AES-100

ADSL-Ethernet Switch

May 2002

User's Guide

ZyXEL

TOTAL INTERNET ACCESS SOLUTION

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- Warranty information.
- Date you received your product.
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Table of Contents

Copyright ... ii
ZyXEL Limited Warranty ... iii
Interference Statements and Warnings ... iv
Customer Support ... v
Table of Contents ... vi
List of Figures ... ix
List of Tables ... x
Preface ... xi
Chapter 1 Getting to Know the AES-100 ... 1-1
1.1 Features ... 1-1
1.2 Benefits ... 1-3
1.3 Physical Specifications ... 1-4
Chapter 2 Hardware Overview ... 2-1
2.1 Unpacking the AES-100 ... 2-1
2.2 Additional Installation Requirements ... 2-1
2.3 Front Panel ... 2-1
2.4 Console Port ... 2-2
2.5 ADSL Port Connections ... 2-3
2.6 Rear Panel ... 2-3
Chapter 3 Factory Default Settings ... 3-1
3.1 IP Parameters ... 3-1
3.2 Console Port ... 3-1
3.3 SNMP Community Strings ... 3-1
3.4 Console, Telnet and FTP Password ... 3-1
3.5 ADSL Ports ... 3-1
3.6 Ethernet Port ... 3-2
3.7 Other Factory Defaults ... 3-2
Chapter 4 System Commands ... 4-1
4.1 Command Line Interface (CI) ... 4-1
4.2 Console Connection ... 4-1
4.3 Command Structure ... 4-1
4.4 Commonly Used Commands ... 4-2
4.5 Sys Commands ... 4-3
4.6 Secured Host Commands ... 4-4
4.7 UNIX Syslog Commands ... 4-5
4.8 System Error Log Commands ... 4-6
Chapter 5 ADSL Configuration ... 5-1

5.1 ADSL Standards 5-1
5.2 Profiles 5-1
5.3 Configured Vs. Actual Rate 5-1
5.4 Default Settings 5-2
5.5 ADSL Commands 5-3
Chapter 6 10/100M Fast Ethernet Port Commands 6-1
6.1 10/100M Auto-Sensing Ethernet 6-1
6.2 Ethernet Commands 6-1
Chapter 7 Bridge Commands 7-1
7.1 Bridge Port Numbers 7-1
7.2 Basic Commands 7-1
7.3 MACfilter Commands 7-2
7.4 Filter Commands 7-3
7.5 Port-Based VLAN Commands 7-5
7.6 Tagged Ethernet Frames Commands (Fast Mode) 7-8
Chapter 8 IEEE 802.1Q Tagged VLAN Commands 8-1
8.1 Introduction 8-1
8.2 IEEE 802.1Q Tagged VLAN -Tags 8-1
8.3 VLAN-Aware/VLAN-Unaware Devices 8-1
8.4 Filtering Databases 8-1
8.5 IEEE 802.1Q Tagged VLAN Commands 8-2
Chapter 9 IEEE 802.1p Priority Commands 9-1
9.1 Introduction 9-1
9.2 IEEE 802.1p Priority Commands 9-1
Chapter 10 IP Commands 10-1
10.1 Setting the IP Address 10-1
10.2 General IP Commands 10-2
Chapter 11 Remote Management 11-1
11.1 Management by Telnet 11-1
11.2 SNMP Management 11-1
11.3 SNMP Access Configuration 11-2
11.4 SNMP Trap Configuration 11-3
Chapter 12 Configuration Backup/Restore 12-1
12.1 Configuration Files of the ADSL Networking Module 12-1
12.2 Configuration Backup 12-1
12.3 Configuration Restore 12-1
Chapter 13 Firmware Upload and Recovery 13-1
13.1 FTP Firmware Upload on the ADSL Networking Module 13-1
13.2 BOOTP/TFTP Firmware Recovery of the ADSL Networking Module 13-2

Chapter 14 Troubleshooting 14-1
14.1 ADSL LED(s) 14-1
14.2 Data Transmission 14-1
14.3 ADSL LED(s) turn On and Off 14-2
14.4 Data Rate 14-2
14.5 Configured Settings 14-2
14.6 Password 14-3
14.7 Remote Server 14-3
14.8 SNMP 14-3
14.9 Telnet 14-4
Index ..... A

List of Figures

Figure 1-1 MTU Application 1-3
Figure 1-2 ISP Application 1-4
Figure 2-1 AES-100 Front Panel 2-2
Figure 2-2 AES-100 Rear Panel AC Power Version 2-3
Figure 2-3 AES-100 Rear Panel DC Power Version 2-3
Figure 2-4 Connecting the Power Cord to the AES-100 and a Power Source 2-4
Figure 4-1 Example: Procedure to Save and View a Previous Error Log 4-7
Figure 7-1 Default VLAN Settings 7-6
Figure 7-2 Example of Modified VLAN Port 2 7-7
Figure 7-3 Example of Modified VLAN Port 3 7-8
Figure 7-4 Example of Modified VLAN Settings 7-8
Figure 8-1 Example: PVID Command Display 8-3
Figure 8-2 Example: SVLAN List Command Display 8-3
Figure 8-3 Example: SVLAN List Command Display 8-4
Figure 8-4 SVLAN Example 8-5
Figure 8-5 Example: Svlan Getentry 2 Command Display 8-6
Figure 8-6 Example: DVLAN List Command Display 8-7
Figure 8-7 Example: DVLAN Getentry 2 Command Display 8-7
Figure 8-8 Example: VLAN List Command Display 8-8
Figure 10-1 Setting IP Address and Default Gateway 10-2
Figure 11-1 SNMP Management Model 11-1
Figure 13-1 BOOTP/TFTP Server 13-3
Figure 13-2 Input MAC 13-3
Figure 13-3 Database Edit Dialog 13-4
Figure 13-4 Enable BOOTP/TFTP 13-4
Figure 13-5 Enter Debug Mode 13-4

List of Tables

Table 2-1 Front Panel Ports of an ADSL Network Module 2-2
Table 2-2 AES-100 Network Module LED Descriptions 2-2
Table 4-1 Logs Sent to Your UNIX Server 4-5
Table 5-1 Maximum Transfer Rates of the AES-100's ADSL Ports 5-1
Table 7-1 Physical Ports, Port Numbers and AES-100 Default PVID Tags in Fast Mode 7-9
Table 14-1 Troubleshooting the ADSL LED(s) 14-1
Table 14-2 Troubleshooting Data Transmission 14-1
Table 14-3 Troubleshooting a Non-Constant ADSL LED 14-2
Table 14-4 Troubleshooting the SYNC-rate 14-2
Table 14-5 Troubleshooting the AES-100's Configured Settings 14-2
Table 14-6 Troubleshooting the Password 14-3
Table 14-7 Troubleshooting a Remote Server 14-3
Table 14-8 Troubleshooting the SNMP Server 14-3
Table 14-9 Troubleshooting Telnet 14-4

Preface

Congratulations on your purchase of the AES-100 ADSL-Ethernet Switch.

This preface introduces you to the AES-100 and discusses the organization and conventions of this user's guide. It also provides information on other related documentation.

About the AES-100

The AES-100 is an ADSL (Asymmetrical Digital Subscriber Line) to Ethernet switch. It allows you to multiplex traffic from up to 16 ADSL lines to an Ethernet network before it is forwarded to the Internet.

General Syntax Conventions

"Enter" means for you to type one or more characters and press the carriage return. "Select" or "Choose" means for you to select one from the predefined choices.

Related Documentation

AES-100 Quick Start Guide

Our Quick Start Guide is designed to help you get up and running right away. It contains detailed easy-to-follow directions for initial configuration, setting up IP parameters and setting up and enabling ADSL ports.

AES-100 Hardware Installation Guide

This guide provides detailed information about the physical specifications and procedures for installing the AES-100 hardware.

Support Notes

More detailed information about the AES-100 and examples of its use can be found in the Support Notes accessible through the ZyXEL web pages at *www.zyxel.com*.

ZyXEL Web Page and FTP Server Site

You can access release notes as well as firmware upgrades at ZyXEL web and FTP sites. Refer to the Customer Support page for more information.

Glossary

Please refer to www.zyxel.com for an online glossary of networking terms.

Chapter 1
Getting to Know the AES-100

This chapter describes the key features, benefits and applications of your AES-100.

The AES-100 is an ADSL (Asymmetrical Digital Subscriber Line) to Ethernet switch. It aggregates traffic from up to 16 ADSL lines to Ethernet.

ADSL allows the coexistence of broadband data service and conventional voice service over the same telephone wire. When deployed together with ZyXEL's ADSL modems, for instance the P642M, and WAN routers, like the P1400, the combination forms an integrated solution for providing broadband services to multiple tenant units such as apartments, hotels, offices and campus buildings.

1.1 Features

Two-Slot Chassis

The AES-100 has two slots for the ADSL to Ethernet multiplexer modules. This design provides the flexibility for you to install as few as a single module for the initial deployment and yet still has room to grow as demand increases.

8-Port ADSL to Ethernet Multiplexer Modules

Each ADSL to Ethernet multiplexer module aggregates traffic from 8 lines to an Ethernet port.

Integrated Splitters

The integrated splitters eliminate the need to use external splitters to separate voice-band and ADSL signals.

10/100 Mbps Auto-sensing Ethernet Port

This 10/100 Mbps auto-sensing Ethernet port connects the AES-100 to an Ethernet network. With Ethernet as the backbone, you can create a network that provides ADSL service to hundreds of subscribers.

ADSL Compliance

- Multi-Mode ADSL standard
  - G.DMT (ITU-T G.992.1)
  - G.Lite (ITU-T G.992.2)
  - G.hs (ITU-T G.994.1)
  - ANSI T1.413 issue 2
- Rate adaptation support

Bridging

- IEEE 802.1D transparent bridging
- Up to 4096 MAC entries address table
- IGMP snooping for appropriate multicast forwarding.

IEEE 802.1Q Tagged VLAN

Your AES-100 uses the IEEE 802.1Q Tagged VLAN (Virtual Local Area Network) which allows your device to deliver tagged/untagged packets to and from its ports. The AES-100 supports up to 255 VLANs and the maximum VLAN ID 4094.

IEEE 802.1p Priority

IEEE 802.1p Priority gives your AES-100 the ability to regenerate priority changes for ports.

Fast Mode

The AES-100's fast mode makes use of the "tag" subset of the IEEE 802.1Q standard to identify the source port of a frame and speed traffic through a service gateway.

MAC (Media Access Control) Filtering

Use MACfilter commands to filter incoming packets based on MAC (Media Access Control) address(es) that you specify. You may enable/disable specific ports. You may specify up to five MAC addresses per port.

Secured Host

Allow up to ten remote hosts to access your AES-100 via IP addresses you specify.

System Error Logging

The system error log will record error logs locally to the AES-100 memory. These logs may be viewed again after a warm restart.

UNIX Syslog Logging

Use UNIX syslog commands to send logs to your UNIX server.

Protocol

- Multiple Protocols over AAL5 (RFC 1483)

Management

- Remote configuration backup/restore and firmware upgrade
- SNMP manageable
- Text-based management locally via console port and remotely via telnet

Security

- Password protection for system management
- Port-based VLAN

IGMP Snooping

IGMP (Internet Group Management Protocol) snooping reduces multicast traffic for maximum performance.

Overheating Detection and Warning

- An ALM LED turns on when the AES-100's internal temperature is too high and turns off when the temperature has returned to a normal level.

1.2 Benefits

1.2.1 MTU Application

The following diagram depicts a typical application of the AES-100 is in a large residential building, or multiple tenant unit (MTU), that leverages the existing phone line wiring to provide Internet access to all tenants.

A tenant connects a computer to the phone line in a unit using an ADSL modem. The other end of the phone line is connected to a port on the AES-100. The AES-100 aggregates the traffic from the tenants to the Ethernet port and forwards it to a router. The router then routes the traffic further to the Internet. The following diagram shows the installation environment for an MTU Application.

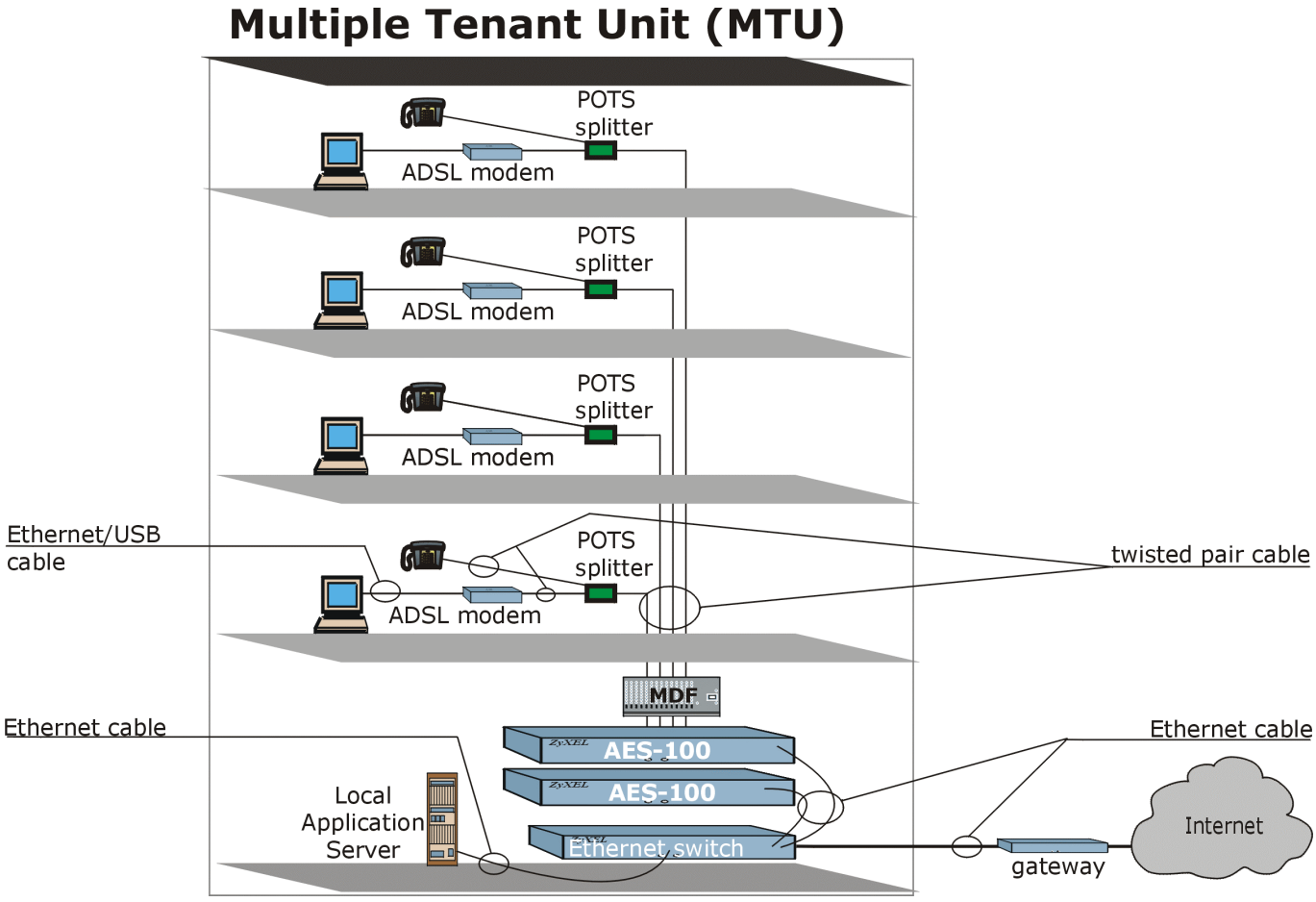


Figure 1-1 MTU Application

1.2.2 ISP Application

The AES-100 can also be used by an Internet Service Provider (ISP) as an IP DSLAM. The AES-100 terminates all of the ADSL ATM circuits and converts the traffic to IP packets. All IP traffic goes directly to the ISP's internal Ethernet network, before being routed to the Internet. The following diagram is an example of the AES-100 in an ISP Application.

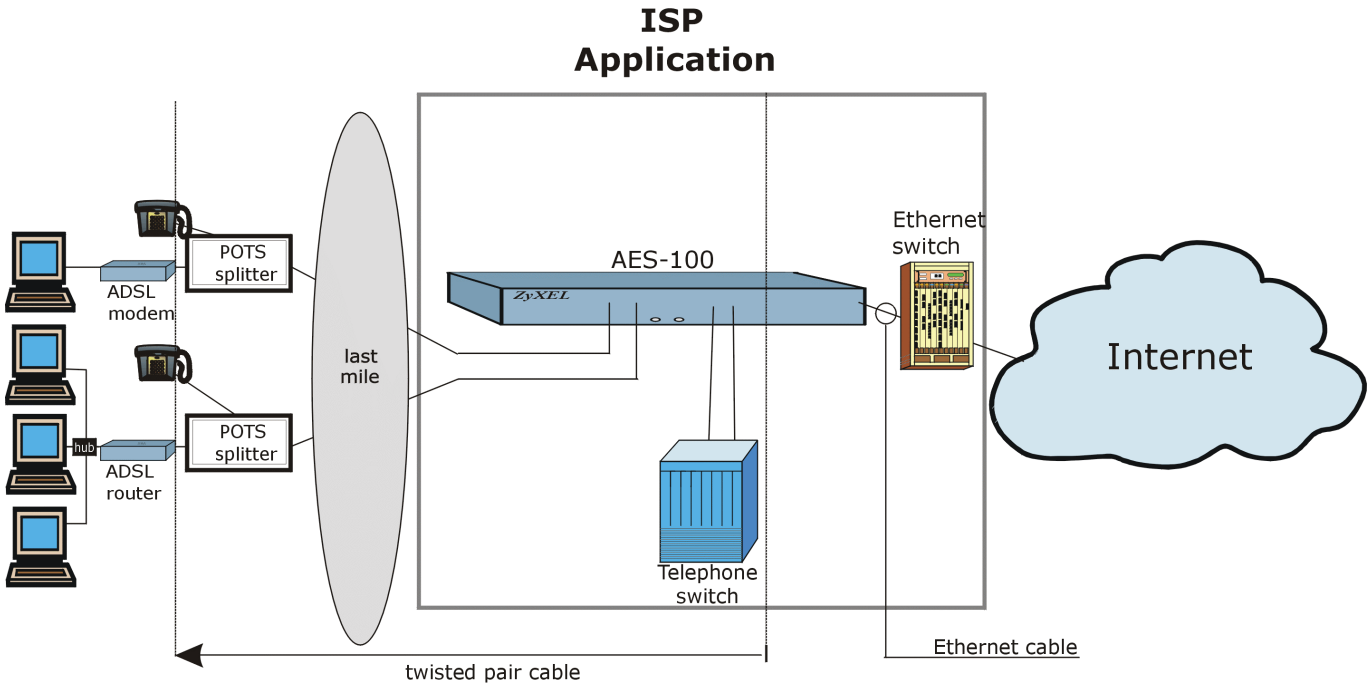


Figure 1-2 ISP Application

1.2.3 Compact Design for Limited Space

The AES-100 occupies only 1.5 U of standard Telco rack space. Its compactness is perfect for collocation (installation in a central office) and basement installation. Because the AES-100 has built-in POTS splitters, service providers do not have to allocate extra space for POTS splitter shelves.

1.2.4 Scalable Platform for Future Expansion

The flexible design of the AES-100 series allows service providers to start with minimum cost. As the number of users and applications increases additional AES-100s can be added to provide greater bandwidth.

1.3 Physical Specifications

Physical Interfaces

- Two network module slots
- Each network module has eight RJ-11 ports to the CO side and eight RJ-11 ports to the USER side
- Each network module has one auto-sensing 10/100M Ethernet port
- Each network module has one RS-232 console port for local configuration and management

Dimensions

- In mm: 440 (W) x 320 (L) x 66 (H)

Weight

- 6.84 kg (two network modules loaded)

Power Consumption

- 80 watts maximum
- 100 - 240 VAC, 50/60 Hz

Operating Environment

- Temperature: 0 - 50°C; Humidity: 5% - 95%

Storage Environment

- Temperature: -30 - 60°C; Humidity: 2% - 95%

Chapter 2
Hardware Overview

This chapter gives a brief introduction to the AES-100 hardware.

2.1 Unpacking the AES-100

Before installing, check to see that all the components of the AES-100 are included in the package.

2.2 Additional Installation Requirements

In addition to the contents of the package, you need the following hardware and software components before you install and use your product:

- A computer with Ethernet 10Base-T or 100Base-TX NIC (Network Interface Card)
- WAN service provided by a local phone company
- A computer with terminal emulation software configured to the following parameters:
  - VT100 terminal emulation
  - 9600 bps
  - No parity, 8 data bits, 1 stop bit
  - No flow control

2.3 Front Panel

The following figure shows the front panel of the AES-100.

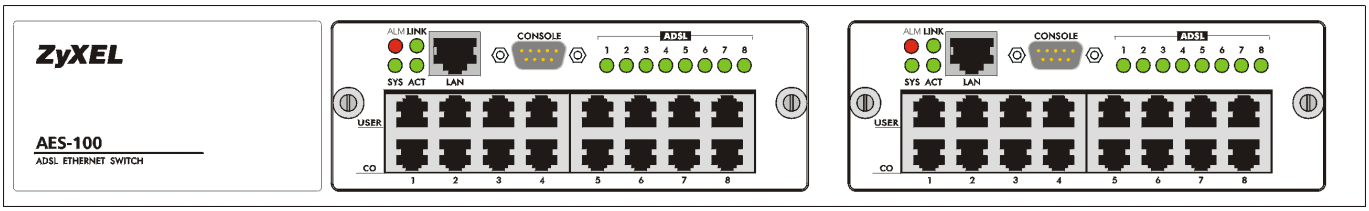


Figure 2-1 AES-100 Front Panel

2.3.1 Front Panel Ports

The following table describes the ports on the front panel of an AES-100 network module.

Table 2-1 Front Panel Ports of an ADSL Network Module

PORTS	DESCRIPTION
LAN	The LAN port is a 10/100 Mbps auto-sensing Ethernet port for connection to a router.
CONSOLE	The CONSOLE port is an RS-232 port for configuring the AES-100.
USER 1-8	The USER port connects to the user (subscriber) ADSL equipment.
CO 1-8	The CO port connects to the central office or a PBX.

2.3.2 Front Panel LEDs

The following table describes the LED indicators on the front panel of an AES-100 network module.

Table 2-2 AES-100 Network Module LED Descriptions

LED	COLOR	STATUS	MEANING
ALM	Red	On	The AES-100 network module has overheated.
LINK	Green	On Off	The LAN port link is up. The LAN port link is down.
SYS	Green	On Off Blinking	Your AES-100 Network Module is on and functioning properly. The system is not ready or has a malfunction. The system is initializing.
ACT	Green	Off Blinking	The LAN port is not active. Data is being sent.
ADSL 1-8	Green	On Off	The ADSL link is up. The ADSL link is down.

2.4 Console Port

For the initial configuration, you need to use terminal emulator software on a computer and connect it to the AES-100 through the console port. Connect the male 9-pin end of the console cable to the console port of the AES-100. Connect the other end (either a female 25-pin or female 9-pin) to a serial port (COM1, COM2 or other COM port) of your computer. You can use an extension RS-232 cable if the enclosed one is too short. After the initial setup, you can modify the configuration remotely through telnet connections.

2.5 ADSL Port Connections

The line from the user carries both the ADSL and the voice signals. For each line, the AES-100 has a built-in splitter that separates the high frequency ADSL signal from the voice band signal and feeds the ADSL signal to the AES-100, while the voice band signal is diverted to the CO port.

To complete an ADSL connection, connect the line from the user equipment to the **USER** port and the line from the central office switch or PBX (Private Branch Exchange) to the **CO** port. Make sure that the **USER** line and the **CO** line are not shorted on the MDF (Main Distribution Frame).

2.6 Rear Panel

Make sure you are using the correct power source.

The following figure shows the rear panel of the AES-100.

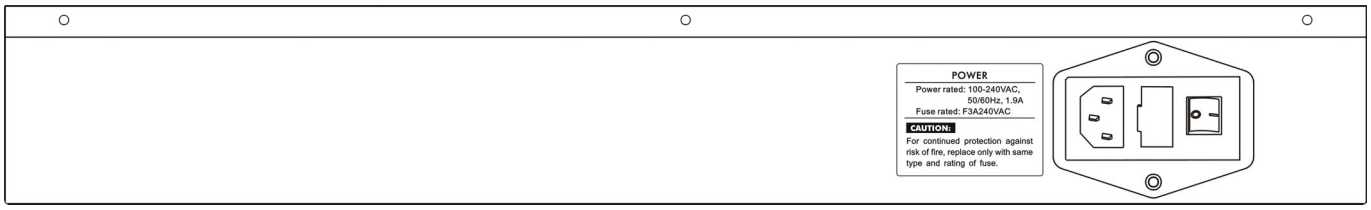


Figure 2-2 AES-100 Rear Panel AC Power Version

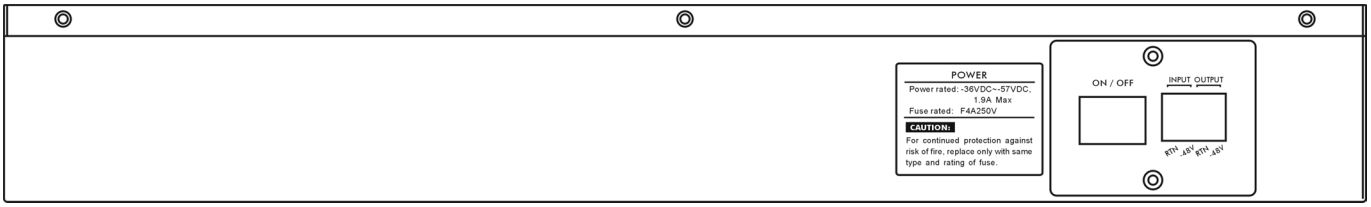


Figure 2-3 AES-100 Rear Panel DC Power Version

Connect the female end of the power cord to the power receptacle on the rear panel of your AES-100 (just to the right of the warning sticker) as seen next. Connect the other end of the cord to a power outlet. Make sure that no objects obstruct the airflow of the fans (located on the side of the unit).

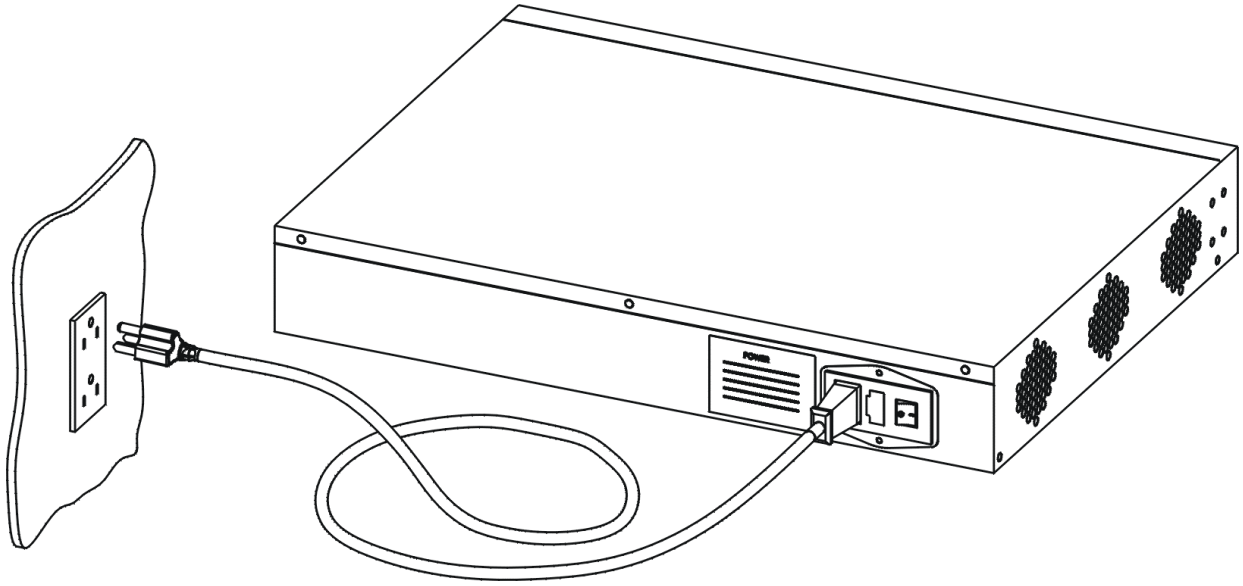


Figure 2-4 Connecting the Power Cord to the AES-100 and a Power Source

Chapter 3
Factory Default Settings

This section describes the factory default settings of the AES-100.

3.1 IP Parameters

- IP address = 192.168.1.1
- Subnet mask = 255.255.255.0
- Default gateway = 192.168.1.254

3.2 Console Port

- Baud rate = 9600 bps
- Data bits = 8
- Parity = none
- Stop bit = 1
- Flow control = none

3.3 SNMP Community Strings

- Read = public
- Write = 1234

3.4 Console, Telnet and FTP Password

- 1234 (default)

3.5 ADSL Ports

- Encapsulation: RFC 1483
- Multiplexing: LLC-based
- VPI: 0
- VCI: 33
- Enable/Disable State: Disabled
- Maximum Upstream Rate: 1024 Kbps for G.dmt, 512 Kbps for G.Lite

- Maximum Downstream Rate: 8160 Kbps for G.dmt, 1536 Kbps for G.Lite
- Operational Mode: auto

3.6 Ethernet Port

The factory default settings for the Ethernet port of the AES-100 are:

- Auto-negotiation: ON
- Speed used with auto-negotiation OFF: 100Mbps
- Duplex mode used with auto-negotiation OFF: half duplex

3.7 Other Factory Defaults

- MACfilter: Disabled
- Secured Host: Disabled
- Sys Error Log: Always Enabled
- UNIX Syslog: Disabled
- IEEE 802.1Q Tagged VLAN: Disabled

Chapter 4
System Commands

This section describes basic configuration and system-related commands.

4.1 Command Line Interface (CI)

The AES-100 uses text command lines as the user interface for software configuration. Before discussing the details of configuration, the rules of the commands are listed next.

`The command keywords are in regular courier font.`

1. The command keywords must be entered exactly as shown, that is, no abbreviations are allowed.
2. The required fields in a command are enclosed in angle brackets (<>), for instance,

```
list port <port #>
```

   means that you must specify the port number for this command.

3. The optional fields in a command are enclosed in square brackets ([]), for instance,

```
config [save]
```

   means that the field `save` is optional.

4. "Command" refers to a command used in the command line interface (CI command).

Using commands not documented in the user's guide can damage the unit and possibly render it unusable.

4.2 Console Connection

For the initial configuration, you must use the console port. After the initial setup, you can *telnet* to the system and perform additional management tasks. Connect the RS-232 cable to the console port of the ADSL Networking Module. Connect the other end to a serial port (COM1, COM2 or other COM port) of your computer.

You can use any terminal emulation program (Windows' built-in HyperTerminal for example) with the following parameters:

- VT100 terminal emulation
- 9600 bps
- No parity, 8 data bits, 1 stop bit
- No flow control

4.3 Command Structure

The system uses a two-level command structure. The commands related to one subsystem are grouped under a primary command of that subsystem, for instance, to configure the ADSL parameters, you must first enter the ADSL subsystem by entering the `adsl` command. When you are in a subsystem, the system reminds you by including the subsystem name in the command prompt, for example,

```
192.168.1.1 adsl>
```

To get back to the top level prompt from a subsystem, use the `home` command.

The remainder of this user's guide describes CI Commands that are helpful for configuring network modules.

4.3.1 Help Facility

The system includes a help facility to provide you with online assistance.

- You can issue the `help` or `?` command at any time. The system will display a list of available commands in response.
- You can issue `help` with a command name to get more details about it, for instance, the command

```
192.168.1.1> help version
```

yields

```
version                         - show system software version
```

The system responds with a description of the `version` command.

4.3.2 Saving Your Configuration

Always remember to save your configuration using the following syntax:

```
192.168.1.1> config save
```

This command saves all system configurations into nonvolatile memory. You must use this command to save any configurations that you make, otherwise the AES-100 will return to its default settings when it is restarted.

Do not turn off your AES-100 while saving your configuration.

4.4 Commonly Used Commands

This section shows you commonly used commands.

4.4.1 Uptime Command

Syntax:

```
192.168.1.1> uptime
```

This command shows the elapsed time the system has been running since the last reboot.

4.4.2 Version Command

Syntax:

```
192.168.1.1> version
```

This command shows the system firmware version and date

4.4.3 Restart Command

Syntax:

```
192.168.1.1> restart
```

This command instructs the system to perform a warm start, that is, restarting the system without turning the power off and on.

4.4.4 Passwd Command

Syntax:

```
192.168.1.1> passwd
```

This command changes the management password. The management password is used for authentication at console or Telnet login. This command is only allowed for local console management sessions. The management password must be from 1 to 8 characters long and any character is accepted. The factory default password is "1234".

It is very important that you remember your password. If you forget it, refer to the *Troubleshooting* section for help.

4.4.5 Config Print Command

Syntax:

```
192.168.1.1> config print
```

This command lists all current system configuration settings.

4.4.6 Exit Command

Syntax:

```
192.168.1.1> exit
```

This command terminates the console or telnet management session.

4.5 Sys Commands

4.5.1 Info Command

Syntax:

```
192.168.1.1 sys> info
```

This command displays system related information.

4.5.2 Set Name Command

Syntax:

```
192.168.1.1 sys> set name <name>
```

This command allows you to set the name of your AES-100. The previous setting will be cleared if the command is entered with the `<name>` parameter omitted.

4.5.3 Set Contact Command

Syntax:

```
192.168.1.1 sys> set contact [<name>]
```

This command allows you to set the name of the contact person for your AES-100. The previous setting will be cleared if the command is entered with the name omitted.

4.5.4 Set Location Command

Syntax:

```
192.168.1.1 sys> set location [<name>]
```

This command allows you to set the location of your AES-100. The previous setting will be cleared if the command is entered with the location omitted.

4.5.5 Set Mode

Syntax:

```
192.168.1.1 sys> set mode [fast/normal]
```

where

`fast` = makes use of the "tag" subset of the IEEE 802.1Q standard to identify the source port of a frame and speed traffic through a service gateway.

`Normal` = switches packets using a layer two switch (IEEE 801.1D) transparent bridge standard. Use normal mode when you are using a regular gateway.

This command lets you set the ADSL Networking Module into fast or normal mode. Determine which mode you are using by entering the `info` command.

Enable fast mode only when you are using a service gateway.

4.6 Secured Host Commands

Allow up to ten remote users to access your AES-100 via IP addresses you specify.

4.6.1 Secured Host Command

Syntax:

```
192.168.1.1 sys> secured host [<mode>]
```

where

`<mode>` = "enable" or "disable".
If `<mode>= disable` (default), then anyone may access your AES-100.
If `<mode>= enable`, then only those users with IP addresses specified by you may access your AES-100 (refer to the S*ecured Host Add* command).

This command enables/disables the secured host function. To display current secured host settings, simply enter the command `secured host.`

4.6.2 Secured Host Add Command

Syntax:

```
192.168.1.1 sys> secured host add <host IP>
```

where

`<host IP>` = IP address of a secured host.

This command adds the IP address of a secured host. You may add up to ten IP addresses.

4.6.3 Secured Host Delete Command

Syntax:

```
192.168.1.1 sys> secured host delete <host IP>
```

where

`<host IP>` = IP address of a secured host.

This command deletes the IP address of a previously added secured host.

4.7 UNIX Syslog Commands

Use UNIX syslog commands to send logs to your UNIX syslog server. If the ADSL link is on or goes down, the AES-100 will send a log to your UNIX syslog server. The table, shown next, indicates what is logged in each case.

Table 4-1 Logs Sent to Your UNIX Server

ADSL LINK ON	ADSL LINK DOWN
port number	port number
sequence number	sequence number
rate	-

If your Unix syslog server is down these logs will be lost.

4.7.1 Syslog Command

Syntax:

```
192.168.1.1 sys> syslog [<mode>]
```

where

`<mode>` = enable or disable.

This command enables or disables the sending of logs to your Unix syslog server. The default is disable (`<mode>`= disable). A log is sent if `<mode>= enable`. To display current settings, do not specify a `<mode>`.

4.7.2 Syslog Facility Command

Syntax:

```
192.168.1.1 sys> syslog facility <facility>
```

where

`<facility>` = local1 to local7.

This command sets the syslog facility for the UNIX system.

4.7.3 Syslog Server Command

Syntax:

```
192.168.1.1 sys> syslog server <server IP>
```

where

`<server IP>` = IP address of syslog server.

This command sets the UNIX syslog server IP address. If `<server IP>=0.0.0.0` (default), then logs will be dropped (not be sent).

4.8 System Error Log Commands

The system error log will record error events locally to the AES-100 memory. You may clear or display these logs using the commands listed in this section.

The following lists what logs the system error log can record.

- ADSL link on (port number, sequence number, rate, noise margin, attenuation)
- ADSL link down (port number, sequence number, noise margin, attenuation)
- ADSL OVER_HEAT_ACTIVE (temperature)
- ADSL OVER_HEAT_RELEASE (temperature)
- Console session begin
- Console session end
- Telnet session begin
- Telnet session end
- Incorrect telnet password
- Insecure telnet access (IP address)
- FTP session begin
- FTP session end
- Incorrect FTP password
- Insecure FTP access (IP address)
- FTP image error (reason)
- FTP receive file OK (file name)
- System reboot

4.8.1 Errlog Display Command

Syntax:

```
192.168.1.1 sys> errlog display
```

This command displays the system error log.

4.8.2 Errlog Clear Command

Syntax:

```
192.168.1.1 sys> errlog clear
```

This command clears the system error log.

If you clear a log (using the `errlog clear` command), you may not view it again.

4.8.3 Saving and Viewing a Previous Error Log

You may save and view a previous error log after warm restarting the AES-100 (refer to *Figure 4-1*).

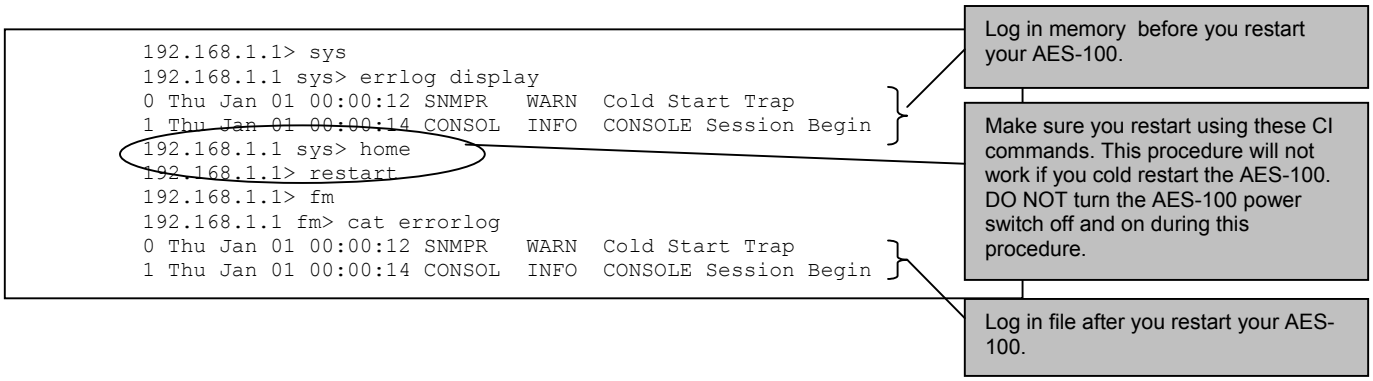


Figure 4-1 Example: Procedure to Save and View a Previous Error Log

Chapter 5
ADSL Configuration

The ADSL (Asymmetrical Digital Subscriber Line) subsystem allows you to configure and monitor the ADSL ports.

5.1 ADSL Standards

The AES-100 supports both the G.lite and the G.dmt standards. G.lite is intended to minimize the cost for the consumer market.

Table 5-1 Maximum Transfer Rates of the AES-100's ADSL Ports

STANDARD	MAXIMUM DOWNSTREAM	MAXIMUM UPSTREAM
G.dmt	8160 Kbps	1024 Kbps
G.lite	1536 Kbps	512 Kbps
T1.413	8160 Kbps	1024 Kbps

5.2 Profiles

A profile is a table that contains a list of pre-configured ADSL settings. Each ADSL port has one (and only one) profile assigned to it at any given time. The profile defines the maximum and minimum upstream/downstream rates, the target upstream/downstream signal noise margins, and the maximum and minimum upstream/downstream acceptable noise margins of all the ADSL ports that have this profile. You can configure multiple profiles, including profiles for troubleshooting.

Profiles allow you to configure ADSL ports efficiently. You can configure all of the ADSL ports with the same profile by modifying the profile, thus removing the need to configure the ADSL ports one-by-one. You can also change an individual ADSL port by assigning it a different profile.

For example, you could set up different profiles for different kinds of accounts (say economy, standard and premium). Assign the appropriate profile an ADSL port to and it takes care of a large part of the port's configuration. You still get to individually enable or disable each port, as well as configure its encapsulation type, multiplexing mode, VPI, VCI and operational mode. See later in this chapter for how to configure profiles.

5.3 Configured Vs. Actual Rate

You configure the maximum rate of an individual ADSL port by modifying its profile (see the `set profile` command) or assigning the port to a different profile (see the `set port` command). However, due to noise and other factors on the line, the actual rate may not reach the maximum that you specify.

Even though you can specify arbitrary numbers in the `set profile` command, the actual rate is always a multiple of 32 Kbps. If you enter a rate that is not a multiple of 32 Kbps, the actual rate will be the next lower multiple of 32Kbps. For instance, if you specify 60 Kbps for a port, the actual rate for that port will not exceed 32 Kbps, and if you specify 66 Kbps, the actual rate will not be over 64Kbps.

Note that when you configure an ADSL port, the upstream rate must be less than or equal to the downstream rate. Note also that the `list port` command displays the configured parameters of the ADSL port, while the `show port` command displays the actual rates.

5.4 Default Settings

The default profile always exists and all of the ADSL ports belong to it when the AES-100 is shipped. The default profile's name is set to `DEFVAL`.

5.4.1 Default Profile Settings

The following are the settings of the default profile.

- Name: DEFVAL
- Profile Status: Active

Downstream ADSL settings:

- Target Signal/Noise Ratio: 6 db
- Maximum Signal/Noise Ratio: 31 db
- Minimum Signal/Noise Ratio: 0 db
- Minimum Transmission Rate: 32 Kbps
- Maximum Transmission Rate: 2048 Kbps

Upstream ADSL settings:

- Target Signal/Noise Ratio: 6 db
- Maximum Signal/Noise Ratio: 31 db
- Minimum Signal/Noise Ratio: 0 db
- Minimum Transmission Rate: 32 Kbps
- Maximum Transmission Rate: 512 Kbps

5.4.2 Other Default Settings

The factory default settings for all ADSL ports of the AES-100 are

- Encapsulation: RFC 1483
- Multiplexing: LLC-based
- VPI : 0
- VCI : 33
- Enable/Disable State: disabled
- Operational mode: auto

5.5 ADSL Commands

5.5.1 Config Save Command

Syntax:

```
192.168.1.1 adsl> config save
```

The `config save` command saves the ADSL configuration into nonvolatile memory.

5.5.2 Disable Port Command

Syntax:

```
192.168.1.1 adsl> disable port <port number>
```

where

`<port number>` = port number, from 1 to 8

The `disable port` command forcibly disables the specified ADSL port.

The factory default of all ports is disabled. A port must be enabled before data transmission can occur. An enabled but disconnected ADSL port generates more heat than an operating port. To minimize heat generation and to enhance reliability, remember to disable a port when it is not in use.

5.5.3 Disable Ports Command

Syntax:

```
192.168.1.1 adsl> disable ports
```

The `disable ports` command forcibly disables all ADSL ports.

The factory default of all ports is disabled. A port must be enabled before data transmission can occur. An enabled but disconnected ADSL port generates more heat than an operating port. To minimize heat generation and to enhance reliability, remember to disable a port when it is not in use.

5.5.4 Enable Port Command

Syntax:

```
192.168.1.1 adsl> enable port <port number>
```

where

`<port number>` = port number, from 1 to 8

The `enable port` command forcibly enables the specified ADSL port.

The factory default of all ports is disabled. A port must be enabled before data transmission can occur. An enabled but disconnected ADSL port generates more heat than an operating port. To minimize heat generation and to enhance reliability, remember to disable a port when it is not in use.

5.5.5 Enable Ports Command

Syntax:

```
192.168.1.1 adsl> enable ports
```

The `enable ports` command forcibly enables all ADSL ports.

The factory default of all ports is disabled. A port must be enabled before data transmission can occur. An enabled but disconnected ADSL port generates more heat than an operating port. To minimize heat generation and to enhance reliability, remember to disable a port when it is not in use.

5.5.6 Linedata Command

Syntax:

```
192.168.1.1 adsl> linedata <port number>
```

where

`<port number>` = port number, from 1 to 8

The `linedata` command shows the line bit allocation of an ADSL port.

An example is shown next.

```
192.168.1.1 adsl> linedata 7
DS carrier load: number of bits per symbol(tone):
tone   0- 31:  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
tone  32- 63:  0  0  0 22 22 33 33 33 33 33 33 44 33 44 44 44
tone  64- 95:  4 44 44 43 43 33 34 44 33 44 44 34 44 43 33 44
tone  96-127: 44 43 34 44 44 33 43 44 44 34 44 44 33 44 44 44
tone 128-159: 44 44 44 34 44 34 43 44 33 43 34 33 33 33 33 34
tone 160-191: 43 33 33 34 34 33 23 33 33 33 22 33 33 33 33 33
tone 192-223: 33 33 33 23 22 33 33 33 23 33 33 33 22 23 22 32
tone 224-255: 22 22 22 22 20 22 22 22 20  0  0  0  0  0  0  0
US carrier load: number of bits per symbol(tone)
tone   0- 31:  0  0  0  0  2 34 55 77 88 89 99 99 99 98 88 87
tone  32- 63:  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
```

The results can determine whether a given sub-carrier loop has sufficient margins to support ADSL transmission rates, and possibly to determine whether certain specific types of interference or line attenuation exist.

The bit allocation contents are only valid when the link is up.

5.5.7 Lineinfo Command

Syntax:

```
192.168.1.1 adsl> lineinfo <port number>
```

where

`<port number>` = port number, from 1 to 8

The `lineinfo` command shows the line operating values of an ADSL port.

An example is shown next.

```
192.168.1.1 adsl> lineinfo 7
```

```
Current Operating Modes:
    Data Mode: ATM    Service Type in operation: G.DMT
    Number of Channels (Down/up stream): 1/1
    Downstream Framing Structure       : 3
    Active down/up stream rate option  : 1/1
    TRELLIS operation mode is          : ON
Current Connection detail:
    Down/up stream interleaved Delay :  4/ 4 ms
    Downstream Parity byte assigned to fast/interleaved : 0/ 2
    Upstream   Parity byte assigned to fast/interleaved : 0/ 2
    Downstream Symbols assigned to fast/interleaved     : 0/ 1
    Upstream   Symbols assigned to fast/interleaved     : 0/ 1
    Down/up stream Depth value       :  2/ 2
    Total Transceiver Output Power   :  8dB
Current ATUR Information:
    Country code 0
    Provider Code 01020304
    Capabilities:
        g.dmt  POTS overlap (Annex A)
```

The results contain the operating modes, interleave delay, parity byte assignment, parity bytes per codeword, symbols per codeword and interleave depth. `Current ATUR Information` contains data acquired from the ATUR (stands for ADSL Termination Unit – Remote, in this case the user's ADSL modem or router) during negotiation/provisioning message interchanges. It includes the Vendor ID and Version Number obtained from Vendor ID fields (g.994.1) or R-MSGS1(T1.413) and country code from Vendor ID (g.994.1).

Information obtained prior to training to steady state transition will not be valid or will be old information.

5.5.8 Lineperf Command

Syntax:

```
192.168.1.1 adsl> lineperf <port number>
```

where

`<port number>` = port number, from 1 to 8

The `lineperf` command shows the line performance counters of an ADSL port.

An example is shown next.

```
192.168.1.1 adsl> lineperf 7
 nfebe-I/nfebe-ni                : 0/0
 ncrc-I/ncrc-ni                  : 0/0
 nfecc-I/nfecc-ni                : 0/0
 nfec-I/nfec-ni                  : 0/0
 nblks-ds/nblks-us               : 120878/120878
```

```
nsec-ds/nsec-us                 : 2060/2060
n-eb-ds/n-eb-us                 : 0/0
n-bbe-ds/n-bbe-us               : 0/0
n-es-ds/n-es-us                 : 0/0
n-ses-ds/n-ses-us               : 0/0
non-ses-blks-ds/non-ses-blks-us : 120878/120878
n-uas-ds/n-uas-us               : 0/0
fe_loss_seconds/ne_loss_seconds : 0/0
fe_fec_seconds/ne_fec_seconds   : 0/0
fast_trains                     : 0
fast_trains_fail                : 0
```

These counts contain line performance data that has been accumulated since the system started. In the list above the definitions of near end/far end will always be relative to the ATU-C (ADSL Termination Unit-Central Office). Downstream (ds) refers to data from the ATU-C and upstream (us) refers to data from the ATU-R.

5.5.9 Linerate Command

Syntax:

```
192.168.1.1 adsl> linerate <port number>
```

where

`<port number>` = port number, from 1 to 8

The `linerate` command shows the line rate parameters of an ADSL port.

An example is shown next.

```
192.168.1.1 adsl> linerate 7
Current Active Rates:
    AS0 downstream rate              :  2048 Kbps
    AS1 downstream rate              :     0 Kbps
    LS0 upstream   rate              :   512 Kbps
    LS1 upstream   rate              :     0 Kbps
    Down/up stream noise Margin            : 31/22 dB
    Down/up stream Attenuation       :  0/ 0 dB
    Attainable Down/up stream Rate   : 11456/ 1344 Kbps
```

These results contain the current downstream and upstream operating values (SHOWTIME) for the requested line, the latest available downstream and upstream noise margins, channel attenuation and the maximum attainable rate.

Downstream and upstream noise margins must both be at least 6 dB. The initial downstream and upstream noise margins are first set during training. The upstream margin is recalculated every 15 seconds during "showtime" at the ATU-C and the downstream margin updates every 15 seconds during "showtime" by using EOC messaging.

Information obtained prior to training to steady state transition will not be valid or will be old information.

5.5.10 List Port Command

Syntax:

```
192.168.1.1 adsl> list port <port number>
```

where

`<port number>` = port number, from 1 to 8

The `list port` command shows the configured maximum upstream/downstream rates, the mode (or standard), and enable/disable state of an individual ADSL port.

5.5.11 List Ports Command

Syntax:

```
192.168.1.1 adsl> list ports
```

The `list ports` command shows the configured maximum rates, modes and states of all ADSL ports.

5.5.12 Set Profile Command

Syntax:

```
192.168.1.1 adsl> set profile <name> <atur max rate > <atuc max rate> [<atur ...> <atuc ...>]
        <atux ...> = <target margin> <min margin> <max margin> <min rate>
```

where

`<name>` =	The name of the profile (up to 32 characters).
`<atur max rate>` =	The maximum ADSL upstream transmission rate.
`<atuc max rate>` =	The maximum ADSL downstream transmission rate.
`<atur target margin>` =	The target ADSL upstream signal/noise margin (0..31db).
`<atuc target margin>` =	The target ADSL downstream signal/noise margin (0..31db).
`<atur min margin>` =	The minimum acceptable ADSL upstream signal/noise margin (0..31db).
`<atuc min margin>` =	The minimum acceptable ADSL downstream signal/noise margin (0..31db).
`<atur max margin>` =	The maximum acceptable ADSL upstream signal/noise margin (0..31db).
`<atuc max margin>` =	The maximum acceptable ADSL downstream signal/noise margin (0..31db).
`<atur min rate>` =	The minimum ADSL upstream transmission rate in Kbps.
`<atuc min rate>` =	The minimum ADSL downstream transmission rate in Kbps.

ATU-C (`atuc`) stands for ADSL Termination Unit-Central and refers to downstream transmission and ATU-R (`atur`) stands for ADSL Termination Unit-Remote and refers to upstream transmission.

The profile is a table that contains information on ADSL line configuration. Each entry in this table reflects a parameter defined by a manager, which can be used to configure the ADSL line.

Note that the default value will be used for any of the above fields that are omitted.

The upstream rate must be less than or equal to the downstream rate.

Even though you can specify arbitrary numbers in the `set profile` command, the actual rate is always a multiple of 32 Kbps. If you enter a rate that is not a multiple of 32 Kbps, the actual rate will be the next lower multiple of 32Kbps. For instance, if you specify 60 Kbps for a port, the actual rate for that port will not exceed 32 Kbps, and if you specify 66 Kbps, the actual rate will not be over 64Kbps.

An example is shown next.

```
192.168.1.1 adsl> set profile debug 800 8000
```

This command sets the maximum upstream transmission rate to 800 kbps and the maximum downstream transmission rate to 8000 kbps. None of the other settings are changed

5.5.13 Delete Profile Command

Syntax:

```
192.168.1.1 adsl> delete profile <name>
```

where

`<name>` = profile name

The `delete profile` command allows you to delete an individual profile index by its name.

5.5.14 List Profiles Command

Syntax:

```
192.168.1.1 adsl> list profiles
```

The `list profiles` command displays all of the configured ADSL profiles and which ADSL ports are assigned to each.

An example is shown next.

```
192.168.1.1 adsl> list profiles
Profile 1 : DEFVAL
Profile 2 : debug


Port 1, Profile : DEFVAL
Port 2, Profile : DEFVAL
Port 3, Profile : DEFVAL
Port 4, Profile : debug
Port 5, Profile : DEFVAL
Port 6, Profile : DEFVAL
Port 7, Profile : DEFVAL
Port 8, Profile : DEFVAL
```

This display shows that there are two profiles (DEFVAL and debug) and that port 4 belongs to the debug profile while ports 1, 2, 3, 5, 6, 7 and 8 belong to the DEFVAL profile.

5.5.15 Show Profile Command

Syntax:

```
192.168.1.1 adsl> show profile <name>
```

where

<name> = a profile name

The show profile command displays the settings of an ADSL profile.

An example is shown next.

```
192.168.1.1 adsl> show profile debug
#Entry type : adslLineConfProfileEntry
ConfProfileName : debug
AtucConfTargetSnrMgn : 6 db
AtucConfMaxSnrMgn : 31 db
AtucConfMinSnrMgn : 0 db
AtucChanConfInterleaveMinTxRate : 32 Kbps
AtucChanConfInterleaveMaxTxRate : 8000 Kbps
AturConfTargetSnrMgn : 6 db
AturConfMaxSnrMgn : 31 db
AturConfMinSnrMgn : 0 db
AturChanConfInterleaveMinTxRate : 32 Kbps
AturChanConfInterleaveMaxTxRate : 800 Kbps
ConfProfileRowStatus : active(1)
```

This display shows that the maximum upstream ransmission rate is set to 800 kbps and the maximum downstream transmission rate is set to 8000 kbps. All of the other settings are still at the default values.

5.5.16 Show Profiles Command

Syntax:

```
192.168.1.1 adsl> show profiles
```

The show profiles command displays the settings of all the ADSL profiles.

5.5.17 Set Port Command

Syntax:

```
192.168.1.1 adsl> set port <port number> <profile name> <oper mode>
```

where

<port number> =	Port number ranging from 1 to 8.
<profile name> =	The profile that will define the settings of this port.
<oper mode> =	Operational mode; the available choices are glite, gdmt, t.413 or auto.

The set port command assigns an individual port to a specific profile and sets the port's mode, or standard. The profile defines the maximum and minimum upstream/downstream rates, the target upstream/downstream signal noise margins, and the maximum and minimum upstream/downstream acceptable noise margins of all the ADSL ports that are assigned to it.

The mode parameter specifies the standard that this port is allowed. When set to auto, the AES-100 follows whatever mode is set on the other end of the line.

When the mode is set to auto and the negotiated mode is G.lite, if the configured rates exceed those allowed by G.lite, the actual rates are governed by G.lite, regardless of the configured numbers.

An example is shown next.

```
192.168.1.1 adsl> set port 4 debug auto
```

This command sets ADSL port 4 to have the debug profile. The results of this command are reflected when you use the list profiles command.

5.5.18 Set Ports Command

Syntax:

```
192.168.1.1 adsl> set ports <profile name> <oper mode>
```

where

`<profile name> =`	The profile that will define the settings of this port.
`<oper mode> =`	Operational mode; the available choices are glite, gdmt, t1.413, or auto.

The `set ports` command assigns a specific profile to all of the ADSL ports and sets all of the ports to one mode, or standard. The profile defines the maximum and minimum upstream/downstream rates, the target upstream/downstream signal noise margins, and the maximum and minimum upstream/downstream acceptable noise margins of all the ADSL ports.

The mode parameter specifies the standard that this port is allowed. When set to auto, the AES-100 follows whatever mode is set on the other end of the line.

When the mode is set to auto and the negotiated mode is G.lite, if the configured rates exceed those allowed by G.lite, the actual rates are governed by G.lite, regardless of the configured numbers.

5.5.19 Show Port Command

Syntax:

```
show port <port number>
```

where

`<port number> =` port number, from 1 to 8

The show port command shows the line status (up or down), the actual upstream/downstream rates and mode of an individual ADSL port.

5.5.20 Show Ports Command

Syntax:

```
192.168.1.1 adsl> show ports
```

The `show ports` command shows the line status (up or down), the actual upstream/downstream rates and the mode of all ADSL ports.

5.5.21 Set PVC Command

Syntax:

```
192.168.1.1 adsl> set pvc <port number> <multiplexing mode> <tx vpi> <tx vci> [<rx vpi> <rx vci>]
```

where

`<port number> =` port number, from 1 to 8.

`<multiplexing mode> =` either "llc" or "vc"

`<tx vpi> =` the VPI setting of the ADSL port for use with a TX based network

`<tx vci> =` the VCI setting for the ADSL port for use with a TX based network

`<rx vpi> =` the VPI setting for the ADSL port for use with Rx based networks

`<rx vci> =` the VCI setting for the ADSL port for use with Rx based networks

The `<rx vpi>` and `<rx vci>` settings will be equal to those of `<tx vpi>` and `<tx vci>` if the rx settings are not configured.

The `set pvc` command allows the configuration of a PVC (permanent virtual circuit) for an individual ADSL port.

5.5.22 Set PVCs Command

Syntax:

```
192.168.1.1 adsl> set pvcs <multiplexing mode> <tx vpi> <tx vci> [<rx vpi> <rx vci>]
```

where

`<multiplexing mode> =` either "`llc`" or "`vc`"

`<tx vpi> =` the VPI setting of the ADSL ports for use with a TX based network

`<tx vci> =` the VCI setting for the ADSL ports for use with a TX based network

`<rx vpi> =` the VPI setting for the ADSL ports for use with Rx based networks

`<rx vpi> =` the VCI setting for the ADSL ports for use with Rx based networks

The `<rx vpi>` and `<rx vci>` settings will be equal to those of `<tx vpi>` and `<tx vci>` if the rx settings are not configured.

The `set pvcs` command allows you to configure a single PVC for all of the ADSL ports at once.

5.5.23 Show PVC Command

Syntax:

```
192.168.1.1 adsl> show pvc <port number>
```

where

`<port number> =` port number, from 1 to 8.

The `show pvc` command allows you to display the PVC parameters of an individual ADSL port.

5.5.24 Show PVCs command

Syntax:

```
192.168.1.1 adsl> show pvcs
```

The `show pvcs` command allows you to display the PVC parameters of all ADSL ports.

Chapter 6
10/100M Fast Ethernet Port Commands

The Ethernet subsystem allows you to configure and monitor the 10/100M fast Ethernet port.

6.1 10/100M Auto-Sensing Ethernet

The AES-100 supports 10/100Mbps auto-sensing Ethernet. There are two factors related to the connection of two Ethernet ports: rate and duplex mode. In a 10/100Mbps fast Ethernet, the rate can be 10Mbps or 100Mbps and the duplex mode can be half duplex or full duplex. The auto-negotiation capability makes one Ethernet port able to negotiate with a peer automatically to obtain the optimal connection rate and duplex mode.

When auto-negotiation is turned on, the Ethernet port of the AES-100 negotiates with the peer Ethernet port on the Ethernet cable automatically to determine the optimal connection rate and duplex mode. If the peer Ethernet port does not support auto-negotiation or turns off this feature, the AES-100 determines the connection rate by detecting the signal on the cable and using half duplex mode. When the AES-100's auto-negotiation is turned off, the Ethernet port uses the pre-configured rate and duplex mode settings when making a connection, thus requiring you to check the settings of the peer Ethernet port in order to connect.

6.2 Ethernet Commands

6.2.1 Set Auto Command

Syntax:

```
192.168.1.1 ethernet> set auto <ON/OFF>
```

where

`<ON/OFF> = on or off`

This command sets the auto-negotiation of the Ethernet port either on or off.

6.2.2 Set Duplex Command

Syntax:

```
192.168.1.1 ethernet> set duplex <mode>
```

where

`<mode> = full or half`

This command sets the duplex mode used when auto-negotiation is turned off.

6.2.3 Set Speed Command

Syntax:

```
192.168.1.1 ethernet> set speed <speed>
```

where

`<speed>` = 10 or 100

This command sets the connection speed used when auto-negotiation is turned off. `10` stands for 10Mbps and `100` stands for 100Mbps.

6.2.4 Status Command

Syntax:

```
192.168.1.1 ethernet> status
```

This command shows the current status of the Ethernet port.

Chapter 7
Bridge Commands

This chapter discusses the bridge subsystem. It allows you to configure and monitor the bridging, configure MAC filters, port-based VLANs and tagged frame functions of the AES-100.

The AES-100 supports IEEE 802.1D transparent bridging; but not the static filtering feature or spanning tree protocol. The bridge learns the source MAC addresses of sender hosts by inspecting incoming Ethernet frames and recording the learned MAC addresses with their incoming port numbers into its filtering database. Based on the database, the bridge forwards each incoming frame to its destination port.

7.1 Bridge Port Numbers

The bridge subsystem of the AES-100 defines its own numbering convention for ports.

The bridge has a total of nine ports: bridge port 1 stands for the Ethernet port, bridge port 2 stands for ADSL port 1, bridge port 3 stands for ADSL port 2, and so on.

Be sure you have clarified the relation between bridge ports and ADSL ports.

7.2 Basic Commands

7.2.1 Config Save Command

Syntax:

```
192.168.1.1 bridge> config save
```

This command saves the bridge configuration into nonvolatile memory. You must use this command to save any configurations that you make, otherwise the AES-100 will return to its default settings when it is restarted.

Do not turn off your AES-100 while saving your configuration.

7.2.2 Device Command

Syntax:

```
192.168.1.1 bridge> device
```

This command shows information on all bridge ports.

7.2.3 Status Command

Syntax:

```
192.168.1.1 bridge> status
```

This command displays the bridge status.

7.3 MACfilter Commands

Use MACfilter commands to filter incoming packets based on MAC (Media Access Control) address(es) that you specify. If you do not use this command, your AES-100 will not filter packets. MACfilter commands are listed next. You may specify up to five MAC addresses per port.

7.3.1 MACfilter Command

Syntax:

```
192.168.1.1 bridge> macfilter [<port>]
```

where

`<port>` = a bridge port number.

This command displays the MAC filtering status and the fixed source MAC addresses on a port or on all ports if no port is specified.

7.3.2 Macfilter Enable Command

Syntax:

```
192.168.1.1 bridge> macfilter enable [<port>]
```

where

`<port>` = a bridge port number.

This command enables the MAC filtering feature on a specific port or on all ports if no port is specified.

7.3.3 Macfilter Disable Command

Syntax:

```
192.168.1.1 bridge> macfilter disable [<port>]
```

where

`<port>` = a bridge port number.

This command disables the MAC filtering feature on a specific port or on all ports if no port is specified.

7.3.4 Macfilter Add Command

Syntax:

```
192.168.1.1 bridge> macfilter add <port> <mac>
```

where

`<port>` = a bridge port number.

`<mac>` = the source MAC address in "00:a0:c5:12:34:56" format.

This command adds a source MAC address fixed on a specified port. You may add up to five MAC addresses.

7.3.5 Macfilter Delete Command

Syntax:

```
192.168.1.1 bridge> macfilter delete <port> <mac>
```

where

`<port>` = a bridge port number.

`<mac>` = the source MAC address in "00:a0:c5:12:34:56" format.

This command removes a configured source MAC address from a port specified by you.

7.4 Filter Commands

7.4.1 Filter Command

Syntax:

```
192.168.1.1 bridge> filter
```

This command displays the filtering database.

7.4.2 A Note about IGMP Snooping

Traditionally, IP packets are transmitted in one of either two ways - Unicast (1sender to 1 recipient) or Broadcast (1 sender to everybody on the network). Multicast delivers IP packets to just a group of hosts on the network. IGMP (Internet Group Multicast Protocol) is a session-layer protocol used to establish membership in a Multicast group - it is not used to carry user data. Refer to RFC 2236 for information IGMP version 2 and RFC 1112 for IGMP version 1. A Layer 2 switch can passively snoop on IGMP Query and Report packets transferred between IP Multicast Routers/Switches and IP Multicast host groups to learn the IP Multicast group members. It checks IGMP packets passing through it, picks out the group registration information, and configures multicasting accordingly. IGMP Snooping generates no additional network traffic, allowing you to significantly reduce the multicast traffic passing through your switch.

7.4.3 Mfilter Command

Syntax:

```
192.168.1.1 bridge> mfilter
```

This command displays the multicast filtering database. The `mfilter` command is what allows you to monitor the AES-100's IGMP snooping activities.

The following is an example of a multicast filtering database.

```
192.168.1.1 bridge> mfilter

ID        GDA              MAC       Member Ports
```

```
0   239.255.255.250      7f-ff-fa      1, 2
1   224.000.001.022      00-01-16      1, 3, 4
2   235.001.001.006      01-01-06      1, 2, 5, 7,8
3   229.055.150.208      37-96-d0      1, 9
4   224.000.001.060      00-01-3c      1, 3, 5, 6
5   235.209.237.084      51-ed-54      1, 4, 6, 9


Total 6 entries.
IGMP version 2
Query Received 343
Max Response Time 100 * 1/10 seconds
Query Interval 125 seconds
```

where

ID	The location of the entry in the multicast filtering database.
GDA	Group Destination Address. The IP address of a multicast group destination.
MAC	The last 3 bytes of the multicast MAC that the GDA is mapped to.
Member Ports	The ports that belong to this multicast group. 1= Ethernet, 2= ADSL port 1, 3=ADSL port 2 and so on.
IGMP version	The version of IGMP being used in the network.
Query Received	The number of query packets received by the AES-100.
Max Response Time	The longest period of time used to respond to a query packet, measured in tenths of a second.
Query Interval	The time period between query packets.

7.4.4 Filterage Command

Syntax:

```
192.168.1.1 bridge> filterage [age]
```

where

`age` = aging out timer period in seconds.

This command sets or shows the aging out timer period of the filtering database. It is recommended that you use the default setting. If the time interval is set too short, it could increase broadcast traffic and reduce the available bandwidth.

7.4.5 Flush Command

Syntax:

```
192.168.1.1 bridge> flush [port]
```

where

`port` = A bridge port number

This command flushes out the filtering database of the specified bridge port. If the <port> field is omitted, this command will flush out the filtering databases of all ports.

7.4.6 Info Command

Syntax:

```
192.168.1.1 bridge> info
```

This command shows the software number of the bridge implementation and the maximum size of the filtering database.

7.5 Port-Based VLAN Commands

The AES-100 VLAN (Virtual Local Area Network) mechanism can be used to limit the broadcast domain to the members of a VLAN group only. In this way, VLAN increases network performance by limiting broadcasts to a smaller and more manageable logical broadcast domain. In traditional switched environments, all broadcast packets go to each and every individual port.

The stations on a logical network belong to one group; however, a station can belong to more than one group. Users of one group are not allowed to access the resources of other groups and a higher level of security is achieved. This isolates the subscribers from one another and prevents a subscriber from discovering the resources, for example, shared drives or printers, of another subscriber.

In the AES-100 port-based VLAN, the allowable outgoing port(s) of each incoming port must be defined. Ethernet frames are forwarded according to these rules. Therefore, if you wish to allow two subscriber ports to talk to each other, for example, between conference rooms in a hotel, you must define the egress port (outgoing port) for both ports. An egress port is an outgoing port, that is, a port through which a data packet leaves. Port-based VLANs are specific only to the switch on which they were created.

The factory default settings for the port-based VLAN of the AES-100 are:

- Bridge port 1 (Ethernet port) allowed to all bridge ports
- Bridge port 2 (ADSL port 1) allowed to bridge port 1 (Ethernet port) only
- Bridge port 3 (ADSL port 2) allowed to bridge port 1 (Ethernet port) only
- Bridge port 4 (ADSL port 3) allowed to bridge port 1 (Ethernet port) only
- Bridge port 5 (ADSL port 4) allowed to bridge port 1 (Ethernet port) only
- Bridge port 6 (ADSL port 5) allowed to bridge port 1 (Ethernet port) only
- Bridge port 7 (ADSL port 6) allowed to bridge port 1 (Ethernet port) only
- Bridge port 8 (ADSL port 7) allowed to bridge port 1 (Ethernet port) only
- Bridge port 9 (ADSL port 8) allowed to bridge port 1 (Ethernet port) only

The default VLAN settings allow each ADSL port to communicate back and forth with only the Ethernet port, and not with other ADSL ports. The following figure illustrates this.

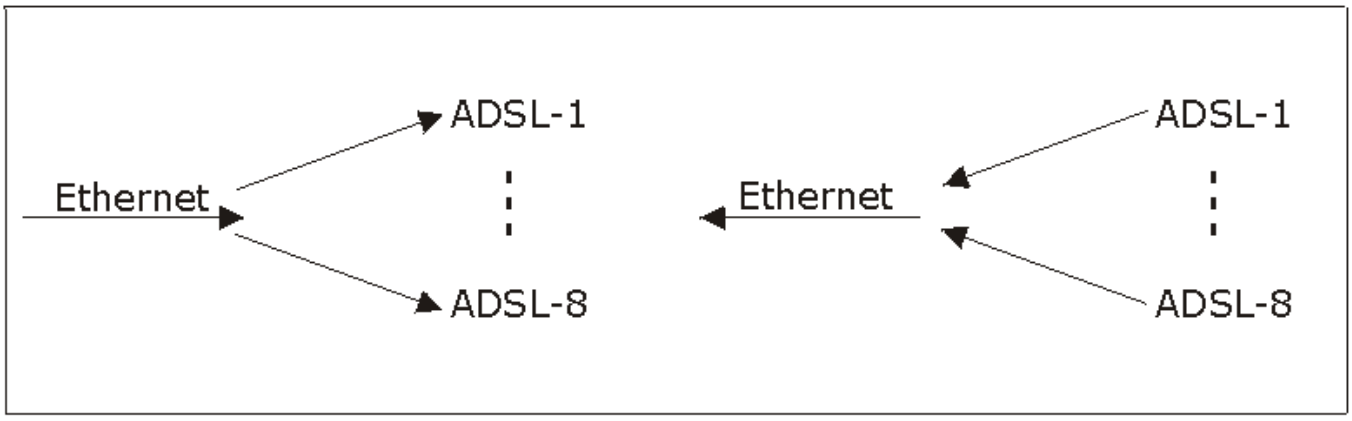


Figure 7-1 Default VLAN Settings

7.5.1 Portfilter Command

Syntax:

```
192.168.1.1 bridge> portfilter <source port> [all|<dest ports>]
```

where

`<source port>` = an incoming bridge port number.

`all` = all bridge ports are allowed outgoing ports.

`<dest ports>` = the outgoing bridge ports. Separate by a space if there is more than one port.

This command sets or displays the port-based VLAN configuration.

An example is shown next.

```
192.168.1.1 > bridge
192.168.1.1 bridge> portfilter
Port 1 (ethernet):       all
Port 2 (adsl1):          1
Port 3 (adsl2):          1
Port 4 (adsl3):          1
Port 5 (adsl4):          1
Port 6 (adsl5):          1
Port 7 (adsl6):          1
Port 8 (adsl7):          1
Port 9 (adsl8):          1
```

The above shows the current configuration of the port-based VLAN. It is the same as the default settings.

An example with an altered configuration is shown next.

```
192.168.1.1 > bridge
192.168.1.1 bridge> portfilter 2 1 3
192.168.1.1 bridge> portfilter 3 1 2
```

This example sets the allowed outgoing bridge ports of port 2 (ADSL port 1) to port 1 (Ethernet port) and port 3 (ADSL port 2). The allowed outgoing bridge ports of port 3 (ADSL port 2) are set to port 1 (Ethernet port) and port 2 (ADSL port1). This way ADSL ports 2 and 3 can communicate with each other and the Ethernet port. You can see the effects of this example by using the following command:

```
192.168.1.1 bridge> portfilter
Port 1 (ethernet):       all
Port 2 (adsl1):        1 3
Port 3 (adsl2):        1 2
Port 4 (adsl3):        1
Port 5 (adsl4):        1
Port 6 (adsl5):        1
Port 7 (adsl6):        1
Port 8 (adsl7):        1
Port 9 (adsl8):        1
```

The following figures illustrate the above example. Notice that ports 2 (ADSL port 1) and 3 (ADSL port 2) are able to communicate with each other, as well as with the Ethernet. All of the other ports will only be able to communicate with the Ethernet port.

The following figure illustrates the

```
192.168.1.1 bridge> portfilter 2 1 3
```

command line. Port 2 (ADSL port 1) is able to send to both the Ethernet port and port 3 (ADSL port 2).

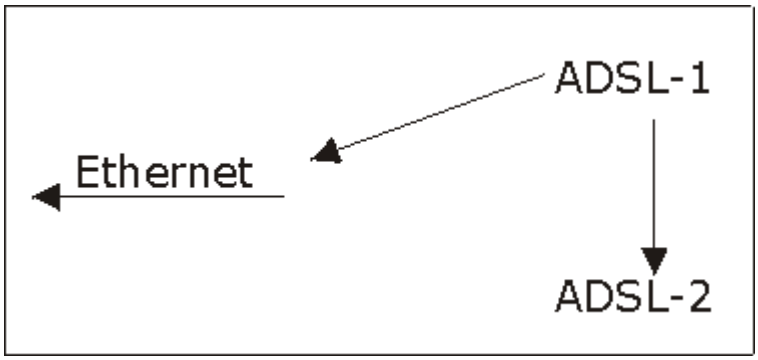


Figure 7-2 Example of Modified VLAN Port 2

The following figure illustrates the

```
192.168.1.1 bridge> portfilter 3 1 2
```

command line.

Port 3 (ADSL port 2) is able to send to both the Ethernet port and port 2 (ADSL port 1).

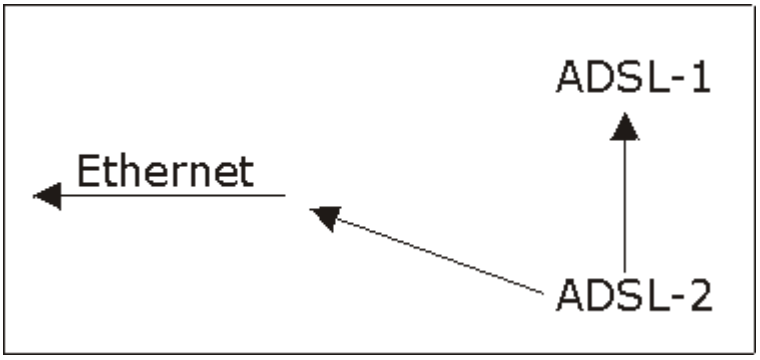


Figure 7-3 Example of Modified VLAN Port 3

The following figure illustrates that port 1 (the Ethernet port) is linked to ports 2 (ADSL port 1) and 3 (ADSL port 2). Ports 2 (ADSL port1) and 3 (ADSL port 2) are also linked to each other. Or, in other words, the following figure is a result of the following commands:

```
192.168.1.1 bridge> portfilter 2 1 3
192.168.1.1 bridge> portfilter 3 1 2
```

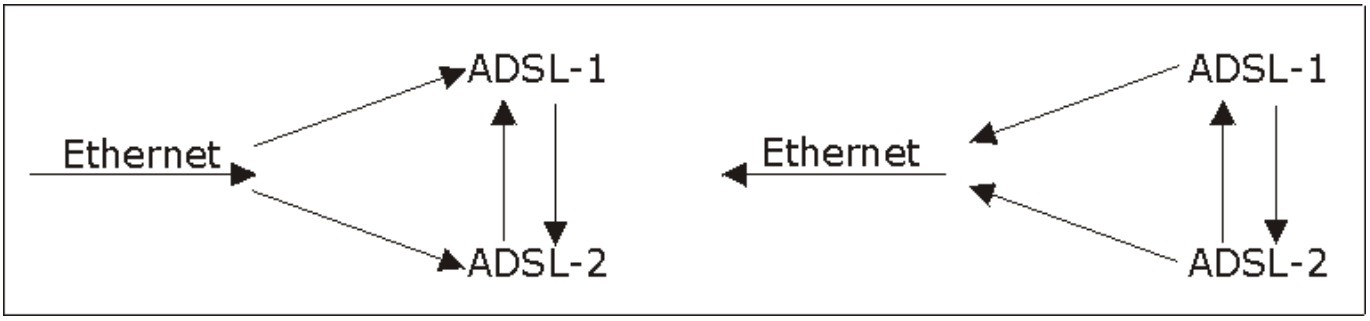


Figure 7-4 Example of Modified VLAN Settings

7.6 Tagged Ethernet Frames Commands (Fast Mode)

The ADSL Networking Module's fast mode makes use of the "tag" subset of the IEEE 802.1Q standard to identify the source port of an Ethernet frame and speed traffic through a service gateway. In this way, the source port of a frame can be recognized across switches.

7.6.1 PVID Command

Syntax:

```
192.168.1.1 bridge> pvid [<port> <vid>]
```

where

`<port>`	=	port number of the ADSL Networking Module. Port 0 is the CPU's port, port 1 is the Ethernet port and ports 2-9 are the bridge ports on ADSL Networking Module modules. These are logical ports.
`<vid>`	=	The tag number (or IEEE 802.1Q identification) that identifies the source port of an Ethernet frame. Allocate tag numbers for all logical ports on your ADSL Networking Module.

This command lets you allocate IEEE 802.1Q identification numbers (tags) on a port-by-port basis.

The command `192.168.1.1 bridge> pvid` displays the default port identification of all ADSL Networking Module ports.

The IEEE 802.1Q standard uses an explicit tag in the header to specify the VLAN ID (VID) of an Ethernet frame. In this way, the VLAN membership of a frame can be carried across switches. The following table displays the physical port and corresponding default PVID tag on the AES-100.

Table 7-1 Physical Ports, Port Numbers and AES-100 Default PVID Tags in Fast Mode

PHYSICAL PORT	PORT NUMBER	DEFAULT PVID TAG
CPU (Central Processing Unit)	0	1
ADSL Networking Module LAN Port (Ethernet)	1	N/A
ADSL Port 1	2	2
ADSL Port 2	3	3
ADSL Port 3	4	4
ADSL Port 4	5	5
ADSL Port 5	6	6
ADSL Port 6	7	7
ADSL Port 7	8	8
ADSL Port 8	9	9

Chapter 8
IEEE 802.1Q Tagged VLAN Commands

This chapter generally describes the IEEE 802.1Q Tagged VLAN and associated CI Commands.

8.1 Introduction

The IEEE 802.1Q Tagged VLAN allows your ADSL Networking Module to deliver tagged/untagged frames to and from its ports. The standard gives the ADSL Networking Module the ability to recognize VLAN-aware and VLAN-unaware devices and automatically strips tags off of frames destined for ports that would normally drop tagged frames.

The system mode of the ADSL Networking Module must be set to "Normal" (see *4.5.5*) in order to use the 802.1Q Tagged VLAN.

8.2 IEEE 802.1Q Tagged VLAN -Tags

When a LAN bridge receives a frame from a workstation, the VLAN from whence it came must be known so the bridge may respond, if necessary, to the source of the frame. This is accomplished by tagging. There are two kinds of tagging:

1. Explicit Tagging
   - A VLAN identifier is added to the frame header that identifies the source VLAN.
2. Implicit Tagging
   - The MAC (Media Access Control) number, the port or other information is used to identify the source of a VLAN frame.

The IEEE 802.1Q Tagged VLAN uses both explicit and implicit tagging.

8.3 VLAN-Aware/VLAN-Unaware Devices

It is important for the LAN bridge to determine what devices are VLAN-aware and VLAN-unaware so that it can decide whether to forward a tagged frame (to a VLAN-aware device) or first strip the tag from a frame and then forward it (to a VLAN-unaware device).

8.4 Filtering Databases

A filtering database stores and organizes VLAN registration information useful for routing frames to and from a LAN bridge. A filtering database consists of a static entries (Static VLAN or SVLAN table) and dynamic entries (Dynamic VLAN or DVLAN table).

8.4.1 Static Entries (SVLAN Table)

Static entry registration information is added, modified and removed by management only.

8.4.2 Dynamic Entries (DVLAN Table)

Dynamic entries are learned by the bridge and cannot be created or updated by management. The bridge learns this information by observing what port, source address and VLAN ID (or VID) is associated with a frame. Entries are added and deleted using GARP VLAN Registration Protocol (GVRP), where GARP is the Generic Attribute Registration Protocol.

8.5 IEEE 802.1Q Tagged VLAN Commands

Bridge port 1 stands for the Ethernet port, bridge port 2 stands for ADSL port 1, bridge port 3 stands for ADSL port 2, and so on.

8.5.1 Enabling the IEEE 802.1Q Tagged VLAN

The default for the IEEE 802.1Q Tagged VLAN is disable. Enable the IEEE 802.1Q Tagged VLAN by following the example shown next.

Syntax:

```
192.168.1.1 vlan1q> vlan enable
```

8.5.2 Disabling the IEEE 802.1Q Tagged VLAN

You can disable the IEEE 802.1Q Tagged VLAN by using the `VLAN Disable` command.

Syntax:

```
192.168.1.1 vlan1q> vlan disable
```

This command disables the IEEE 802.1Q Tagged VLAN.

8.5.3 PVID Command

Syntax:

```
192.168.1.1 vlan1q> pvid [<port #> <vlan id>]
```

where

`<port #> =` bridge port number. Valid parameter range = [1 - 9].

`<vlan id> =` VLAN ID. Valid parameter range = [1 - 4094].

This command sets the VLAN ID to a specific port in the PVID table. To display the PVID table simply enter this command without parameters, as shown next.

```
192.168.1.1 vlan1q> pvid
```

```
pvid        port#
-----       -----
1           1
1           2
1           3
1           4
1           5
1           6
1           7
1           8
1           9
192.168.1.1 vlan1q>
```

Figure 8-1 Example: PVID Command Display

8.5.4 SVLAN CPU Command

Syntax:

```
192.168.1.1 vlan1q> svlan cpu [<vid>]
```

where

`<vid>` = VLAN ID. Valid parameter range = [1 – 4094].

This command registers your CPU as a port member of the static VLAN with `<vid>`. To display the CPU static VLAN identification, simply enter this command without parameters, as shown next.

```
192.168.1.1 vlan1q> svlan cpu
```

8.5.5 SVLAN List Command

Syntax:

```
192.168.1.1 vlan1q> svlan list
```

This command displays the static VLAN registration table. The following figure is an example of what is displayed when you use this command.

```
vid        port#      ad_control     tag_control
--------   -------    ------------   ------------
   1         1         fixed          Tag
             2         normal         UnTag
             3         normal         UnTag

   2         1         normal         UnTag
             2         fixed          UnTag
             3         normal         UnTag

   3         1         normal         UnTag
             2         normal         UnTag
             3         fixed          UnTag
```

Figure 8-2 Example: SVLAN List Command Display

For more information about the *Svlan List* command display, refer to the *Svlan Setentry* command (shown next).

8.5.6 SVLAN Setentry Command

Syntax:

```
192.168.1.1 vlan1q> svlan setentry <vid> <port#> <ad_control> <tag_control>
```

where

`<vid>`	=	VLAN ID. Valid parameter range = [1 – 4094].
`<port#>`	=	bridge port number. Valid parameter range = [1 – 9].
`<ad_control>`	=	Registrar administration control flag. Valid parameters = [fixed, forbidden, normal]. Select *fixed* to register a `<port #>` to the static VLAN table with `<vid>`. Select *normal* to confirm registration of the `<port #>` to the static VLAN table with `<vid>`. Select *forbidden* to unregister a `<port #>` from the static VLAN table with `<vid>`.
`<tag_control>`	=	Tag control flag. Valid parameters = [tag, untag]. Select *tag* to tag outgoing frames. Select *untag* if you do not want to tag outgoing frames.

This command adds or modifies an entry into the static VLAN table. Display your configuration by using the `Svlan List` command. An example of a configuration is shown next.

Modify a Static VLAN Table Example

The following is an example of how to modify a static VLAN table.

1. `192.168.1.1 vlan1q> svlan setentry 3 3 fixed untag`
2. `192.168.1.1 vlan1q> svlan setentry 2 2 fixed untag`
3. `192.168.1.1 vlan1q> svlan setentry 1 1 fixed tag`
4. `192.168.1.1 vlan1q> svlan list`

The arrows, in the figure shown next, point to the lines that have been modified in this table as a result of the previous commands.

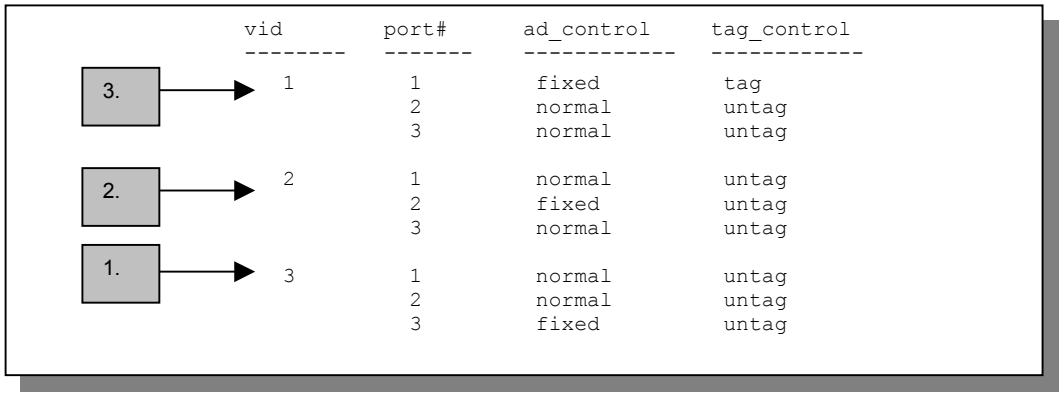


Figure 8-3 Example: SVLAN List Command Display

Forwarding Process Example

The switch uses the SVLAN in making frame-forwarding decisions.

First the switch checks the MAC address in a frames header against the MAC filtering database.

Next the switch checks the VLAN ID (VID) of tagged frames or assigns temporary VIDs to untagged frames (see the *PVID Command*).

The switch then checks the VID in a frame's tag against the SVLAN table.

The switch notes what the SVLAN table says (that is, the SVLAN tells the switch whether or not to forward a frame and if the forwarded frames should have tags).

Then the switch applies the port filter to finish the forwarding decision. This means that frames may be dropped even if the SVLAN says to forward them. Frames might also be dropped if they are sent to an ADSL CPE device that does not accept tagged frames.

The following figure shows the flow of the decision process used with a broadcast frame (one that is meant to go to all of the ports).

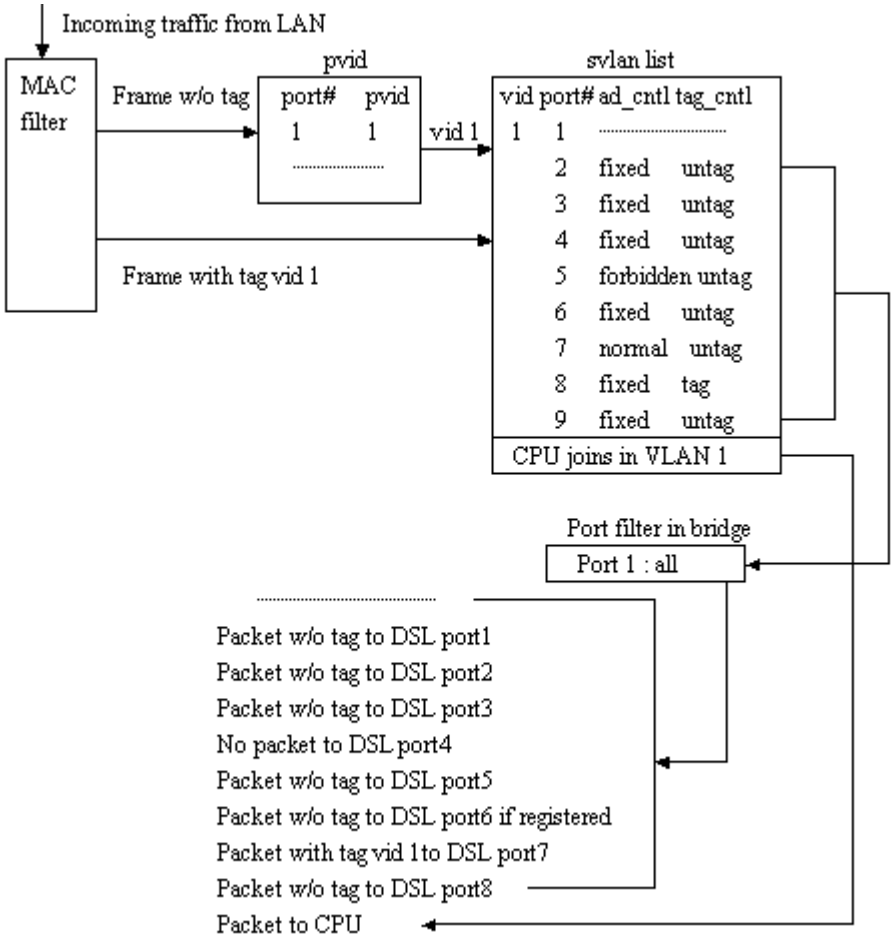


Figure 8-4 SVLAN Example

An untagged frame comes in from the LAN.

The switch checks the PVID table and assigns a temporary VID of 1.

The switch ignores port# 1 (the LAN port where the frame came in), because the switch does not send a frame to the port that it came in through.

The switch sees that port #s 2, 3, 4, 6, 8 and 9 (ADSL ports 1, 2, 3, 5, 7 and 9) are all set to "fixed" and "untag" which means the SVLAN allows the frame to be sent to those ports without a tag.

Port # 5 is "forbidden" so the frame is not forwarded to adsl port # 4.

Port # 7 (ADSL port 6) is "normal" which means that it was entered dynamically, so the frame is permitted to be forwarded to port # 7 if port # 7 is registered in the DVLAN table.

After looking at the SVLAN, the switch sees that the port filter is set for port 1 (the LAN port) to forward frames to all of the ADSL ports, so the switch forwards everything that the SVLAN permits.

Please note that the switch also sends the frame to "CPU" (the switch itself), because the switch is a member of this VLAN. The switch can be a member of only one VLAN at a time.

8.5.7 SVLAN Getentry Command

Syntax:

```
192.168.1.1 vlan1q> svlan getentry <vid>
```

where

<vid> = VLAN ID. Valid parameter range = [1 – 4094].

This command displays an entry with a specified VLAN ID in the static VLAN table.

Display a Static VLAN Table Entry Example

The following figure is an example display of the following command.

```
192.168.1.1 vlan1q> svlan getentry 2
```

```
vid        port#      ad_control     tag_control
--------   -------    ------------   ------------
   2         1         normal         UnTag
             2         fixed          UnTag
             3         normal         UnTag
```

Figure 8-5 Example: Svlan Getentry 2 Command Display

8.5.8 SVLAN Delentry Command

Syntax:

```
192.168.1.1 vlan mgr> svlan delentry <vid>
```

where

<vid> = VLAN ID. Valid parameter range = [1 – 4094].

This command deletes an entry with a specified VLAN ID in the static VLAN table

Delete a Static VLAN Entry Example

The following example will delete entry 2 in the static VLAN table.

```
192.168.1.1 vlan mgr> svlan delentry 2
```

8.5.9 DVLAN List Command

Syntax:

```
192.168.1.1 vlan1q> dvlan list
```

This command displays the dynamic VLAN registration table. The following figure is an example of what is displayed when you use this command.

```
vid     01      02      03      04      05      06      07      08      09
----    ----    ----    ----    ----    ----    ----    ----    ----    ----
 2      ||      >>      ||      ||      >>      >>      ||      ||      >>
 3      >>      >>      ||      ||      ||      >>      >>      >>      ||
 4      >>      ||      ||      >>      >>      ||      ||      >>      >>
 5      ||      >>      ||      ||      >>      >>      ||      ||      >>
 6      >>      >>      ||      ||      ||      >>      >>      >>      ||
 7      ||      >>      ||      >>      >>      ||      ||      >>      >>
 8      >>      ||      ||      >>      ||      >>      >>      >>      >>
 9      ||      >>      ||      ||      ||      >>      ||      >>      >>
```

Figure 8-6 Example: DVLAN List Command Display

In the figure above, "||" denotes "filter" and ">>" denotes "forward".

8.5.10 DVLAN Getentry Command

Syntax:

```
192.168.1.1 vlan1q> dvlan getentry <vid>
```

where

`<vid>` = VLAN ID. Valid parameter range = [1 – 4094].

This command displays an entry with a specified VLAN ID in dynamic GVRP table.

Display a Dynamic VLAN Table Entry Example

The following figure is an example display of the following command.

```
192.168.1.1 vlan1q> dvlan getentry 2
```

```
vid     01      02      03      04      05      06      07      08      09
----    ----    ----    ----    ----    ----    ----    ----    ----    ----
 2      ||      >>      ||      ||      >>      >>      ||      ||      >>
```

Figure 8-7 Example: DVLAN Getentry 2 Command Display

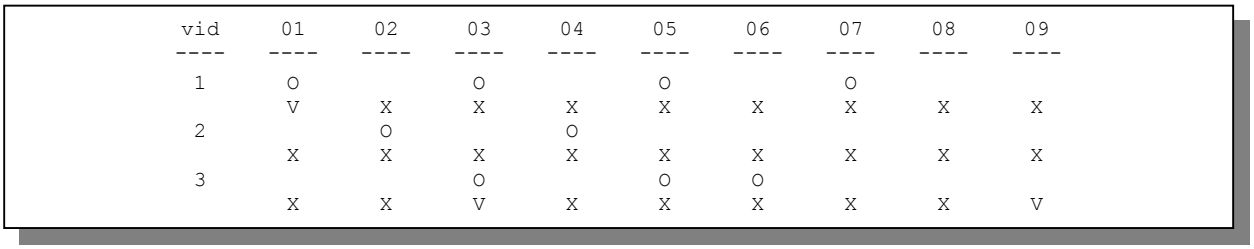
In the figure above, "||" denotes "filter" and ">>" denotes "forward".

8.5.11 VLAN List Command

Syntax:

```
192.168.1.1 vlan1q> vlan list
```

This command displays the entire VLAN table. The display refreshes periodically. Press [ENTER] and then enter the `stop` command to stop the display from refreshing. The following figure is an example what is displayed when you use this command.



```
vid     01      02      03      04      05      06      07      08      09
----    ----    ----    ----    ----    ----    ----    ----    ----    ----
 1      O               O               O               O
        V       X       X       X       X       X       X       X       X
 2              O               O
        X       X       X       X       X       X       X       X       X
 3                      O               O       O
        X       X       V       X       X       X       X       X       V
```

Figure 8-8 Example: VLAN List Command Display

In the figure above "O" denotes "egress port", "V" denotes "tagged" and "X" denotes " untagged".

Chapter 9
IEEE 802.1p Priority Commands

This chapter explains IEEE 802.1p Priority CI Commands.

9.1 Introduction

IEEE 802.1p Priority CI Commands provide priority regeneration for ports. IEEE 802.1p defines up to eight priorities (0-7) by inserting a tag into a MAC-layer frame that contains bits to define priority of service.

9.2 IEEE 802.1p Priority Commands

Bridge port 1 stands for the Ethernet port, bridge port 2 stands for ADSL port 1, bridge port 3 stands for ADSL port 2, and so on.

9.2.1 Priority Port Command

Syntax:

```
192.168.1.1 vlan1q> priority port <port #> <priority>
```

where

`<port #>` = bridge port number. Valid parameter range = [1 - 9].

`<priority>` = default priority for the specified port. Valid parameter range = [0 - 7], where 0 is the lowest priority and 7 is the highest priority.

This command sets the default priority for an ingress port.

To display the default port priority table, simply use the `Priority Port` command without parameters, as shown next.

```
192.168.1.1 vlan1q> priority port
```

9.2.2 Regen Port Command

Syntax:

```
192.168.1.1 vlan1q> regen port [<port #> <user priority> <regened priority>]
```

where

`<port #>` = bridge port number. Valid parameter range = [1 – 9].

`<user priority>` = the user priority for a frame received on this port. Valid parameter range = [0 - 7], where 0 is the lowest priority and 7 is the highest priority.

`<regened priority>` = the regenerated user priority the incoming user priority is mapped to for `<port #>`. Valid parameter range = [0 - 7], where 0 is the lowest priority and 7 is the highest priority.

This command sets the mapping of incoming user priority to a regenerated user priority for an ingress port.

To display the regeneration table, simply use the `Regen Port` command without parameters, as shown next.

```
192.168.1.1 vlan1q> regen port
```

Chapter 10
IP Commands

This chapter shows you how to configure the IP (Internet Protocol) parameters. The IP host implementation in the AES-100 allows you to manage it over the network.

More often than not, you have more than one AES-100 for a particular installation. Before you start configuring the AES-100s, make sure that you

1. Plan ahead.
2. Have a complete diagram showing the whole network.
3. Record the IP parameters assigned to the equipment in your network.

10.1 Setting the IP Address

To set the IP address, default gateway and the subnet mask of the Ethernet port of a ADSL Networking Module, use the following command sequence.

1. `192.168.1.1> ip`
2. `192.168.1.1 ip> device delete ether`
3. `<mac address> ip> device add ether ether //bridge <new ip address>`
4. `<new ip address> ip> route delete default`
5. `<new ip address> ip> route add default 0.0.0.0 <default gateway> 00:00:00:00`
6. `<new ip address> ip> config save`

where

`<mac address>`	=	The MAC address of the ADSL Networking Module.
`<new ip address>`	=	The IP address you want to configure into the ADSL Networking Module.
`<default gateway>`	=	The default gateway IP address of the ADSL Networking Module.

Line 1 brings you to the IP subsystem.

Line 2 clears the old parameters of the AES-100.

Line 3 allows you to add a new IP address for the AES-100. The MAC address of the AES-100 is displayed in the command prompt. The system will automatically compute the subnet mask when the system is restarted. If you want to specify a subnet manually, add the following two commands before line 4:

```
192.168.1.1 ip> subnet delete ether.home
192.168.1.1 ip> subnet add ether.home ether <subnet address> <subnet mask>
```

where `<subnet mask>` is the subnet mask in hexadecimal, for example "`ff:ff:ff:00`".

Line 4 deletes the existing default route.

Line 5 adds the new default route. The default route tells the system where the gateway (next hop) is when the AES-100 sends frames to a destination that is not on the same subnet as the AES-100.

Line 6 saves the new configuration to the nonvolatile memory.

For example, if you want the AES-100 to have 172.21.100.1 as the IP address, 255.255.255.0 for the subnet mask and 172.21.100.254 for the default gateway, you may use the following command sequence:

```
192.168.1.1> ip
192.168.1.1 ip> device delete ether
192.168.1.1 ip> device add ether ether //bridge 172.21.100.1
192.168.1.1 ip> subnet delete ether.home
192.168.1.1 ip> subnet add ether.home ether 172.21.100.0 ff:ff:ff:00
192.168.1.1 ip> route delete default
192.168.1.1 ip> route add default 0.0.0.0 172.21.100.254 00:00:00:00
192.168.1.1 ip> config save
```

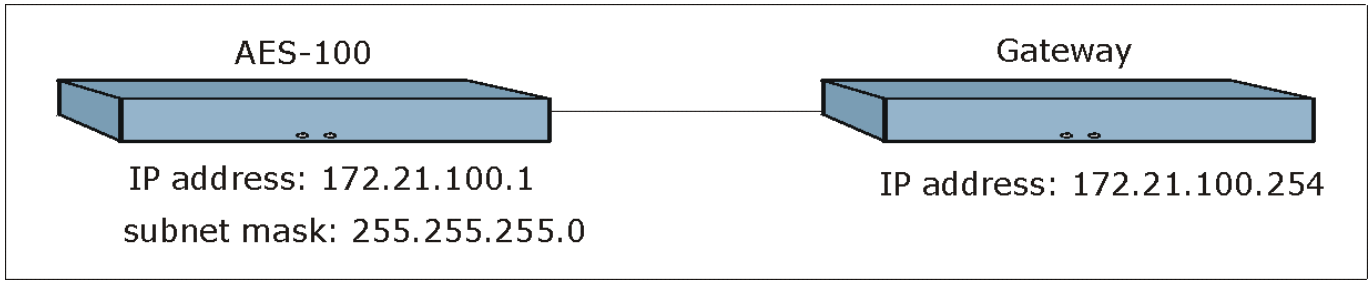


Figure 10-1 Setting IP Address and Default Gateway

The AES-100 leaves the factory with a default IP address of 192.168.1.1 and a subnet mask of 255.255.255.0, or FF.FF.FF.0 in hexadecimal notation, and the default gateway set at 192.168.1.254. Make sure that you configure the IP parameters correctly before you connect an AES-100 to the network, otherwise, you may interrupt services already running.

10.2 General IP Commands

The following is a list of general IP commands that help with the management of the IP parameters.

10.2.1 Config Command

Syntax:

```
192.168.1.1> config [save]
```

This command shows the IP configuration. The `save` option saves the configuration to the nonvolatile memory.

10.2.2 Version Command

```
192.168.1.1> version
```

This command shows the firmware version and date on the ADSL Networking Module.

10.2.3 Ping Command

Syntax:

```
192.168.1.1> ping <host> [<ttl> [<size>]]
```

where

`host`	=	the IP address of the target.
`ttl`	=	Time to Live (optional). This parameter limits the number of hops (routers) that the echo request can travel before it reaches the target.
`size`	=	The parameter specifies the size of the payload, that is, not counting the headers, of the echo request. The default size is 32 octets.

This is an IP facility to check for network functionality by sending an echo request to another IP host and waiting for the reply.

10.2.4 Statistics Command

Syntax:

```
192.168.1.1> stats <sub cmd>
```

This command shows the statistics for the traffic of the type specified by the sub-command. Statistics are available for the following traffic types: ARP, ICMP, IP, raw, TCP and UDP.

Chapter 11
Remote Management

This chapter shows you how to manage the AES-100 remotely.

More often than not, you will have the AES-100 located remotely making its remote management features very useful.

11.1 Management by Telnet

After you have set up the IP parameters and connected the AES-100 to the network, you can manage it remotely with telnet. You can use any telnet client that you find convenient. The configuration procedures with telnet are exactly the same as those using the direct connection via the console port. The default password for a telnet session is "1234". Although telnet will work while the console port is being used, only one telnet session is allowed at a time.

11.2 SNMP Management

SNMP (Simple Network Management Protocol) is a protocol used for exchanging management information between network devices. The AES-100 supports SNMP version 2 agent functionality, which allows a manager station to manage and monitor it through the network.

The next figure illustrates an SNMP management operation.

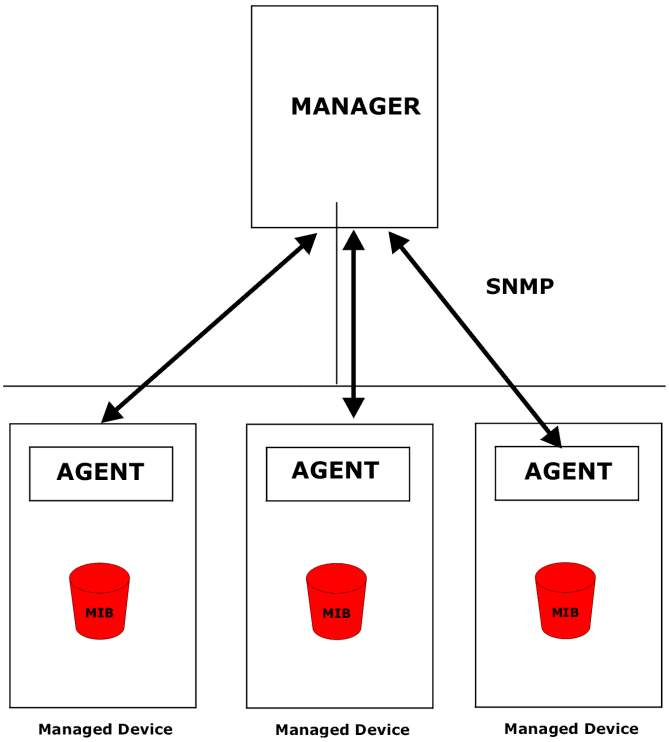


Figure 11-1 SNMP Management Model

An SNMP managed network consists of two main component types: agents and a manager.

An agent is a management software module that resides in a managed device (the AES-100). An agent translates the local management information from the managed device into a form compatible with SNMP. The manager is the station through which network administrators perform network management functions. It executes operations that control and monitor the managed devices.

The managed devices contain objects that define each piece of information to be collected about a device. Examples of variables include the number of frames received, node port status, etc. A Management Information Base (MIB) is a collection of managed objects. SNMP allows manager and agents to communicate for the purpose of accessing these objects.

SNMP itself is a simple request/response protocol based on the manager/agent model. The manager issues a request and the agent returns responses using the following protocol operations:

- Get

  Allows the manager to retrieve an object variable from the agent.

- GetNext

  Allows the manager to retrieve the next object variable from a table or list within an agent. In SNMPv1, when a manager wants to retrieve all elements of a table from an agent, it initiates a Get operation, followed by a series of GetNext operations.

- Set
  Allows the manager to set values for object variables within an agent.

- Trap
  Used by the agent to inform the manager of some events.

11.2.1 Supported MIBs

The ADSL Networking Module supports MIB II that is defined in RFC 1213 and RFC 1215 as well as transparent bridge MIBs defined in RFC 1493. The ADSL Networking Module can also respond with specific data from the ZyXEL private MIB (ZYXEL-MIB).

11.3 SNMP Access Configuration

To control access to the agent in the ADSL Networking Module, use the `access` commands in the SNMP subsystem. Note that "community" is SNMP's terminology for password. After configuring the SNMP access parameters, save the configuration to the nonvolatile memory with the `config save` command. The default write community string is "1234", and the default read community string is "public".

11.3.1 SNMP Access Read/Write Command

Syntax:

```
192.168.1.1 snmp> access <read | write> <community> [<IP addr>]
```

where

```
<read | write> =    Specifies read-only/read-write permission.
<community> =       Password needed to access the SNMP agent on
                    the ADSL Networking Module.
[<IP addr>] =       Optional IP address of the allowed SNMP
                    manager.
```

This command allows read-only or read-write access. If the IP address is specified, access is allowed for the manager station with that address only.

11.3.2 SNMP Access Delete Command

Syntax:

```
192.168.1.1 snmp> access delete <community> [<IP addr>]
```

This command revokes SNMP access by the specified community (password). If the IP address is specified, access is denied for that manager station only.

11.3.3 SNMP Access Flush Command

Syntax:

```
192.168.1.1 snmp> access flush
```

This command revokes access by any and all manager stations.

11.3.4 SNMP Access List Command

Syntax:

```
192.168.1.1 snmp> access list
```

This command shows the allowed access.

11.4 SNMP Trap Configuration

The ADSL Networking Module uses the SNMP trapping facility to proactively report unusual events to one or more trap servers. To configure the trap parameters, use the `trap` commands in the SNMP subsystem. After configuring the SNMP trap parameters, save the configuration to the nonvolatile memory with the `config save` command.

11.4.1 Supported Traps

ADSL Networking Module supports the following traps

- coldStart Trap (defined in RFC 1215) :

  This trap is sent at system start-up.
- authenticationFailure Trap (defined in RFC 1215) :

  This trap is sent if a request arrives with an invalid community string.
- linkUp Trap (defined in RFC 1215) :

  This trap is sent when an ADSL port is up.
- linkDown Trap (defined in RFC 1215) :

  This trap is sent when an ADSL port is down.
- overheat Trap (defined in ZYXEL-MIB) :

  This trap is sent when the ADSL Networking Module is overheated.

- overheatOver Trap (defined in ZYXEL-MIB) :

  This trap is sent periodically when the ADSL Networking Module is no longer overheated.

11.4.2 Trap Add Command

Syntax:

```
192.168.1.1 snmp> trap add <community> <IP addr> [<port>]
```

where

`<community> =`	The password used by the ADSL Networking Module to authenticate itself to the trap server.
`<IP addr> =`	The IP address of the trap server.
`[<Port>] =`	The optional port parameter is for specifying the UDP port number on the server in case it is different from the default of port 162.

This command adds a trap server.

11.4.3 Trap Delete Command

Syntax:

```
192.168.1.1 snmp> trap delete <community> <IP addr> [<port>]
```

This command deletes a trap destination. The parameters are the same as the `trap add` command.

11.4.4 Trap Flush Command

Syntax:

```
192.168.1.1 snmp> trap flush
```

This command deletes all trap destinations.

11.4.5 Trap List Command

Syntax:

```
192.168.1.1 snmp> trap list
```

This command lists all the trap destinations.

Chapter 12
Configuration Backup/Restore

This chapter describes the process for backing up your user settings (configuration) from the ADSL Networking Module onto your computer and how to restore them to the ADSL Networking Module.

The ADSL Networking Module uses FTP for configuration backup/restore through its built-in FTP server. You can use any FTP client (for example, ftp.exe in Windows) to backup/restore the ADSL Networking Module's configuration.

12.1 Configuration Files of the ADSL Networking Module

The ADSL Networking Module uses configuration files to store the user's settings, so they can be applied the next time the ADSL Networking Module is booted. The ADSL Networking Module has the following two configuration files:

init =	The system configuration file for the ADSL Networking Module.
password =	The configuration file for the console, Telnet and FTP password.

12.2 Configuration Backup

You can backup all or some configuration files from the ADSL Networking Module to your computer. Backup the system configuration by following the example shown next.

Step 1. Connect to the ADSL Networking Module with your favorite FTP client. The command is generally

```
C:\> ftp <ADSL Networking Module IP address>
```

at the computer command prompt.

Step 2. Enter the User name (just press [ENTER]).

```
User: <ENTER>
```

Step 3. Enter the management password (1234 by default).

```
Password: 1234
230 Logged in
```

Step 4. Get the configuration files from the ADSL Networking Module

```
ftp> get init
```

Step 5. Quit FTP.

```
ftp> quit
```

12.3 Configuration Restore

You can restore configuration files from your computer to the ADSL Networking Module. Restore the system configuration by following the example shown next.

Do *not* turn off the ADSL Networking Module during the restore process, as it may corrupt the firmware and make your ADSL Networking Module unusable.

Step 1. Connect to the ADSL Networking Module with your favorite FTP client. The command is generally

```
C:\> ftp <ADSL Networking Module IP address>
```

at the computer command prompt.

Step 2. Enter the User name (just press [ENTER]).

```
User: <ENTER>
```

Step 3. Enter the management password (1234 by default).

```
Password: 1234
230 Logged in
```

Step 4. Transfer the configuration files to the ADSL Networking Module

```
ftp> put init
```

Step 5. Quit FTP.

```
ftp> quit
```

Wait for the update to finish. The ADSL Networking Module restarts automatically.

Chapter 13
Firmware Upload and Recovery

ZyXEL periodically releases new firmware for the ADSL Networking Module for bug fixes and enhancements. Please check the web site at www.zyxel.com every now and then for the latest firmware release.

The ADSL Networking Module uses FTP to upload firmware and no longer supports TFTP uploads. If the firmware in non-volatile memory is damaged, the ADSL Networking Module uses BOOTP/TFTP to recover the firmware. The differences between these two methods are as follows:

- Upload timing:

  An FTP upload is done during operation (run-time), while a BOOTP/TFTP recovery is done when the ADSL Networking Module is restarted.

- Protocols used:

  An FTP upload uses FTP protocol, while a BOOTP/TFTP recovery uses BOOTP and TFTP protocols.

- Remote upload:

  An FTP upload does not require the ADSL Networking Module and your computer to be on the same LAN, while a BOOTP/TFTP recovery does.

- Firmware files used:

  An FTP upload uses a file with an ".img" extension name, while a BOOTP/TFTP recovery uses a file with a ".bin" extension name.

- The role of the ADSL Networking Module:

  An FTP upload uses the ADSL Networking Module's built-in FTP server and a BOOTP/TFTP recovery uses the ADSL Networking Module's built-in BOOTP/TFTP client.

- The impact to the ADSL Networking Module:

  An FTP upload overwrites the ADSL Networking Module's firmware only while a BOOTP/TFTP recovery overwrites the ADSL Networking Module's firmware and all configuration files.

13.1 FTP Firmware Upload on the ADSL Networking Module

The ADSL Networking Module uses FTP for firmware uploads through its built-in FTP server when the ADSL Networking Module is operational. To update the firmware, first download it (the file will have an "**img**" extension name) from the ZyXEL web site and store it on your computer. You can use any FTP client (for example, ftp.exe in Windows) to upgrade the ADSL Networking Module's firmware. The procedure for FTP upgrade is as follows.

Do *not* turn off the ADSL Networking Module during the updating process, as it may corrupt the firmware and make your ADSL Networking Module unusable.

1. Connect to the ADSL Networking Module with your favorite FTP client.
   The command is generally: `ftp <ADSL Networking Module IP address>` at the computer command prompt.
2. Enter the user name (just press [ENTER]). For example,
   `User: <ENTER>`

3. Enter the management password (1234 by default). For example,
```
Password: 1234
230 Logged in
```

4. Transfer the firmware file to the ADSL Networking Module. For example,
```
ftp> put 201AS0b1.img image
```
where

`201AS0b1.img` = The firmware file that you want to upload.

`image` = The internal firmware name in the ADSL Networking Module.

5. Quit FTP. For example,
```
ftp> quit
```

Wait for the update to finish. The ADSL Networking Module restarts automatically.

Do *not* turn off the AES-100 during the updating process, as it may corrupt the firmware and make your unit unusable.

13.2 BOOTP/TFTP Firmware Recovery of the ADSL Networking Module

The ADSL Networking Module uses BOOTP/TFTP for firmware recovery through its built-in BOOTP/TFTP client when the ADSL Networking Module is restarted. To recover the firmware, first download it from the ZyXEL web site and store it on your computer. You can use any BOOTP/TFTP server (for example, BootpTftp.exe) to update the ADSL Networking Module's firmware. The update procedure for BootpTftp.exe is as follows:

Do *not* turn off the AES-100 during the updating process, as it may corrupt the firmware and make your unit unusable.

1. Connect your ADSL Networking Module's LAN port to a computer's LAN port directly using a crossover Ethernet cable, or connect both to an Ethernet hub/switch using straight-through cables.
2. Connect your ADSL Networking Module's console port to a computer's serial port with a console cable.
3. Run any terminal emulation program, for example, Windows' built-in HyperTerminal, with the following parameters:

   VT100 terminal emulation

   9600 bps

   No parity, 8 data bits, 1 stop bit

   No flow control
4. Run `BootpTftp.exe`, to bring up the following window. Click **New** to create a MAC address entry.

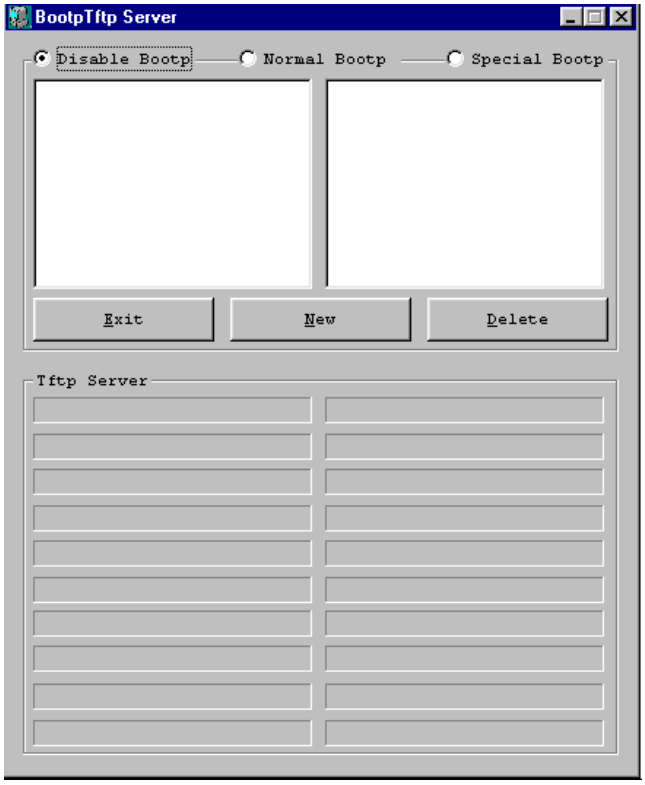


Figure 13-1 BOOTP/TFTP Server

5. The **Input Box** window will pop up as shown next. Type the MAC address of the ADSL Networking Module and then click **OK**. You can find the MAC address of the ADSL Networking Module on its boot console.

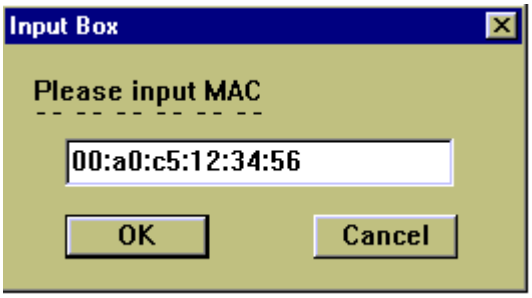


Figure 13-2 Input MAC

6. Type the host IP address (the IP address you want to assign to the ADSL Networking Module), server IP address (the IP address of this computer), net mask, gateway and filename (the new firmware name) into the appropriate fields in the screen shown next. Click **Update Database**.

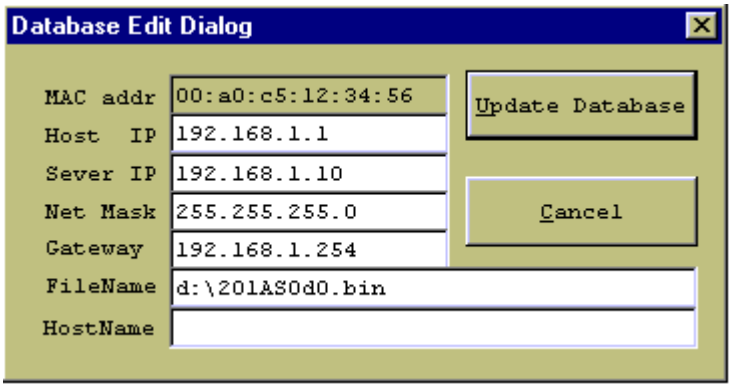


Figure 13-3 Database Edit Dialog

7. Select **Normal Bootp** to enable normal BOOTP/TFTP functions.

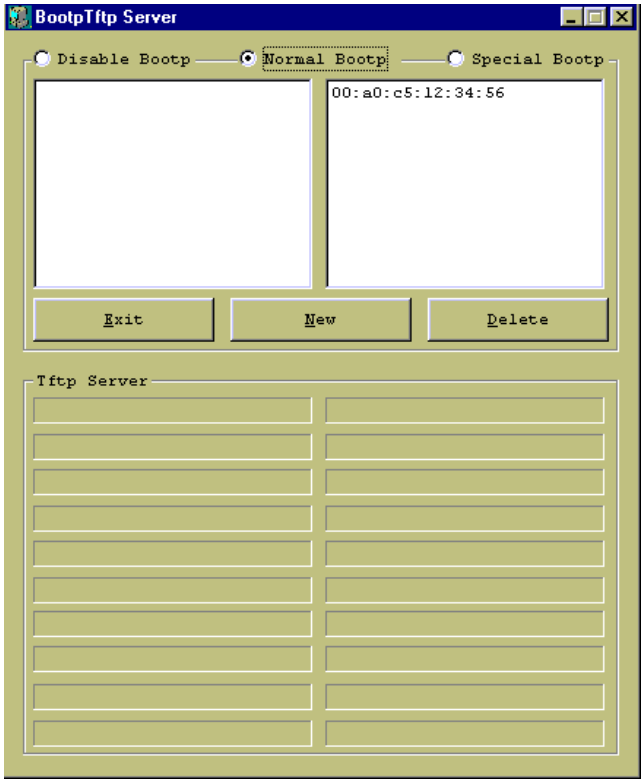


Figure 13-4 Enable BOOTP/TFTP

8. Restart the ADSL Networking Module and press any key within three seconds to get the following screen.

```
SDRAM Testing ...
Mac address 00:A0:C5:12:34:56

Press any key within 3 seconds to enter debug mode
.............................
```

Figure 13-5 Enter Debug Mode

9. Press any key at the "`Press any key within 3 seconds to enter debug mode` ....." message, to enter the debug mode.

10. Enter `atnb` at the ADSL Networking Module boot console.

11. Wait for the firmware upload to finish.

12. Use the following command sequence on the ADSL Networking Module to write new firmware to flash memory.

```
192.168.1.1> flashfs
192.168.1.1 flashfs> wipe
192.168.1.1 flashfs> update
```

13. Wait for the update to complete and then restart the ADSL Networking Module.

Chapter 14 Troubleshooting

This chapter covers potential problems and possible remedies. After each problem description, some steps are provided to help you to diagnose and to solve the problem.

14.1 ADSL LED(s)

An ADSL LED is not on.

Table 14-1 Troubleshooting the ADSL LED(s)

STEPS	CORRECTIVE ACTION
1	Unplug the phone wire coming from the USER port of the AES-100 and connect the user's ADSL modem or router directly to the USER port of the AES-100 using a different telephone wire. If the LED turns on, check for a problem with the building's phone wire.
2	Make sure the ADSL port is enabled (refer to the section on *enabling ADSL ports*).
3	If the LED remains off, contact the distributor.

14.2 Data Transmission

The ADSL LED is on, but data can not be transmitted.

Table 14-2 Troubleshooting Data Transmission

STEPS	CORRECTIVE ACTION
1	Unplug the phone wire coming from the USER port of the AES-100 and connect the user's ADSL modem or router directly to the USER port of the AES-100 using a different telephone wire. If data can be transmitted, check for a problem with the building's phone wire.
2	Check to see that the VPI/VCI settings in the user's ADSL modem or router match those in the AES-100 (refer to the *Default Settings* in the *ADSL Configuration* chapter of this User's Guide). Also make sure that it is using RFC-1483 encapsulation, bridge mode and LLC- based multiplexing.
3	Make sure that the device type of the AES-100's IP address is set to bridge (refer to the *Setting IP Address* section).
4	Check the VLAN configuration of the AES-100 (refer to the *Bridge Configuration* chapter).
5	Ping the AES-100 from the user's computer.
6	If you cannot ping, connect the ADSL modem or router to another AES-100 ADSL port. If the ADSL modem or router works with a different port, then there may be a problem with the port user's original port. Contact the distributor.
7	If using a different port does not work, try a different ADSL modem or router with the original port.

14.3 ADSL LED(s) turn On and Off

An ADSL LED turns on and off intermittently.

Table 14-3 Troubleshooting a Non-Constant ADSL LED

STEPS	CORRECTIVE ACTION
1	Unplug the phone wire coming from the USER port of the AES-100 and connect the user's ADSL modem or router directly to the USER port of the AES-100 using a different telephone wire. If the ADSL LED stays on, check for a problem with the building's phone wire.
2	Use the `linerate` command to check the user's regular telephone wire (refer to the *ADSL Configuration* chapter). If the ADSL LED still turns on and off repeatedly, contact the distributor.

14.4 Data Rate

The SYNC-rate is not the same as the configured rate.

Table 14-4 Troubleshooting the SYNC-rate

STEPS	CORRECTIVE ACTION
1	Unplug the phone wire coming from the USER port of the AES-100 and connect the user's ADSL modem or router directly to the USER port of the AES-100 using a different telephone wire. If the rates match, the regular phone wire quality may be limiting the speed to a certain rate (see the *Configured Vs. Actual Speed* section).
2	Use the `linerate` command to check the user's regular telephone wire (refer to the *ADSL Configuration* chapter). If they do not match when a good wire is used, contact the distributor.

14.5 Configured Settings

The AES-100's configured settings do not take effect at restart.

Table 14-5 Troubleshooting the AES-100's Configured Settings

CORRECTIVE ACTION
After you finish configuring the settings, remember to use the `config save` command to save your settings to the AES-100. If this does not work, contact the distributor.

14.6 Password

I forgot the password to my AES-100.

Table 14-6 Troubleshooting the Password

OPTIONS	CORRECTIVE ACTION
1	Send a screen shot of your AES-100's MAC address to your local distributor.
2	Refer to the *BOOTP/TFTP Firmware Update* section to update your firmware. All settings will return to default value, so any configurations you have made will be lost.

14.7 Remote Server

The user's computer behind the ADSL modem or router can not access a remote server.

Table 14-7 Troubleshooting a Remote Server

STEPS	CORRECTIVE ACTION
1	Refer to *Data Transmission* in this chapter to make sure that the user is able to transmit to the AES-100.
2	Make sure the gateway's IP address is the same as the one configured in the user's computer.
3	Check the VLAN configuration of the Ethernet port on the AES-100 (refer to the *Bridge Configuration* chapter).
4	Check the Ethernet cable and connections between the AES-100 and the gateway.
5	Try to access another remote server. If data can be transmitted to a different remote server, the remote server that could not be accessed may have a problem.

14.8 SNMP

The SNMP manager server can not get information from the AES-100.

Table 14-8 Troubleshooting the SNMP Server

STEPS	CORRECTIVE ACTION
1	Ping the SNMP server from the AES-100. If you cannot, change the cable or IP configuration (see the *IP Configuration* chapter).
2	Check to see that the community (or trusted host) in the AES-100 matches the SNMP server's community. If these steps fail to correct the problem, contact the distributor.

14.9 Telnet

I can not telnet into the AES-100.

Table 14-9 Troubleshooting Telnet

STEPS	CORRECTIVE ACTION
1	Make sure that a telnet session is not already operating. The AES-100 will only accept one telnet session at a time.
2	Ping the AES-100 from your computer. If you are able to ping the AES-100 but are still unable to telnet, contact the distributor. If you cannot ping the AES-100, check the IP addresses in the AES-100 and your computer. Make sure that both IP addresses are located in the same subnet (refer to the *Setting IP Address* section of this User's Guide).
3	If you are attempting to telnet from the ADSL side of the AES-100, refer to *Data Transmission* in this chapter to make sure that you can transmit data to the AES-100.
4	If you are attempting to telnet from the Ethernet side of the AES-100, check the Ethernet cable.
5	Make sure that the device type of the AES-100's IP address is set to bridge (refer to the *Setting IP Address* section). If these steps fail to correct the problem, contact the distributor.

Index

1

10/100M Auto-Sensing Ethernet 6-1

A

AC INPUT 2-4
Access Delete Command 11-3
Access Flush Command 11-3
Access List Command 11-3
Actual Rate 5-1
ADSL Compliance 1-1
ADSL Configuration 5-1
ADSL standards 5-2
ADSL Standards 6-2
AES-100 xi
Aggregates traffic 1-3
airflow 2-4
auto 5-9, 5-10

B

BOOTP/TFTP 13-2
Bridge Commands 7-1
Bridge Port Numbers 7-1

C

CE Mark Warning iv
certification iv
channel attenuation 5-6
Chassis 1-1
CI Commands 4-1
CO port 2-3
Command Line Interface 4-1
Command Structure 4-1
Community 11-2
Config Command 10-2
Config Print Command 4-3
Config Save Command 4-2, 5-3, 7-1
Configuration
  Backing up 12-1
  Restoring 12-1
Configuration Backup/Restore 12-1
Connections
  ADSL Port 2-3
Console Port 2-2
Contacting Customer Support v
Copyright ii
Customer Support v

D

Default IP Address 10-2
Default Profile Settings 5-2
Default Route 10-1
Default Settings 5-2
Defaults 3-2
Delete Profile Command 5-8
Device Command 7-1
Dimensions 1-5
Disable Port Command 5-3
Disable Ports Command 5-3
Disclaimer ii
Downstream (ds) 5-6
DVLAN Table 8-1, 8-2

E

Enable Port Command 5-3
Enable Ports Command 5-3
Ethernet Port Commands 6-1
Ethernet Port Default Settings 3-2
Exit Command 4-3

F

Factory Default Settings 3-1
Fast Mode 1-2

FCC iv
FCC Rules iv
Federal Communications Commission (FCC) Interference Statement iv
Filter Command 7-3
Filterage Command 7-4
Filtering Databases 8-1
Firmware
  Recovery 13-1, 13-2
  Remote Upload 13-1
Firmware Upload
  File Types 13-1
  FTP 13-1
  Impact to the AES-100 13-1
  Protocols 13-1
  Timing 13-1
Flush Command 7-4
Front Panel 2-1
Front Panel Indicators 2-2
Front Panel Ports 2-2
FTP 13-1
FTP Firmware Upload 13-1

G

G.dmt 5-1, 6-1, 7-1
G.lite 5-1, 5-10, 6-1, 7-1
GARP 8-2
gdmt 5-9, 5-10
General IP Commands 10-2, 12-1
GetNext 11-2, 11-3
glite 5-9, 5-10
GVRP 8-2

H

Help Facility 4-2

I

IEEE 802.1p Priority 9-1
  Commands 9-1
IEEE 802.1Q Tagged VLAN 1-2, 4-4, 7-8, 7-9, 8-1
  Commands 8-1
  Default 3-2
  Introduction 8-1
  Register Your CPU 8-3
  Tags 8-1
IEEE 802.1Q VLAN
  Standard 1-2
IGMP Packets 7-3
IGMP Snooping 1-2
  Monitoring 7-3
  Notes About 7-3
Info Command 4-3, 7-5
Ingress 9-1, 9-2
Installation Requirements 2-1
interleave delay 5-5
IP Commands 10-1
IP Parameters 3-1
ISP Application 1-4

L

line bit allocation 5-4
line operating values 5-4
line performance counters 5-5
line rate parameters 5-6
Linedata Command 5-4
Lineinfo Command 5-4
Lineperf Command 5-5
Linerate Command 5-6
List Port Command 5-7
List Ports Command 5-7
List Profiles Command 5-8
Location Name Command 4-4

M

MACfilter 7-2
  Default 3-2
  Disable 7-2

Enable 7-2
Filter 7-2
Status 7-2
Management 1-2
Management Information Base (MIB) 11-2
margins 5-6
maximum attainable rate 5-6
MDF (Main Distribution Frame) 2-4
Mfilter Command 7-3
MTU 1-3
Multiplexer 1-1

N

Network Interface Card 2-1
NIC ..... See Network Interface Card

O

Operating Environment 1-5
Operational mode 5-9, 5-10

P

parity byte assignment 5-5
parity bytes per codeword 5-5
Passwd Command 4-3
Password 11-2
Physical Interfaces 1-4
Physical Specifications 1-4
Ping Command 10-2
Port-Based VLAN 7-5
Portfilter Command 7-6
Power Consumption 1-5
Profile 5-1
PVID 8-2
PVID Command 7-8

R

Rear Panel 2-3
Rear Panel Connections
Connections 2-4
Rear Panel 2-3
Related Documentation xi
Remote Firmware Upload 13-1
Remote Management 11-1
Restart Command 4-2
RFC 1213 11-2
RFC 1215 ..... 11-2, 11-3
RFC 1483 3-1
RFC 1493 11-2

S

Scalable 1-4
Secured Host 4-4
Default 3-2
Enable/Disable 4-4
Set 11-2, 11-3, 11-4
Set Auto Command 6-1
Set Contact Command 4-3
Set Duplex Command 6-1
Set Name Command 4-3
Set Port Command 5-9
Set Ports Command 5-10
Set Profile Command 5-7
Set PVC Command 5-11
Set PVCs Command 5-11
Set Speed Command 6-1
Setting IP Address 10-1
Show Port Command 5-10
Show Ports Command 5-10
Show Profile Command 5-8
Show Profiles Command 5-9
Show PVC Command 5-11, 7-2
Show PVCs command 5-12
SHOWTIME 5-6
SNMP 11-1, 11-2, 11-3
Get 11-2, 11-3
Manager 11-2
Trap 11-2

Splitters
Integrated Splitters....1-1
Statistics Command....10-3
Status Command....6-2, 7-1
Storage Environment....1-5
Supported Traps....11-3
SVLAN Table....8-1
Syntax Conventions....xi
Sys Errlog....4-6
Clear Log....4-6
Logs....4-6
Saving and Viewing a Previous Error Log....4-7
Sys Error Log
Default....3-2
System Commands....4-1
T
Tagged Ethernet Frames....7-8
Taiwanese BCIQ A Warning....iv
Telco Rack Space....1-4
Telnet....11-1
Terminal Emulation....2-1, 4-1
TFTP....12-1, 13-2
Trademarks....ii
Trap Add Command....11-4
Trap Configuration....11-3
Trap Delete Command....11-4
Trap Flush Command....11-4
Trap List Command....11-4
Troubleshooting....14-1
U
UNIX Syslog....4-5
Default....3-2
Enable/Disable Logs....4-5
Logs Lost....4-5
Logs Sent....4-5
Unpacking....2-1
Upload Firmware
File Types....13-1
Protocols....13-1
Timing....13-1
upstream (us)....5-6
Uptime Command....4-2
USER port....2-3
V
Vendor ID....5-5
Version Command....4-2
Version Number....5-5
VLAN....7-5, 8-1
Aware Devices....8-1
Explicit Tagging....8-1
ID (VID)....7-9, 8-2
Implicit Tagging....8-1
Port-Based....7-5
Registration Information....8-1
Tags....8-1
Unware Devices....8-1
VT100....2-1, 4-1
W
Warm Restarting....4-7
Warning Sticker....2-4
Weight....1-5
Z
ZyXEL Limited Warranty....iii