

About this Software Reference

Introduction

This Software Reference is the complete reference to the configuration, management and operation of all x900 Series switches, and includes detailed descriptions of all management commands.

Structure of this Software Reference

Part 1: Introduction and Setup

See this chapter...	For information about...
Chapter 1, Getting Started	how to start operating the switch.
Chapter 2, Using the Command Line Interface (CLI)	the structure of commands, command line editing, and aliases.
Chapter 3, Using the Graphical User Interface (GUI) on AT-9900 Series Switches	how to access the switch via the GUI, and an overview of the GUI's features and navigation.
Chapter 4, Configuring and Monitoring the System	the switch's system identification parameters and how to monitor system functionality and the switch's environment.
Chapter 5, Managing Configuration Files and Software Versions	how to save and edit the switch configuration, how to load files to and from the switch, and how to upgrade the switch software.
Chapter 6, Managing the File System	switch memory and how to create, edit, and delete files.

Part 2: LAN Switching and WAN Connections

See this chapter...	For information about...
Chapter 7, Switching	how to configure the switch ports on the switch, VLAN membership, and filtering.
Chapter 8, Spanning Trees	how to configure spanning tree protocols, including MSTP.
Chapter 9, Generic Attribute Registration Protocol (GARP)	the switch's implementation of the Generic Attribute Registration Protocol (GARP).
Chapter 10, Interfaces	the Ethernet and asynchronous network interfaces on the switch.
Chapter 11, Point-to-Point Protocol (PPP)	implementation of the Point-to-Point Protocol (PPP) on x900-48FE and AT-9900 switches.
Chapter 12, Layer Two Tunnelling Protocol (L2TP)	implementation of the Layer Two Tunnelling Protocol on x900-48FE and AT-9900 switches.

Part 3: Routing— IP and Other Protocols

See this chapter...	For information about...
Chapter 13, Internet Protocol (IP)	implementation of the Internet Protocol (IP), which provides TCP/IP routing in hardware. This chapter also describes IP filters, RIP, and the address resolution protocols ARP, Proxy ARP, and Inverse ARP.
Chapter 14, Dynamic Host Configuration Protocol (DHCP)	implementation of the Dynamic Host Configuration Protocol. The switch can act as a DHCP server and automatically assign IP addresses and other configuration information to PCs and other hosts on TCP/IP networks.
Chapter 15, DHCP Snooping	implementation of DHCP Snooping on x900-48FE and AT-9900 switches. How the switch snoops client DHCP lease information and records it in a DHCP snooping binding database.
Chapter 16, MAC-Forced Forwarding	implementation of this method on x900-48FE and AT-9900 switches for subscriber separation on a network that works in conjunction with DHCP snooping.
Chapter 17, IP Multicasting	IP multicasting, including IGMP for group management, IGMP snooping, and DVMRP and PIM Sparse and Dense Mode for multicast routing.
Chapter 18, Routing Information Protocol (RIP)	implementation of the Routing Information Protocol (RIP), a simple routing protocol.
Chapter 19, Open Shortest Path First (OSPF)	implementation of the Open Shortest Path First (OSPF) routing protocol.
Chapter 20, Border Gateway Protocol version 4 (BGP-4)	implementation of BGP-4 and how to configure it on the switch.
Chapter 21, Filtering IP Routes	how to select which routes the switch imports, uses, and advertises.
Chapter 22, Generic Routing Encapsulation (GRE)	implementation of the Generic Routing Encapsulation (GRE) protocol on x900-48FE and AT-9900 switches to connect private IP networks via public internets.
Chapter 23, Internet Protocol version 6 (IPv6)	implementation of IPv6, the next generation of the Internet Protocol, including stateless address autoconfiguration, RIPv6 and ICMPv6.
Chapter 24, Dynamic Host Configuration Protocol for IPv6 (DHCP6)	implementation of Dynamic Host Configuration Protocol for IPv6 and the support provided by the switch.
Chapter 25, IPv6 Multicasting	IPv6 multicasting, including MLDv2 for group management, and PIM Sparse and Dense Mode for multicast routing.

Part 4: Traffic Engineering

See this chapter...	For information about...
Chapter 26, Generic Packet Classifier	how the switch performs packet classification.
Chapter 27, Quality of Service (QoS)	how the switch performs policy-based priority, queuing and bandwidth management operations.
Chapter 28, Resource Reservation Protocol (RSVP)	implementation of the Resource Reservation Protocol, which allows receivers of traffic flow to reserve resources for the flow. RSVP delivers quality of service to application data streams.

Part 5: Security

See this chapter...	For information about...
Chapter 29, User Authentication	how to put the switch into secure mode, and how to authenticate users who access the switch. Authentication options include a built-in user database, and interaction with external servers such as RADIUS, TACACS and TACACS+.
Chapter 30, Encryption Services for x900-24X Switches	the data encryption services that the x900-24X switch provides.
Chapter 31, Compression and Encryption Services for x900-48FE and AT-9900 Switches	the data compression and encryption services the x900-48FE and x900-24X switches provide. This includes Van Jacobson's header compression, STAC LZS and Predictor compression.
Chapter 32, Port Authentication	how to configure 802.1x port authentication on the switch.
Chapter 33, Secure Shell	the switch's implementation of the Secure Shell protocol for secure remote management.
Chapter 34, Secure Sockets Layer (SSL)	the switch's implementation of SSL and how to configure it on the switch.
Chapter 35, Public Key Infrastructure (PKI)	the configuration of the switch for interaction with a Public Key Infrastructure (PKI).

**Part 6:
High Availability**

See this chapter...	For information about...
Chapter 36, Virtual Router Redundancy Protocol (VRRP)	implementation of the Virtual Router Redundancy Protocol (VRRP), a mechanism for combining backup switches into a single logical gateway.
Chapter 37, Ping Polling of Device Reachability	how to configure the switch to regularly check whether it can reach a device. The switch can also respond when a device or link goes up or down.
Chapter 38, Ethernet Protection Switching Ring (EPSR)	how to configure an Ethernet Protected Switching Ring (EPSR) to prevent loops and add resiliency in Ethernet ring based topologies.

**Part 7: Network
Management
and Utilities**

See this chapter...	For information about...
Chapter 39, Simple Network Management Protocol (SNMP)	the switch's implementation of the Simple Network Management Protocol. Support for SNMP, combined with standard MIBs and the Allied Telesis Enterprise MIB, enables the switch to be managed by a separate SNMP management station.
Chapter 40, Link Layer Discovery Protocol (LLDP)	the switch's implementation of the Link Layer Discovery Protocol (LLDP) for receiving and processing Cisco® Discovery Protocol messages.
Chapter 41, Network Time Protocol (NTP)	the switch's implementation of the Network Time Protocol (NTP).
Chapter 42, Management Stacking	how to synchronise information across multiple switches and manage them as one logical device.
Chapter 43, Scripting	the switch's scripting facility for creating, storing and executing sequences of commands. Scripting enables automated configuration of switches and centralised management of configurations.

See this chapter...	For information about...
Chapter 44, Trigger Facility	the switch's automated trigger facility for timed execution of management commands in response to specific events.
Chapter 45, Logging Facility	the switch's flexible event logging capability and how to configure it to monitor switch activities. The advanced logging facility allows alarm notification to single or multiple management centres.
Chapter 46, Terminal Server	terminal services the switch provides and the switch's implementation of the Internet Telnet protocol. This includes using Telnet with local host nicknames.
Chapter 47, Stream Printing for AT-9900 Switches	the stream printing services that the AT-9900 Series switch provides.
Chapter 48, Test Facility	describes the facilities built into the switch for testing the switch's interfaces, and how to execute and interpret the tests.

Support Information

See this section...	For...
Command Summary	an alphabetical list of all switch commands and their syntax.
Appendix A, Messages	informational, warning, and error messages generated by the switch.
Appendix B, Reference Tables	identifiers and return codes for a range of switch functions and network services.
Appendix C, SNMP MIBs	a description of the <i>Management Information Bases (MIBs)</i> and managed objects supported by the switch's SNMP agent, including the Allied Telesis Enterprise MIB.
Glossary	definitions of terms and concepts used in this Software Reference.
Index	a master index to topics and commands covered in this Software Reference.

Intended Audience

This Software Reference is intended for the system administrator, network manager, or communications technician who configure and maintain the x900 Series switch, or who manages a network of switches.

It is assumed that the reader is familiar with:

- The topology of the network in which the x900 Series switch is to be used.
- Basic principles of computer networking, protocols and routing, and interfaces.
- Administration and operation of a computer network.

This Software Reference is not intended for users who use the computer network to access network services from their terminal, personal computer, or workstation. Most of the commands require Manager privilege and can be entered only from a terminal or port that has been assigned Manager privilege.

Conventions

A number of symbols, typographic, and stylistic conventions are used throughout this Software Reference to aid learning and make information easier to find. The following table explains them.

This typeface...	Is used for...
<i>Italic</i>	Introducing and emphasising new terms. Referring to other documents by their title (for example, “RFC 2236, <i>Internet Group Management Protocol, version 2</i> ”).
Monospace	Text as it appears on-screen, or something you must type.
bold	Names of commands, parameters and options, when they are written within a paragraph of text. Also sometimes used for emphasis.
0xFF	Numbers starting with the 0x prefix are hexadecimal values.
[Key]	A key on your keyboard. For example, “at the prompt, type a command and press [Enter]. Examples of keys include [Shift], [Alt], [Ctrl] and [Backspace]. Keys may also be referred to using the word “key” (for example, “Press the Ctrl key”).
[Key+Key]	A pair of keys on your keyboard that should be pressed together. For example, [Ctrl+P] means to press and hold down the [Ctrl] key, and then press and release the [P] key. Then release the [Ctrl] key.
[Key,Key]	A sequence of keys that should be pressed in sequence. For example, [Break,T] means to press and release the [Break] key; and then press and release the [T] key. The [Key+Key] and [Key,Key] symbols can be combined. For example, [Ctrl+P,T] means to press and hold down the [Ctrl] key, press and release the [P] key, and release the [Ctrl] key; and then press and release the [T] key”.
<i>Attention</i>	A special keystroke known as the attention character, which is either [Break] or [Ctrl/P].



Warning or Caution. A warning alerts you to situations in which you could hurt yourself. A caution alerts you to situations in which you could lose data or cause damage to the equipment.

Screen views show examples of the output from particular commands or what the screen should look like at a particular time, for example:

Configuration for ETH instance 0:

Module	Protocol	Format	Discrim	MAC address
IPG	IP	Ethernet	0800	0000cd000027
IPG	ARP	Ethernet	0806	0000cd000027
IPX	Novell	Novell	-	0000cd000027
DNT	DECnet	Ethernet	6003	aa0004003908
Bridging	LAT	Ethernet	6004	-
Bridging	EtherTalk	SNAP	00000080f3	-

Command Descriptions

Commands are described in the Command Reference section of the individual chapter for the protocol or feature. Each command is described in the format shown in [Figure 1](#).

Figure 1: Command format

Command name	add ip host	
The syntax of the command	Syntax	<code>ADD IP Host=name IPaddress=ipadd</code> where: <ul style="list-style-type: none">■ <i>name</i> is a character string up to 60 characters in length. If the string contains spaces it must be enclosed in double quotes.■ <i>ipadd</i> is an IP address in dotted decimal notation.
What the command does, and what each of the parameters mean	Description	<p>This command adds a user-defined name for an IP host to the host name table. The host name table makes it easier to Telnet to commonly accessed hosts by enabling the user to enter a shorter, easier to remember name for the host rather than the host's full IP address or domain name. The name can also be used with the ping command on page 12-116.</p> <p>The host parameter specifies the user-defined name for the IP host. A host with the same name must not already exist in the host name table. When a host name is specified in the Telnet command, the entire name will be used to match a name in the host name table. All characters are used in the comparison, including nonalphabetic characters if they are present.</p> <p>The ipaddress parameter specifies the IP address of the host.</p>
Examples show how the command is used	Examples	<p>To add the host name "zaphod" to the host name table for an IP host with an IP address of 172.16.1.5 and the domain name "zaphod.company.com", use:</p> <pre>add ip host=zaphod ip=172.16.1.5</pre> <p>To Telnet to the host, use any of the following commands:</p> <pre>telnet zaphod telnet zaphod.company.com telnet 172.16.1.5</pre>
References to related commands	Related Commands	delete ip host set ip host set ip nameserver set ip secondary nameserver show ip host

PREFACE1

Command syntax Conventions used in command syntax is explained in the following table.

Element	Description
Keywords in CAPS and lower case (mixed case)	The shortest valid command is denoted by capital letters. Exceptions are commands with profound effects such as <i>restart immediately</i> , which must be typed in full.
<i>italic</i>	A variable placeholder to be replaced by an actual value in a command.
=	The equals sign is optional to link parameters with their values, and is the default. However, a space is also acceptable. For details, see set command assignmentoperator command on page 2-12 of Chapter 2, Using the Command Line Interface (CLI).
[]	Square brackets enclose optional items. Enter the item or items but do not type the brackets.
	Vertical bars separate choices in a list—choose one of the items.
...	Ellipses indicate that the preceding element may be repeated any number of times.
{ }	Braces enclose a choice of options that is required; you must choose one of the options listed.
n . .m	Defines a range of values—most often positive integers—from n to m inclusive.
<i>interface</i>	An interface type and one of the following: <div> <div>ASYNn</div> <div>for Asynchronous interfaces</div> </div> <div> <div>PPPN</div> <div>for Point-to-Point interfaces</div> </div> <div> <div>SLIPn</div> <div>for SLIP interfaces</div> </div> <div> <div>VLANn</div> <div>for Virtual LAN interfaces</div> </div> <div> <div>n</div> <div>when defining one of the above interface types. n is a non-negative, zero-based decimal number.</div> </div>
<i>ipadd</i>	IP address in dotted decimal form, such as 131.203.9.197. In some situations, an address in domain name format.
<i>macadd</i>	Hardware address, such as an Ethernet address, in the format XXXXXXXXXXXX, where XX is a two-digit hexadecimal number with leading zeros if necessary.

Where To Find More Information

The Documentation and Tools CD-ROM bundled with each switch contains the complete Document Set for your switch and, where applicable, its expansion options. The CD-ROM also includes tools for managing your switch.

The Document Set includes:

- The Installation and Safety Guide for your switch, which outlines the procedure for installing the switch, and provides safety and statutory information.
- The Hardware Reference for your switch, which provides detailed information on the hardware features of x900 Series switches.
- This Software Reference, which provides detailed information on configuring the switch and its software.

These documents can also be downloaded from <http://www.alliedtelesis.com>.

Obtaining Copies of Internet Protocols and Standards

The Internet Protocols are defined in *Requests For Comments* (RFCs). RFCs are developed and published under the auspices of the *Internet Engineering Steering Group* (IESG) of the *Internet Engineering Task Force* (IETF). For more information about the IESG and IETF, visit the IETF web site at <http://www.ietf.org/>. For more information about RFCs and Internet-Drafts (the starting point for RFCs), visit the RFC Editor web site at <http://www.rfc-editor.org/>. This site has information about the RFC standards process, archives of RFCs and current Internet Drafts, links to RFC indexes and search engines, and a list of other RFC repositories.

RFCs can be obtained electronically from many RFC repositories, mail servers, World Wide Web (WWW), Gopher or WAIS sites. A good starting point for finding the nearest RFC repository is to point your Web browser at <http://www.isi.edu/in-notes/rfc-retrieval.txt>.

To obtain a copy of an RFC using FTP, FTP to the host and login as user anonymous, and a password of either guest or your email address. The FTP server usually prompts you for one or the other. Use the `get` command to retrieve the desired RFC. Most sites have a file, usually `rfc-index.txt`, which lists the titles and file names of all available RFCs. Most sites have a file, usually `rfc-retrieval.txt`, which gives detailed information about RFC repositories and how to retrieve RFCs via FTP, mail servers, WWW, Gopher, and WAIS.

To learn how to obtain a copy of an RFC via email from a mail server, point your browser at <http://www.isi.edu/in-notes/rfc-editor/rfc-info.help>.

To obtain a copy of an RFC from a Web site, or to search RFC repositories for a specific RFC or all RFCs relating to a topic, point your Web browser at <http://www.rfc-editor.org/rfc.html>.

Publicly Accessible Documents

Allied Telesis maintains an online archive of documents and files that you can access in the following ways:

- WWW: <http://www.alliedtelesis.com>
- Anonymous FTP: <ftp.alliedtelesis.com>
Login as user “anonymous” and enter your email address as the password.

Allied Telesis Offices and Locations

With locations covering all of the established markets in North America, Latin America, Europe, Asia and the Pacific, Allied Telesis provides localized sales and technical support worldwide. To find our representative nearest you, visit Allied Telesis on the web at: <http://www.alliedtelesis.com>.

