       Step
Peer                       Clk   Clk   Clk                           Rem
                           Cls   Acc   Var
===============================================================================
1/1  10.222.222.10   yes   128   6     33    25600  128  4041424344454637 1
1/2                  -     -     -     -     -      -    -                -
```

Table 32: Show System PTP Clock Summary Output Fields

Label	Description
Prt/Peer	The PTP port and peer ID as configured in the `config system ptp clock` context
Peer IP	The IP address of the PTP peer
Slave	Whether or not the clock is in a slave state
Port State	The PTP port state: initializing, listening, uncalibrated, slave, master, or passive
Dyn/Stat	Indicates if the peer is statically configured or dynamically requested
In/Out	The direction of the packet counts
Anno	The number of ingress or egress announce packets
Sync	The number of ingress or egress synchronization packets
Delay Req/Resp	The number of ingress or egress delay request or delay response packets
Anno Lease	The announce time remaining in the unicast session. The peer must re-request announce before this expires or the peer communication will be canceled.

Table 32: Show System PTP Clock Summary Output Fields (Continued)

Label	Description
Sync Lease	The synchronization time remaining in the unicast session. The peer must re-request synchronization before this expires or the peer communication will be canceled.
Delay Lease	The delay time remaining in the unicast session. The peer must re-request delay before this expires or the peer communication will be canceled.
Anno Rate	The rate of announce packets to or from the peer
Sync Rate	The rate of synchronization packets to or from the peer
Delay Rate	The rate of delay packets to or from the peer
Pri1	The grand master clock priority1 designation
GM Clk Cls	The grand master clock class designation
GM Clk Acc	The grand master clock accuracy designation
GM Clk Var	The grand master clock scaled log variance, in decimal format
Pri2	The grand master clock priority2 designation
GM ClockId	The grand master clock identification
Step Rem	The number of boundary clocks between the peer and the grand master

Sample Output

```
A:# show system ptp clock 1 detail

===============================================================================
IEEE1588 PTP Clock Information
===============================================================================
-------------------------------------------------------------------------------
Local Clock
-------------------------------------------------------------------------------
Clock Type           : ordinary,slave   Admin State          : up
Source I/F           : ptp loop         Clock MDA            : 1/2
PTP Profile          : ieee1588-2008    Dynamic Peers        : not allowed
Clock ID             : 0025bafffed119b7 Clock Class          : 255
Clock Accuracy       : unknown(254)     Clock Variance       : not computed
Clock Priority1      : 128              Clock Priority2      : 128
Domain               : 0                Two-Step             : unknown
-------------------------------------------------------------------------------
Operational Data
-------------------------------------------------------------------------------
Parent Clock ID      : 001af0fffe6808a7 Parent Port Number   : 2
GM Clock Id          : 4041424344454637 GM Clock Class       : 6
GM Clock Accuracy    : 100ns            GM Clock Variance    : 25600
GM Clock Priority1   : 128              GM Clock Priority2   : 128
-------------------------------------------------------------------------------
```

```
Slave Port Index     : 1                Slave Port State     : slave
Slave Peer Index     : 1                Slave Peer IP        : 10.222.222.10
Forward Weight       : 100              Reverse Weight       : 0
Recovery State       : phase-tracking
===============================================================================

===============================================================================
Interface Configuration Information
===============================================================================
Source IP Interface  : ptp loop             IP Interface Port    : loopback:125
IP Interface Address : 200.254.254.10       PTP Enabled          : True
Admin Status         : Up                   Oper Status          : Up
===============================================================================

===============================================================================
Reference Operational Information
===============================================================================
Admin Status         : up                   Qualified For Use    : Yes
Not Qualified Due To : N/A                  Selected For Use     : Yes
===============================================================================
```

Table 33: Show System PTP Clock Detail Output Fields

Label	Description
Clock Type	The local clock type
Admin State	up — the local clock is enabled and running
	down — the local clock is shut down and not running
Source I/F	The PTP clock source interface as configured by the source-interface command
Clock MDA	The PTP clock-mda as configured by the clock-mda command
PTP Profile	The PTP profile as configured by the profile command
Dynamic Peers	Whether or not dynamic peers are enabled
Clock ID	The local clock identification
Clock Class	The local clock class
Clock Accuracy	The local clock accuracy designation
Clock Variance	The local clock variance
Clock Priority1	The local clock priority1 designation
Clock Priority2	The local clock priority2 designation
Domain	The local clock domain
Two-Step	Whether the local clock uses a one-step or two-step synchronization method

Table 33: Show System PTP Clock Detail Output Fields (Continued)

Label	Description
Operational Data	
Parent Clock ID	The parent clock identification
Parent Port Number	The parent clock port number
GM Clock ID	The grand master clock ID
GM Clock Class	The grand master clock class
GM Clock Accuracy	The grand master clock accuracy designation
GM Clock Variance	The grand master clock variance
GM Clock Priority1	The grand master clock priority1 designation
GM Clock Priority2	The grand master clock priority2 designation
Slave Port Index	The port index of the slave clock
Slave Port State	The port state of the slave clock
Slave Peer Index	The peer index of the slave clock
Slave Peer IP	The IP address of the slave clock
Forward Weight	The percentage of the sync packet direction being used to recover the clock from the selected peer
Reverse Weight	The percentage of the delay packet direction being used to recover the clock from the selected peer
Recovery State	The clock recovery state: free-run, acquiring, phase-tracking, or locked
Interface Configuration Information	
Source IP Interface	The IP interface name that provides IEEE 1588v2 PTP packets to the clock recovery mechanism on the applicable 8-port Ethernet Adapter card on the 7705 SAR-8, 7705 SAR-18 or Ethernet port on the 7705 SAR-F
IP Interface Port	The source IP interface port
IP Interface Address	The source IP interface address

Table 33: Show System PTP Clock Detail Output Fields (Continued)

Label	Description
PTP Enabled	True — PTP is enabled on the IP interface
	False — PTP is not enabled on the IP interface
Admin Status	The administrative status of the source IP interface
Oper Status	The operational status of the source IP interface
Reference Operational Information	
Admin Status	down — the ref1 configuration is administratively shut down
	up — the ref1 configuration is administratively enabled
Qualified for Use	Whether or not the ref1 or ref2 timing reference is qualified for use by the synchronous timing subsystem
Not Qualified Due To	If the ref1 or ref2 timing reference is not qualified, the reason why
Selected for Use	Whether or not the ref1 or ref2 timing reference is presently selected
Not Selected Due To	If the ref1 or ref2 timing reference is not selected, the reason why

ptp-port

Syntax **ptp-port** *port-id*

Context show>system>clock

Description This command displays PTP port information.

Parameters *port-id* — specifies the PTP port ID

Values 1 to 10

Output The following output is an example of PTP port information, and Table 34 describes the fields.

Sample Output

```
A:# show system ptp clock 1 ptp-port 1

===============================================================================
PTP Port
===============================================================================
Admin State          : up               Number Of Peers      : 2
Log-anno-interval    : 1                Anno-rx-timeouts     : 3
Log-sync-interval    : -6               Unicast              : True
PTP Port State       : slave
===============================================================================
```

Table 34: Show System PTP Port Output Fields

Label	Description
Admin State	up — The SNTP server is administratively up
	down — The SNTP server is administratively down
Number Of Peers	The number of peers associated with this PTP port
Log-anno-interval	The expected interval between the reception of announce messages
Anno-rx-timeouts	The number of announce timeouts that need to occur before communication messages with a master clock are assumed lost and the master clock is considered not available. One timeout in this context is equal to the announce interval in seconds, calculated using the logarithm 2^log-anno-interval-value.
Log-sync-interval	The expected interval between the reception of synchronization messages
Unicast	True — the PTP slave clock can unicast-negotiate with the PTP master clock
	False — the PTP slave clock cannot unicast-negotiate with the PTP master clock
PTP Port State	The PTP port state: initializing, listening, uncalibrated, slave, master, or passive

peer

Syntax **peer** *peer-id* [**detail**]

Context show>system>clock>ptp-port

Description This command displays PTP peer information.

Parameters *peer-id* — specifies the PTP peer ID

Values 1 to 10

Output The following output is an example of detailed PTP peer information, and Table 35 describes the fields.

Sample Output

```
A:# show system ptp clock 1 ptp-port 1 peer 1 detail

===============================================================================
Peer-1
===============================================================================
IP Address           : 10.222.222.10    static/dynamic       : static
Current Master       : TRUE
Description          : (Not Specified)
Clock Id             : 001af0fffe6808a7 Port Number          : 2
GM Clock Id          : 4041424344454637 GM Clock Class       : 6
GM Clock Accuracy    : 100ns            GM Clock Variance    : 25600
GM Clock Priority1   : 128              GM Clock Priority2   : 128
Step Type            : one-step
Last Rx Anno Msg     : 11/10/2010 10:32:54

-------------------------------------------------------------------------------
Unicast Info
-------------------------------------------------------------------------------
Dir Type       Rate      Dur Result         Time                  Remain
-------------------------------------------------------------------------------
Rx  Anno       1 pkt/2 s 300 granted        11/10/2010 10:31:34   142
    Sync       64 pkt/s  300 granted        11/10/2010 10:31:38   150
    DelayResp  64 pkt/s  300 granted        11/10/2010 10:31:38   150
-------------------------------------------------------------------------------
===============================================================================

===============================================================================
PTP Peer-1 Statistics
===============================================================================
                                                  Input                 Output
-------------------------------------------------------------------------------
Signalling Packets                                  91                    94
Unicast Request Announce Packets                    55                    15
Unicast Request Announce Timeout                     0                     3
Unicast Request Announce Reject                      0
Unicast Request Sync Packets                         0                    12
Unicast Request Sync Timeout                         0                     0
Unicast Request Sync Reject                          0
Unicast Request Delay Resp Packe*                    0                    12
Unicast Request Delay Resp Timeo*                    0                     0
Unicast Request DelayResp Reject                     0
Unicast Grant Announce Packets                      12                     0
Unicast Grant Announce Rejected                      0                    55
Unicast Grant Sync Packets                          12                     0
Unicast Grant Sync Rejected                          0                     0
Unicast Grant Delay Resp Packets                    12                     0
Unicast Grant Delay Resp Rejected                                          0
Unicast Cancel Announce Packets                      0                     0
Unicast Cancel Sync Packets                          0                     0
```

```
Unicast Cancel Delay Resp Packets                      0                       0
Unicast Ack Cancel Announce Pack*                      0                       0
Unicast Ack Cancel Sync Packets                        0                       0
Unicast Ack Cancel Delay Resp Pa*                      0                       0
Anno Packets                                         854                       0
Sync Packets                                      113840                       0
Delay Response Packets                            113838                       0
Delay Request Packets                                  0                  113838
Follow-Up Packets                                      0
Out Of Order Sync Packets                              1
Total UDP (port 320) Pkts                            945                      94
Total UDP (port 319) Pkts                         227678                  113838


Discard Statistics
-------------------------------------------------------------------------------
Alternate Master Packets                               0
Bad Domain Packets                                     0
Bad Version Packets                                    0
Duplicate Msg Packets                                  0
Step RM Greater Than 255                               0
===============================================================================
* indicates that the corresponding row element may have been truncated.

===============================================================================
PTP Peer 1 Algorithm State Statistics (in seconds)
===============================================================================
  Free-run                        : 1100
  Acquiring                       : 120
  Phase-Tracking                  : 560
  Hold-over                       : 0
  Locked                          : 0
===============================================================================

===============================================================================
PTP Peer 1 Algorithm Event Statistics
===============================================================================
  Excessive Freq Error Detected   : 4
  Excessive Packet Loss Detected  : 0
  Packet Loss Spotted             : 0
  Excessive Phase Shift Detected  : 0
  High PDV Detected               : 0
  Sync Packet Gaps Detected       : 0
===============================================================================
===============================================================================
PTP Peer-1 Clock Recovery
  - Internal Digital Phase Locked Loop (DPLL) Statistics
===============================================================================
                             sync   delay-req        phase        phase
                      pkt delay   pkt delay        error        error
                         stddev      stddev                     stddev
time                       (ns)        (ns)         (ns)         (ns)
-------------------------------------------------------------------------------
11/10/2010 10:31:17           0           0          211           16
11/10/2010 10:29:17           0           0          251            7
11/10/2010 10:27:17           0           0          243           11
11/10/2010 10:25:16           0           0          170           32
11/10/2010 10:07:16         138         131        -6789        36545
~11/10/2010 10:05:16          0           0            0            0
```

Table 35: Show System PTP Port Peer Detail Output Fields

Label	Description
Peer-1	
IP Address	The peer-1 clock IP address
Current Master	True — the peer-1 clock is the current master clock
	False — the peer-1 clock is not the current master clock
Description	The peer-1 clock description
Clock ID	The peer-1 clock identification
Port Number	The peer-1 clock port number
GM Clock ID	The grand master clock identification
GM Clock Class	The grand master clock class designation
GM Clock Accuracy	The grand master clock accuracy designation
GM Clock Variance	The grand master clock scaled log variance in decimal format
GM Clock Priority1	The grand master clock priority1 designation
GM Clock Priority2	The grand master clock priority2 designation
Step Type	Whether the peer-1 clock uses a one-step or two-step synchronization method
Last Rx Anno Msg	The time when the last announce message was received from the peer clock
Unicast Info	
Dir	The direction of the unicast information: either Rx or Tx
Type	The message type: announce, synchronization, or delay response
Rate	The rate of the unicast information in packets per second
Dur	The lease duration for the session
Result	The result of the last unicast request sent to the peer for the indicated message type
Time	The time the unicast information was received
Remain	The time remaining before the lease expires

Table 35: Show System PTP Port Peer Detail Output Fields (Continued)

Label	Description
PTP Peer-1/Peer-2 Statistics	
	The following input/output statistics are provided for the peer-1/peer-2 clock: • Signalling Packets • Unicast Request Announce Packets • Unicast Request Announce Timeout • Unicast Request Announce Reject • Unicast Request Sync Packets • Unicast Request Sync Timeout • Unicast Request Sync Reject • Unicast Request Delay Resp Packets • Unicast Request Delay Resp Timeout • Unicast Request DelayResp Reject • Unicast Grant Announce Packets • Unicast Grant Announce Rejected • Unicast Grant Sync Packets • Unicast Grant Sync Rejected • Unicast Grant Delay Resp Packets • Unicast Grant Delay Resp Rejected • Unicast Cancel Announce Packets • Unicast Cancel Sync Packets • Unicast Cancel Delay Resp Packets • Unicast Ack Cancel Announce Packets • Unicast Ack Cancel Sync Packets • Unicast Ack Cancel Delay Resp Packets • Anno Packets • Sync Packets • Delay Response Packets • Delay Request Packets • Follow-Up Packets • Out Of Order Sync Packets • Total UDP (port 320) Pkts • Total UDP (port 319) Pkts

Table 35: Show System PTP Port Peer Detail Output Fields (Continued)

Label	Description
	The following discard statistics are provided for the peer-1/peer-2 clock: • Alternate Master Packets • Bad Domain Packets • Bad Version Packets • Duplicate Msg Packets • Step RM Greater Than 255
	The following algorithm state statistics (in seconds) are provided for the peer-1/peer-2 clock: • Free-run • Acquiring • Phase-Tracking • Hold-over • Locked
	The following algorithm event statistics are provided for the peer-1/peer-2 clock: • Excessive Freq Error Detected • Excessive Packet Loss Detected • Packet Loss Spotted • Excessive Phase Shift Detected • High PDV Detected • Sync Packet Gaps Detected
	The following statistics are shown for the peer clock. These statistics are refreshed every 2 min; the display shows the time of the last update: • sync pkt delay stddev (ns) • delay-req pkt delay stddev (ns) • phase error (ns) • phase error stddev (ns)

sntp

Syntax **sntp**

Context show>system

Description This command displays SNTP protocol configuration and state.

Output The following output is an example of SNTP information, and Table 36 describes the fields.

Sample Output

```
A:ALU-1# show system sntp

===============================================================================
SNTP Status
===============================================================================
Admin Status : up           Oper Status : up           Mode : unicast
===============================================================================

===============================================================================
SNTP Servers
===============================================================================
SNTP Server            Version            Preference         Interval
-------------------------------------------------------------------------------
10.10.20.253           3                  Preferred          64
===============================================================================
A:ALU-1#
```

Table 36: Show System SNTP Output Fields

Label	Description
Admin Status	up — The SNTP server is administratively up
	down — The SNTP server is administratively down
Oper Status	up — The SNTP server is operationally up
	down — The SNTP server is operationally down
Mode	broadcast — The SNTP server has broadcast client mode enabled
	unicast — The SNTP server has unicast client mode enabled
SNTP Server	The SNTP server address for SNTP unicast client mode
Version	The SNTP version number, expressed as an integer
Preference	Normal — when more than one time server is configured, one server can be configured to have preference over another
	Preferred — indicates that this server has preference over another
Interval	The frequency, in seconds, that the server is queried

thresholds

Syntax **thresholds**

Context show>system

Description This command display system monitoring thresholds.

Output The following output is an example of system monitoring thresholds information, and Table 37 describes the fields.

Sample Output

```
A:ALU-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  : 2748341* 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  : 27483    SampleType : absolute
Startup Alarm    : rising   Owner      : TiMOS CLI

Variable: sgiMemoryUsed.0
Alarm Id         : 3        Last Value : 42841056
Rising Event Id  : 5        Threshold  : 4000
Falling Event Id : 6        Threshold  : 2000
Sample Interval  : 2147836  SampleType : absolute
Startup Alarm    : either   Owner      : TiMOS CLI

===============================================================
* indicates that the corresponding row element may have been truncated.
===============================================================
Threshold Events
===============================================================
Description: TiMOS CLI - cflash capacity alarm rising event
Event Id         : 1        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI

Description: TiMOS CLI - cflash capacity alarm falling event
Event Id         : 2        Last Sent  : 10/31/2006 08:48:00
Action Type      : both     Owner      : TiMOS CLI

Description: TiMOS CLI - cflash capacity warning rising event
Event Id         : 3        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI

Description: TiMOS CLI - cflash capacity warning falling event
Event Id         : 4        Last Sent  : 10/31/2006 08:47:59
```

```
Action Type      : both     Owner      : TiMOS CLI

Description: TiMOS CLI - memory usage alarm rising event
Event Id         : 5        Last Sent  : 10/31/2006 08:48:00
Action Type      : both     Owner      : TiMOS CLI

Description: TiMOS CLI - memory usage alarm falling event
Event Id         : 6        Last Sent  : 10/31/2006 08:47:59
Action Type      : both     Owner      : TiMOS CLI

===============================================================

===============================================================
Threshold Events Log
===============================================================
Description      : TiMOS CLI - cflash capacity alarm falling eve
                   nt : value=835, <=2500 : alarm-index 1, event
                   -index 2 alarm-variable OID tmnxCpmFlashUsed.
                   1.11.1
Event Id         : 2        Time Sent  : 10/31/2006 08:48:00

Description      : TiMOS CLI - memory usage alarm rising event :
                    value=42841056, >=4000 : alarm-index 3, even
                   t-index 5 alarm-variable OID sgiMemoryUsed.0
Event Id         : 5        Time Sent  : 10/31/2006 08:48:00

===============================================================
A:ALU-48#
```

Table 37: Show System Threshold Output Fields

Label	Description
Variable	The variable OID
Alarm Id	The numerical identifier for the alarm
Last Value	The last threshold value
Rising Event Id	The identifier of the RMON rising event
Threshold	The identifier of the RMON rising threshold
Falling Event Id	The identifier of the RMON falling event
Threshold	The identifier of the RMON falling threshold
Sample Interval	The polling interval, in seconds, over which the data is sampled and compared with the rising and falling thresholds
Sample Type	The method of sampling the selected variable and calculating the value to be compared against the thresholds
Startup Alarm	The alarm that may be sent when this alarm is first created
Owner	The owner of this alarm
Description	The event cause

Table 37: Show System Threshold Output Fields (Continued)

Label	Description
Event Id	The identifier of the threshold event
Last Sent	The date and time the alarm was sent
Action Type	log — an entry is made in the RMON-MIB log table for each event occurrence. This does not create a TiMOS logger entry. The RMON-MIB log table entries can be viewed using the **show>system>thresholds** CLI command. trap — a TiMOS logger event is generated. The TiMOS logger utility then distributes the notification of this event to its configured log destinations which may be CONSOLE, telnet session, memory log, cflash file, syslog, or SNMP trap destinations logs. both — both an entry in the RMON-MIB logTable and a TiMOS logger event are generated none — no action is taken
Owner	The owner of the event

time

Syntax **time**

Context show>system

Description This command displays the system time and zone configuration parameters.

Output The following output is an example of system time information, and Table 38 describes the fields.

Sample Output

```
A:ALU-1# show system time
===============================================================================
Date & Time
===============================================================================
Current Date & Time : 2008/05/25 23:03:13    DST Active            : yes
Current Zone        : PDT                    Offset from UTC       : -7:00
-------------------------------------------------------------------------------
Non-DST Zone        : PST                    Offset from UTC       : -8:00
Zone type           : standard
-------------------------------------------------------------------------------
DST Zone            : PDT                    Offset from Non-DST   : 0:60
Starts              : first sunday in april 02:00
Ends                : last sunday in october 02:00
===============================================================================
A:ALU-1#
```

```
A:ALU-1# show system time (with no DST zone configured)
===============================================================================
Date & Time
===============================================================================
Current Date & Time : 2008/05/12 11:12:05       DST Active      :     no
Current Zone        : APA                       Offset from UTC :  -8:00
-------------------------------------------------------------------------------
Non-DST Zone        : APA                       Offset from UTC :  -8:00
Zone Type           : non-standard
-------------------------------------------------------------------------------
No DST zone configured
===============================================================================
A:ALU-1#
```

Table 38: Show System Time Output Fields

Label	Description
Date & Time	The system date and time using the current time zone
DST Active	Yes — Daylight Savings Time is currently in effect
	No — Daylight Savings Time is not currently in effect
Zone	The zone names for the current zone, the non-DST zone, and the DST zone if configured
Zone type	Non-standard — the zone is user-defined
	Standard — the zone is system-defined
Offset from UTC	The number of hours and minutes added to universal time for the zone, including the DST offset for a DST zone
Offset from Non-DST	The number of hours (always 0) and minutes (0—60) added to the time at the beginning of Daylight Saving Time and subtracted at the end Daylight Saving Time
Starts	The date and time Daylight Saving Time begins
Ends	The date and time Daylight Saving Time ends

time

Syntax **time**

Context show

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.

Sample Output

```
A:ALU-1# show time
Tue Mar 25 12:17:15 GMT 2008
A:ALU-1#
---------------------------------
```

redundancy

Syntax **redundancy**

Context show

Description This command enables the context to show redundancy information.

synchronization

Syntax **synchronization**

Context show>redundancy

Description This command displays redundancy synchronization times.

Output The following output is an example of redundancy synchronization information, and Table 39 describes the fields.

Sample Output

```
A:ALU-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:ALU-1>show>redundancy#
```

Table 39: Show Synchronization Output Fields

Label	Description
Standby Status	Displays the status of the standby CSM
Last Standby Failure	Displays the timestamp of the last standby failure
Standby Up Time	Displays the length of time the standby CSM has been up
Failover Time	Displays the timestamp when the last redundancy failover occurred causing a switchover from active to standby CSM. If there is no redundant CSM card in this system or no failover has occurred since the system last booted, the value will be 0.
Failover Reason	Displays a text string giving an explanation of the cause of the last redundancy failover. If no failover has occurred, an empty string displays.
Boot/Config Sync Mode	Displays the type of synchronization operation to perform between the primary and secondary CSMs after a change has been made to the configuration files or the boot environment information contained in the boot options file (BOF).
Boot/Config Sync Status	Displays the results of the last synchronization operation between the primary and secondary CSMs
Last Config File Sync Time	Displays the timestamp of the last successful synchronization of the configuration files
Last Boot Env Sync Time	Displays the timestamp of the last successful synchronization of the boot environment files

uptime

Syntax **uptime**

Context show

Description This command displays the time since the system started.

Output The following output is an example of system uptime information, and Table 40 describes the fields.

Sample Output

```
A:ALU-1# show uptime
System Up Time         : 11 days, 18:32:02.22 (hr:min:sec)
A:ALU-1#
```

Table 40: System Uptime Output Fields

Label	Description
System Up Time	The length of time the system has been up in days, hr:min:sec format

sync-if-timing

Syntax **sync-if-timing**

Context show>system

Description This command displays synchronous interface timing operational information.

Output The following output is an example of synchronous interface timing information, and Table 41 describes the fields.

Sample Output

Note: Some of the fields in the following output apply to the 7705 SAR-18 only.

```
A:ALU-1# show system sync-if-timing
===============================================================================
System Interface Timing Operational Info
===============================================================================
System Interface Timing Operational Info
===============================================================================
System Status CSM A                : Master Locked
    Reference Input Mode           : Non-revertive
    Quality Level Selection        : Disabled

Reference Order                    : bits ref1 ref2 Unknown

Reference Input 1
    Admin Status                   : down
    Configured Quality Level       : none
    Rx Quality Level               : unknown
    Qualified For Use              : No
        Not Qualified Due To       : disabled
    Selected For Use               : No
        Not Selected Due To        : disabled
```

```
Reference Input 2
    Admin Status                  : down
    Configured Quality Level      : none
    Rx Quality Level              : unknown
    Qualified For Use             : No
        Not Qualified Due To      : disabled
    Selected For Use              : No
        Not Selected Due To       : disabled

Reference BITS 1
    Admin Status                  : up
    Configured Quality Level      : stu
    Rx Quality Level              : unknown
    Qualified For Use             : Yes
    Selected For Use              : Yes
    Interface Type                : DS1
    Framing                       : ESF
    Line Coding                   : B8ZS
    Output Admin Status           : up
    Output Reference Selected     : none
    Tx Quality Level              :

Reference BITS 2
    Admin Status                  : up
    Configured Quality Level      : stu
    Rx Quality Level              : unknown
    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
    Output Admin Status           : up
    Output Reference Selected     : none
    Tx Quality Level              :

===============================================================================
A:ALU-1#
```

Table 41: Show Sync-If-Timing Output Fields

Label	Description
System Status CSM A	The present status of the synchronous timing equipment subsystem (SETS): • Not Present • Master Freerun • Master Holdover • Master Locked • Slave • Acquiring

Table 41: Show Sync-If-Timing Output Fields (Continued)

Label	Description
Reference Input Mode	Revertive — a revalidated or a newly validated reference source that has a higher priority than the currently selected reference has reverted to the new reference source
	Non-revertive — the clock cannot revert to a higher priority clock if the current clock goes offline
Quality Level Selection	Whether Quality Level Selection is enabled or disabled
Reference Order	bits, ref1, ref2 — the priority order of the timing references
Reference Input 1, 2	The reference 1 and reference 2 input parameters
Admin Status	down — the ref1 or ref2 configuration is administratively shut down
	up — the ref1 or ref2 configuration is administratively enabled
Configured Quality Level	Synchronization Status Messaging quality level value manually configured on port for ref1 or ref2
Rx Quality Level	Synchronization Status Messaging quality level value received on port for ref1 or ref2
Qualified for Use	Whether or not the ref1 or ref2 timing reference is qualified for use by the synchronous timing subsystem
Selected for Use	Whether or not the ref1 or ref2 timing reference is presently selected
Not Selected Due To	If the ref1 or ref2 timing reference is not selected, the reason why
Not Qualified Due To	If the ref1 or ref2 timing reference is not qualified, the reason why
Source Port	None — no source port is configured or in use as a ref1 or ref2 timing reference
	card/slot/port — the source port of the ref1 or ref2 timing reference
Reference BITS 1, 2	The reference 1 and reference 2 BITS parameters, applicable to the 7705 SAR-18 only

Table 41: Show Sync-If-Timing Output Fields (Continued)

Label	Description
Admin Status	down – the BITS 1 or BITS 2 configuration is administratively shut down
	up – the BITS 1 or BITS 2 configuration is administratively enabled
Configured Quality Level	Synchronization Status Messaging quality level value manually configured on port for BITS 1 or BITS 2
Rx Quality Level	Synchronization Status Messaging quality level value received on port for BITS 1 or BITS 2
Qualified For Use	Whether or not the BITS 1 or BITS 2 reference is qualified for use by the synchronous timing subsystem
Selected For Use	Whether or not the BITS 1 or BITS 2 reference is presently selected
Not Qualified Due To	If the BITS 1 or BITS 2 reference is not qualified, the reason why
Not Selected Due To	If the BITS 1 or BITS 2 reference is not selected, the reason why
Interface Type	The interface type for the BITS port
Framing	The framing type used by the BITS port
Line Coding	The line coding type used by the BITS port
Output Admin Status	The administrative status of the BITS output port
Output Reference Selected	The type of output reference selected by the BITS port
Tx Quality Level	The Synchronization Status Messaging quality level value received on the BITS port

chassis

Syntax **chassis** [**environment** | **power-feed**]

Context show

Description This command displays general chassis status information.

Parameters **environment —** displays chassis environmental status information

Default Display all chassis information.

power-feed — displays chassis power feed status information

Default Display all chassis information.

Output The following output is an example of general chassis information, and Table 42 describes the fields.

Sample Output

```
A:ALU-1# show chassis
===============================================================================
Chassis Information
===============================================================================
    Name                          : ALU-1
    Type                          : 7705 SAR-8
    Location                      :
    Coordinates                   :
    CLLI code                     :
    Number of slots               : 3
    Number of ports               : 88
    Critical LED state            : Red
    Major LED state               : Off
    Minor LED state               : Off
    Over Temperature state        : OK
    Base MAC address              : 00:1a:f0:67:fc:a6

Hardware Data
    Part number                   : 3HE02773AAAA0101
    CLEI code                     : ipmjj10gra
    Serial number                 : NS000000094
    Manufacture date              : 11262007
    Manufacturing string          : Backplane SEEP
    Manufacturing deviations      :
    Time of last boot             : 2008/04/11 09:32:06
    Current alarm state           : alarm active
-------------------------------------------------------------------------------
Environment Information
    Module
      Status                      : ok
      Type                        : fan-v1

    Fan Information
      # of on-board fans          : 8
      Status                      : up
      Speed                       : full speed

    External Alarms Interface
       ------------------------------------------
        Input  Pin  Event           State
       ------------------------------------------
        IN-1   1    Major         : ok
        IN-2   2    Major         : ok
        IN-3   11   Major         : ok
        IN-4   12   Minor         : ok
       ------------------------------------------

Hardware Data
    Part number                   : 3HE02777AAAA01
    CLEI code                     :
```

```
    Serial number                 : NS073840018
    Manufacture date              :
    Manufacturing string          :
    Manufacturing deviations      :
    Time of last boot             : 2008/04/11 09:32:07
    Current alarm state           : alarm cleared
-------------------------------------------------------------------------------
Power Feed Information
    Number of power feeds         : 2

    Input power feed              : A
      Type                        : dc
      Status                      : up

    Input power feed              : B
      Type                        : dc
      Status                      : failed
===============================================================================
A:ALU-1#

A:7705-3>config# show chassis environment
===============================================================================
Chassis Information
===============================================================================
Environment Information
    Module
      Status                      : ok
      Type                        : fan-v1

    Fan Information
      # of on-board fans          : 8
      Status                      : up
      Speed                       : full speed

    External Alarms Interface
       ------------------------------------------
        Input  Pin  Event           State
       ------------------------------------------
        IN-1   1    Major         : ok
        IN-2   2    Major         : ok
        IN-3   11   Major         : ok
        IN-4   12   Minor         : ok
       ------------------------------------------

Hardware Data
    Part number                   : 3HE02777AAAA01
    CLEI code                     :
    Serial number                 : NS073840018
    Manufacture date              :
    Manufacturing string          :
    Manufacturing deviations      :
    Time of last boot             : 2008/04/11 09:32:07
    Current alarm state           : alarm cleared
===============================================================================
A:7705>
```

Table 42: Show Chassis Output Fields

Label	Description
Name	The system name for the router
Type	The router series model number
Location	The system location for the device
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 all CSM slots.
Number of ports	The total number of ports currently installed in this chassis. This count does not include the CSM Management ports 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
Over Temperature state	Indicates whether there is an over-temperature condition
Base MAC address	The base chassis Ethernet MAC address
Part number	The CSM part number
CLEI code	The code used to identify the router
Serial number	The CSM 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

Table 42: Show Chassis Output Fields (Continued)

Label	Description
Current alarm state	Displays the alarm conditions for the specific board
Environment Information	
Status	Current status of the fan module
Type	Version of the fan module
# of on-board fans	The total number of fans installed in this chassis
Status	Current status of the fans
Speed	Half speed – the fans are operating at half speed
	Full speed – the fans are operating at full speed
External Alarms Interface	
Input	External alarm input number
Pin	Port connector pin number for the alarm input
Event	Severity level of events reported by this input: • Critical: critical log event, trap and critical alarm/relay LED illuminated • Major: major log event, trap and major alarm/relay LED illuminated • Minor: minor log event, trap and minor alarm/relay LED illuminated • Warning: warning log, event, trap, no alarm/relay illuminated • Indeterminate: indeterminate log event trap, no alarm/relay illuminated • Suppressed: no log events, traps or alarm/relays illuminated
State	State of alarm event
Hardware data	Hardware information for fan module
Power Feed Information	
Number of power feeds	The number of power feeds installed in the chassis
Input power feed - Type	The type of power feed – dc power

Table 42: Show Chassis Output Fields (Continued)

Label	Description
Input power feed - Status	Up — the specified power supply is up
	Down — the specified power supply is down

Debug Commands

sync-if-timing

Syntax **sync-if-timing**

Context debug

Description This command enables the context to debug synchronous interface timing references.

force-reference

Syntax **force-reference** {**external | ref1 | ref2**}
no force-reference

Context debug>sync-if-timing

Description This command allows an operator to force the system synchronous timing output to use a specific reference.

Note: 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 any time. The state of this command is not persistent between system boots.

When the **debug force-reference** command is executed, the current system synchronous timing output is immediately referenced from the specified reference input. If the specified input is not available (shutdown), or in a disqualified state, the timing output will enter the holdover state based on the previous input reference.

Parameters **ref1** — forces the clock to use the first timing reference

ref2 — forces the clock to use the second timing reference

external — forces the clock to use the third timing reference

system

Syntax [**no**] **system**

Context debug

Description This command displays system debug information.

http-connections

Syntax **http-connections** [*host-ip-address/mask*]
no http-connections

Context debug>system

Description This command displays HTTP connections debug information.

Parameters *host-ip-address/mask* — displays information for the specified host IP address and mask

ntp

Syntax **ntp router** *router-name* **interface** *ip-int-name*
no ntp

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* — specifies the route name, either base or 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.

Clear Commands

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

action-owner — specifies the owner name

Default TiMOS CLI

screen

Syntax **screen**

Context clear

Description This command allows an operator to clear the Telnet or console screen.

system

Syntax **system sync-if-timing** {**external** | **ref1** | **ref2**}

Context clear

Description This command allows an operator to individually clear (re-enable) a previously failed reference. As long as the reference is one of the valid options, this command is always executed. An inherent behavior enables the revertive mode which causes a re-evaluation of all available references.

Parameters **ref1 —** clears the first timing reference

ref2 — clears the second timing reference

external — clears the third timing reference

trace

Syntax **trace log**

Context clear

Description This command allows an operator to clear the trace log.

Standards and Protocol Support

Standards Compliance

IEEE 802.1ag Service Layer OAM
IEEE 802.1p/q VLAN Tagging
IEEE 802.3 10BaseT
IEEE 802.3ah Ethernet OAM
IEEE 802.3u 100BaseTX
IEEE 802.3x Flow Control
IEEE 802.3z 1000BaseSX/LX
IEEE 802.3-2008 Revised base standard
ITU-T Y.1731 OAM functions and mechanisms for Ethernet-based networks

Telecom Compliance

IC CS-03 Issue 9 Spectrum Management and Telecommunications
ACTA TIA-968-A
AS/ACIF S016 (Australia/New Zealand) Requirements for Customer Equipment for connection to hierarchical digital interfaces
ITU-T G.703 Physical/electrical characteristics of hierarchical digital interfaces
ITU-T G.707 Network node interface for the Synchronous Digital Hierarchy (SDH)
ITU-T G.712-2001 Transmission performance characteristics of pulse code modulation channels
ITU-T G.957 Optical interfaces for equipments and systems relating to the synchronous digital hierarchy
ITU-T V.24 List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)
ITU-T V.36 Modems for synchronous data transmission using 60-108 kHz group band circuits
ITU-T X.21 Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment for Synchronous Operation on Public Data Networks

Protocol Support

ATM

RFC 2514 Definitions of Textual Conventions and OBJECT_IDENTITIES for ATM Management, February 1999
RFC 2515 Definition of Managed Objects for ATM Management, February 1999
RFC 2684 Multiprotocol Encapsulation over ATM Adaptation Layer 5
af-tm-0121.000 Traffic Management Specification Version 4.1, March 1999
ITU-T Recommendation I.610 - B-ISDN Operation and Maintenance Principles and Functions version 11/95
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GR-1248-CORE - Generic Requirements for Operations of ATM Network Elements (NEs). Issue 3 June 1996
GR-1113-CORE - Bellcore, Asynchronous Transfer Mode (ATM) and ATM Adaptation Layer (AAL) Protocols Generic Requirements, Issue 1, July 1994
AF-PHY-0086.001 Inverse Multiplexing for ATM (IMA)

BFD

draft-ietf-bfd-mib-00.txt Bidirectional Forwarding Detection Management Information Base
draft-ietf-bfd-base-o5.txt Bidirectional Forwarding Detection
draft-ietf-bfd-v4v6-1hop-06.txt BFD IPv4 and IPv6 (Single Hop)
draft-ietf-bfd-multihop-06.txt BFD for Multi-hop Paths

BGP

RFC 1397 BGP Default Route Advertisement
RFC 1997 BGP Communities Attribute
RFC 2385 Protection of BGP Sessions via MDS
RFC 2439 BGP Route Flap Dampening
RFC 2547bis BGP/MPLS VPNs
RFC 2918 Route Refresh Capability for BGP-4
RFC 3107 Carrying Label Information in BGP-4
RFC 3392 Capabilities Advertisement with BGP-4
RFC 4271 BGP-4 (previously RFC 1771)
RFC 4360 BGP Extended Communities Attribute
RFC 4364 BGP/MPLS IP Virtual Private Networks (VPNs) (previously RFC 2574bis BGP/MPLS VPNs)
RFC 4456 BGP Route Reflection: Alternative to Full-mesh IBGP (previously RFC 1966 and RFC 2796)
RFC 4724 Graceful Restart Mechanism for BGP - GR Helper
RFC 4760 Multi-protocol Extensions for BGP (previously RFC 2858)
RFC 4893 BGP Support for Four-octet AS Number Space

DHCP/DHCPv6

RFC 1534 Interoperation between DHCP and BOOTP
RFC 2131 Dynamic Host Configuration Protocol (REV)
RFC 3046 DHCP Relay Agent Information Option (Option 82)
RFC 3315 Dynamic Host Configuration Protocol for IPv6

DIFFERENTIATED SERVICES

RFC 2474 Definition of the DS Field in the IPv4 and IPv6 Headers
RFC 2597 Assured Forwarding PHB Group
RFC 2598 An Expedited Forwarding PHB
RFC 3140 Per-Hop Behavior Identification Codes

DIGITAL DATA NETWORK MANAGEMENT

V.35
RS-232 (also known as EIA/TIA-232)

GRE

RFC 2784 Generic Routing Encapsulation (GRE)

IPv6

RFC 2460 Internet Protocol, Version 6 (IPv6) Specification
RFC 2462 IPv6 Stateless Address Autoconfiguration
RFC 2464 Transmission of IPv6 Packets over Ethernet Networks
RFC 3587 IPv6 Global Unicast Address Format
RFC 3595 Textual Conventions for IPv6 Flow Label
RFC 4007 IPv6 Scoped Address Architecture
RFC 4193 Unique Local IPv6 Unicast Addresses
RFC 4291 IPv6 Addressing Architecture
RFC 4443 Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 Specification
RFC 4649 DHCPv6 Relay Agent Remote-ID Option
RFC 4861 Neighbor Discovery for IP version 6 (IPv6)

LDP

RFC 5036 LDP Specification

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 (IS-IS) 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 4205 for Shared Risk Link Group (SRLG) TLV draft-ietf-isis-igp-p2p-over-lan-05.txt
RFC 5309 Point-to-Point Operation over LAN in Link State Routing Protocols

MPLS

RFC 3031 MPLS Architecture
RFC 3032 MPLS Label Stack Encoding
RFC 3815 Definitions of Managed Objects for the Multiprotocol Label Switching (MPLS), Label Distribution Protocol (LDP)
RFC 4379 Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures

NETWORK MANAGEMENT

ITU-T X.721: Information technology- OSI-Structure of Management Information
ITU-T X.734: Information technology- OSI-Systems Management: Event Report Management Function
M.3100/3120 Equipment and Connection Models
TMF 509/613 Network Connectivity Model
RFC 1157 SNMPv1
RFC 1305 Network Time Protocol (Version 3) Specification, Implementation and Analysis
RFC 1850 OSPF-MIB
RFC 1907 SNMPv2-MIB
RFC 2011 IP-MIB
RFC 2012 TCP-MIB
RFC 2013 UDP-MIB
RFC 2030 Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI
RFC 2096 IP-FORWARD-MIB
RFC 2138 RADIUS
RFC 2206 RSVP-MIB
RFC 2571 SNMP-FRAMEWORKMIB
RFC 2572 SNMP-MPD-MIB
RFC 2573 SNMP-TARGET-&-NOTIFICATION-MIB
RFC 2574 SNMP-USER-BASED-SMMIB
RFC 2575 SNMP-VIEW-BASED ACM-MIB
RFC 2576 SNMP-COMMUNITY-MIB
RFC 2588 SONET-MIB
RFC 2665 EtherLike-MIB
RFC 2819 RMON-MIB
RFC 2863 IF-MIB
RFC 2864 INVERTED-STACK-MIB
RFC 3014 NOTIFICATION-LOG MIB
RFC 3164 The BSD Syslog Protocol
RFC 3273 HCRMON-MIB
RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks
RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
RFC 3413 Simple Network Management Protocol (SNMP) Applications
RFC 3414 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)
RFC 3418 SNMP MIB
draft-ietf-disman-alarm-mib-04.txt
draft-ietf-mpls-ldp-mib-07.txt
draft-ietf-ospf-mib-update-04.txt
draft-ietf-mpls-lsr-mib-06.txt
draft-ietf-mpls-te-mib-04.txt
IANA-IFType-MIB

OSPF

RFC 1765 OSPF Database Overflow
RFC 2328 OSPF Version 2
RFC 2370 Opaque LSA Support
RFC 3101 OSPF NSSA Option
RFC 3137 OSPF Stub Router Advertisement
RFC 3630 Traffic Engineering (TE) Extensions to OSPF
RFC 4203 Shared Risk Link Group (SRLG) sub-TLV

PPP

RFC 1332 PPP Internet Protocol Control Protocol (IPCP)
RFC 1570 PPP LCP Extensions
RFC 1619 PPP over SONET/SDH
RFC 1661 The Point-to-Point Protocol (PPP)
RFC 1662 PPP in HDLC-like Framing
RFC 1989 PPP Link Quality Monitoring
RFC 1990 The PPP Multilink Protocol (MP)
RFC 2686 The Multi-Class Extension to Multi-Link PPP

PSEUDOWIRES

RFC 3550 RTP: A Transport Protocol for Real-Time Applications
RFC 3985 Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture
RFC 4385 Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN
RFC 4446 IANA Allocation for PWE3
RFC 4447 Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP)

RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks
RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)
RFC 4717 Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS Networks
RFC 5085 Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires
RFC 5086 Structure-Aware Time Division Multiplexed (TDM) Circuit Emulation Service over Packet Switched Network (CESoPSN)
draft-ietf-pwe3-redundancy-02 Pseudowire (PW) Redundancy

RADIUS

RFC 2865 Remote Authentication Dial In User Service
RFC 2866 RADIUS Accounting

RSVP-TE and FRR

RFC 2430 A Provider Architecture for DiffServ & TE
RFC 2961 RSVP Refresh Overhead Reduction Extensions
RFC 2702 Requirements for Traffic Engineering over MPLS
RFC 2747 RSVP Cryptographic Authentication
RFC 3097 RSVP Cryptographic Authentication - Updated Message Type Value
RFC 3209 Extensions to RSVP for LSP Tunnels
RFC 3210 Applicability Statement for Extensions to RSVP for LSP Tunnels
RFC 4090 Fast Reroute Extensions to RSVP-TE for LSP Tunnels

SONET/SDH

GR-253-CORE SONET Transport Systems: Common Generic Criteria. Issue 3, September 2000
ITU-T Recommendation G.841 Telecommunication Standardization Section of ITU, Types and Characteristics of SDH Networks Protection Architecture, issued in October 1998 and as augmented by Corrigendum1 issued in July 2002

SSH

draft-ietf-secsh-architecture.txt SSH Protocol Architecture
draft-ietf-secsh-userauth.txt SSH Authentication Protocol
draft-ietf-secsh-transport.txt SSH Transport Layer Protocol
draft-ietf-secsh-connection.txt SSH Connection Protocol
draft-ietf-secsh- newmodes.txt SSH Transport Layer Encryption Modes

SYNCHRONIZATION

G.813 Timing characteristics of SDH equipment slave clocks (SEC)
G.8261 Timing and synchronization aspects in packet networks
G.8262 Timing characteristics of synchronous Ethernet equipment slave clock
GR 1244 CORE Clocks for the Synchronized Network: Common Generic Criteria
IEEE 1588v2 1588 PTP 2008

TACACS+

IETF draft-grant-tacacs-02.txt The TACACS+ Protocol

TCP/IP

RFC 768 User Datagram Protocol
RFC 791 Internet Protocol
RFC 792 Internet Control Message Protocol
RFC 793 Transmission Control Protocol
RFC 826 Ethernet Address Resolution Protocol
RFC 854 Telnet Protocol Specification
RFC 1350 The TFTP Protocol (Rev. 2)
RFC 1812 Requirements for IPv4 Routers

VPLS

RFC 4762 Virtual Private LAN Services Using LDP

Proprietary MIBs

TIMETRA-ATM-MIB.mib
TIMETRA-CAPABILITY-7705-V1.mib
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TIMETRA-LOG-MIB.mib
TIMETRA-MPLS-MIB.mib
TIMETRA-OAM-TEST-MIB.mib
TIMETRA-PORT-MIB.mib
TIMETRA-PPP-MIB.mib
TIMETRA-QOS-MIB.mib
TIMETRA-ROUTE-POLICY-MIB.mib
TIMETRA-RSVP-MIB.mib
TIMETRA-SAP-MIB.mib
TIMETRA-SDP-MIB.mib
TIMETRA-SECURITY-MIB.mib
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TIMETRA-SYSTEM-MIB.mib
TIMETRA-TC-MIB.mib

Customer documentation and product support

Customer documentation

http://www.alcatel-lucent.com/myaccess

Product manuals and documentation updates are available at alcatel-lucent.com. If you are a new user and require access to this service, please contact your Alcatel-Lucent sales representative.

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