IES-1248-51V

48-port ADSL2+ remote IP DSLAM
with embedded Media Gateway

User's Guide

Default Login Details

IP Address	http://192.168.1.1
User Name	admin
Password	1234

Firmware Version 3.53
Edition 2, 03/2009

www.zyxel.com

About This User's Guide

Intended Audience

This manual is intended for people who want to configure the IES using the web configurator. You should have at least a basic knowledge of TCP/IP networking concepts and topology.

Related Documentation

Note: It is recommended you use the web configurator to configure the IES.

- Supporting Disk

  Refer to the included CD for support documents.

- ZyXEL Web Site

  Please refer to www.zyxel.com for additional support documentation and product certifications.

User Guide Feedback

Help us help you. Send all User Guide-related comments, questions or suggestions for improvement to the following address, or use e-mail instead. Thank you!

The Technical Writing Team,
ZyXEL Communications Corp.,
6 Innovation Road II,
Science-Based Industrial Park,
Hsinchu, 300, Taiwan.

E-mail: techwriters@zyxel.com.tw

Document Conventions

Warnings and Notes

These are how warnings and notes are shown in this User's Guide.

Warnings tell you about things that could harm you or your IES.

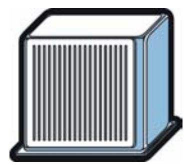
Note: Notes tell you other important information (for example, other things you may need to configure or helpful tips) or recommendations.

Syntax Conventions

- The IES-1248-51V may be referred to as the "IES", the "device", the "system" or the "product" in this User's Guide.
- Product labels, screen names, field labels and field choices are all in **bold** font.
- A key stroke is denoted by square brackets and uppercase text, for example, [ENTER] means the "enter" or "return" key on your keyboard.
- "Enter" means for you to type one or more characters and then press the [ENTER] key. "Select" or "choose" means for you to use one of the predefined choices.
- A right angle bracket (>) within a screen name denotes a mouse click. For example, **Maintenance > Log > Log Setting** means you first click **Maintenance** in the navigation panel, then the **Log** sub menu and finally the **Log Setting** tab to get to that screen.
- Units of measurement may denote the "metric" value or the "scientific" value. For example, "k" for kilo may denote "1000" or "1024", "M" for mega may denote "1000000" or "1048576" and so on.
- "e.g.," is a shorthand for "for instance", and "i.e.," means "that is" or "in other words".

Icons Used in Figures

Figures in this User's Guide may use the following generic icons. The IES icon is not an exact representation of your IES.

IES 	Computer 	Notebook computer 
Server 	DSLAM 	CPE Device 
Telephone 	Switch 	Router 

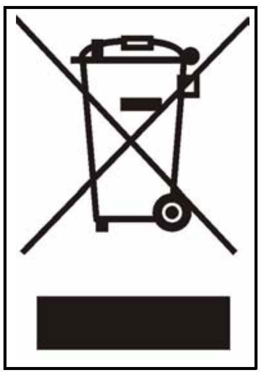
Safety Warnings

For your safety, be sure to read and follow all warning notices and instructions.

- Do NOT use this product near water, for example, in a wet basement or near a swimming pool.
- Do NOT expose your device to dampness, dust or corrosive liquids.
- Do NOT store things on the device.
- Do NOT install, use, or service this device during a thunderstorm. There is a remote risk of electric shock from lightning.
- Connect ONLY suitable accessories to the device.
- ONLY qualified service personnel should service or disassemble this device.
- Make sure to connect the cables to the correct ports.
- Place connecting cables carefully so that no one will step on them or stumble over them.
- Always disconnect all cables from this device before servicing or disassembling.
- Use ONLY power wires of the appropriate wire gauge (see Chapter 71 on page 599 for details) for your device. Connect it to a power supply of the correct voltage (see Chapter 71 on page 599 for details). .
- Do NOT allow anything to rest on the power adaptor or cord and do NOT place the product where anyone can walk on the power adaptor or cord.
- Do NOT use the device if the power adaptor or cord is damaged as it might cause electrocution.
- If the power adaptor or cord is damaged, remove it from the device and the power source.
- Do NOT attempt to repair the power adaptor or cord. Contact your local vendor to order a new one.
- Do not use the device outside, and make sure all the connections are indoors. There is a remote risk of electric shock from lightning.
- Caution: Risk of explosion if battery (on the motherboard) is replaced by an incorrect type. Dispose of used batteries according to the instructions. Dispose them at the applicable collection point for the recycling of electrical and electronic equipment. For detailed information about recycling of this product, please contact your local city office, your household waste disposal service or the store where you purchased the product.
- Do NOT obstruct the device ventilation slots, as insufficient airflow may harm your device.
- Ensure that the fan filter is in place before switching on the IES.

- Use only No. 26 AWG (American Wire Gauge) or larger telecommunication line cord.
- Fuse Warning! Replace a fuse only with a fuse of the same type and rating.
- The length of exposed (bare) power wire should not exceed 7mm.
- Fan Module Warning! Use the fan module handle when pulling out or pushing in the fan module. Be careful not to put fingers or objects inside the fan module.

This product is recyclable. Dispose of it properly.



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Introduction

1

Introducing the IES

1.1 Overview

The IES is an IP-based DSLAM (Internet Protocol Digital Subscriber Line Access Multiplexer) that connects ADSL and voice subscribers to the Internet. As a high-performance but yet compact platform, it can conveniently deliver broadband Internet access and VoIP telephony service (over existing POTS telephone wiring) to multi-tenant units (MTUs), hospitals, hotels, schools, university campuses and ISPs. The IES's low cost and easy management make it a perfect DSL-provider solution.

The IES platform allows for convenient management and support of ADSL technology. Up to 48 ADSL subscribers can simultaneously utilize a wide range of powerful broadband services.

1.1.1 Voice Features

The IES provides 48 aggregated lines of POTS connectivity, designed to connect the subscriber with the Public Switched Telephone Network (PSTN).

Each telephone line interface is a Foreign Exchange Subscriber (FXS) port connecting to the subscriber's telephone via copper wire. The analog voice signal from the subscriber is converted to voice data packets and transmitted towards the callee across the IP packet-switched network.

The IES uses Session Initialization Protocol (SIP) for network signaling to establish or tear down a voice call. Dual-Tone Multi-Frequency (DTMF) signals are also translated into SIP signals (or transmitted in the voice band).

Advanced call features such as call forwarding and call waiting are integrated to ease next-generation network migration and access network deployment. To further simplify migration towards an all-IP network, the IES's FXS line interface can co-exist with ADSL service on the same copper wire. Metallic Line Testing (MLT) is also available for copper loop diagnostics.

1.2 Applications

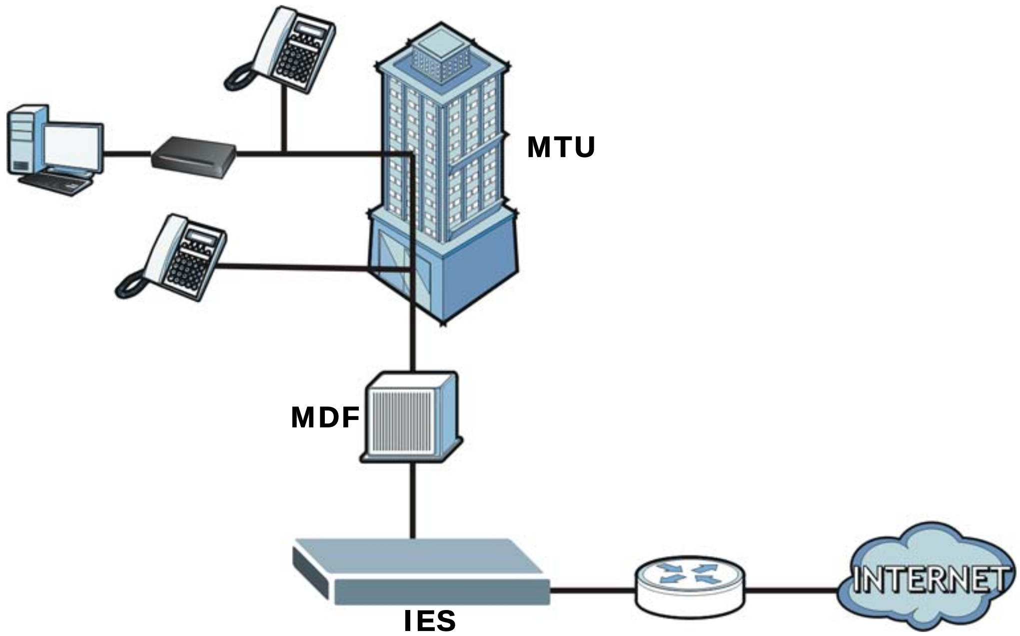
These are the main applications for the IES:

- Internet access, multimedia and phone services for Multiple Tenant Units (MTU).
- Other applications include telemedicine, surveillance systems, remote server systems, cellular base stations and high-quality teleconferencing.

1.2.1 MTU Application

The following diagram depicts a typical application of the IES with ADSL modems, in a large residential building, or multiple tenant unit (MTU), that leverages existing phone line wiring to provide Internet access and voice service to all tenants. ADSL data service can coexist with voice service on the same line.

Figure 1 MTU Application

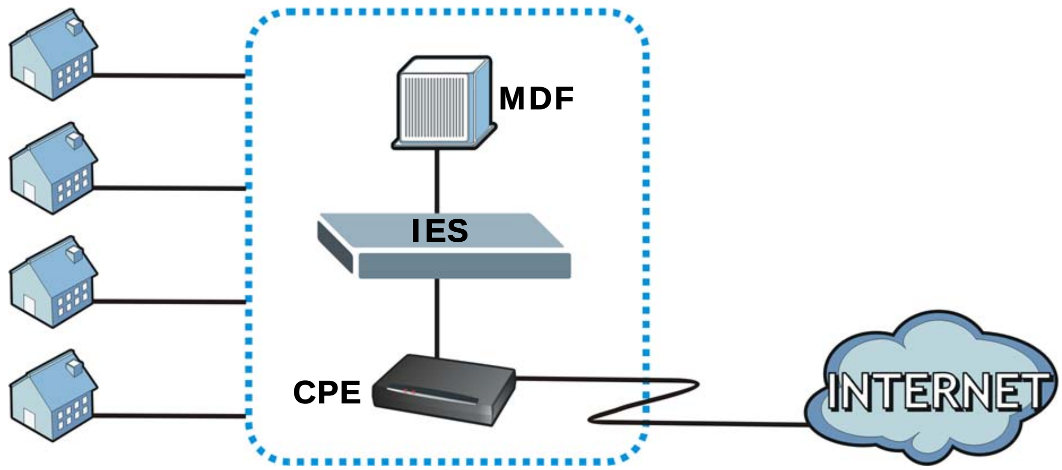


1.2.2 Curbside Application

The IES can also be used by an Internet Service Provider (ISP) in a street cabinet to form a “mini POP (Point-of-Presence)” to provide broadband and phone services to residential areas that are too far away from the ISP to avail of DSL or PSTN phone service. Residents need an ADSL modem for data services, connected as shown in the previous figure.

In the example below, the street cabinet (the blue box) contains an Main Distribution Frame (**MDF**), the **IES** and a **CPE** device.

Figure 2 Curbside Application



1.3 System Description

Two Telco-50 Connectors

There are two Telco-50 connectors for ADSL and analog phone connections.

1000/100 Mbps Ethernet Ports

The IES has two 1000/100Mbps auto-sensing Ethernet ports.

They allow you to:

- Connect the IES to a second-level switch
- Daisy-chain other IES

Two Slots for Mini GBIC Modules

The mini GBIC (Gigabit Interface Converter) module transceivers allow flexibility in connection options. You can use mini GBIC transceivers for fiber connections to backbone Ethernet switches.

Stacking

Daisy-chain up to three IES (or other Ethernet devices).

Integrated Splitters

The integrated DSL splitter eliminates the need to use external splitters that separate the voice-band and ADSL signals.

Console Port

Use the console port for local management of the IES.

Fans

The fans cool the IES sufficiently to allow reliable operation of the IES in even poorly ventilated rooms or basements. To conserve energy and reduce noise, the fan speed depends on the temperature.

IP Protocols

- IP Host (No routing)
- Telnet for configuration and monitoring
- SNMP for management
  - SNMP MIB II (RFC 1213)
  - SNMP v1 RFC 1157
  - SNMPv2, SNMPv2c, or later
  - Bridge MIBs (RFC 1493, 2674)
  - SMI RFC 1155
  - ADSL Line MIB (RFC 2662)
  - ADSL Extension Line MIB (RFC2449)
  - Private MIBs

ADSL Encapsulation

Multiple Protocols over AAL5 (RFC 1483)

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
  - ADSL2: G.992.3, G.992.4
  - ADSL2+: G.992.5
- Rate adaptation support

IEEE 802.1p Priority

Your IES uses IEEE 802.1p Priority to assign priority levels to individual PVCs.

Multiple PVC and ATM QoS

The IES allows you to use different channels (also called Permanent Virtual Circuits or PVCs) for different services or subscribers. Define channels on each DSL port for different services or levels of service and assign each channel a priority. ATM Quality of Service (QoS) allows you to regulate the average rate and fluctuations of data transmission. This helps eliminate congestion to allow the transmission of real time data (such as audio and video).

IEEE 802.1x Port-based Authentication

The IES supports the IEEE 802.1x standard for centralized user authentication and accounting management through an optional network authentication (RADIUS) server.

2684 Routed Mode

The IES can handle 2684 routed mode traffic.

Downstream Broadcast

The IES can block downstream broadcast packets from being sent to specified VLANs on specified ports.

Management

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

Security

- Password protection for system management
- VLAN

MAC (Media Access Control) Filter

Use the MAC filter to accept or deny incoming frames based on MAC (Media Access Control) address(es) that you specify. You may enable/disable the MAC filter on specific ports. You may specify up to ten MAC addresses per port.

MAC (Media Access Control) Count Filter

You can limit the number of MAC addresses that may be dynamically learned on a port. You may enable/disable the MAC count filter on individual ports.

OUI Filter

Use the OUI filter to block or forward packets from devices with the manufacturer-specific OUI octets in the MAC address. This allows you to filter swathes of MAC addresses based on the manufacturer of the type of hardware trying to access the IES rather than based on individual devices themselves.

Static Multicast

Use static multicast to allow incoming frames based on multicast MAC address(es) that you specify. This feature can be used in conjunction with IGMP snooping and IGMP proxy to allow multicast MAC address(es) that are not learned by IGMP snooping or IGMP proxy.

IGMP Proxy

In a simple tree network, the system can proxy multicast traffic in order to improve network performance.

IGMP Snooping

With IGMP snooping, group multicast traffic is only forwarded to ports that are members of that group. IGMP Snooping generates no additional network traffic, allowing you to significantly reduce multicast traffic passing through your IES.

Multicast VLANs

This feature allows you to manage multicast traffic using VLAN IDs. You can control the traffic passing through to the different host devices and, through the creative implementation of VLANs, direct different multicast traffic to different destinations without mixing them together.

System Monitoring

- System status (link status, rates, statistics counters)
- Temperatures, voltage reports and alarms.

System Error Logging

The IES's system error log will record error logs locally. These logs may be viewed again after a warm restart.

Alarm LED

An **ALM** (alarm) LED lights when the IES is overheated, the fans are not working properly, the voltage readings are outside the tolerance levels or an alarm has been detected on the ALARM input pins.

Bandwidth Control

The IES supports rate limiting in 32 Kbps increments allowing you to create different service plans

Quality of Service

- Four priority queues for ENET and eight priority queues for downstream PVC so you can ensure mission-critical data gets delivered on time.
- Follows the IEEE 802.1p priority setting standard.

STP (Spanning Tree Protocol) / RSTP (Rapid STP)

(R)STP detects and breaks network loops and provides backup links between switches, bridges or routers. It allows a switch to interact with other (R)STP - compliant switches in your network to ensure that only one path exists between any two stations on the network.

1.4 VoIP Features

IEEE 802.1Q Tagged VLAN

Your IES uses the IEEE 802.1Q Tagged VLAN (Virtual Local Area Network), which allows it to deliver tagged/untagged frames. The IES supports up to 4094 individual VLANs.

Quality of Service (QoS)

The IES supports IEEE 802.1p QoS (Quality of Service) network traffic prioritization for SIP and RTP traffic, as well as DSCP (Differentiated Services Code Point) and ToS (Type of Service) tagging.

SIP Keep Alive

The IES supports SIP session keep alive, as defined in RFC-4028.

Voice Compression and Decompression

The IES supports the following voice codecs.

- G.711 A-law
- G.711 µ-law
- G.723.1
- G.726 (40, 32, 24 and 16 kbps)
- G.729AB

Out-of-Band POTS Signaling

As well as transmitting and receiving voice band data, FXS and FXO can communicate using out-of-band signals.

Table 1 Out-of-Band POTS Signaling

SIGNAL	DESCRIPTION
Off Hook	FXO intends to start a call
On Hook	FXO terminates the call
Flash	Short on-hook “tap” for special call functions.
Pulse Dial	Dialing method using an interrupted signal.
Ring	AC power signal from FXS port indicating a phone call attempt from remote party.
Tip/Ring Reversal	FXS port reverses the voltage between the tip and the ring
Metering Tone	FXS port sends a 12 /16kHz out-of-band sine wave for payphone use.

Call Progress Tones

The IES can provide the following tones to connected telephones:

Table 2 Supported Tones

TONE	INDICATION
Dial tone	A line is available for use.
Busy tone	The dialed number is unreachable.
Congestion tone	There are not enough resources to handle a call.
Ringback tone	The remote party’s phone is ringing.
Waiting tone	The other party’s line is engaged.
Howler tone	The handset has been left off-hook too long.

Numbering Plan

A telephone number generally comprises a country code, a national destination code, and a subscriber number (as defined in ITU-T E.164). You can configure the IES to recognize certain outgoing phone numbers, and translate them into the correct SIP URI, and to translate incoming request URIs into the correct format.

Key Combinations for SIP Services

The IES allows users to perform a variety of call functions, including call hold, call waiting and call transfer. The user can activate these by pressing a combination of telephone keypad keys. The IES provides a default set of key combinations.

Caller Line Identifier Presentation and Caller Line Identifier Restriction

The IES can transmit caller ID to the callee (CLIP) or restrict it (CLIR) over SIP.

Analog Modem Pass-through

The IES supports analog modem service over the voice channel.

Fax Pass-through

The IES supports fax service over the voice channel.

DTMF Relay

DTMF (Dual-Tone Multi-Frequency) relay detects DTMF signals and sends them out-of-band (via SIP or RTP) to the remote party. DTMF relay is used when a low-bitrate voice codec might distort DTMF signals sent over the voice channel. The IES supports RFC 2833 and SIP INFO.

Country Code

Many settings governing call functions differ from one region to another. The IES allows you to set these by entering a preconfigured country code. The following variables are affected when you set the country code.

- AC impedance
- PCM companding law
- Cadence ring
- Flash time
- Pulse dial interval
- Pay-signal type

Metallic Line Test

The IES provides the following metallic line test (MLT) measurements.

- Foreign AC voltage (50Hz ~ 500Hz)
- Foreign DC voltage
- Hazardous potential test
- Three-element capacitance test
- Three-element resistance test
- Ringing equivalency number test (REN measurement)
- Metering

Test In/Out

The IES supports the connection of external testing devices. The **TEST IN** port is used for testing internal POTS circuits, and the **TEST OUT** port is used for testing external wire loop to the customer’s phone.

SIP/RTP Statistics

The IES provides the following SIP and RTP statistics.

- SIP local URI
- SIP remote URI
- RTP TX codec
- RTP RX codec
- RTP TX payload type
- RTP RX payload type
- RTP local IP/port

• RTP remote IP/port

Echo Cancellation

The device supports G.168, an ITU-T standard for eliminating the echo caused by the sound of your voice reverberating in the telephone receiver while you talk.

Voice Activity Detection

Voice Activity Detection (VAD) reduces the bandwidth that a call uses by not transmitting when you are not speaking.

Comfort Noise Generation

Your device generates background noise to fill moments of silence when the other device in a call stops transmitting because the other party is not speaking (as total silence could easily be mistaken for a lost connection).

Dynamic Jitter Buffer

The built-in adaptive buffer helps to smooth out the variations in delay (jitter) for voice traffic. This helps ensure good voice quality for your conversations.

2

Hardware Installation

This chapter explains how to install the IES.

2.1 General Installation Instructions

Before you begin, read all the safety warnings in Safety Warnings on page 6, and make sure you follow them.

Perform the installation as follows:

1 Make sure the IES power switch is in the **OFF** position.

2 Attach the fan cover. See Section 2.2 on page 61.

3 Install the hardware. See Section 2.3 on page 63.

4 Connect the frame ground. See Section 2.4 on page 66.

5 See Chapter 3 on page 67 for instructions on making front panel connections.

6 See Chapter 4 on page 75 for instructions on connecting the Telco-50 connectors.

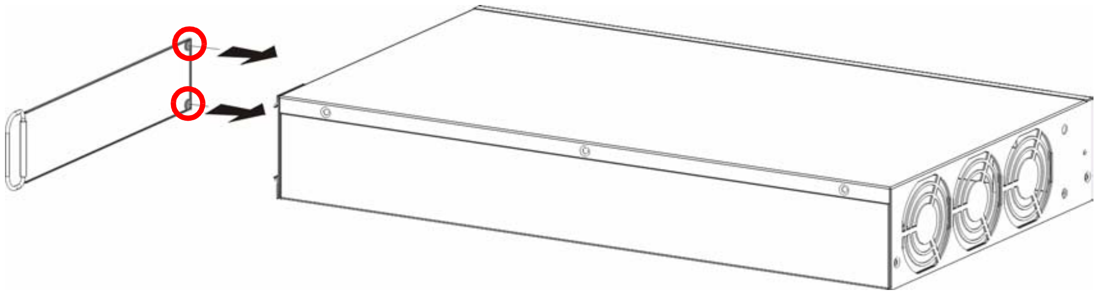
7 See Chapter 5 on page 79 for instructions on making power connections and turning on the IES.

2.2 Fan Cover Installation

Before you mount the IES, take the following steps to install the fan cover.

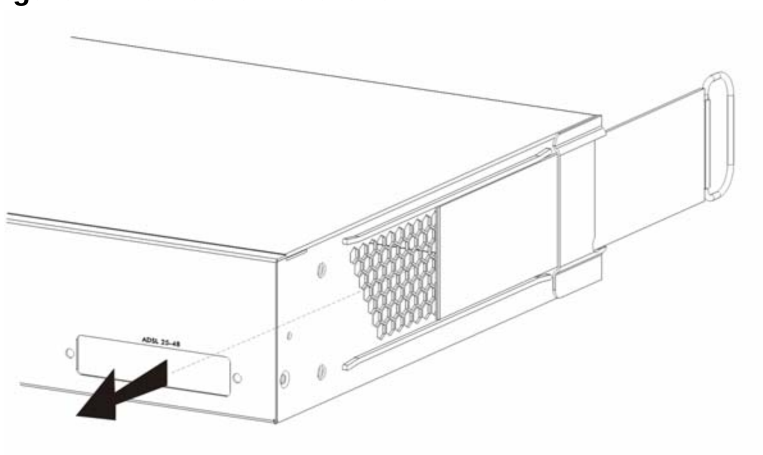
1 Ensure that the side of the fan cover with the magnets is facing the IES.

Figure 3 Fan Cover Magnets



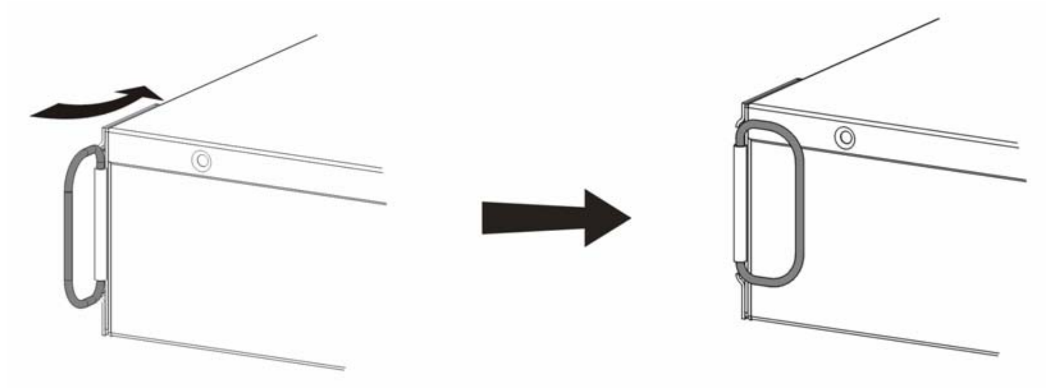
2 Slide the fan cover underneath the fan cover retainer and between the side rails until it is securely fitted on the side of the IES.

Figure 4 Fan Cover Installation



3 Flip the fan cover handle around so it is flush with the rear of the IES.

Figure 5 Fan Cover Handle



2.3 Installation Scenarios

The IES can be placed on a desktop or rack-mounted on a standard EIA rack. Use the rubber feet in a desktop installation and the brackets in a rack-mounted installation.

For proper ventilation, allow at least 4 inches (10 cm) of clearance at the left and right of the IES. This is especially important for enclosed rack installations.

2.3.1 Desktop Installation Procedure

1 Make sure the IES is clean and dry.

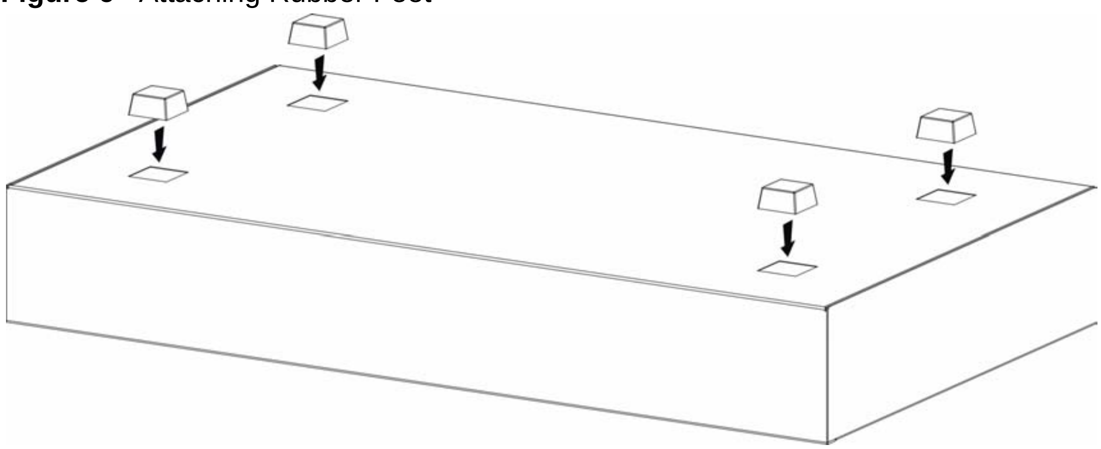
2 Set the IES on a smooth, level surface strong enough to support the weight of the IES and the connected cables. Make sure there is a power outlet nearby.

3 Make sure there is enough clearance around the IES to allow air circulation and the attachment of cables and the power cord.

4 Remove the adhesive backing from the rubber feet.

5 Attach the rubber feet to each corner on the bottom of the IES. These rubber feet help protect the IES from shock or vibration and ensure space between IES when stacking.

Figure 6 Attaching Rubber Feet



Do not block the ventilation holes. Leave space between IESs when stacking.

2.3.2 Rack-Mounted Installation

2.3.2.1 Rack-mounted Installation Requirements

The IES can be mounted on an EIA standard size, 19-inch rack or in a wiring closet with other equipment. Follow the steps below to mount your IES on a standard EIA rack using a rack-mounting kit.

Make sure the rack will safely support the combined weight of all the equipment it contains.

Make sure the position of the IES does not make the rack unstable or top-heavy. Take all necessary precautions to anchor the rack securely before installing the unit.

- Use a #2 Phillips screwdriver to install the screws.
- See Chapter 71 on page 599 for the gauge of wire to use for the frame ground connections.
- See Chapter 71 on page 599 for the hardware that is required to mount the IES.

Failure to use the proper screws may damage the unit.

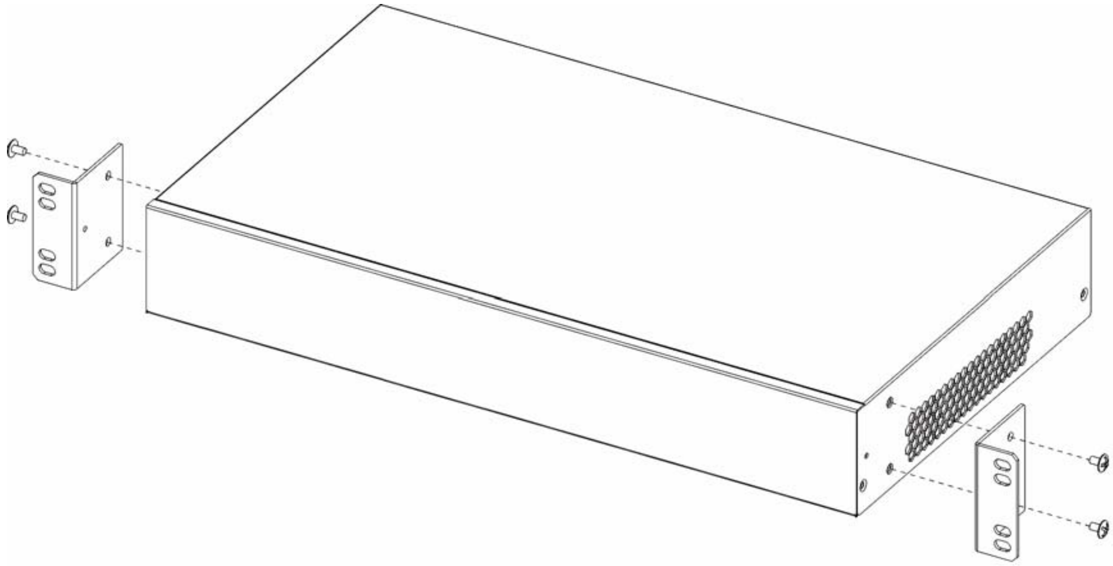
Do not block the ventilation holes. Leave space between IES when stacking.

2.3.2.2 Rack-Mounted Installation Procedure

1 Align one bracket with the holes on one side of the IES and secure it with the bracket screws smaller than the rack-mounting screws.

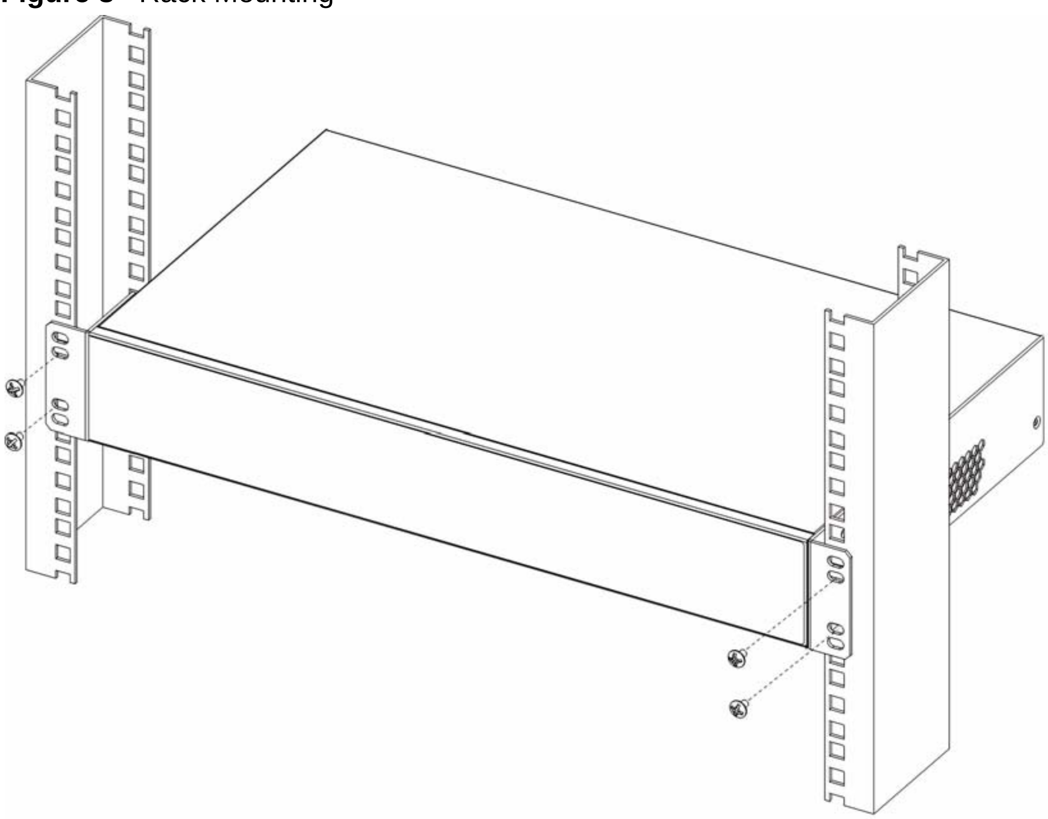
2 Attach the other bracket in a similar fashion.

Figure 7 Attaching Mounting Brackets and Screws



3 After attaching both mounting brackets, position the IES in the rack by lining up the holes in the brackets with the appropriate holes on the rack. Secure the IES to the rack with the rack-mounting screws.

Figure 8 Rack Mounting



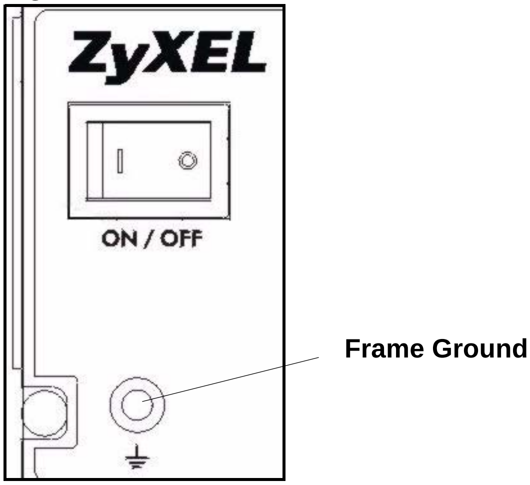
2.4 Connecting the Frame Ground

Note: See Chapter 71 on page 599 for the ground wire gauge.

- The IES frame ground is on the lower left corner of the front panel.
- Connect the frame grounds to a building's protective earthing terminals using a green-and-yellow frame ground wire.

Connect the frame ground before you connect any other cables or wiring.

Figure 9 IES Frame Ground



3

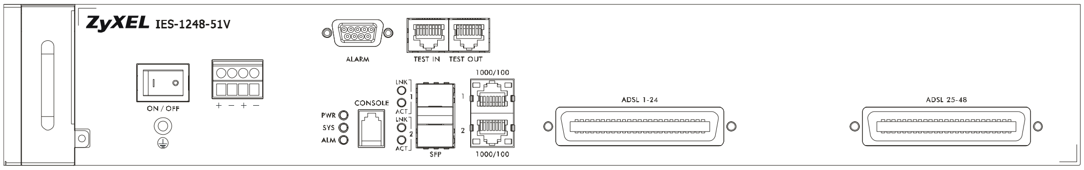
Front Panel Connections

This chapter describes the ports on the front panel, and how to make connections to the ports.

3.1 Front Panel

The following figure shows the front panel of the IES.

Figure 10 IES Front Panel



3.1.1 Front Panel Ports

The following table describes the ports on the front panel of the IES.

Table 3 IES Front Panel Ports

CONNECTOR	DESCRIPTION
CONSOLE	Connect this mini-RJ-11 port to a computer for local management.
1000/100 1/2	Use these RJ-45 ports for subtending. You can daisy chain more IESs or other Ethernet switches. This is an electrical Ethernet interface for use with the following copper Ethernet cables: • 100Base-Tx 2 pair UTP Cat. 5, up to 100m • 1000Base-T 4-pair UTP Cat. 5e or Cat. 6, up to 100m For better performance and lower radiation noise, use shielded Ethernet cables.

Table 3 IES Front Panel Ports (continued)

CONNECTOR	DESCRIPTION
ALARM	This DB9 connector has alarm input pins and alarm output pins. Connect the alarm input pins to alarm output terminals on other pieces of equipment. Connect the alarm output pins to an alarm input terminal on another piece of equipment.
SFP 1, 2	Each of these Small Form-factor Pluggable (SFP) slots can house a mini GBIC (Gigabit Interface Converter) transceiver.
TEST IN, TEST OUT	Use these RJ-45 ports to connect external equipment for conducting metallic line tests on the IES's **ADSL** ports. Use the **TEST IN** port for testing internal POTS circuits, and the **TEST OUT** port for testing the external wire loop to the customer's phone.
ADSL 1-24, 25-48	Connect these Telco-50 connectors to subscribers 1-24 and 25-48 respectively.

3.1.2 Front Panel LEDs

The following table describes the LED indicators on the front panel of the IES.

Table 4 LED Descriptions

LED	COLOR	STATUS	DESCRIPTION
PWR	Green	On	The power is turned on.
		Off	The power is off.
SYS	Green	Blinking	The system is rebooting and performing self-diagnostic tests.
		On	The system is on and functioning properly.
		Off	The system is not ready/malfunctioning.
ALM	Red	On	There is a hardware failure, or there is ALM input.
		Off	The system is functioning normally.
1000/100 1,2	Yellow	On	The link to a 100 Mbps Ethernet network is up.
		Blinking	The link is transmitting/receiving 100 Mbps Ethernet traffic.
		Off	The link to a 100 Mbps Ethernet network is down.
	Green	On	The link to a 1000 Mbps (1Gbps) Ethernet network is up.
		Blinking	The link is transmitting/receiving 1000 Mbps (1Gbps) Ethernet traffic.
		Off	The link to a 1000 Mbps (1Gbps) Ethernet network is down.
SFP 1,2 LNK	Green	On	The link to a 1000 Mbps (1 Gbps) Ethernet network is up.
		Off	There is not a link to a 1000 Mbps (1 Gbps) Ethernet network or the 1000 Mbps network link is down.

Table 4 LED Descriptions (continued)

LED	COLOR	STATUS	DESCRIPTION
SFP 1,2 ACT	Green	Blinking	The system is transmitting/receiving Ethernet traffic.
		Off	The system is not transmitting/receiving Ethernet traffic.

3.2 1000/100M Auto-Sensing Ethernet

The IES has two 1000/100Mbps auto-sensing Ethernet ports. There are two factors related to Ethernet: speed and duplex mode. In 1000/100Mbps Fast Ethernet, the speed can be 100Mbps or 1000Mbps 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 connection speed and duplex mode that both ends support.

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

Use the Ethernet ports for subtending. You can daisy chain more IES or other Ethernet switches.

Use with the following copper Ethernet cables: 1000Base-T 4-pair UTP Cat. 5e or Cat.6, up to 100m.

Note: For better performance and lower radiation noise, use shielded Ethernet cables.

Each 1000/100M port is paired with a mini GBIC slot. The IES uses up to one connection for each pair for a total of two possible gigabit connections (one from each of the two pairs). The IES uses the mini GBIC transceiver whenever it has a connection.

3.2.1 Ethernet Default Settings

- Speed: Auto
- Duplex: Auto

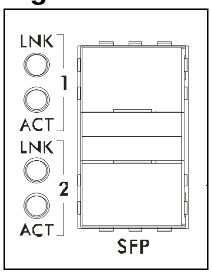
3.3 SFP Mini GBIC Slots

The **SFP** slots can each house a mini GBIC (Gigabit Interface Converter) transceiver. A transceiver is a single unit that houses a transmitter and a receiver. The IES does not come with a transceiver. You must use a transceiver that complies with the Small Form-factor Pluggable (SFP) Transceiver MultiSource Agreement (MSA). See the SFF committee's INF-8074i specification Rev 1.0 for details.

You can change transceivers while the IES is operating. You can use different transceivers to connect to Ethernet switches with different types of fiber-optic connectors.

To avoid possible eye injury, do not look directly into an operating fiber-optic module's connectors.

Figure 11 SFP Mini GBIC Slots



- Type: SFP connection interface
- Connection speed: 1 Gigabit per second (Gbps)

3.3.1 Transceiver Installation

Use the following steps to install a mini GBIC transceiver (SFP module) in the **SFP** slot.

1 Remove the dust cover from the transceiver.

2 For transceivers with a flip-up or flip-down latch, close the latch.

3 Insert the fiber-optic cables into the transceiver (you may need to remove cable dust covers).

4 Insert the transceiver into the IES's **SFP** slot.

5 Press the transceiver firmly until it clicks into place.

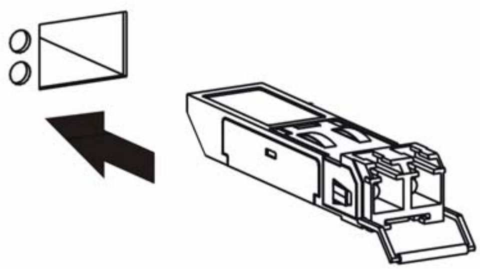


Figure 12 Transceiver Installation

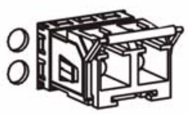


Figure 13 Installed Transceiver

3.3.2 Transceiver Removal

Use the following steps to remove a mini GBIC transceiver (SFP module) from the IES.

1 Remove the fiber-optic cables from the transceiver.

2 Unlock the transceiver's latch (latch styles vary).

3 Pull the transceiver out of the slot.

4 Put the transceiver's dust cover on the transceiver.

Figure 14 Opening the Transceiver Latch

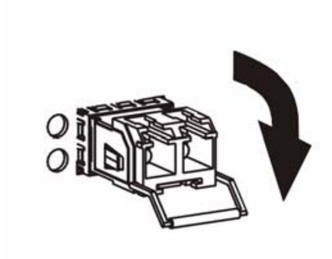
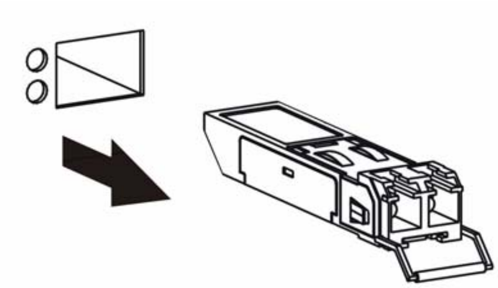


Figure 15 Removing the Transceiver



3.4 Console Port Connection

For local management, you can use 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

Connect the mini-RJ-11 male end of the console cable to the console port of the IES. Connect the female end to a serial port (COM1, COM2 or other COM port) of your computer.

3.5 ALARM Connections

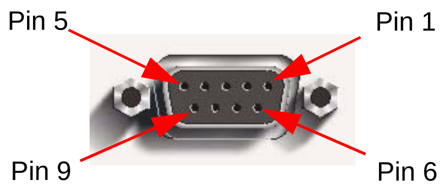
A closed circuit on the **ALARM** input pins indicates an alarm. Pins 7 and 3 are alarm input one. Pins 8 and 4 are alarm input two. Pins 9 and 5 are alarm input 3.

The IES signals an alarm when it detects an alarm on the **ALARM** input pins or the IES.

To signal an alarm, the IES opens the circuit for pins 1 and 6 (the common pin) and closes the circuit for pins 2 and 6.

Examples of an alarm on the IES are when the IES's voltage or temperature is outside of the normal range.

Figure 16 ALARM Pins Layout



3.6 ADSL Connections

Connect the lines from the user equipment (ADSL modems) to the **ADSL** Telco-50 connectors.

The line from the user carries both the ADSL and the voice signals. For each line, the IES has a built-in splitter that separates the high frequency ADSL signal from the voice band signal. See Chapter 4 on page 75 for more information on the Telco-50 connections.

4

MDF Connections

This chapter shows you how to connect the Telco-50 connectors to an MDF.

4.1 MDF Connections Overview

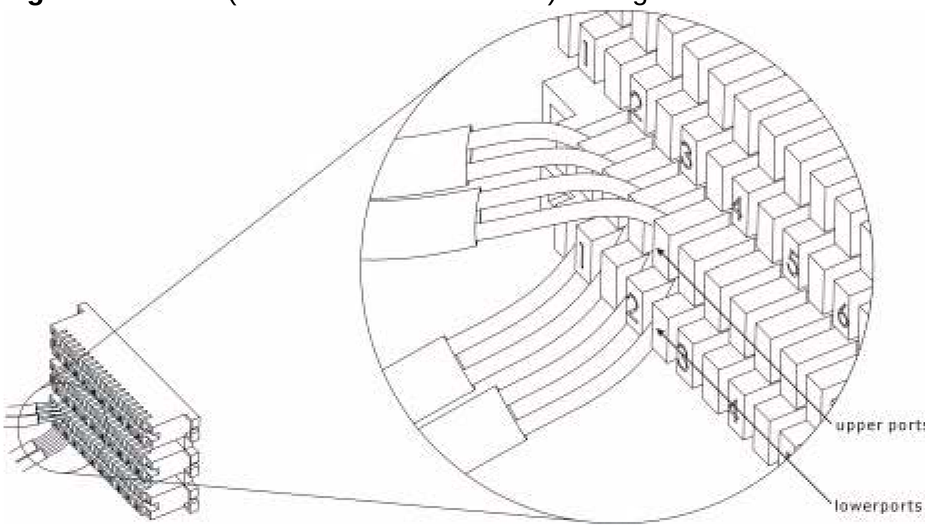
Observe the following before you start:

- See Chapter 71 on page 599 for the gauge of telephone wire to use.
- Follow the pin assignments shown in Chapter 71 on page 599 to wire Telco-50 cables to Telco-50 connectors.
- See Chapter 71 on page 599 for details on how to make the management connections.

4.2 MDF (Main Distribution Frame)

An MDF is usually installed between subscribers' equipment and the telephone company (CO) in a basement or telephone room. The MDF is the point of termination for the outside telephone company lines coming into a building and the telephone wiring in the building.

Figure 17 MDF (Main Distribution Frame) Wiring



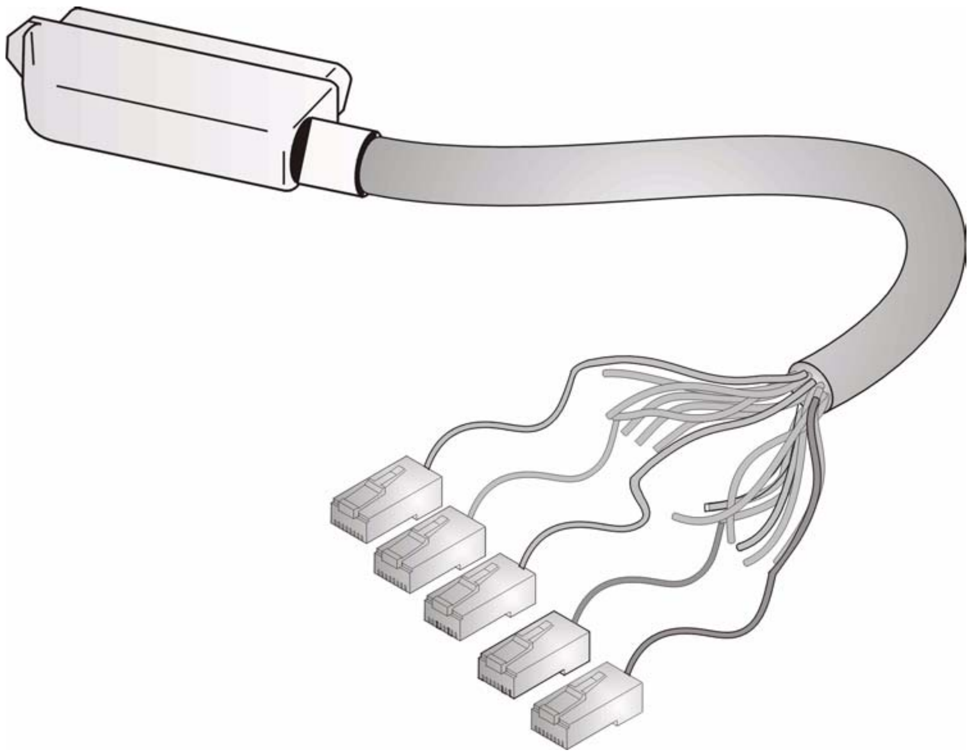
- Connect wiring to end-user equipment to the lower ports of an MDF and connect wiring from the telephone company to the upper ports of an MDF (see the previous figure).
- Some MDFs have surge protection circuitry built in between the two banks; thus, do not connect telephone wires from the telephone company directly to your IES.
- Use a punch-down tool to seat telephone lines into MDF blocks.
- Multiple upper and lower MDF port connections are shown as one line in the following figures.

4.3 Telco-50 Cables

Telco-50 cables are used for data and voice applications with MDFs (Main Distribution Frame), patch panels and distribution boxes. They can also be used as extension cables. Telco-50 cables are made up of 25 twisted-pair copper wires.

Connect a Telco-50 connector to one end of the cable (see Chapter 71 on page 599 for pin assignments) and connect the other end directly to an MDF; alternatively attach RJ-11 connectors and connect directly to DSL modem(s).

Figure 18 Telco-50 Cable with RJ-11 Connectors



5

Power Connections

This chapter shows you how to connect the IES to a power source.

5.1 Power Connections Overview

Use the following procedures to connect the IES to a power source after you have installed it in a rack.

Note: Check the power supply requirements in Chapter 71 on page 599, and make sure you are using an appropriate power source.

Observe the following before you start:

- See Chapter 71 on page 599 for the gauge of wire to use for the IES power connections.
- Keep the IES power switch in the **OFF** position until you come to the procedure for turning on the power.
- Keep the power supply switch in the **OFF** position until you come to the procedure for turning on the power.

Use only power wires of the required diameter for connecting the IES to a power supply (see Chapter 71 on page 599 for the required wire diameter).

5.2 Power Connections

The IES power connections are at the lower-left corner of the front panel.

When installing the IES power wire, push the wire firmly into the terminal as deep as possible and make sure that no exposed (bare) wire can be seen or touched.

1 Connect one end of a power wire to the **–** power terminal on the front panel of your IES and tighten the terminal screw.

2 Connect the other end of the power wire to the -36 to -72 VDC terminal on the power supply.

3 Repeat the previous step for the terminal labeled **+**.

5.3 Procedure to Turn on the Power

1 Turn on the power supply.

2 Move the IES power switch to the **ON** position.

6

Fan Maintenance

This chapter describes how to change a fan module.

6.1 Fan Maintenance Introduction

The IES has a hot-swappable fan module. Use the following procedures to remove the fan module. Replace the entire fan module. Return any malfunctioning fan modules to the manufacturer.

6.2 Removing and Installing the Fan Module

The IES fan module is at the left on the front panel. Perform the following procedure to remove the fan module.

1 Loosen the thumbscrew on the front of the fan module.

2 Slide out the fan module.

3 Use a different fan module from the manufacturer.

4 Slide the fan module into the fan module slot.

5 Tighten the thumbscrew.

Figure 19 Fan Module Thumbscrews

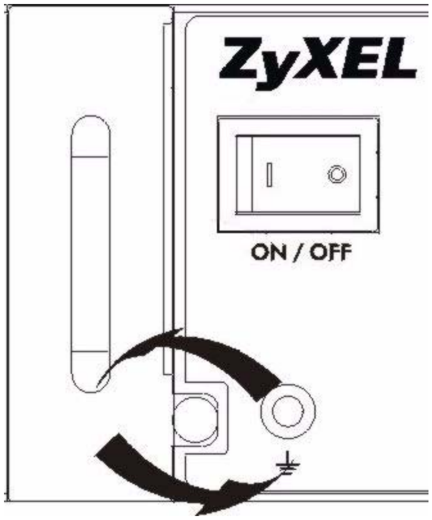


Figure 20 Removing the Fan Module

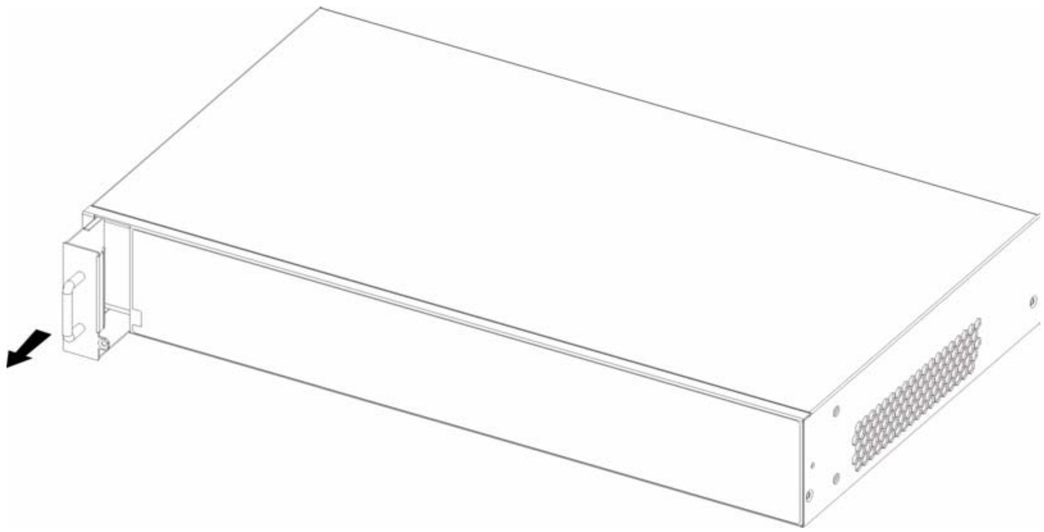
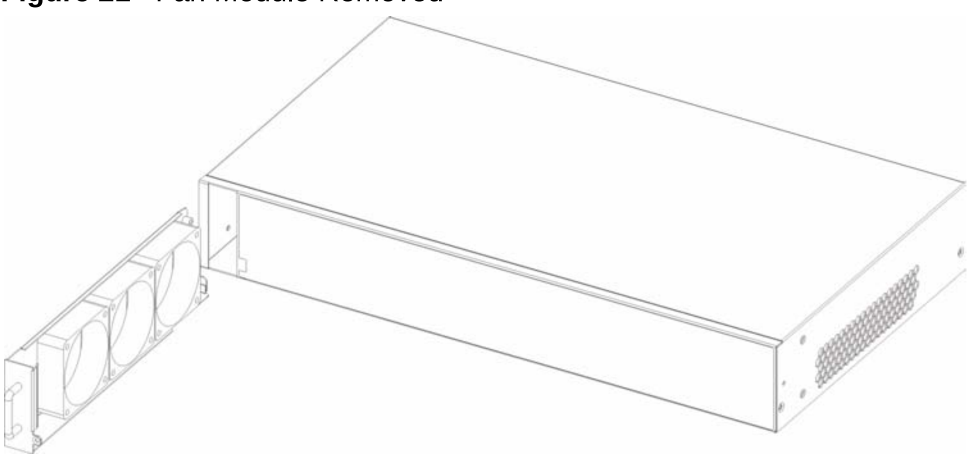


Figure 21 Fan Module Removed



PART II
Basic Settings

7

Introducing the Web Configurator

7.1 Web Configurator Overview

This chapter tells how to access and navigate the web configurator. The web configurator allows you to use a web browser to manage the IES.

7.2 Screen Privilege Levels

There is a high or low privilege level for each screen.

High privilege screens are only available to administrators with high privilege access. High privilege screens include things like creating administrator accounts, restarting the system, saving changes to the nonvolatile memory and resetting to factory defaults. Nonvolatile memory refers to the IES's storage that remains even if the IES's power is turned off. Administrators with high privilege access can use all screens including the lower privilege screens.

Administrators with the low privilege level are restricted to using only low privilege screens. Low privilege screens are read only.

7.3 Accessing the Web Configurator

Use Internet Explorer 6 and later versions with JavaScript enabled.

Use the following instructions to log on to the web configurator.

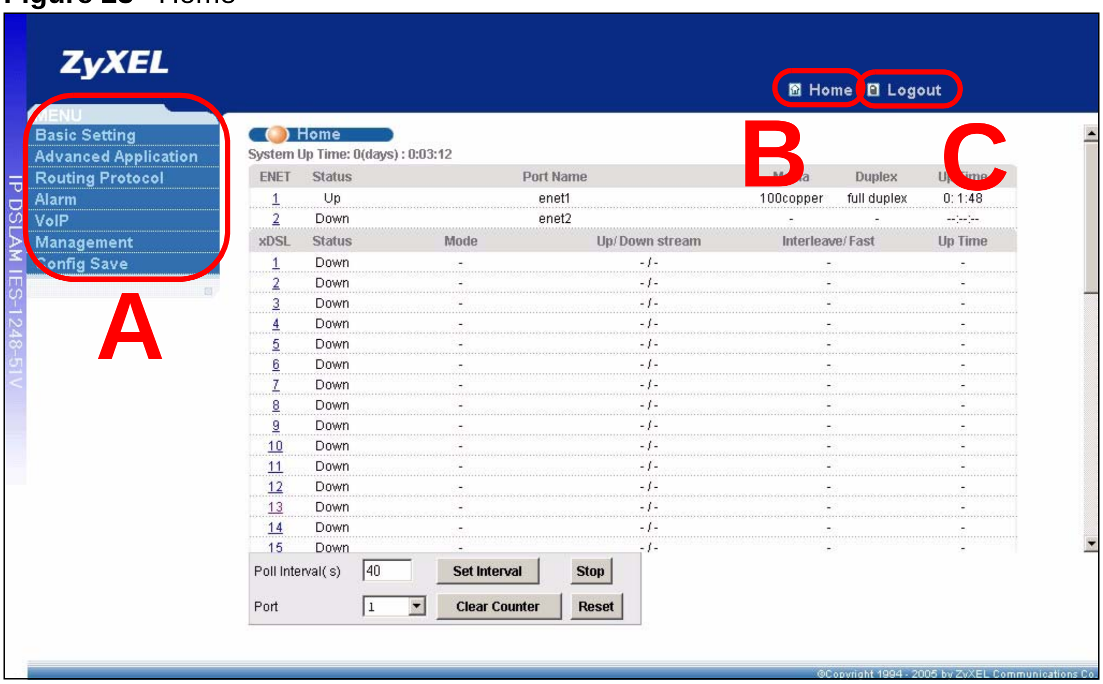
1 Launch your web browser, and enter the IP address of the IES (default: **192.168.1.1** is the factory default) in the **Location** or **Address** field. Press **Enter**. The **Login** screen appears.

Figure 22 Login

2 Type **admin** in the **User Name** field and your password (default: **1234**) in the **Password** field. Click **OK**. The main screen appears.

This is the web configurator's main screen.

Figure 23 Home



A - Click the menu items to open submenu links, and then click on a submenu link to open the screen in the main window. See Section 7.4 on page 89 for more information.

B - Click this to open the **Home** screen. (This is the same screen that is displayed above.) See Chapter 9 on page 101 for more information.

C - Click this to log out of the web configurator.

7.4 Navigation Panel

In the navigation panel, click a menu item to reveal a list of submenu links. Click a submenu link to go to the corresponding screen.

Table 5 Navigation Panel Submenu Links

BASIC SETTING	ADVANCED APPLICATION	ROUTING PROTOCOL
System Information General Setup User Account Switch Setup IP Setup ENET Port Setup xDSL Port Setup xDSL Profiles Setup xDSL Line Data G.bond	VLAN IGMP Static Multicast Multicast VLAN Filtering MAC Filter Spanning Tree Protocol Port Authentication Port Security DHCP Relay DHCP Snoop 2684 Routed Mode PPPoA to PPPoE DSCP TLS PVC ACL Downstream Broadcast SysLog Access Control IP Bridge PPPoE Intermediate Agent Maximum MTU Size PVC Upstream Limit OUI Filter	Static Routing
ALARM	**VOIP**	**MANAGEMENT**
Alarm Status Alarm Event Setup Alarm Port Setup	VoIP Port Setup SIP Profile Call Service Profile DSP Profile Number Plan Table Local Help Key Pattern Dialplan Localcall Time VoIP Line Status and Info Diagnostic SIP Proxy Server	Maintenance Diagnostic MAC Table ARP Table
CONFIG SAVE		
Config Save		

The following table briefly describes the functions of the screens that you open by clicking the navigation panel's sub-links.

Table 6 Web Configurator Screens

LABEL	DESCRIPTION
Basic Setting	
System Information	Use this screen to display general system and hardware monitoring information.
General Setup	Use this screen to configure general identification information about the device and the time and date settings.
User Account	Use this screen to configure system administrator accounts.
Switch Setup	Use this screen to set up system-wide parameters such as MAC address learning and priority queues.
IP Setup	Use this screen to configure the system and management IP addresses and subnet masks.
ENET Port Setup	Use this screen to configure settings for the Ethernet ports.
xDSL Port Setup	Use these screens for configuring settings for individual DSL ports.
xDSL Profiles Setup	Use these screens for configuring profiles for the DSL ports.
xDSL Line Data	Use these screens for viewing DSL line operating values, bit allocation and performance counters.
G.bond	Use this screen to configure ADSL port bonding on your IES.
Advanced Application	
VLAN	Use these screens for viewing and configuring the VLAN settings.
IGMP	Use these screens to view IGMP status information and configure IGMP settings and IGMP filters.
Static Multicast	Use this screen to configure static multicast entries.
Multicast VLAN	Use these screens to set up multicast VLANs that can be shared among different subscriber VLANs on the network.
Filtering	Use this screen to configure packet filtering.
MAC Filter	Use this screen to configure MAC filtering for each port.
Spanning Tree Protocol	Use this submenu to go to screens for displaying Rapid Spanning Tree Protocol (RSTP) information and configuring RSTP settings.
Port Authentication	Use this submenu to go to screens for configuring RADIUS and IEEE 802.1x security settings.
Port Security	Use this screen to limit the number of MAC address that can be learned on a port.
DHCP Relay	Use this screen to configure the DHCP relay settings.
DHCP Snoop	Use these screens to drop traffic from IP addresses not assigned by the DHCP server and to look at a summary of the DHCP packets on each port.
2684 Routed Mode	Use this screen to configure the IES to handle 2684 routed mode traffic.
PPPoA to PPPoE	Use this screen to enable PPPoA-to-PPPoE conversions on each port.

Table 6 Web Configurator Screens (continued)

LABEL	DESCRIPTION
DSCP	Use this screen to set up DSCP on each port and to convert DSCP values to IEEE 802.1p values.
TLS PVC	Use this screen to set up Transparent LAN Service (VLAN stacking, Q-in-Q) on each port.
ACL	Use this screen to set up Access Control Logic profiles and to assign them to each PVC.
Downstream Broadcast	Use this screen to block downstream broadcast packets from being sent to specified VLANs on specified ports.
SysLog	Use this screen to configure the syslog settings.
Access Control	Use this screen to configure service access control and configure SNMP and remote management.
IP Bridge	Use these screens to configure IP-aware bridging, where the IES forwards packets based on destination IP address instead of destination MAC address.
PPPoE Intermediate Agent	Use this screen to insert line information into client PPPoE Discover Initialization (PODI) packets
Maximum MTU Size	Use this screen to configure the Maximum Transmission Unit (MTU) for the Ethernet interfaces. The Ethernet interfaces discard any packets larger than this.
PVC Upstream Limit	Use this screen to limit the transmission rate for upstream traffic by PVC.
OUI Filter	Use this screen to list specific MAC address octets to filter.
Routing Protocol	
Static Routing	Use this screen to configure static routes. A static route defines how the IES should forward traffic by configuring the TCP/IP parameters manually.
Alarm	
Alarm Status	Use these screens to view the alarms that are currently in the system.
Alarm Event Setup	Use these screens to view and set the severity levels of the alarms and where the system is to send them.
Alarm Port Setup	Use this screen to set the alarm severity threshold for recording alarms on an individual port(s).
VoIP	
VoIP Port Setup	Use these screens to configure the Voice over IP (VoIP) settings of each of the IES's ports.
Sip Profile	Use this screen to configure basic information about the SIP accounts used by the IES.
Call Service Profile	Use this screen to configure information about the call service profiles used by the IES.
DSP Profile	Use this screen to configure information about the Digital Signal Processing (DSP) profiles used by the IES.
Number Plan Table	Use this screen to see, load and delete number plan tables.

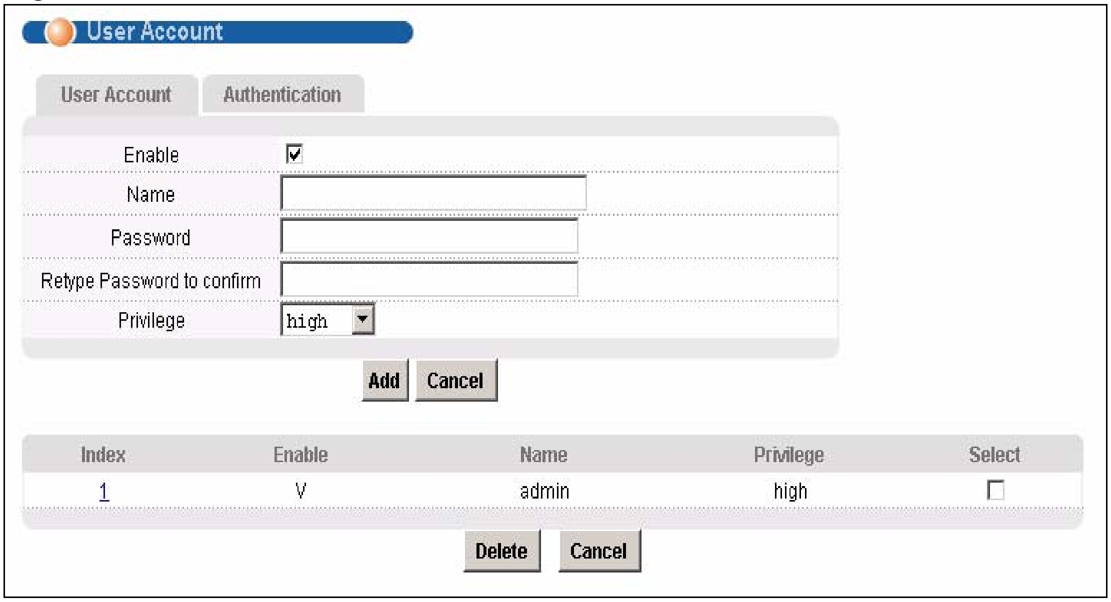
Table 6 Web Configurator Screens (continued)

LABEL	DESCRIPTION
Local Help	Use this screen to set up the local call table that allows subscribers on the VoIP line card(s) to place calls to other extensions when the system's connection to the regular service provider is not available.
Key Pattern	Use this screen to configure key pattern profiles. A key pattern profile is a set of telephone key-presses that allow users to access a variety of features such as call hold, call transfer, and so on.
Dialplan	Use this screen to configure individual dial plans. The system uses dial plans to identify specific types of phone numbers dialed by a user, and to process the number before transmission by deleting or adding digits according to the relevant rule.
Localcall Time	Use this screen to allow subscribers to call other subscribers if the system cannot connect to the SIP server after a specified duration.
VoIP Line Status and Info	Use this screen to see detailed information about the VoIP configuration currently active on each of the IES's analog phone ports.
Diagnostic	Use these screens to perform analog line tests on the lines connected to the IES.
SIP Proxy Server	Use this screen to view information about your SIP servers.
Management	
Maintenance	Use this screen to perform firmware and configuration file maintenance as well as restart the system.
Diagnostic	Use this screen to view system logs and test port(s).
MAC Table	Use this screen to view the MAC addresses of devices attached to what ports.
ARP Table	Use this screen to view the MAC address to IP address resolution table.
Config Save	
Config Save	Use this screen to save the device's configuration into the nonvolatile memory (the IES's storage that remains even if the IES's power is turned off).

7.5 Changing Your Password

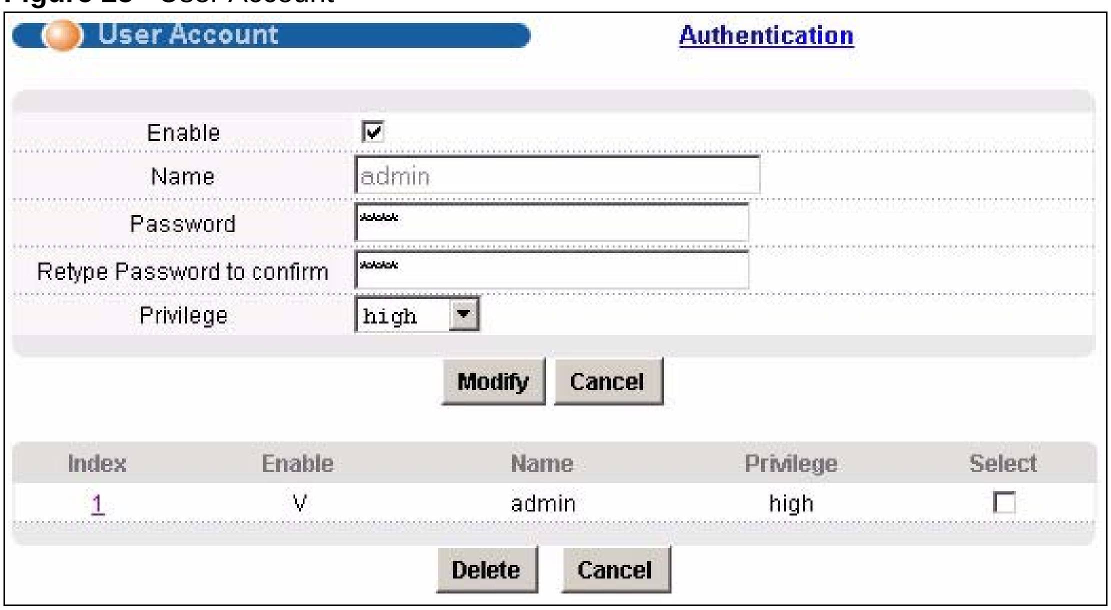
After you log in for the first time, it is recommended you change the default administrator password. Click **Basic Setting** and then **User Account** to display the **User Account** screen.

Figure 24 User Account



Click the index number **1** to edit the default administrator account settings.

Figure 25 User Account



Enter the new password in the **Password** and **Retype Password** to confirm fields, and click **Modify**. Do not forget to click **Config Save** before you exit the web configurator. See Section 7.6 on page 94.

7.6 Saving Your Configuration

Click **Apply** in a configuration screen when you are done modifying the settings in that screen to save your changes back to the run-time memory. Settings in the run-time memory are lost when the IES's power is turned off.

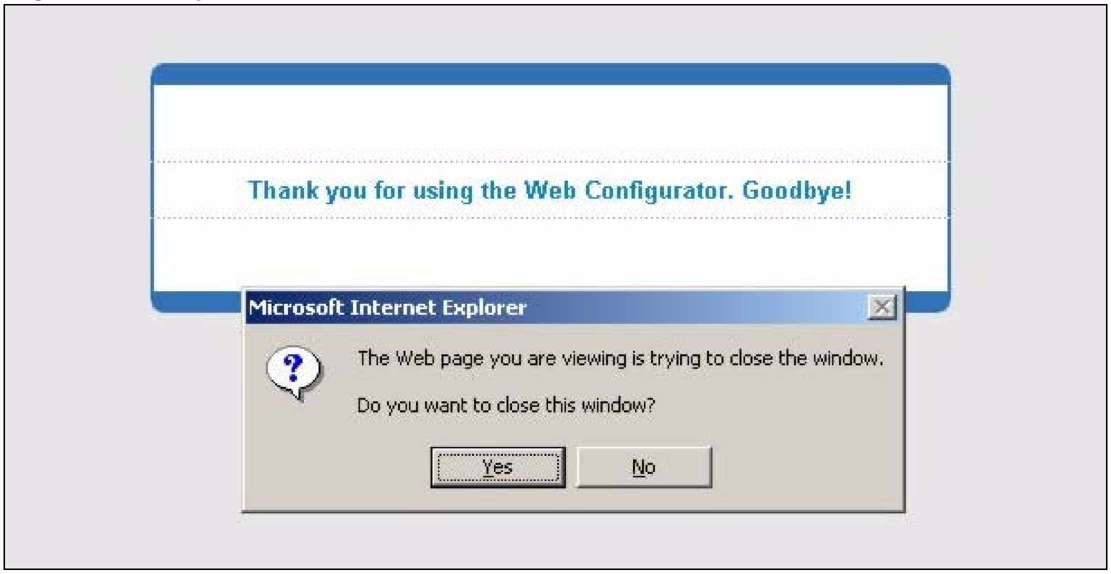
Click **Config Save** in the navigation panel to save your configuration to nonvolatile memory. Nonvolatile memory refers to the IES's storage that remains even if the IES's power is turned off.

Note: Use **Config Save** when you are done with a configuration session.

7.7 Logging Out of the Web Configurator

Click **Logout** in any screen to exit the web configurator. You have to log in with your password again after you log out. This is recommended after you finish a management session both for security reasons and so you do not lock out other device administrators.

Figure 26 Logout



8

Initial Configuration

This chapter describes initial configuration for the IES. See Chapter 71 on page 599 for various default settings of the IES.

8.1 Initial Configuration Overview

This chapter shows what you first need to do to provide service to ADSL subscribers.

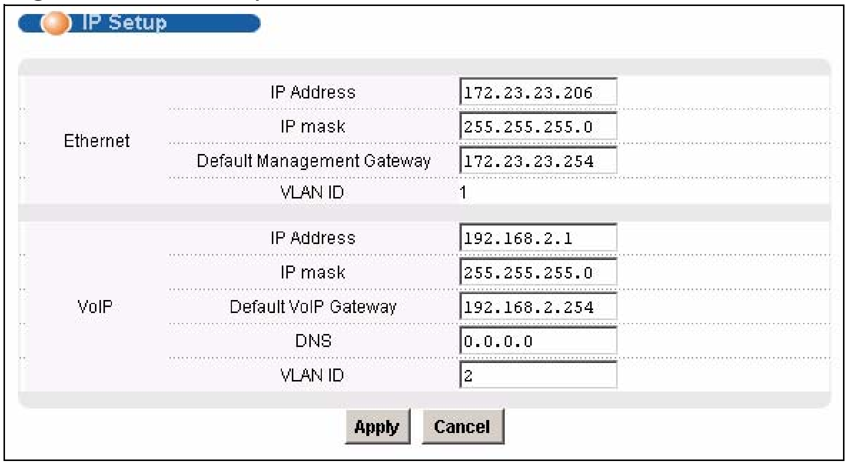
8.2 Initial Configuration

This chapter uses the web configurator for initial configuration. See chapters 50 ~ 68 for information on the commands. Use Internet Explorer 6 and later versions with JavaScript enabled.

1 Log in to the web configurator. See Section 7.3 on page 87 for instructions.

2 In the navigation panel, click **Basic Setting**, **IP Setup**. The **IP Setup** screen appears.

Figure 27 IP Setup



3 Use this screen to change the IP address, subnet mask, and default gateway IP address for your network. Apply the settings.

Note: If you change the IP address of the IES, after you click **Apply IP setting**, you have to use the new IP address to log into the web configurator again.

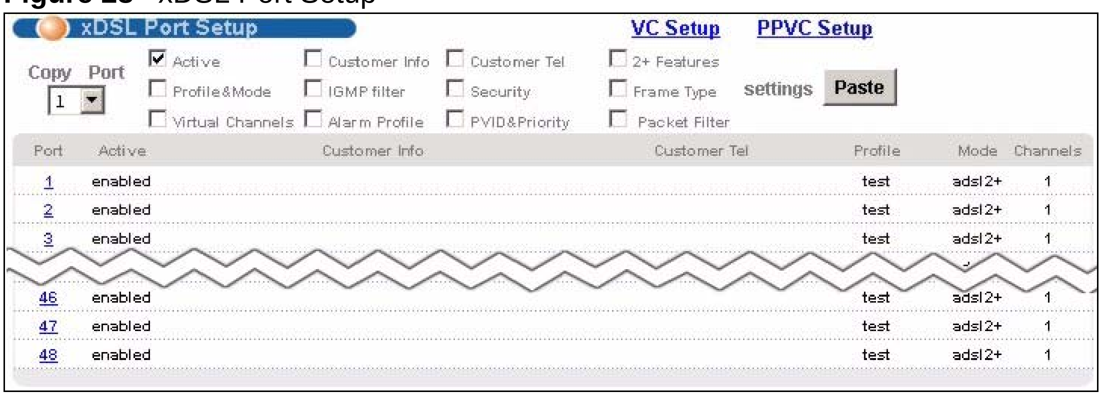
4 If your subscribers use VPI 0 and VCI 33 (the default for all of the ADSL ports), go to step 13. Otherwise, use the following steps to change the VPI and VCI settings for all of the ADSL ports.

First, you will delete the default virtual channel from all of the ADSL ports. (You cannot edit it). Then, you will configure a new virtual channel for a port and copy it to the other ADSL ports.

Adding another virtual channel without deleting the default virtual channel is not recommended since you cannot set the new channel to be the port's super channel. The super channel can forward frames belonging to multiple VLAN groups (that are not assigned to other channels). A channel that is not the super channel can only forward frames with a single VLAN ID (that is configured on that channel). In this case, the IES drops any frames received from the subscriber that are tagged with another VLAN ID.

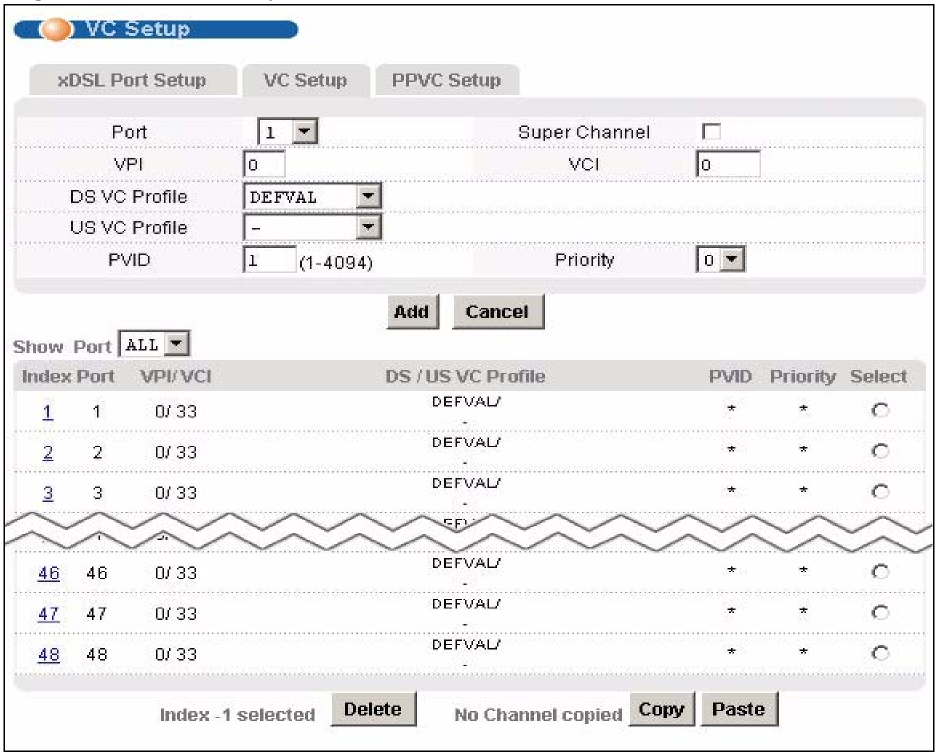
5 In the navigation panel, click **Basic Setting**, **xDSL Port Setup**. The **xDSL Port Setup** screen appears.

Figure 28 xDSL Port Setup



6 Click **VC Setup**. The following screen appears.

Figure 29 VC Setup

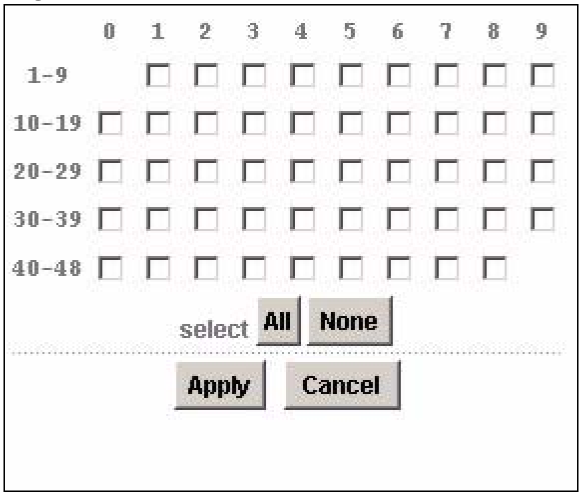


7 Select any virtual channel's **Select** radio button, and click **Delete**. The following screen appears.

Figure 30 VC Setup, Delete

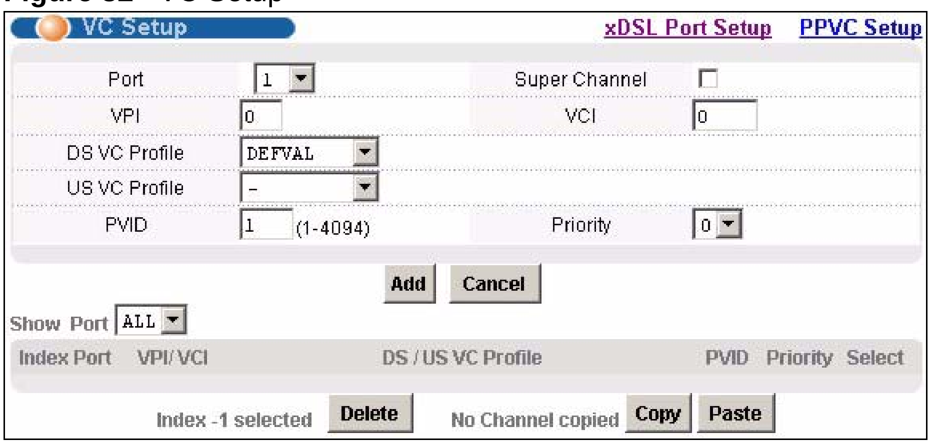
8 Click **OK**. The following screen appears.

Figure 31 Select Ports



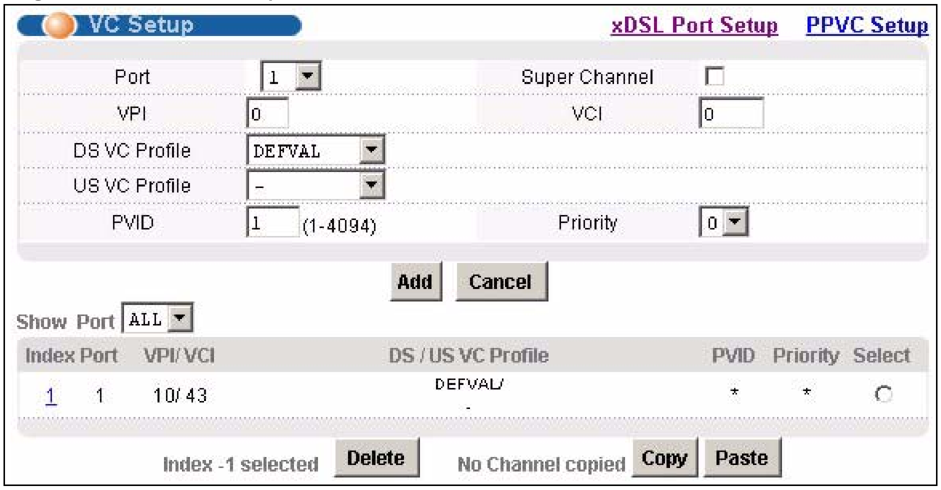
9 Click **All,** and then click **Apply**. The **VC Setup** screen is updated.

Figure 32 VC Setup



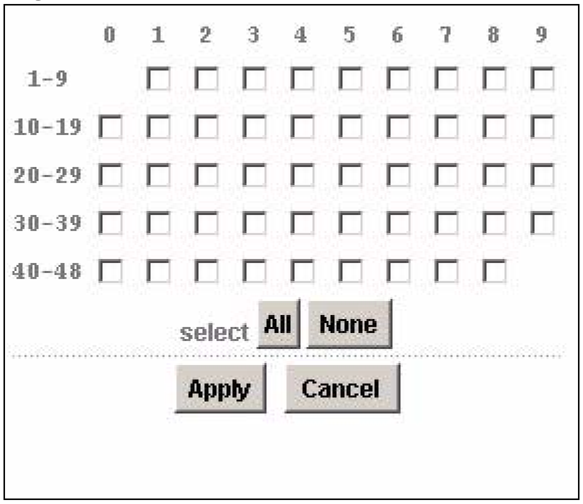
10 Select **Super Channel** to allow the channel to forward frames belonging to multiple VLAN groups (that are not assigned to other channels). Then, enter the VPI and VCI that you use. Leave the other default settings, and click **Add**. The **VC Setup** screen is updated.

Figure 33 VC Setup



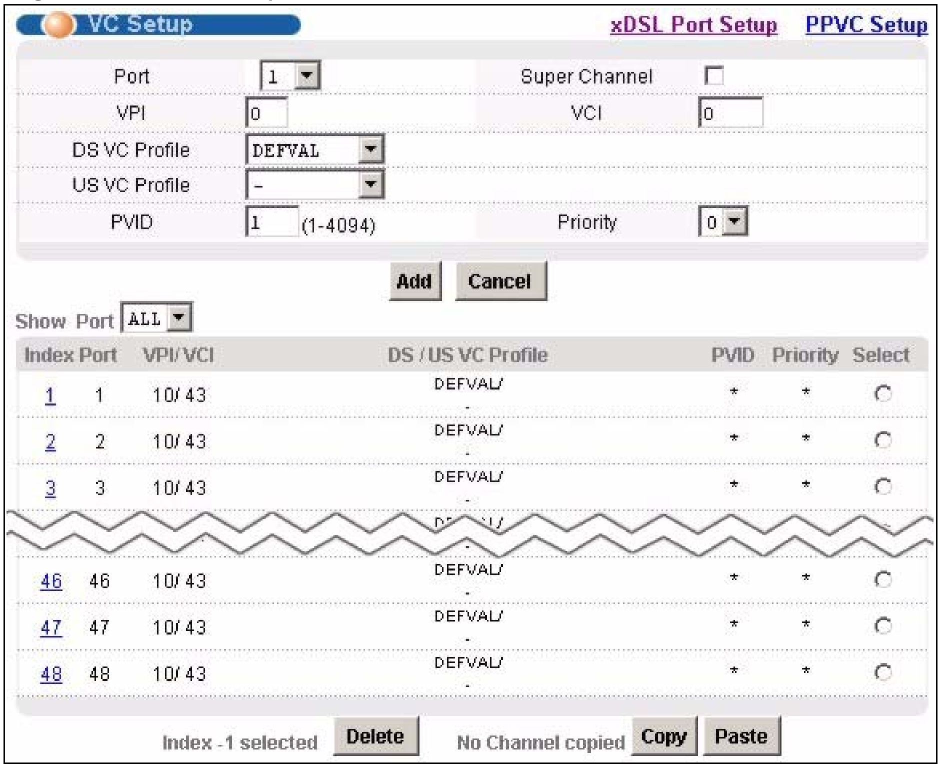
11 Select the new channel's **Select** radio button. Click **Copy**, and then click **Paste**. The following screen appears. The following screen appears.

Figure 34 Select Ports



12 Click **All,** and then click **Apply**. The **VC Setup** screen is updated.

Figure 35 VC Setup



13 Click **Config Save**, **Config Save**. The **Config Save** screen appears.

Figure 36 Config Save

14 Click **Save**. The following screen should appear.

Figure 37 Config Save, Save Successful

You can now use the device (with the other settings set to the defaults) to provide service to ADSL subscribers. See Chapter 71 on page 599 for information on other default settings.

9

Home and Port Statistics Screens

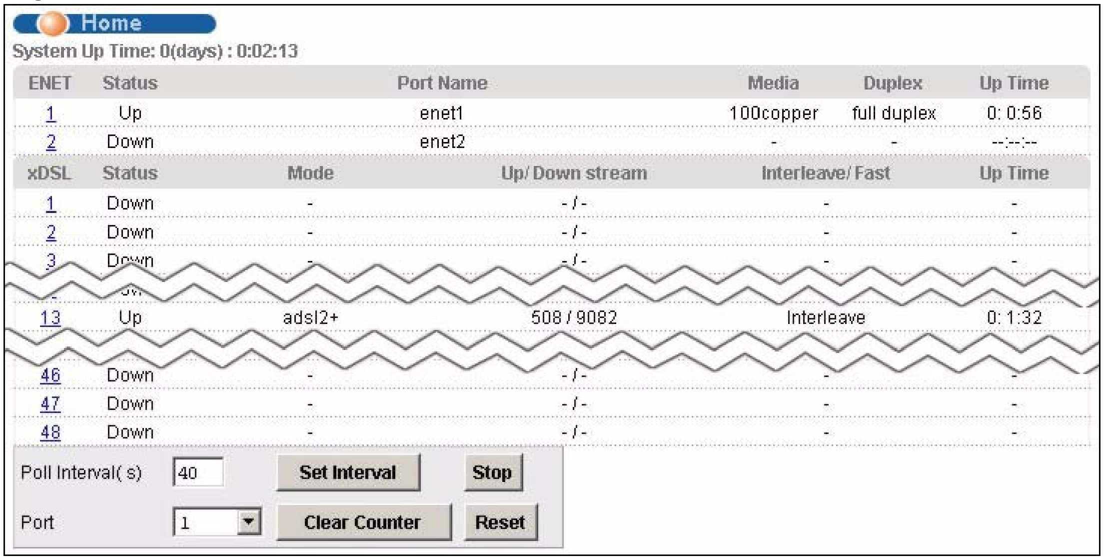
This chapter describes the **Home** (status) and **Port Statistics** screens.

9.1 Home Screen

The **Home** screen of the web configurator displays a port statistical summary with links to each port showing statistical details.

To open this screen, click **Home** in any web configurator screen.

Figure 38 Home



The following table describes the labels in this screen.

Table 7 Home

LABEL	DESCRIPTION
System up Time	This field shows how long the system has been running since the last time it was started.
	The following fields are related to the Ethernet ports.

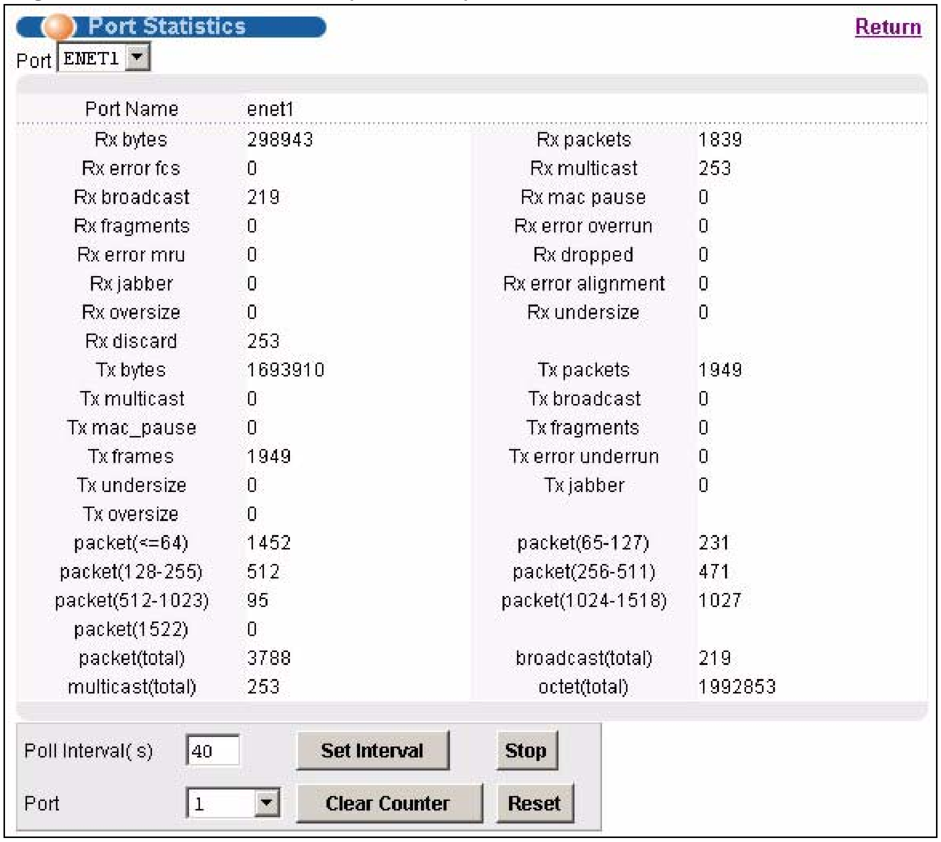
Table 7 Home (continued)

LABEL	DESCRIPTION
ENET	This field displays the number of the Ethernet port. Click a port number to display that port's statistics screen. The Ethernet Port Statistics Screen appears. See Section 9.1.1 on page 103.
Status	This field displays whether the Ethernet port is connected (**Up**) or not (**Down**).
Port Name	This field displays the name of the Ethernet port.
Media	This field displays the type of media that this Ethernet port is using for a connection (**Copper** or **Fiber**). "**-**" displays when the port is disabled or not connected.
Duplex	This field displays whether the port is using half or full-duplex communication. "**-**" displays when the port is disabled or not connected.
Up Time	This field shows the total amount of time in hours, minutes and seconds the port's connection has been up. "**--:--:--**" displays when the port is disabled or not connected.
	The following fields are related to the ADSL ports.
xDSL	This identifies the ADSL port. Click a port number to display that port's statistics screen. The ADSL Port Statistics Screen appears. See Section 9.1.2 on page 106.
Status	This field shows whether the port is connected (**Up**) or not (**Down**).
Mode	This field shows which ADSL operational mode the port is set to use. "**-**" displays when the port is not connected.
Up/Down stream	This field shows the number of kilobits per second that a port is set to transmit and receive.
Interleave/Fast	This field shows the port's ADSL latency mode (fast or interleave).
Up Time	This field shows the total amount of time in hours, minutes and seconds the port's connection has been up. "**-**" displays when the port is not connected.
	The following fields and buttons apply to the whole screen.
Poll Interval(s) Set Interval	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to halt system statistic polling.
Port Clear Counter	Select a port from the **Port** drop-down list box and then click **Clear Counter** to erase the recorded statistical information for that port.
Reset	Click this to set the **Poll Interval(s)** and **Port** fields to their default values and to refresh the screen.

9.1.1 Ethernet Port Statistics Screen

Use this screen to display statistics about an Ethernet port. To open this screen, click an Ethernet port's number in the **Home** screen.

Figure 39 Port Statistics (Ethernet)



The following table describes the labels in this screen.

Table 8 Port Statistics (Ethernet)

LABEL	DESCRIPTION
Return	Click this to go back to the **Home** screen.
Port	Use this drop-down list box to select a port for which you wish to view statistics. This field identifies the port described in this screen.
Port Name	This field displays the name that you have configured for the port.
Rx bytes	This field shows the number of octets of Ethernet frames received that are from 0 to 1518 octets in size, counting the ones in bad packets, not counting framing bits but counting FCS (Frame Check Sequence) octets. An octet is an 8-bit binary digit (byte).
Rx packets	This field shows the number of packets received on this port (including multicast, unicast, broadcast and bad packets).
Rx error fcs	This field shows the number of frames received with an integral length of 64 to 1518 octets and containing a Frame Check Sequence error.

Table 8 Port Statistics (Ethernet) (continued)

LABEL	DESCRIPTION
Rx multicast	This field shows the number of good multicast frames received of 64 to 1518 octets in length (for non VLAN) or 1522 octets (for VLAN), not including Broadcast frames. Frames with range or length errors are also not taken into account.
Rx broadcast	This field shows the number of good broadcast frames received of 64 to 1518 octets in length (for non VLAN) or 1522 octets (for VLAN), not including multicast frames. Frames with range or length errors are also not taken into account.
Rx mac pause	This field shows the number of valid IEEE 802.3x Pause frames received on this port.
Rx fragments	This field shows the number of frames received that were less than 64 octets long, and contained an invalid FCS, including non-integral and integral lengths.
Rx error overrun	This field shows how many times an Ethernet transmitter overrun occurred.
Rx error mru	This field shows the number of received frames that were dropped due to exceeding the Maximum Receive Unit frame size.
Rx dropped	This field shows the number of received frames that were received into the IES, but later dropped because of a lack of system resources.
Rx jabber	This field shows the number of frames received that were longer than 1518 octets (non VLAN) or 1522 octets (VLAN) and contained an invalid FCS, including alignment errors.
Rx error alignment	This field shows the number of frames received that were 64 to 1518 (non VLAN) or 1522 (VLAN) octets long but contained an invalid FCS and a non-integral number of octets.
Rx oversize	This field shows the number of frames received that were bigger than 1518 (non VLAN) or 1522 (VLAN) octets and contained a valid FCS.
Rx undersize	This field shows the number of frames received that were less than 64 octets long and contained a valid FCS.
Tx bytes	This field shows the number of bytes that have been transmitted on this port. This includes collisions but not jam signal or preamble/SFD (Start of Frame Delimiter) bytes.
Tx packets	This field shows the number of packets transmitted on this port.
Tx multicast	This field shows the number of good multicast frames transmitted on this port (not including broadcast frames).
Tx broadcast	This field shows the number of broadcast frames transmitted on this port (not including multicast frames).
Tx mac_pause	This field shows the number of valid IEEE 802.3x Pause frames transmitted on this port.
Tx fragments	This field shows the number of transmitted frames that were less than 64 octets long, and with an incorrect FCS value.
Tx frames	This field shows the number of complete good frames transmitted on this port.
Tx error underrun	This field shows the number of outgoing frames that were less than 64 octets long.
Tx undersize	This field shows the number of frames transmitted that were less than 64 octets long and contained a valid FCS.

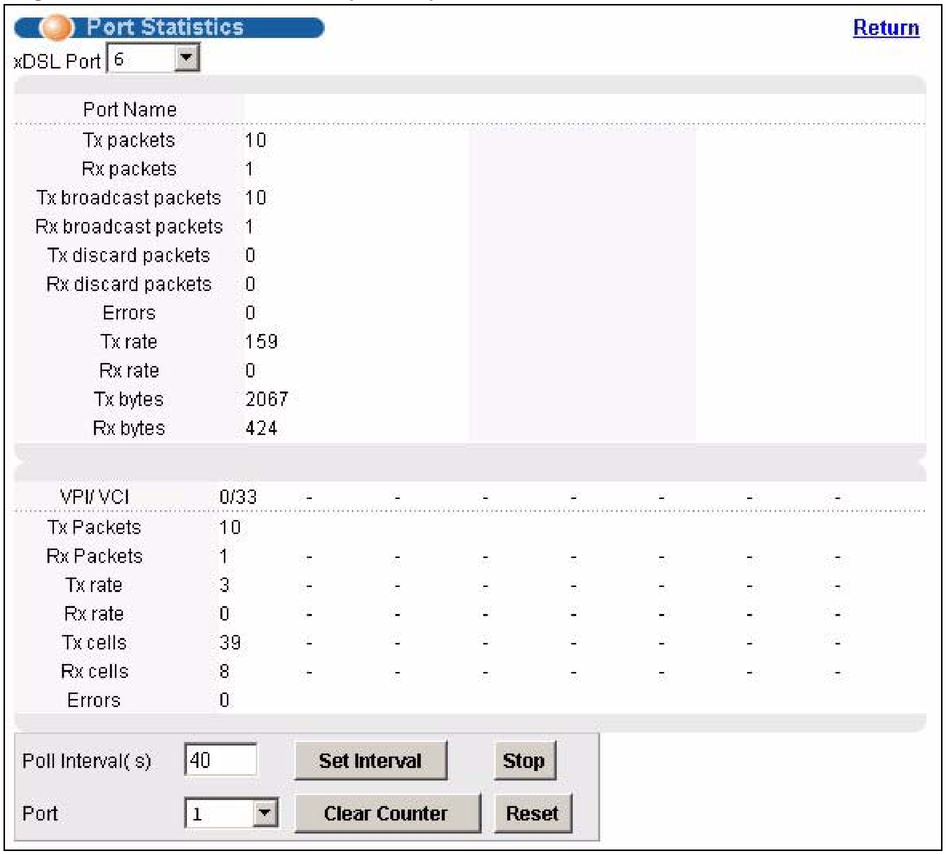
Table 8 Port Statistics (Ethernet) (continued)

LABEL	DESCRIPTION
Tx jabber	This field shows the number of frames transmitted that were longer than 1518 octets (non VLAN) or 1522 octets (VLAN) and contained an incorrect FCS value.
Tx oversize	This field shows the number of frames transmitted that were bigger than 1518 octets (non VLAN) or 1522 (VLAN) and contained a valid FCS.
packet(<=64)	This field shows the number of frames received and transmitted (including bad frames) that were 64 octets or less in length (this includes FCS octets but excludes framing bits).
packet(65-127)	This field shows the number of frames received and transmitted (including bad frames) that were 65 to 127 octets in length (this includes FCS octets but excludes framing bits).
packet(128-255)	This field shows the number of frames received and transmitted (including bad frames) that were 128 to 255 octets in length (this includes FCS octets but excludes framing bits).
packet(256-511)	This field shows the number of frames received and transmitted (including bad frames) that were 256 to 511 octets in length (this includes FCS octets but excludes framing bits).
packet(512-1023)	This field shows the number of frames received and transmitted (including bad frames) that were 512 to 1023 octets in length (this includes FCS octets but excludes framing bits).
packet(1024-1518)	This field shows the number of frames received and transmitted (including bad frames) that were 1024 to 1518 octets in length (this includes FCS octets but excludes framing bits).
packet(1522)	This field shows the number of frames received and transmitted (including bad frames) that were 1519 to 1522 octets in length (this includes FCS octets but excludes framing bits).
packet(total)	This field shows the total number of received and transmitted packets.
broadcast(total)	This field shows the total number of received and transmitted broadcast frames.
multicast(total)	This field shows the total number of received and transmitted multicast frames.
octet(total)	This field shows the total number of received and transmitted octets (unicast, multicast and broadcast).
Poll Interval(s) Set Interval	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to halt system statistic polling.
Port Clear Counter	Select a port from the **Port** drop-down list box and then click **Clear Counter** to erase the recorded statistical information for that port.
Reset	Click this to set the **Poll Interval(s)** and **Port** fields to their default values and to refresh the screen.

9.1.2 ADSL Port Statistics Screen

Use this screen to display statistics about an ADSL port. To open this screen, click an ADSL port's number in the **Home** screen.

Figure 40 Port Statistics (ADSL)



The following table describes the labels in this screen.

Table 9 Port Statistics (ADSL)

LABEL	DESCRIPTION
Return	Click this to go back to the **Home** screen.
xDSL Port	Use this drop-down list box to select a port for which you wish to view statistics. This field identifies the port described in this screen.
Port Name	This field displays the name that you have configured for the port. If you have not configured a name, it is blank.
Tx packets	This field shows the number of packets transmitted on this port.
Rx packets	This field shows the number of packets received on this port.
Tx broadcast packets	This field shows the number of broadcast packets transmitted on this port.
Rx broadcast packets	This field shows the number of broadcast packets received on this port.

Table 9 Port Statistics (ADSL) (continued)

LABEL	DESCRIPTION
Tx discard packets	This field shows the number of outgoing packets that were dropped on this port. The “Tx discard packets” counter always displays “0” because the IES does not discard packets that it sends.
Rx discard packets	This field shows the number of received packets that were dropped on this port. Some of the possible reasons for the discarding of received (rx) packets are: • The packet filter is enabled and the packets matched a packet filter. • The MAC filter is enabled and the IES dropped the packets according to the MAC filter’s configuration. • The packets contained frames with an invalid VLAN ID.
Errors	This field shows the number of AAL5 frames received with CRC errors.
Tx rate	This field shows the number of kilobytes per second transmitted on this port.
Rx rate	This field shows the number of kilobytes per second received on this port.
Tx bytes	This field shows the number of bytes that have been transmitted on this port.
Rx bytes	This field shows the number of bytes that have been received on this port.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI) of channels on this port.
Tx Packets	This field shows the number of packets transmitted on each channel.
Rx Packets	This field shows the number of packets received on each channel.
Tx rate	This field shows the number of bytes per second transmitted on each channel.
Rx rate	This field shows the number of bytes per second received on each channel.
Tx cells	This field shows the number of ATM cells transmitted on each channel.
Rx cells	This field shows the number of ATM cells received on each channel.
Errors	This field shows the number of error packets on each channel.
Poll Interval(s) Set Interval	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to halt system statistic polling.
Port Clear Counter	Select a port from the **Port** drop-down list box and then click **Clear Counter** to erase the recorded statistical information for that port.
Reset	Click this to set the **Poll Interval(s)** and **Port** fields to their default values and to refresh the screen.

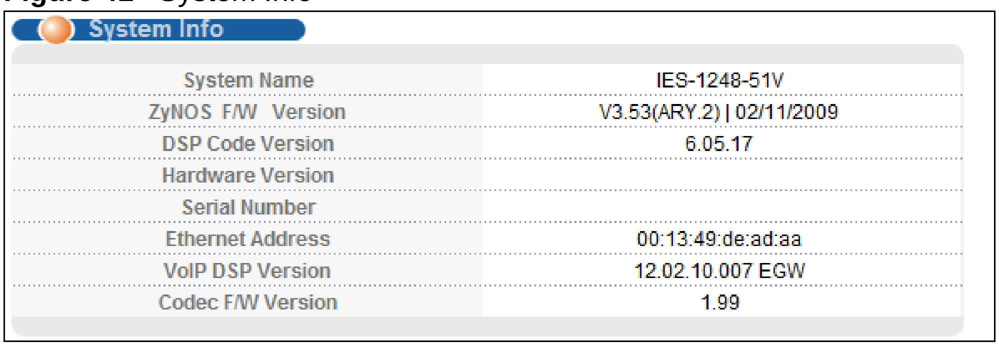
10

System Information

The **System Information** screen displays general device information (such as firmware version number) and hardware polling information (such as fan status). You can check the firmware version number and monitor the hardware status in this screen.

To open this screen, click **Basic Setting** > **System Information**.

Figure 41 System Info

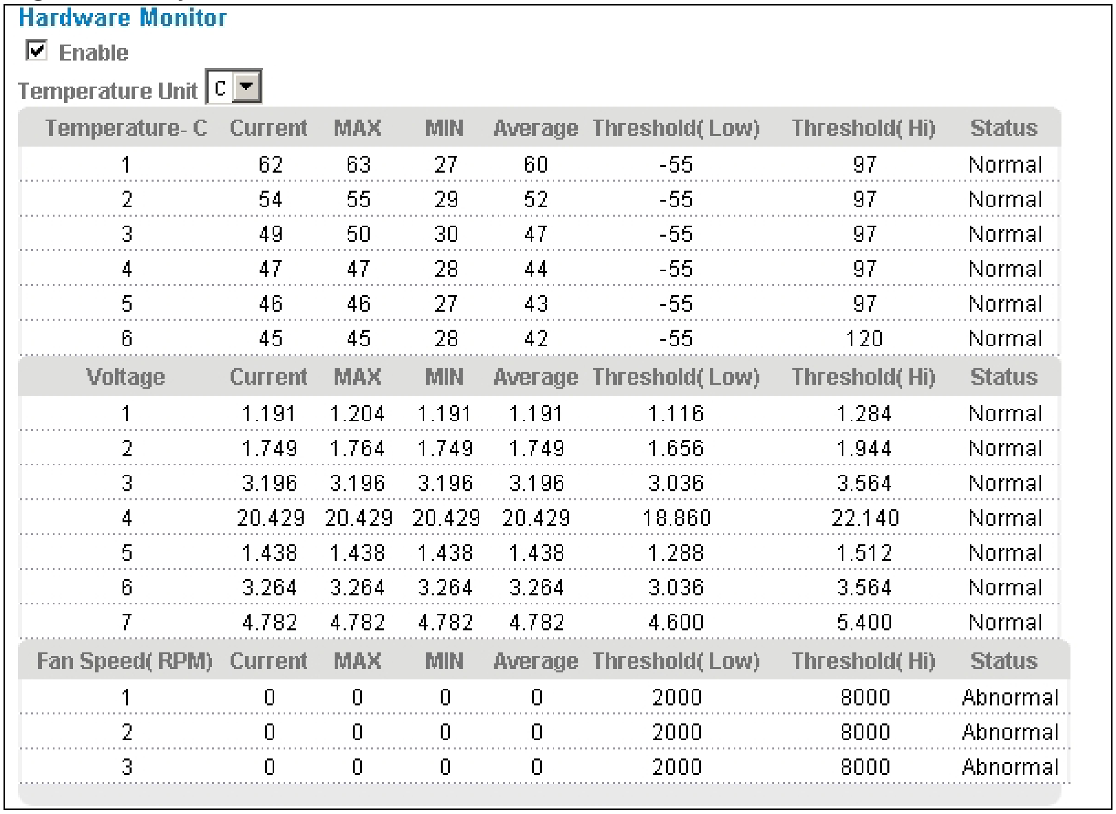


The following table describes the labels in these screens.

Table 10 System Info

LABEL	DESCRIPTION
System Name	This field displays the device 's model name.
ZyNOS F/W Version	This field displays the version number of the device 's current firmware including the date created.
DSP Code Version	This field displays the current Digital Signal Processor firmware version number. This is the modem code firmware.
Hardware Version	This is the version of the physical device hardware.
Serial Number	This is the individual identification number assigned to the device at the factory.
Ethernet Address	This field refers to the Ethernet MAC (Media Access Control) address of the device.
VoIP DSP Version	This field displays the current Voice over IP Digital Signal Processor firmware version number.
Codec F/W Version	This field displays the current audio coder / decoder firmware version number

Figure 42 System Info



Hardware Monitor

☑ Enable

Temperature Unit C

Temperature- C	Current	MAX	MIN	Average	Threshold(Low)	Threshold(Hi)	Status
1	62	63	27	60	-55	97	Normal
2	54	55	29	52	-55	97	Normal
3	49	50	30	47	-55	97	Normal
4	47	47	28	44	-55	97	Normal
5	46	46	27	43	-55	97	Normal
6	45	45	28	42	-55	120	Normal

Voltage	Current	MAX	MIN	Average	Threshold(Low)	Threshold(Hi)	Status
1	1.191	1.204	1.191	1.191	1.116	1.284	Normal
2	1.749	1.764	1.749	1.749	1.656	1.944	Normal
3	3.196	3.196	3.196	3.196	3.036	3.564	Normal
4	20.429	20.429	20.429	20.429	18.860	22.140	Normal
5	1.438	1.438	1.438	1.438	1.288	1.512	Normal
6	3.264	3.264	3.264	3.264	3.036	3.564	Normal
7	4.782	4.782	4.782	4.782	4.600	5.400	Normal

Fan Speed(RPM)	Current	MAX	MIN	Average	Threshold(Low)	Threshold(Hi)	Status
1	0	0	0	0	2000	8000	Abnormal
2	0	0	0	0	2000	8000	Abnormal
3	0	0	0	0	2000	8000	Abnormal

The following table describes the labels in these screens.

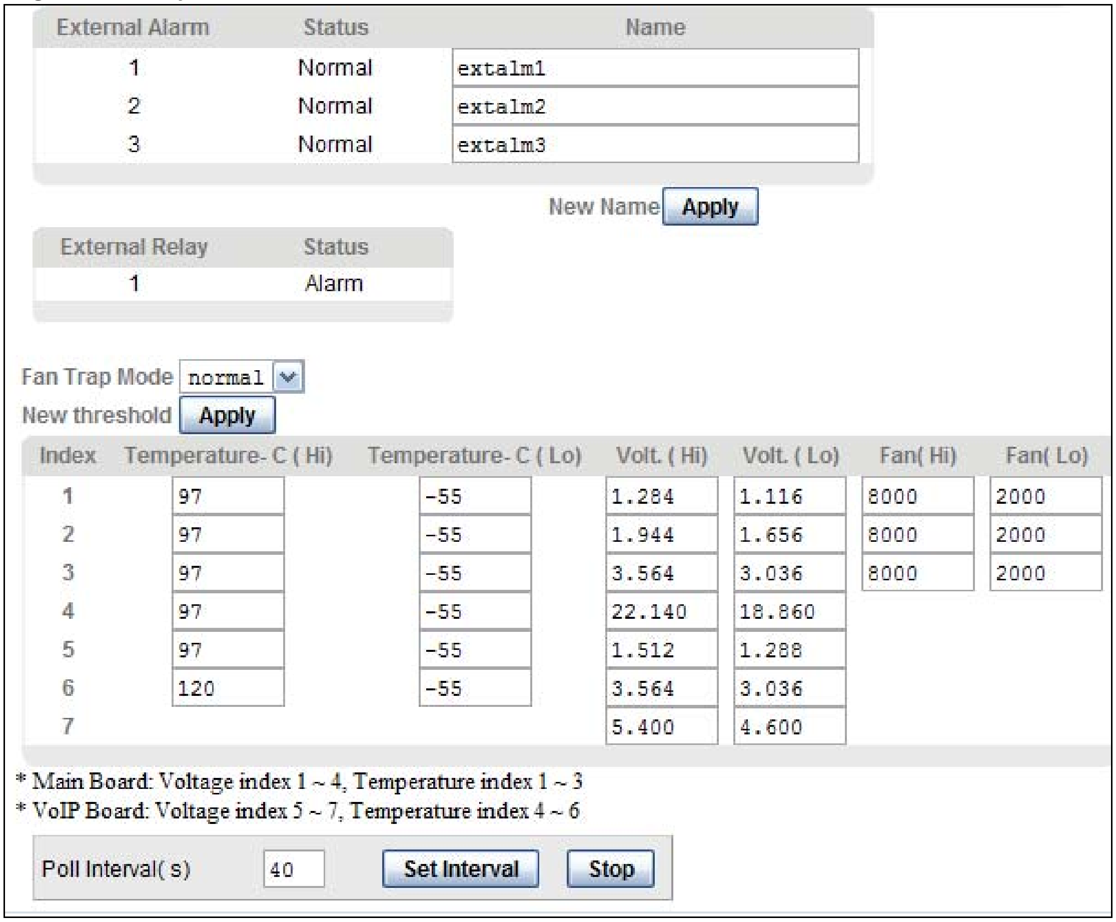
Table 11 System Info

LABEL	DESCRIPTION
Hardware Monitor	
Enable	Select this check box to turn the hardware monitor on or clear it to turn the hardware monitor off.
Temperature Unit	Select **C** to display all temperature measurements in degrees Celsius. Select **F** to display all temperature measurements in degrees Fahrenheit.
Temperature	Each temperature sensor can detect and report the temperature. Temperature sensor 1 is near the ADSL chipset. Temperature sensor 2 is near the central processing unit. Temperature sensor 3 is at the hardware monitor chip.
Current	This shows the current temperature at this sensor.
MAX	This field displays the maximum temperature measured at this sensor.
MIN	This field displays the minimum temperature measured at this sensor.
Average	This field displays the average temperature measured at this sensor.
Threshold (Low)	This field displays the lowest temperature limit at this sensor.
Threshold (Hi)	This field displays the highest temperature limit at this sensor.
Status	This field displays **Normal** for temperatures below the threshold and **Over** for those above.
Voltage(V)	The power supply for each voltage has a sensor that can detect and report the voltage.
Current	This is the current voltage reading.
MAX	This field displays the maximum voltage measured at this point.
MIN	This field displays the minimum voltage measured at this point.
Average	This field displays the average voltage measured at this sensor.
Threshold (Low)	This field displays the lowest voltage limit at this sensor.
Threshold (Hi)	This field displays the highest voltage limit at this sensor.
Status	**Normal** indicates that the voltage is within an acceptable operating range at this point; otherwise **Abnormal** is displayed.
Fan Speed (RPM)	A properly functioning fan is an essential component (along with a sufficiently ventilated, cool operating environment) in order for the device to stay within the temperature threshold. Each fan has a sensor that can detect and report the fan's RPM (Revolutions Per Minute).
Current	This is the current RPM reading.
MAX	This field displays the maximum RPM measured at this point.
MIN	This field displays the minimum RPM measured at this point.
Average	This field displays the average RPM measured at this sensor.
Threshold (Low)	This field displays the lowest RPM limit at this sensor.

Table 11 System Info (continued)

LABEL	DESCRIPTION
Threshold (Hi)	This field displays the highest RPM limit at this sensor.
Status	**Normal** indicates that the RPM is within an acceptable operating range at this point; otherwise **Abnormal** is displayed.

Figure 43 System Info



The following table describes the labels in these screens.

Table 12 System Info

LABEL	DESCRIPTION
External Alarm Status Name Apply	The IES is able to detect alarm input from other equipment connected to the **ALARM** connector. The **Status** column displays **Normal** when no alarm input has been detected from other equipment. It displays **Abnormal** when alarm input has been detected from other equipment. Use the **Name** column to configure a title for each external alarm for identification purposes. Use up to 31 characters. Click **Apply** to save the name changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
External Relay Status	The IES is able to send alarm output to another piece of equipment connected to the **ALARM** connector. The **Status** column displays **Normal** when the IES is not sending alarm output to another piece of equipment. It displays **Abnormal** when the IES is sending alarm output to another piece of equipment.
Fan Trap Mode	Select the device's fan trap mode. • **Normal** - When any single fan's RPM (revolutions per minute) exceeds the limitation range, an SNMP trap is sent. • **Two** - When any 2 fans exceed the RPM limitation range, an SNMP trap is sent.
	Use this section of the screen to configure the hardware monitor threshold settings.
New threshold Apply	Configure new threshold settings in the fields below and click **Apply** to use them.
Index	This field is a sequential value.
Temperature (Hi)	Use these fields to configure the highest temperature limit at each sensor.
Temperature (Lo)	Use these fields to configure the lowest temperature limit at each sensor.
Volt. (Hi)	Use these fields to configure the highest voltage limit at each sensor.
Volt. (Lo)	Use these fields to configure the lowest voltage limit at each sensor.
Fan (Hi)	Use these fields to configure the highest RPM limit at each sensor.
Fan (Low)	Use these fields to configure the lowest RPM limit at each sensor.
Poll Interval(s) Set Interval	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to halt statistic polling.

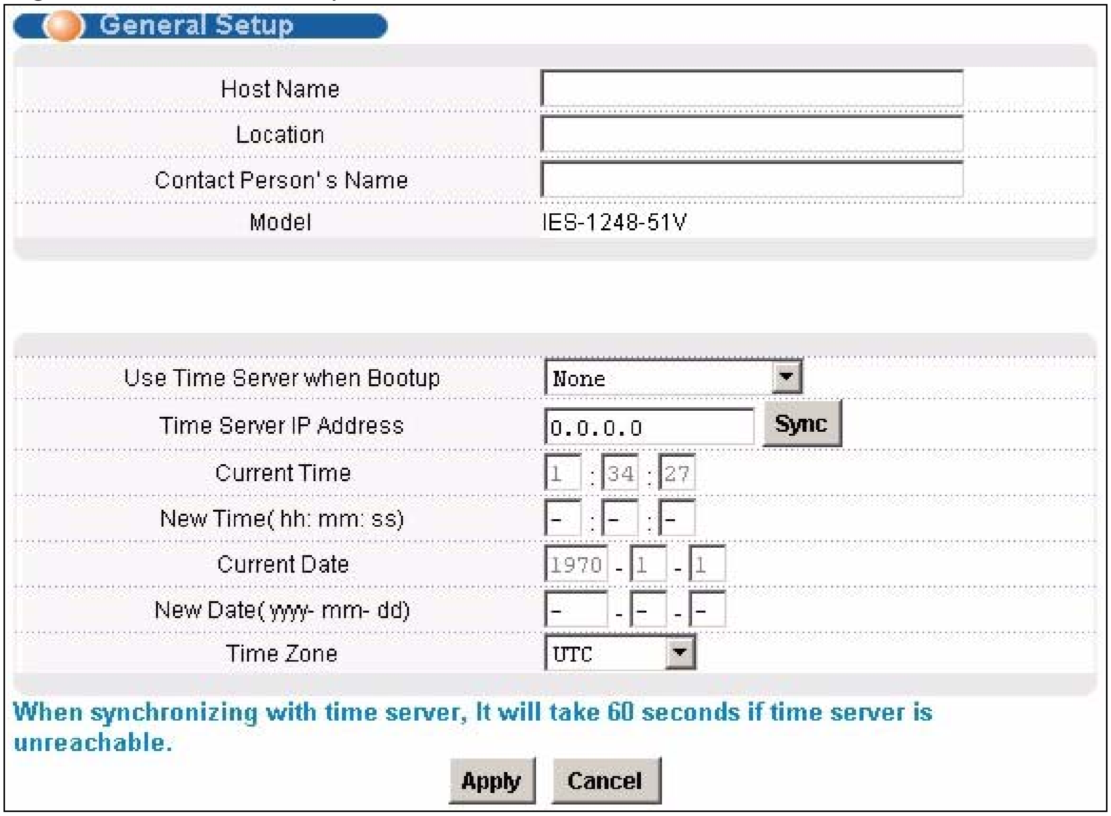
11

General Setup

The **General Setup** screen allows you to configure general device identification information. It also allows you to set the system time manually or get the current time and date from an external server when you turn on your device. The real time is then displayed in the logs.

To open this screen, click **Basic Setting** > **General Setup**.

Figure 44 General Setup



The following table describes the labels in this screen.

Table 13 General Setup

LABEL	DESCRIPTION
Host Name	Choose a descriptive name for identification purposes. This name consists of up to 31 ASCII characters; spaces are not allowed.
Location	Enter the geographic location of your device. You can use up to 31 ASCII characters; spaces are not allowed.
Contact Person's Name	Enter the name of the person in charge of this device. You can use up to 31 ASCII characters; spaces are not allowed.
Model	This field displays your device type.
Use Time Server When Bootup	Select the time service protocol that the timeserver uses. Not all time servers support all protocols, so you may have to use trial and error to find a protocol that works. The main differences between them are the time format. When you select the **Daytime (RFC 867)** format, the switch displays the day, month, year and time with no time zone adjustment. When you use this format it is recommended that you use a Daytime timeserver within your geographical time zone. **Time (RFC-868)** format displays a 4-byte integer giving the total number of seconds since 1970/1/1 at 0:0:0. **NTP (RFC-1305)** is similar to Time (RFC-868). **None** is the default value. Enter the time manually. Each time you turn on the device, the time and date will be reset to 2000-1-1 0:0.
Time Server IP Address	Enter the IP address of your timeserver. The device searches for the timeserver for up to 60 seconds.
Current Time	This field displays the time you open this menu (or refresh the menu).
New Time (hh:min:ss)	Enter the new time in hour, minute and second format. The new time then appears in the **Current Time** field after you click **Apply**.
Current Date	This field displays the date you open this menu.
New Date (yyyy-mm-dd)	Enter the new date in year, month and day format. The new date then appears in the **Current Date** field after you click **Apply**.
Time Zone	Select the time difference between UTC (Universal Time Coordinated, formerly known as GMT, Greenwich Mean Time) and your time zone from the drop-down list box.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

CHAPTER 12

User Account

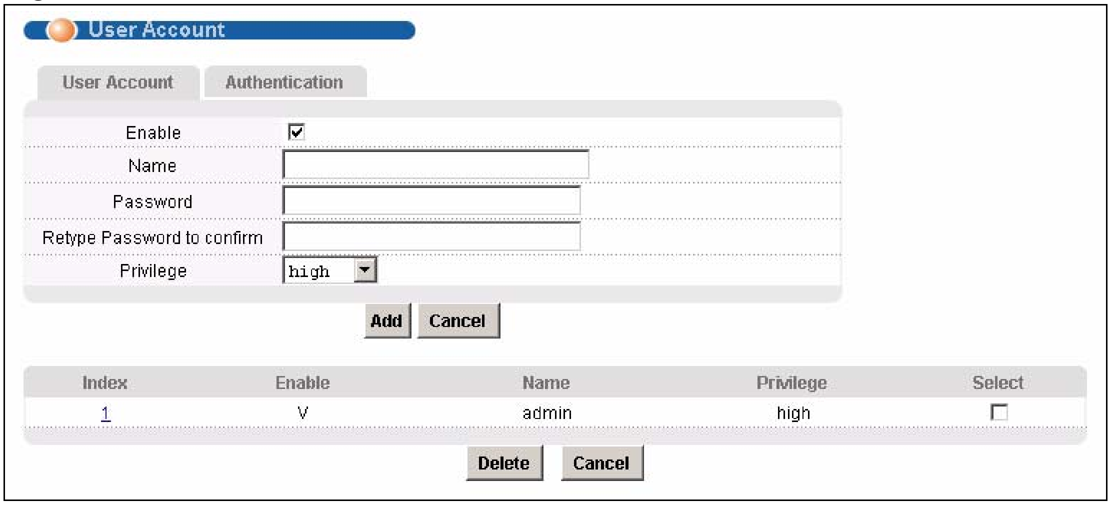
The **User Account** screens allows you to set up and configure system administrator accounts for the IES. You can also configure the authentication policy for IES administrators. This is different than port authentication in Chapter 26 on page 221.

See Chapter 26 on page 221 for background information on authentication.

12.1 User Account Screen

To open this screen, click **Basic Setting** > **User Account**.

Figure 45 User Account



The following table describes the labels in this screen.

Table 14 User Account

LABEL	DESCRIPTION
Authentication	Click this to open the **Authentication** screen. See Section 12.2 on page 119.
Enable	Select this check box to turn on the administrator account.
Name	Enter a user name for the administrator account.

Table 14 User Account (continued)

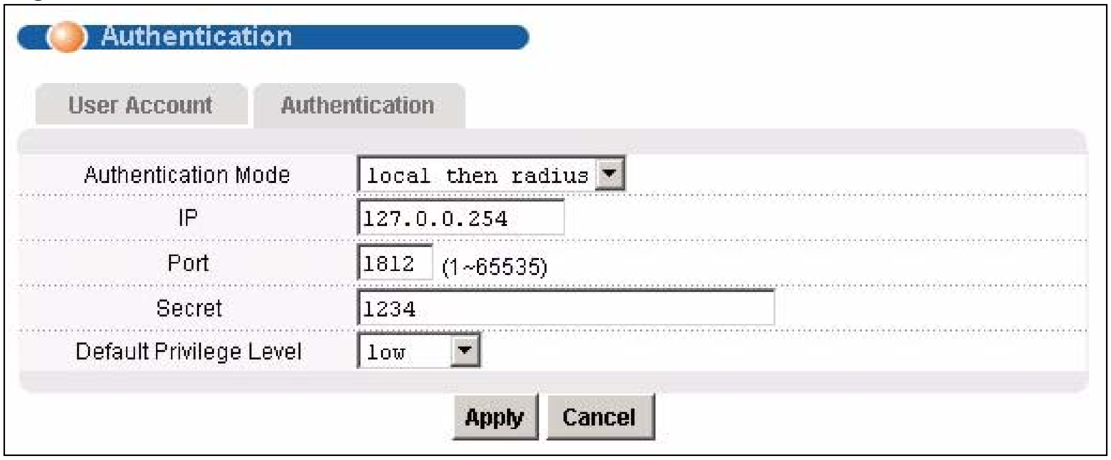
LABEL	DESCRIPTION
Password	Enter a password for the administrator account.
Retype Password to Confirm	Re-enter the administrator account's password to verify that you have entered it correctly.
Privilege	Select a privilege level to determine which screens the administrator can use. There is a high, medium or low privilege level for each command. Select **high** to allow the administrator to use all commands including the lower privilege commands. High privilege commands include things like creating administrator accounts, restarting the system and resetting the factory defaults. Select **middle** to allow the administrator to use middle or low privilege commands. Select **low** to allow the administrator to use only low privilege commands. Low privilege commands are read only.
Add	Click **Add** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields again.
Index	This field displays the number of the user account. Click an account's index number to use the top of the screen to edit it.
Enable	This field displays a “V “ if you have the administrator account turned on. It displays a “-“ if the administrator account is turned off.
Name	This field displays the administrator account's user name.
Privilege	This field displays the administrator account's access level (high, middle or low).
Select	Select this check box and click the **Delete** button to remove an administrator account.
Delete	Select an administrator account's check box and click this button to remove the administrator account.
Cancel	Click **Cancel** to start configuring the screen afresh.

12.2 Authentication Screen

Use this screen to set up the authentication policies and settings by which administrators can access the IES.

To open this screen, click **Basic Setting** > **User Account** > **Authentication**.

Figure 46 Authentication



The following table describes the labels in this screen.

Table 15 User Account

LABEL	DESCRIPTION
User account	Click this to open the **User Account** screen. See Section 12.1 on page 117.
Authentication Mode	Select the process by which the IES authenticates administrators. **local** - Search the local database. You maintain this database in the **User Account** screen. **radius** - Check an external RADIUS database using the settings below. **local then radius** - Search the local database; if the user name is not found, check an external RADIUS database using the settings below.
IP	Enter the IP address of the external RADIUS server in dotted decimal notation.
Port	The default UDP port of the RADIUS server for authentication is **1812**. You need not change this value unless your network administrator instructs you to do so.

Table 15 User Account (continued)

LABEL	DESCRIPTION
Secret	Specify a password (up to 31 alphanumeric characters) as the key to be shared between the external RADIUS server and the switch. This key is not sent over the network. This key must be the same on the external RADIUS server and the switch.
Default Privilege Level	Select the privilege level assigned to administrators in case the external RADIUS database does not provide one. The privilege level determines which screens the administrator can use. There is a high, medium or low privilege level for each command. You can also choose to deny access to the IES. Select **high** to allow the administrator to use all commands including the lower privilege commands. High privilege commands include things like creating administrator accounts, restarting the system and resetting the factory defaults. Select **middle** to allow the administrator to use middle or low privilege commands. Select **low** to allow the administrator to use only low privilege commands. Low privilege commands are read only. Select **deny** to prevent the administrator from accessing the IES.

13

Switch Setup

The **Switch Setup** screen allows you to set up and configure global device features.

13.1 GARP Timer Setup

GARP (Generic Attribute Registration Protocol) allows network devices to register and de-register attribute values with other GARP participants within a bridged LAN. GARP is a protocol that provides a generic mechanism for protocols that serve a more specific application, for example, GVRP (GARP VLAN Registration Protocol). GARP and GVRP are the protocols used to automatically register VLAN membership across switches.

Switches join VLANs by making a declaration. A declaration is made by issuing a **Join** message using GARP. Declarations are withdrawn by issuing a **Leave** message. A **Leave All** message terminates all registrations. GARP timers set declaration timeout values.

13.2 Switch Modes

The IES supports standalone and daisychain switch modes.

13.2.1 Standalone Switch Mode

“Standalone switch mode” relates to the IES’s operational behavior, not a standalone network topology. The standalone switch mode allows either or both of the IES’s Ethernet ports to connect to the backbone Ethernet network. You can also connect one of the IES’s Ethernet ports to the Ethernet network and the other to another IES (see Figure 47 on page 122 for an example). When the IES is in standalone mode, you can use it in a network topology that uses loops (you should also enable RSTP). You can have multiple IES connected on the same network and set both of them to use standalone mode in order to use them with a network topology that uses loops.

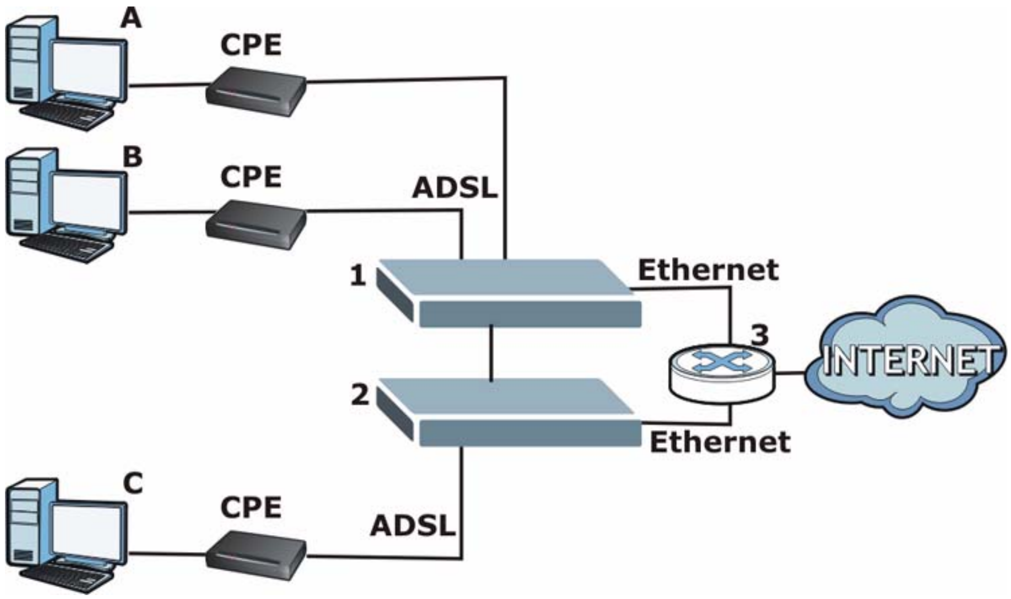
Standalone switch mode with port isolation enabled blocks communications between subscriber ports on an individual IES. However, one IES's subscribers can communicate with another IES's subscribers if the two IES's Ethernet ports are connected to each other (see Figure 47 on page 122 for an example). If you have multiple IES connected on the same network and set to standalone mode, they do not all need to have the same port isolation setting.

13.2.2 Port Isolation with Standalone Switch Mode Example

The following graphic shows IES **1** and **2** connected to each other and the Ethernet backbone switch (**3**) in a network topology that creates a loop. The IES are using the standalone switch mode and have RSTP enabled.

In this example, both IES have port isolation turned on. Communications between **A** and **B** must first go through another switch (**3** in the figure). However, **A** and **B** can communicate with **C** without their communications going through another switch or router.

Figure 47 Port Isolation with Standalone Switch Mode Example



13.2.3 Daisychain Switch Mode

Daisychain switch mode sets the IES to use Ethernet port one (ENET 1) as an uplink port to connect to the Ethernet backbone and Ethernet port two (ENET 2) to connect to another (daisychained or subtending) IES. The daisychain switch mode is recommended for use in a network topology that does not have loops. When you daisychain multiple IES they must all be set to daisychain mode.

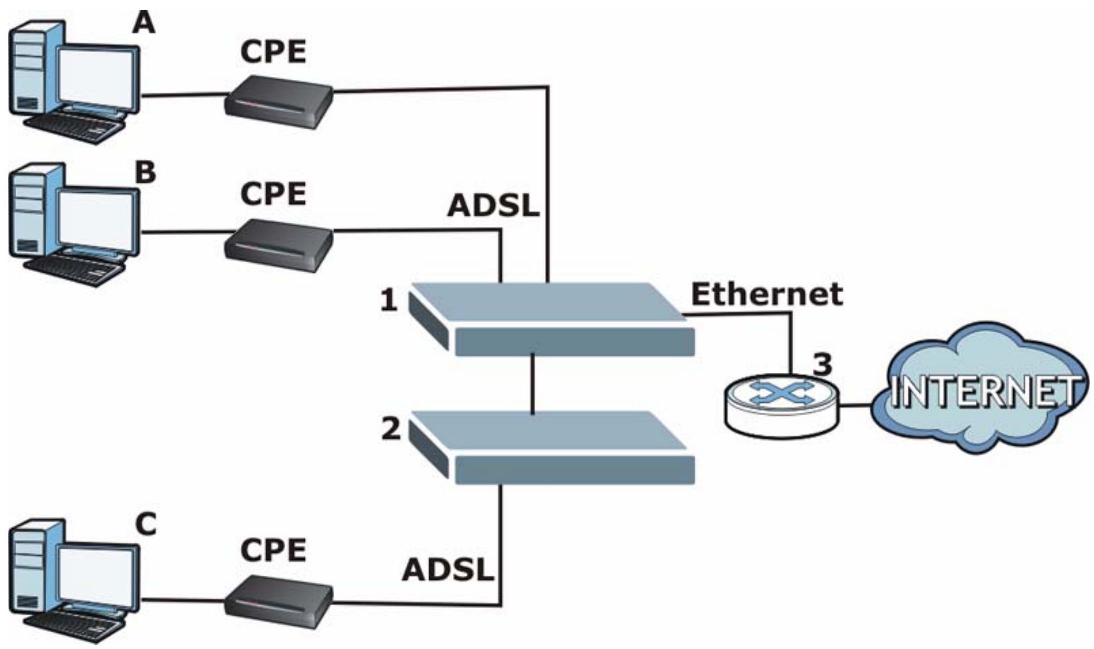
Daisychain switch mode with port isolation enabled blocks communications between subscriber ports on an individual IES and between the subscribers of any daisychained IES (see Figure 48 on page 123 for an example). Use the same port isolation setting on all IES that you set up in a daisychain.

13.2.4 Port Isolation with Daisychain Switch Mode Example

In the example below, the IES 1 has its Ethernet port one (ENET 1) connected to the Ethernet backbone switch (**3**) and it's Ethernet port two (ENET2) connected to Ethernet port one (ENET 1) of the daisychained IES (**2**).

With port isolation turned on, communications between **A** and **B** must first go through another switch or router (**3** in the figure). **A** and **B** also cannot communicate with **C** without their communications going through another switch or router.

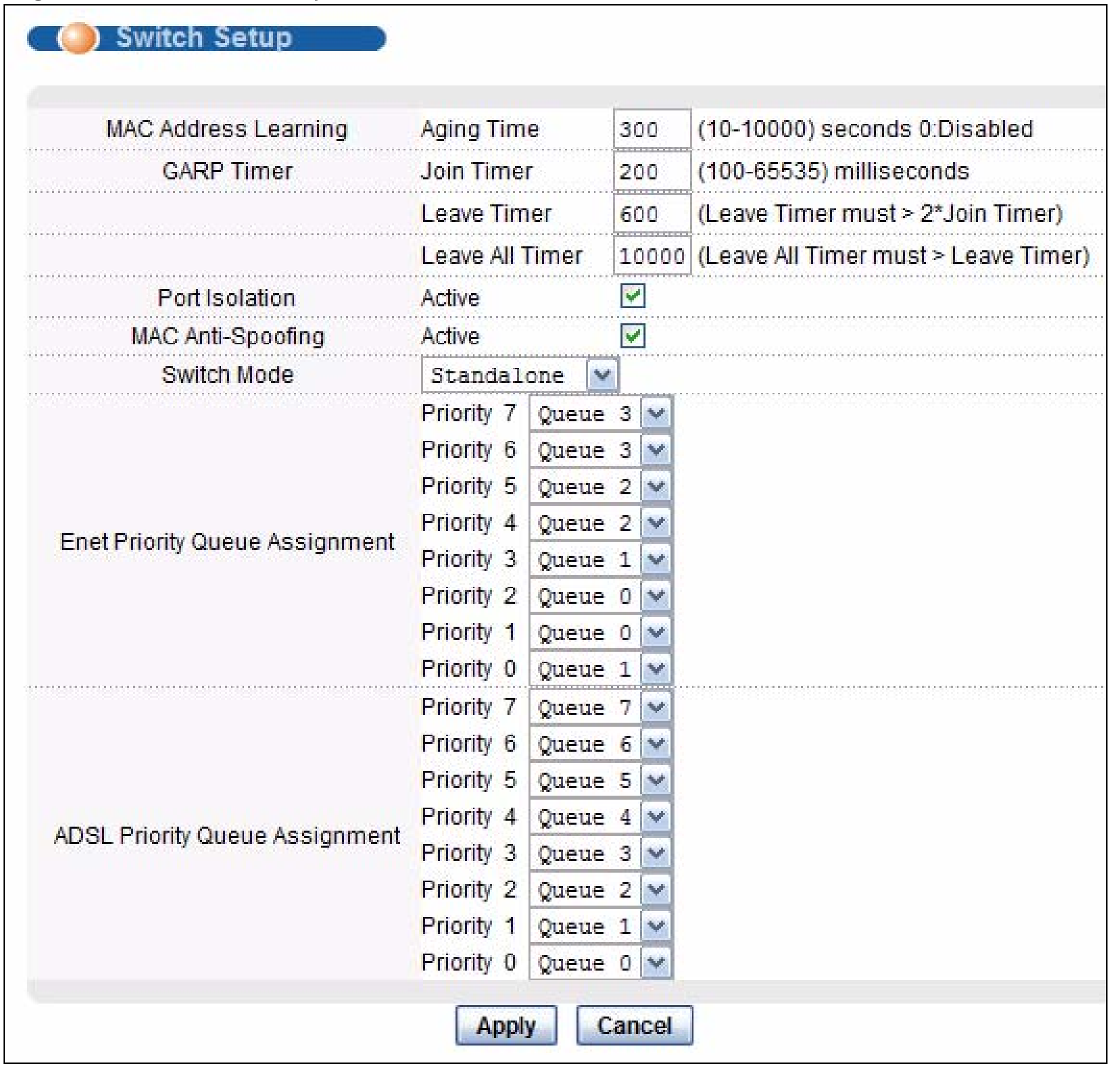
Figure 48 Port Isolation with Daisychain Switch Mode Example



13.3 Switch Setup Screen

To open this screen, click **Basic Setting** > **Switch Setup**.

Figure 49 Switch Setup



The following table describes the labels in this screen.

Table 16 Switch Setup

LABEL	DESCRIPTION
MAC Address Learning Aging Time	Enter a time from 10 to 10,000 seconds. This is how long all dynamically learned MAC addresses remain in the MAC address table before they age out (and must be relearned). Enter 0 to disable the aging out of MAC addresses.
GARP Timer	Switches join VLANs by making a declaration. A declaration is made by issuing a Join message using GARP. Declarations are withdrawn by issuing a Leave message. A Leave All message terminates all registrations. GARP timers set declaration timeout values. Click here for more information on VLANs.

Table 16 Switch Setup (continued)

LABEL	DESCRIPTION
Join Timer	**Join Timer** sets the duration of the Join Period timer for GVRP in milliseconds. Each port has a Join Period timer. The allowed Join Time range is between 100 and 65535 milliseconds; the default is 200 milliseconds.
Leave Timer	**Leave Timer** sets the duration of the Leave Period timer for GVRP in milliseconds. Each port has a single Leave Period timer. Leave Time must be two times larger than Join Timer; the default is 600 milliseconds.
Leave All Timer	**Leave All Timer** sets the duration of the Leave All Period timer for GVRP in milliseconds. Each port has a single Leave All Period timer. Leave All Timer must be larger than Leave Timer.
Port Isolation Active	Turn on port isolation to block communications between subscriber ports. When you enable port isolation you do not need to configure the VLAN to isolate subscribers.
MAC Anti-Spoofing Active	Turn on MAC anti-spoofing to monitor for MAC address "spoofing" by malicious parties. Spoofing is when a device duplicates an existing MAC address. When a spoofed MAC address is detected, the IES disables the port through which it is connected and issues an alarm event.
Switch Mode	Select **Standalone** to use both of the IES's Ethernet ports (ENET 1 and ENET 2) as uplink ports. Note: Standalone mode is recommended for network topologies that use loops. Use **Daisychain** mode to cascade (daisychain) multiple IES. The IES uses Ethernet port one (ENET 1) as an uplink port to connect to the Ethernet backbone and uses Ethernet port two (ENET 2) to connect to another (daisychained or subtending) IES. Note: Daisychain mode is recommended for network topologies that do not use loops.
Priority Queue Assignment	IEEE 802.1p defines up to 8 separate traffic types by inserting a tag into a MAC-layer frame that contains bits to define class of service. Frames without an explicit priority tag are given the default priority of the ingress port. Use the next two fields to configure the priority level-to-physical queue mapping. The device has 4 physical queues that you can map to the 8 priority levels for outgoing Ethernet traffic. The device has 8 physical queues that you can map to the 8 priority levels for outgoing ADSL traffic. Traffic assigned to higher index queues gets through the device faster while traffic in lower index queues is dropped if the network is congested.
Priority Level	The following descriptions are based on the traffic types defined in the IEEE 802.1d standard (which incorporates IEEE 802.1p).
Priority 7	Typically used for network control traffic such as router configuration messages.

Table 16 Switch Setup (continued)

LABEL	DESCRIPTION
Priority 6	Typically used for voice traffic that is especially sensitive to jitter (jitter is the variations in delay).
Priority 5	Typically used for video that consumes high bandwidth and is sensitive to jitter.
Priority 4	Typically used for controlled load, latency-sensitive traffic such as SNA (Systems Network Architecture) transactions.
Priority 3	Typically used for “excellent effort” or better than best effort and would include important business traffic that can tolerate some delay.
Priority 2	This is for “spare bandwidth”.
Priority 1	This is typically used for non-critical “background” traffic such as bulk transfers that are allowed but that should not affect other applications and users.
Priority 0	Typically used for best-effort traffic.
Apply	Click **Apply** to save your changes to the IES’s volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

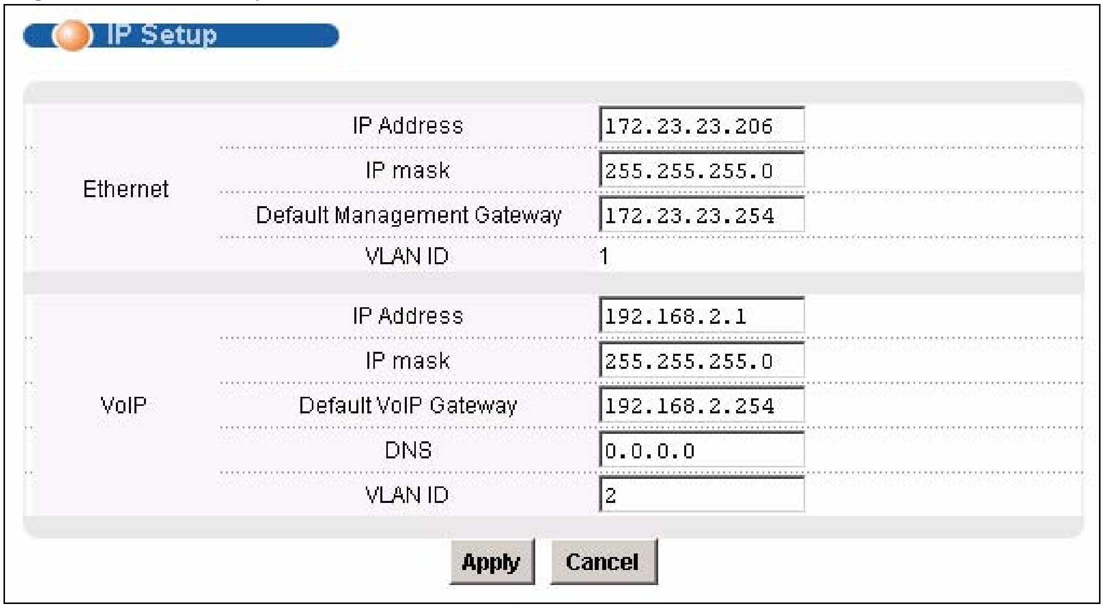
14

IP Setup

The **IP Setup** screen allows you to configure a device IP address, subnet mask and DNS (domain name server) for management purposes, as well as set up the IES's VoIP IP configuration.

To open this screen, click **Basic Setting** > **IP Setup**.

Figure 50 IP Setup



The following table describes the labels in this screen.

Table 17 IP Setup

LABEL	DESCRIPTION
Ethernet	This section allows you to configure the IP setup for management of the IES.
IP	Enter the IP address for management of your IES in dotted decimal notation for example 1.2.3.4.
IP Mask	Enter the IP subnet mask for management of your IES in dotted decimal notation (for example, 255.255.255.0).
Default Management Gateway	Enter the IP address of the default outgoing gateway for management (in dotted decimal notation).

Table 17 IP Setup (continued)

LABEL	DESCRIPTION
VLAN ID	This is the VLAN ID for IES management. See Chapter 19 on page 175 for more information on configuring VLANs on the IES.
VoIP	This section allows you to configure IP setup for VoIP services.
IP address	Enter the IES's VoIP service IP address, in dotted decimal notation.
IP Mask	Enter the subnet mask for the IES's VoIP IP address, in dotted decimal notation.
Default VoIP Gateway	Enter the IP address of the default outgoing gateway for VoIP service (in dotted decimal notation).
DNS	Enter the IP address of the Domain Name System server for VoIP service, in dotted decimal format. Note: You do not need to enter this if your SIP server uses IP addresses in SIP messages (not domain names).
VLAN ID	Enter the VLAN ID for VoIP service. See Chapter 19 on page 175 for more information on configuring VLANs on the IES.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields again.

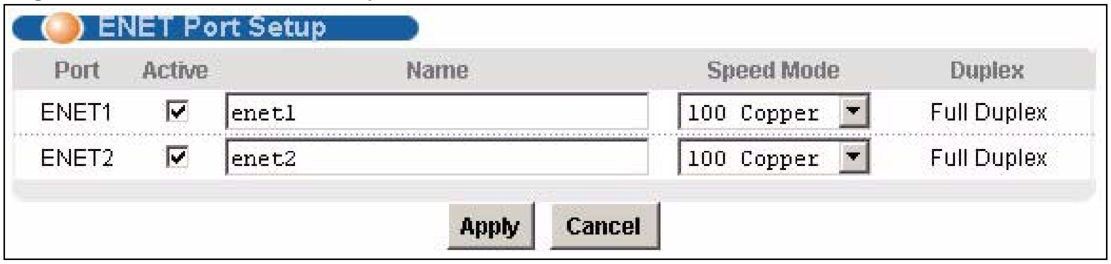
15

ENET Port Setup

The **ENET Port Setup** screen allows you to configure settings for the Ethernet ports.

To open this screen, click **Basic Setting** > **ENET Port Setup**.

Figure 51 ENET Port Setup



The following table describes the labels in this screen.

Table 18 ENET Port Setup

LABEL	DESCRIPTION
Port	This is the port index number.
Active	Select the check box to turn on the port. Clear it to disable the port.
Name	Enter a descriptive name that identifies this port. You can use up to 31 ASCII characters; spaces are not allowed.

Table 18 ENET Port Setup (continued)

LABEL	DESCRIPTION
Speed Mode	Select the type of Ethernet connection for this port. When you don't use auto-negotiation, you must make sure that the settings of the peer Ethernet port are the same in order to connect. Select **Auto** (auto-negotiation) to have the IES automatically determine the type of connection that the Ethernet port has. When the peer Ethernet device has auto-negotiation turned on, the IES negotiates with the peer to determine the connection speed. If the peer Ethernet port does not have auto-negotiation turned on, the IES determines the connection speed by detecting the signal on the cable and using full duplex. When an Ethernet port is set to **Auto**, the IES tries to make a fiber connection first and does not attempt to use the RJ-45 port if the fiber connection is successful. Select **100 Copper** if the Ethernet port has a 100 MB electrical connection. Select **1000 Copper** if the Ethernet port has a 1000 MB (1 gigabit) electrical connection. Select **1000 Fiber** if the Ethernet port has a 1000 MB (1 gigabit) fiber optic connection.
Duplex	The IES uses full duplex Ethernet connections.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

16

xDSL Port Setup

This chapter explains how to configure settings for profiles and individual ADSL ports. It also covers how to configure virtual channels and virtual channel profiles.

16.1 ADSL Standards Overview

These are the ADSL standards and rates that the IES supports at the time of writing. The actual transfer rates will vary depending on what the subscriber's device supports, the line conditions and the connection distance.

Table 19 ADSL Standards Maximum Transfer Rates

STANDARD	MAXIMUM DOWNSTREAM	MAXIMUM UPSTREAM
G.dmt	8160 Kbps	1024 Kbps
ANSI T1.413 issue 2	8160 Kbps	1024 Kbps
ADSL2	12000 Kbps	1200 Kbps
ADSL2 Annex M	12000 Kbps	2400 Kbps
ADSL2+	25000 Kbps	1200 Kbps
ADSL2+ Annex M	25000 Kbps	2400 Kbps

16.2 Downstream and Upstream

Downstream refers to traffic going out from the IES to the subscriber's ADSL modem or router. Upstream refers to traffic coming into the IES from the subscriber's ADSL modem or router.

16.3 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. 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, 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 (for example, economy, standard and premium). Assign the appropriate profile to an ADSL port and it takes care of a large part of the port's configuration maximum and minimum transfer rates. You still get to individually enable or disable each port, as well as configure its channels and operational mode.

16.4 Interleave Delay

Interleave delay is the wait (in milliseconds) that determines the size of a single block of data to be interleaved (assembled) and then transmitted. Interleave delay is used when transmission error correction (Reed- Solomon) is necessary due to a less than ideal telephone line. The bigger the delay, the bigger the data block size, allowing better error correction to be performed.

Reed-Solomon codes are block-based error correcting codes with a wide range of applications. The Reed-Solomon encoder takes a block of digital data and adds extra "redundant" bits. The Reed-Solomon decoder processes each block and attempts to correct errors and recover the original data.

16.4.1 Fast Mode

Fast mode means no interleaving takes place and transmission is faster (a “fast channel”). This would be suitable if you have a good line where little error correction is necessary.

16.5 Configured Versus Actual Rate

You configure the maximum rate of an individual ADSL port by modifying its profile (see Chapter 17 on page 151) or assigning the port to a different profile (see Section 16.7.1 on page 136). 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 using the Edit Profile screen, 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.

Regardless of a profile’s configured upstream and downstream rates, the IES automatically limits the actual rates for each individual port to the maximum speeds supported by the port’s ADSL operational mode. For example, if you configure a profile with a maximum downstream rate of 25000 Kbps, and apply it to a port set to use G.dmt, the IES automatically uses a maximum downstream rate of 8160 Kbps. This means that if you configure a profile with very high rates, you can still use it with any port. See Table 19 on page 131 for a list of the maximum rates supported by the different ADSL standards.

16.6 Default Settings

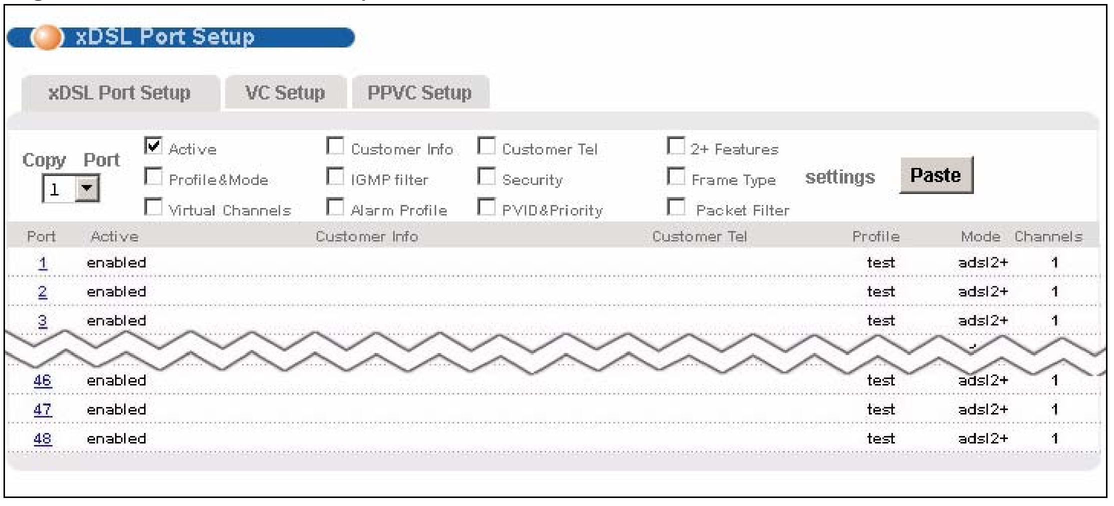
The default profile always exists and all of the ADSL ports use the default profile settings when the IES is shipped. The default profile's name is set to `DEFVAL_MAX`.

See Chapter 71 on page 599 for the settings of the default profile and ADSL port default settings.

16.7 xDSL Port Setup Screen

To open this screen, click **Basic Setting** > **xDSL Port Setup**.

Figure 52 xDSL Port Setup



The following table describes the labels in this screen.

Table 20 xDSL Port Setup

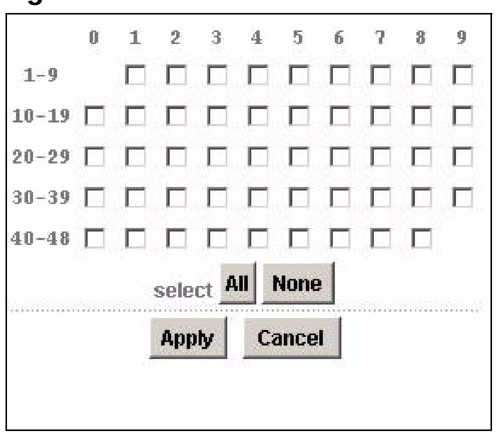
LABEL	DESCRIPTION
VC Setup	Click **VC Setup** to open the **VC Setup** screen where you can configure VC settings for the DSL ports (see Section 16.9 on page 141).
PPVC Setup	Click **PPVC Setup** to open the **PPVC Setup** screen where you can configure priority PVC settings for the DSL ports (see Section 16.11 on page 146).
Copy Port Paste	Do the following to copy settings from one DSL port to another DSL port or ports. 1. Select the number of the DSL port from which you want to copy settings. 2. Select the settings that you want to copy. 3. Click **Paste** and the following screen appears. 4. Select to which ports you want to copy the settings. Use **All** to select every port. Use **None** to clear all of the check boxes. 5. Click **Apply** to paste the settings. **Figure 53** Select Ports 
Active	Select this check box to copy this port's active setting. This is configured in the **xDSL Port Setting** screen (see Section 16.7.1 on page 136).
Customer Info	Select this check box to copy this port's subscriber information. This is configured in the **xDSL Port Setting** screen (see Section 16.7.1 on page 136).
Customer Tel	Select this check box to copy this port's subscriber's telephone number. This is configured in the **xDSL Port Setting** screen (see Section 16.7.1 on page 136).
2+ Features	Select this check box to copy this port's ADSL2+ feature settings. These are configured in the **xDSL Port Setting** screen (see Section 16.7.1 on page 136).

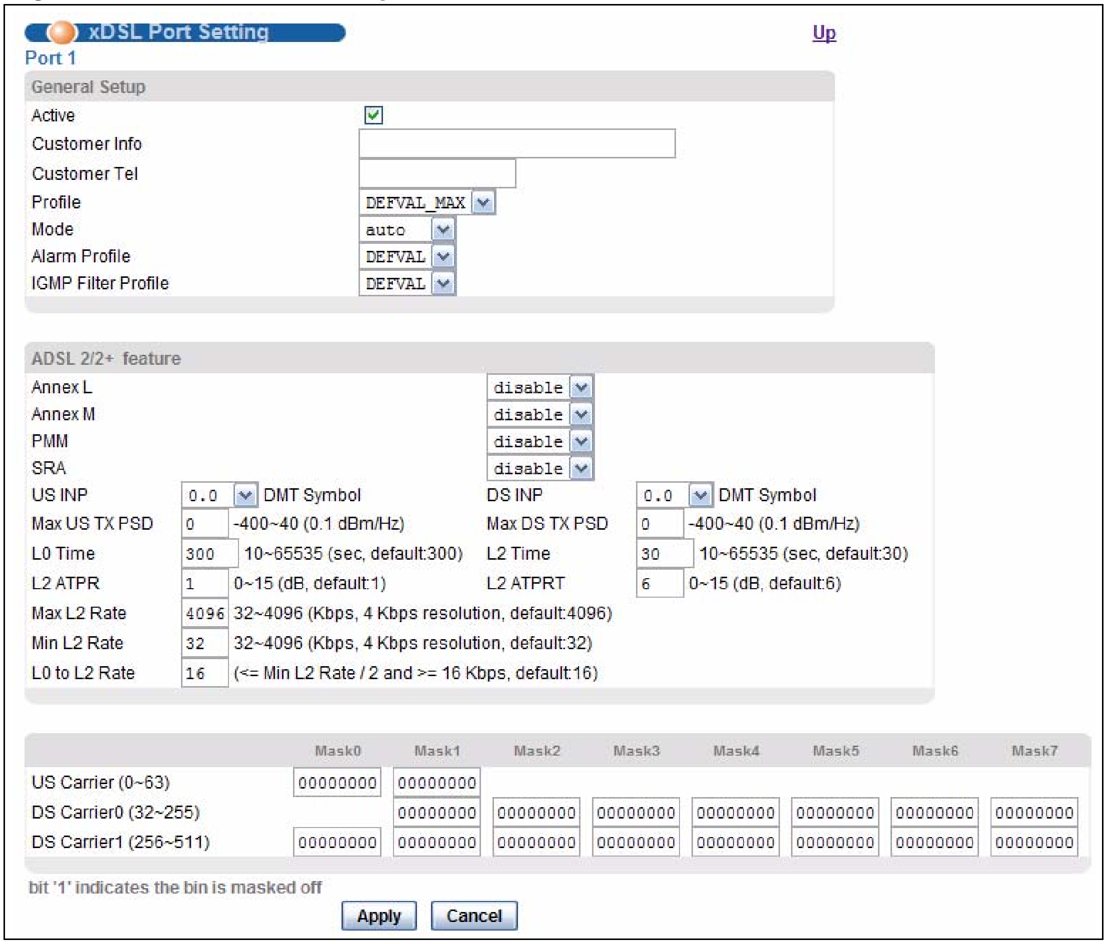
Table 20 xDSL Port Setup (continued)

LABEL	DESCRIPTION
Profile & Mode	Select this check box to copy this port's port profile settings and ADSL operational mode. The port profile settings are configured in the **xDSL Profiles Setup** screens (see Chapter 17 on page 151). The ADSL operational mode is configured in the **xDSL Port Setting** screen (see Section 16.7.1 on page 136).
IGMP Filter	Select this check box to copy this port's IGMP filter settings. These are configured in the **IGMP Filter Profile** screen (see Section 20.7 on page 192).
Security	Select this check box to copy this port's security settings. This is configured in the **Port Security** screen (see Chapter 27 on page 227).
Frame Type	Select this check box to copy this port's allowed frame type. This is configured in the **Static VLAN Setting** screen (see Chapter 25 on page 213).
Virtual Channels	Select this check box to copy this port's virtual channel settings. These are configured in the **VC Setup** screen (see Section 16.9 on page 141).
Alarm Profile	Select this check box to copy this port's alarm profile. This is configured in the **Alarm Profile Setup** screen (see Section 17.6 on page 160).
PVID & Priority	Select this check box to copy this port's PVID and priority settings. These are configured in the **VLAN Port Setting** screen (see Chapter 19 on page 175).
Packet Filter	Select this check box to copy this port's packet filter settings. These are configured in the **Packet Filtering** screen (see Chapter 23 on page 207).
Paste	See **Copy Port**.
Port	This field shows each ADSL port number.
Active	This field shows the active status of this port. The port may be **enabled** or **disabled**. This is configured in the **xDSL Port Setting** screen (see Section 16.7.1 on page 136).
Customer Info	This field shows the customer information provided for this port. This is configured in the **xDSL Port Setting** screen (see Section 16.7.1 on page 136).
Customer Tel	This field shows the customer telephone number provided for this port. This is configured in the **xDSL Port Setting** screen (see Section 16.7.1 on page 136).
Profile	This field shows which profile is assigned to this port. This is configured in the **xDSL Port Setting** screen (see Section 16.7.1 on page 136).
Mode	This field shows which ADSL operational mode the port is set to use. This is configured in the **xDSL Port Setting** screen (see Section 16.7.1 on page 136).
Channels	This field displays the number of PVCs (Permanent Virtual Circuits) that are configured for this port. This is configured in the **VC Setup** screen (see Section 16.9 on page 141).

16.7.1 xDSL Port Setting Screen

To open this screen, click **Basic Setting** > **xDSL Port Setup**, and then click a port's index number.

Figure 54 xDSL Port Setting



The following table describes the labels in this screen.

Table 21 xDSL Port Setting

LABEL	DESCRIPTION
Last Page	Click this to return to the previous screen.
Active	Select this check box to turn on this ADSL port.
Customer Info	Enter information to identify the subscriber connected to this ADSL port. You can use up to 31 printable ASCII characters (including spaces and hyphens).
Customer Tel	Enter information to identify the telephone number of the subscriber connected to this ADSL port. You can use up to 15 ASCII characters (including spaces and hyphens).

Table 21 xDSL Port Setting (continued)

LABEL	DESCRIPTION
Profile	Select a profile of ADSL settings (such as the transfer rate, interleave delay and signal to noise ratio settings) to assign to this port. Use the **Port Profile** screen to configure port profiles (see Chapter 17 on page 151).
Mode	Select the port's ADSL operational mode. Select the mode that the subscriber's device uses or **auto** to have the IES automatically determine the mode to use. See Table 19 on page 131 for information on the individual ADSL modes.
Alarm Profile	Select the port's alarm profile. The alarm profile defines alarm thresholds for the ADSL port. The IES sends an alarm trap and generates a syslog entry when the thresholds of the alarm profile are exceeded (see Section 17.6 on page 160).
IGMP Filter Profile	The IGMP filter profile defines which multicast groups a port can join. Select a profile of IGMP filter settings to assign to this port. Use the **IGMP Filter Profile** screen to configure IGMP filter profiles (see Section 20.7 on page 192).
ADSL2/2+ feature	These are features available with ADSL2/2+. The subscriber's ADSL device must also support the individual features in order to use them. At the time of writing these features have not been fully tested and their performance and interoperability cannot be guaranteed.
Annex L	Enable Annex L to use reach extended ADSL2. This allows increased connection distances.
Annex M	Enable Annex M to use double upstream mode. This has the upstream connection use tones 6 to 63.
Annex I	Enable Annex I to use all digital mode. With Annex I, the ADSL connection uses the full spectrum of the physical line and the user can not use POTS or ISDN service. This increases the upstream data rate. Note: The subscriber cannot use POTS or ISDN services when you enable Annex I.
PMM	Enable the Power ManageMent (PMM) feature to reduce the amount of power used overall and reduce the instances of the connection going down. PMM increases or decreases the transmission power based on line conditions. PMM also decreases the number of service interruptions. Select **L2** to have the ADSL connection use power saving mode and reduce the rate when there is no traffic. The rate comes back up when there is traffic. Select **L3** to use both power management modes L2 and L3. L3 puts the ADSL connection to sleep mode. L0 power mode uses no power reduction. See the ITU-T G.992.3 standard for more on PMM and the power modes (states).
SRA	Enable Seamless Rate Adaptation (SRA) to have the IES automatically adjust the connection's data rate according to line conditions without interrupting service.

Table 21 xDSL Port Setting (continued)

LABEL	DESCRIPTION
	Sudden spikes in the line's noise level (impulse noise) can cause errors and result in lost packets. Set the impulse noise protection minimum to have a buffer to protect the ADSL physical layer connection against impulse noise. This buffering causes a delay that reduces transfer speeds. It is recommended that you use a non-zero setting for real time traffic that has no error correction (like videoconferencing).
US INP	Set the minimum upstream (US) impulse noise protection setting.
DS INP	Set the minimum downstream (DS) impulse noise protection setting.
Max US TX PSD	Specify the maximum upstream transmit power (-256 ~ 255 in 0.1dBs).
Max DS TX PSD	Specify the maximum downstream transmit power (-256 ~ 255 in 0.1dBs).
L0 Time	Set the minimum time (in seconds) that the ADSL line must stay in L0 power mode before changing to the L2 power mode.
L2 Time	Set minimum time (in seconds) that the ADSL line must stay in the L2 power mode before reducing the power again in the L2 power mode.
L2 ATPR	Set the maximum Aggregate Transmit Power Reduction (ATPR) in decibels (dB) that is permitted in a L2 power reduction. The system can gradually decrease the ADSL line transmission power while it is in the L2 power mode. This is the largest individual power reduction allowed in the L2 power mode.
L2 ATPRT	Set the maximum Aggregate Transmit Power Reduction Total (ATPRT) in decibels (dB) that is permitted in the L2 power mode. This is the total transmit power decrease that is allowed to occur in the L2 power mode.
Max L2 Rate	Set the maximum transfer rate (in Kilobits per second) that is permitted while the port is in the L2 power mode. The supported range is 32~4096 Kbps in 4 Kbps increments. If you enter a number that is not a multiple of 4, the system uses the next lower multiple of 4. If you enter 39 for example, the system will use 36. Set this to 0 to have the system automatically assign a value.
Min L2 Rate	Set the minimum transfer rate (in Kilobits per second) that is permitted while the port is in the L2 power mode. The supported range is 32~4096 Kbps in 4 Kbps increments. If you enter a number that is not a multiple of 4, the system uses the next lower multiple of 4. If you enter 39 for example, the system will use 36. Set this to 0 to have the system automatically assign a value.
L0 to L2 Rate	Set the down stream transfer rate (in Kilobits per second) that serves as the threshold for whether the port is to use the L0 or the L2 power mode. The system changes from L0 mode to L2 mode when the downstream transfer rate stays below this threshold for **L0 Time**. The system changes back from L2 mode to L0 mode when the downstream transfer rate goes above this threshold. This rate must be less than or equal to one half of the **Min L2 Rate** and at least 16 Kbps. Set this to 0 to have the system automatically assign a value.

Table 21 xDSL Port Setting (continued)

LABEL	DESCRIPTION
Use this part of the screen to mask carrier tones. Masking a carrier tone disables the use of that tone on the ADSL port. Do this to have the system not use an ADSL line’s tones that are known to have a high noise level. Each mask can use up to 8 hexadecimal digits (00000000~ffffffff). Each hexadecimal digit represents 4 tones. The hexadecimal digit is converted to binary and a '1' masks (disables) the corresponding tone. The most significant bit defines the lowest tone number in a mask.	
USCarrier (0~63)	**Mask0** represents tones 0~31. **Mask1** represents tones 32~63. The most significant bit defines Tone 0. In other words, 0x00000001 means tone 31. For example, you could use 0xfffff000 to disable upstream carrier tones 0~19 and leave tones 20 ~ 31 enabled.
DSCarrier(32~255)	**Mask1** represents tones 32~63 **Mask2** represents tones 64~95 **Mask3** represents tones 96~127 **Mask4** represents tones 128~159 **Mask5** represents tones 160~191 **Mask6** represents tones 192~223 **Mask7** represents tones 224~255 For example, use 0x01000000 in **Mask2** to disable downstream carrier tone 71. Use 0x03000000 in **Mask2** to disable downstream carrier tones 70 and 71.
DSCarrier (256~511)	**Mask0** represents tones 256~287 **Mask1** represents tones 288~319 **Mask2** represents tones 320~351 **Mask3** represents tones 352~383 **Mask4** represents tones 384~415 **Mask5** represents tones 416~447 **Mask6** represents tones 448~479 **Mask7** represents tones 480~511 For example, use 0x00001000 in **Mask1** to disable downstream carrier tone 307. Use 0x0000f000 in **Mask1** to disable downstream carrier tones 304 to 307.
Apply	Click **Apply** to save your changes to the IES’s volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields again.

16.8 Virtual Channels

Defining virtual channels (also called Permanent Virtual Circuits or PVCs) allows you to set priorities for different services or subscribers. You can define up to eight channels on each DSL port and use them for different services or levels of service. You set the PVID that is assigned to untagged frames received on each channel. You also set an IEEE 802.1p priority for each of the PVIDs. In this way you can assign different priorities to different channels (and consequently the services that get carried on them or the subscribers that use them).

For example, you want to give high priority to voice service on one of the ADSL ports.

Use the **Edit Static VLAN** screen to configure a static VLAN on the IES for voice on the port.

Use the **ADSL Edit Port Channel Setup** screen to:

- Configure a channel on the port for voice service.
- Set the channel to use the PVID of the static VLAN you configured.
- Assign the channel a high priority.

16.8.1 Super Channel

The IES forwards frames belonging to VLAN groups that are not assigned to specific channels to the super channel. Enable the super channel option to allow a channel forward frames belonging to multiple VLAN groups (that are not assigned to other channels). The super channel functions in the same way as the channel in a single channel environment. One port can have only one super channel.

16.8.2 LLC

LLC is a type of encapsulation where one VC (Virtual Circuit) carries multiple protocols with each packet header containing protocol identifying information. Despite the extra bandwidth and processing overhead, this method may be advantageous if it is not practical to have a separate VC for each carried protocol, for example, if charging heavily depends on the number of simultaneous VCs.

16.8.3 VC Mux

VC Mux is a type of encapsulation where, by prior mutual agreement, each protocol is assigned to a specific virtual circuit, for example, VC1 carries IP, VC2 carries IPX, and so on. VC-based multiplexing may be dominant in environments where dynamic creation of large numbers of ATM VCs is fast and economical.

16.8.4 Virtual Channel Profile

Virtual channel profiles allow you to configure the virtual channels efficiently. You can configure all of the virtual channels with the same profile, thus removing the need to configure the virtual channels one-by-one. You can also change an individual virtual channel by assigning it a different profile.

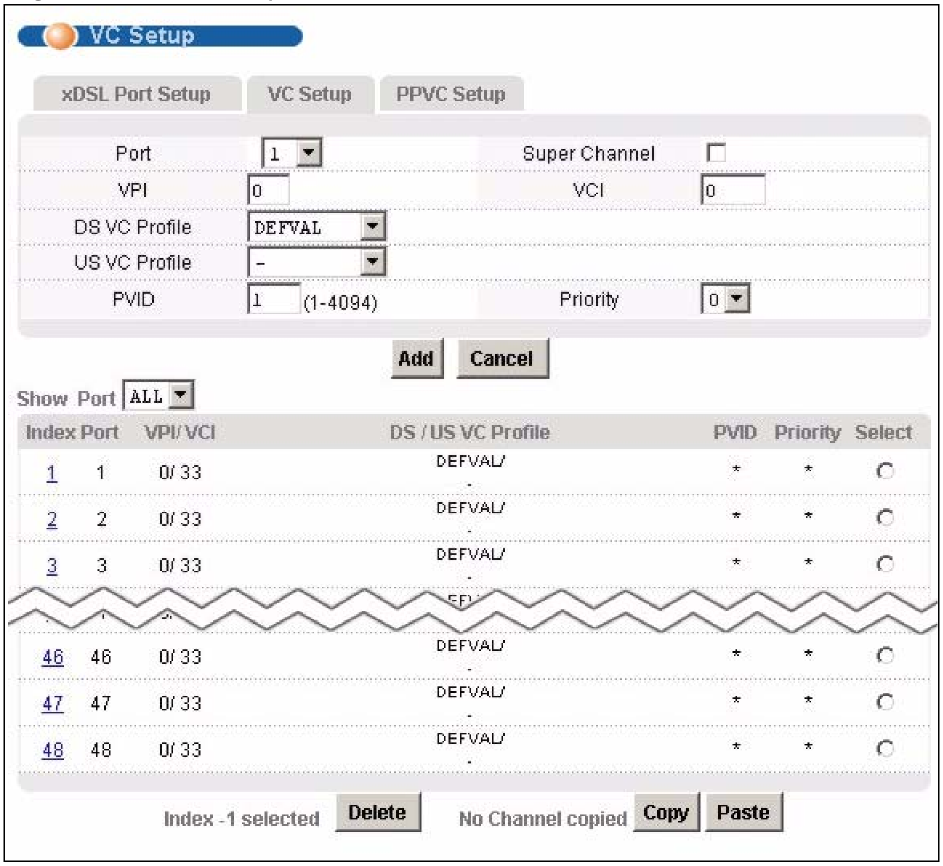
The IES provides two default virtual channel profiles: **DEFVAL** (for LLC encapsulation) and **DEFVAL_VC** (for VC encapsulation). By default, all virtual channels are associated to **DEFVAL**.

16.9 VC Setup Screen

Use this screen to view and configure a port's channel (PVC) settings.

To open this screen, click **Basic Setting** > **xDSL Port Setup** > **VC Setup**.

Figure 55 VC Setup



The following table describes the labels in this screen.

Table 22 VC Setup

LABEL	DESCRIPTION
xDSL Port Setup	Click **xDSL Port Setup** to go to the screen where you can configure DSL port settings (see Section 16.7 on page 133).
PPVC Setup	Click **PPVC Setup** to open the **PPVC Setup** screen where you can configure priority PVC settings for the DSL ports (see Section 16.11 on page 146).
Port	Use this drop-down list box to select a port for which you wish to view or configure settings. This field is read-only once you click on a port number below.
Super Channel	The IES forwards frames belonging to VLAN groups that are not assigned to specific channels to the super channel. Enable the super channel option to have this channel forward frames belonging to multiple VLAN groups (that are not assigned to other channels). The super channel functions in the same way as the channel in a single channel environment.
VPI	Type the Virtual Path Identifier for a channel on this port.
VCI	Type the Virtual Circuit Identifier for a channel on this port.
DS VC Profile	Use the drop-down list box to select a VC profile to use for this channel's downstream traffic shaping.
US VC Profile	Use the drop-down list box to select a VC profile to use for this channel's upstream traffic. The IES does not perform upstream traffic policing if you do not specify an upstream VC profile. Note: Upstream traffic policing should be used in conjunction with the ATM shaping feature on the subscriber's device. If the subscriber's device does not apply the appropriate ATM shaping, all upstream traffic will be discarded due to upstream traffic policing.
PVID	Type a PVID (Port VLAN ID) to assign to untagged frames received on this channel.
Priority	Use the drop-down list box to select the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag. An asterisk (*) denotes a super channel.
Add Apply	Click this to add or save channel settings on the selected port. (The name of the button depends on whether or not you have clicked on a PVC number in the **Index** column.) This saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
Show Port	Select the number of an ADSL port for which to display VC settings (or display all of them).

Table 22 VC Setup (continued)

LABEL	DESCRIPTION
Index	This field displays the number of the PVC. Click a PVC's index number to use the top of the screen to edit the PVC. Note: At the time of writing, you cannot edit the VPI and VCI. If you want to change them, add a new PVC with the desired settings. Then you can delete any unwanted PVCs.
Port	This field displays the number of the ADSL port on which the PVC is configured.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
US / DS VC Profile	This shows which VC profile this channel uses for downstream traffic shaping. The VC profile for upstream policing also displays if the channel is configured to use one.
PVID	This is the PVID (Port VLAN ID) assigned to untagged frames or priority frames (0 VID) received on this channel. An asterisk (*) denotes a super channel.
Priority	This is the priority value (0 to 7) added to incoming frames without a (IEEE 802.1p) priority tag. An asterisk (*) denotes a super channel.

Table 22 VC Setup (continued)

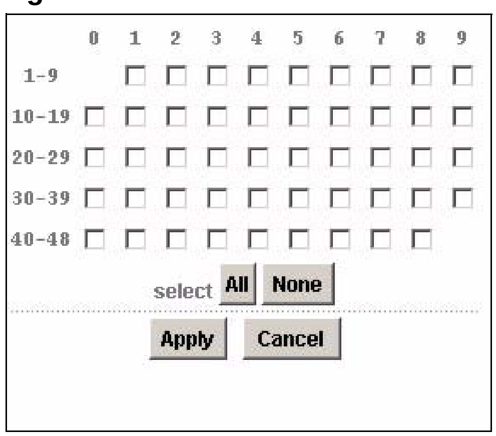
LABEL	DESCRIPTION
Select Delete	Do the following to remove one or more PVCs. 1. Select a PVC's **Select** radio button. 2. Click **Delete**. 3. Click **OK** if you want to remove the PVC from other ports. Click **Cancel** to only remove the one you selected. **Figure 56** Basic Setting > xDSL Port Setup > VC Setup > Delete  4. If you clicked **OK**, the following screen appears. 5. Select to which ports you want to copy the settings. Use **All** to select every port. Use **None** to clear all of the check boxes. 6. Click **Apply** to delete the channels. **Figure 57** Select Ports 

Table 22 VC Setup (continued)

<table>
<tr><th>LABEL</th><th>DESCRIPTION</th></tr>
<tr><td>Select

Copy

Paste</td><td>Do the following to copy settings from one PVC to another port or ports.

1. Click the Select radio button of the PVC from which you want to copy settings.

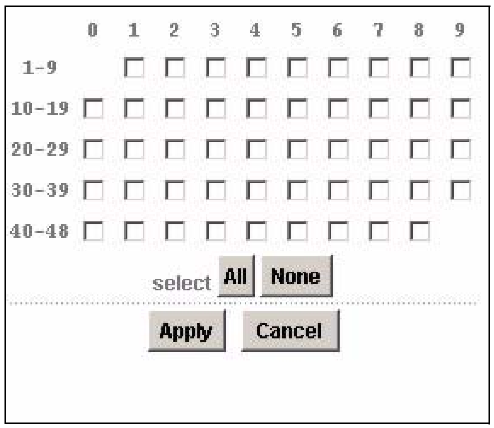
2. Click Paste.

3. The following screen appears.

4. Select to which ports you want to copy the settings. Use All to select every port. Use None to clear all of the check boxes.

5. Click Apply to copy the settings.

Figure 58 Select Ports


</td></tr>
</table>

16.10 Priority-based PVCs

A PPVC (Priority-based PVC) allows you to give different priorities to PVCs that are members of the same VLAN.

The IES uses eight priority queues (also called levels) for the member PVCs. The system maps frames with certain IEEE 802.1p priorities to a PVC with a particular priority queue. The following table gives the factory default mapping.

Table 23 IEEE 802.1p Priority to PPVC Mapping

IEEE 802.1 PRIORITY	MAPS TO:	PPVC 0/33, PRIORITY QUEUE
7	->	level 7
6	->	level 6
5	->	level 5
4	->	level 4

Table 23 IEEE 802.1p Priority to PPVC Mapping (continued)

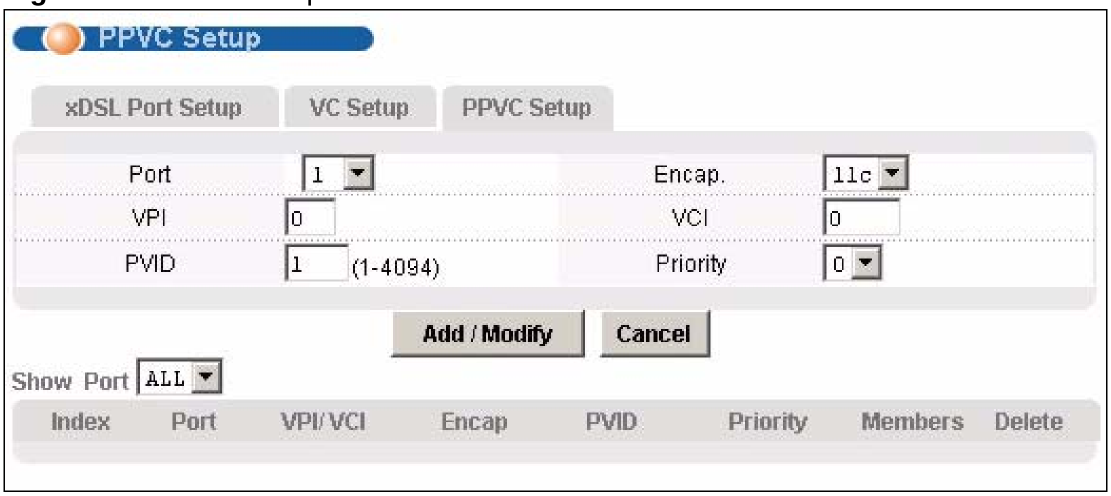
IEEE 802.1 PRIORITY	MAPS TO:	PPVC 0/33, PRIORITY QUEUE
3	->	level 3
2	->	level 2
1	->	level 1
0	>	level 0

16.11 PPVC Setup Screen

Use this screen to view and configure PPVCs.

To open this screen, click **Basic Setting** > **xDSL Port Setup** > **PPVC Setup**.

Figure 59 PPVC Setup



The following table describes the labels in this screen.

Table 24 PPVC Setup

LABEL	DESCRIPTION
xDSL Port Setup	Click **xDSL Port Setup** to go to the screen where you can configure DSL port settings (see Section 16.7 on page 133).
VC Setup	Click **VC Setup** to open the **VC Setup** screen where you can configure VC settings for the DSL ports (see Section 16.9 on page 141).
Port	Use this drop-down list box to select a port for which you wish to configure settings.
Encap.	Select the encapsulation type (**LLC** or **VC**) for this PPVC.
VPI	Type the Virtual Path Identifier for this PPVC.
VCI	Type the Virtual Circuit Identifier for this PPVC. The IES uses this PVC channel internally. This PVC is not needed on the subscriber's device. This PVC cannot overlap with any existing PVC's on this port.

Table 24 PPVC Setup (continued)

LABEL	DESCRIPTION
PVID	Type a PVID (Port VLAN ID) to assign to untagged frames received on this PPVC.
Priority	Use the drop-down list box to select the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.
Add / Modify	Click **Add / Modify** to save PPVC settings for a port. In order to change a port's PPVC settings, just select the port from the **Port** drop-down list box and then configure the settings you want. These settings replace the port's old settings when you click **Add / Modify**. Clicking **Add / Modify** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
Show Port	Select the number of an ADSL port for which to display PPVC settings (or display all of them).
Index	This field displays the number of the PPVC.
Port	This field displays the number of the ADSL port on which the PPVC is configured.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port. The IES uses this PVC channel internally. This PVC is not needed on the subscriber's device.
Encap	This field displays the PPVC's type of encapsulation (**LLC** or **VC**).
PVID	This is the PVID (Port VLAN ID) assigned to untagged frames or priority frames (0 VID) received on this channel.
Priority	This is the priority value (0 to 7) added to incoming frames without a (IEEE 802.1p) priority tag.
Members	This field displays how many PVCs belong to this PPVC has. Click the number to open a screen where you can configure the PPVC's member PVCs.
Delete	Click **Delete** to remove a PPVC. Clicking **Delete** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.

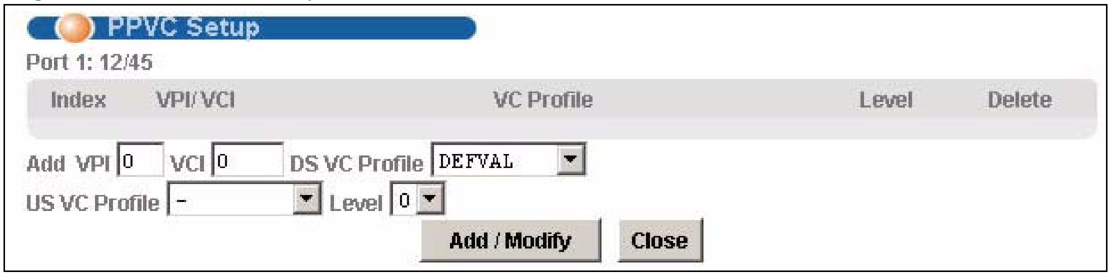
16.11.1 PPVC Setup Members Screen

Use this screen to add and remove member PVCs.

Note: The member PVCs must be created on the subscriber's device.

To open this screen, click **Basic Setting** > **xDSL Port Setup** > **PPVC Setup**. Then, click a PPVC's member number to open the **PPVC Setup Members** screen.

Figure 60 PPVC Setup, Edit



The following table describes the labels in this screen.

Table 25 PPVC Setup, Edit

LABEL	DESCRIPTION
Port	This is the port for which you are viewing or configuring settings.
Index	This field displays the number of the member PVC.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port. The subscriber's device must create this PVC.
VC Profile	This shows which VC profile this channel uses for downstream traffic shaping. The VC profile for upstream policing also displays if the channel is configured to use one.
Level	This field displays the number of the member PVC's priority queue.
Delete	Click **Delete** to remove a member PVC from the PPVC. Clicking **Delete** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Add	Use this section of the screen to add or modify a member PVC.
VPI	Type the Virtual Path Identifier for this member PVC.
VCI	Type the Virtual Circuit Identifier for this member PPVC. This PVC cannot overlap with any existing PVC's on this port.
DS VC Profile	Use the drop-down list box to select a VC profile to use for this channel's downstream traffic shaping.
US VC Profile	Use the drop-down list box to select a VC profile to use for this channel's upstream traffic. The IES does not perform upstream traffic policing if you do not specify an upstream VC profile.
Level	Use the drop-down list box to select the priority queue (0 to 7) to add to use for the PVC. 7 is the highest level.

Table 25 PPVC Setup, Edit (continued)

LABEL	DESCRIPTION
Add / Modify	Click **Add / Modify** to save member PVC settings for a PPVC. In order to change a member PVC ‘s settings, just enter the PVC’s VPI and VCI, and configure the settings you want. These settings replace the PVC’s old settings when you click **Add / Modify**. Clicking **Add / Modify** saves your changes to the IES’s volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Close	Click **Close** to exit the screen without saving your changes.

17

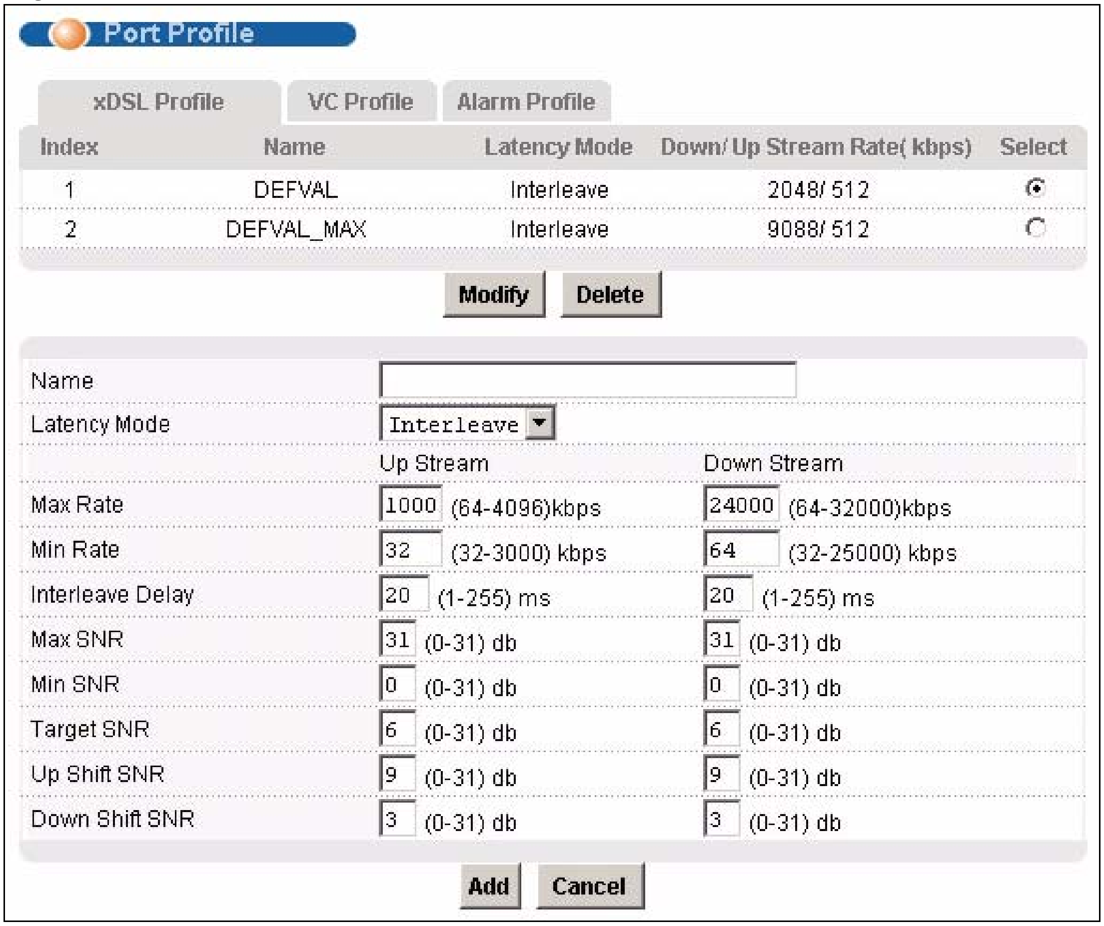
xDSL Profiles Setup

A profile is a list of settings that you define. Then you can assign them to one or more individual ports. For background information about many of these settings, see Chapter 16 on page 131.

17.1 Port Profile Screen

To open this screen, click **Basic Setting** > **xDSL Profiles Setup**.

Figure 61 Port Profile



The following table describes the labels in this screen.

Table 26 Port Profile

LABEL	DESCRIPTION
VC Profile	Click **VC Profile** to open the **VC Profile** screen where you can configure virtual channel profiles (see Section 17.5 on page 158).
Alarm Profile	Click **Alarm Profile** to open the **Alarm Profile** screen where you can configure limits that trigger an alarm when exceeded (see Section 17.6 on page 160)
IGMP Filter Profile	Click **IGMP Filter Profile** to open the **IGMP Filter Profile** screen where you can configure IGMP multicast filter profiles (see Section 20.7 on page 192).
Index	This is the port profile index number.
Name	These are the names of individual profiles. The DEFVAL profile always exists and all of the DSL ports have it assigned to them by default. You can use up to 31 ASCII characters; spaces are not allowed.
Latency Mode	This is the ADSL latency mode (**Fast** or **Interleave**) for the ports that belong to this profile.
Down/Up Stream Rate (kbps)	These are the maximum downstream and upstream transfer rates for the ports that belong to this profile.
Select Modify	Select a profile's **Select** radio button and click **Modify** to edit the profile.
Select Delete	Select a profile's **Select** radio button and click **Delete** to remove the profile.
	The rest of the screen is for profile configuration.
Name	When editing a profile, this is the name of this profile. When adding a profile, type a name (up to 31 characters) for the profile.
Latency Mode	This field sets the ADSL latency mode for the ports that belong to this profile. Select **Fast** mode to use no interleaving and have faster transmission (a "fast channel"). This would be suitable if you have a good line where little error correction is necessary. Select **Interleave** mode to use interleave delay when transmission error correction (Reed- Solomon) is necessary due to a less than ideal telephone line. See Section 16.4 on page 132 for more on interleave delay.
Up Stream	The following parameters relate to upstream transmissions.
Max Rate	Type a maximum upstream transfer rate (64 to 4096 Kbps) for this profile. Configure the maximum upstream transfer rate to be less than the maximum downstream transfer rate.
Min Rate	Type the minimum upstream transfer rate (32 to 3000 Kbps) for this port. Configure the minimum upstream transfer rate to be less than the maximum upstream transfer rate.
Interleave Delay	Configure this field when you set the **Latency Mode** field to **Interleave**. Type the number of milliseconds (1-255) of interleave delay to use for upstream transfers. It is recommended that you configure the same latency delay for both upstream and downstream.

Table 26 Port Profile (continued)

LABEL	DESCRIPTION
Max SNR	Type the maximum upstream signal to noise margin (0-31 dB).
Min SNR	Type the minimum upstream signal to noise margin (0-31 dB). Configure the minimum upstream signal to noise margin to be less than or equal to the maximum upstream signal to noise margin.
Target SNR	Type the target upstream signal to noise margin (0-31 dB). Configure the target upstream signal to noise margin to be greater than or equal to the minimum upstream signal to noise margin and less than or equal to the maximum upstream signal to noise margin.
Up Shift SNR	The upstream up shift signal to noise margin (0-31 dB). When the channel's signal to noise margin goes above this number, the device can attempt to use a higher transfer rate. Configure the upstream up shift signal to noise margin to be greater than or equal to the target upstream signal to noise margin and less than or equal to the maximum upstream signal to noise margin.
Down Shift SNR	The upstream down shift signal to noise margin (0-31 dB). When the channel's signal to noise margin goes below this number, the device shifts to a lower transfer rate. Configure the upstream down shift signal to noise margin to be less than or equal to the target upstream signal to noise margin and greater than or equal to the minimum upstream signal to noise margin.
Down Stream	The following parameters relate to downstream transmissions.
Max Rate	Type a maximum downstream transfer rate (64 to 32000 Kbps) bps for this port. Configure the maximum downstream transfer rate to be greater than the maximum upstream transfer rate.
Min Rate	Type the minimum downstream transfer rate (32 to 32000 Kbps) for this port. Configure the minimum downstream transfer rate to be less than the maximum downstream transfer rate.
Interleave Delay	Configure this field when you set the **Latency Mode** field to **interleave**. Type the number of milliseconds (1-255) of interleave delay to use for upstream transfers. It is recommended that you configure the same latency delay for both upstream and downstream.
Max SNR	Type the maximum downstream signal to noise margin (0-31 dB).
Min SNR	Type the minimum downstream signal to noise margin (0-31 dB). Configure the minimum downstream signal to noise margin to be less than or equal to the maximum downstream signal to noise margin.
Target SNR	Type the target downstream signal to noise margin (0-31 dB). Configure the target downstream signal to noise margin to be greater than or equal to the minimum downstream signal to noise margin and less than or equal to the maximum downstream signal to noise margin.
Up Shift SNR	The downstream up shift signal to noise margin (0-31 dB). When the channel's signal to noise margin goes above this number, the device can attempt to use a higher transfer rate. Configure the downstream up shift signal to noise margin to be greater than or equal to the target downstream signal to noise margin and less than or equal to the maximum downstream signal to noise margin.

Table 26 Port Profile (continued)

LABEL	DESCRIPTION
Down Shift SNR	The downstream down shift signal to noise margin (0-31 dB). When the channel's signal to noise margin goes below this number, the device shifts to a lower transfer rate. Configure the downstream down shift signal to noise margin to be less than or equal to the target downstream signal to noise margin and greater than or equal to the minimum downstream signal to noise margin.
Add	Click **Add** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

17.2 ATM QoS

ATM Quality of Service (QoS) mechanisms provide the best service on a per-flow guarantee. ATM network infrastructure was designed to provide QoS. It uses fixed cell sizes and built-in traffic management (see Section 17.3 on page 154). This allows you to fine-tune the levels of services on the priority of the traffic flow.

17.3 Traffic Shaping

Traffic shaping is an agreement between the carrier and the subscriber to regulate the average rate and fluctuations of data transmission over an ATM network. This agreement helps eliminate congestion, which is important for transmission of real time data such as audio and video connections.

Note: Traffic shaping controls outgoing (downstream) traffic, not incoming (upstream).

17.3.1 ATM Traffic Classes

These are the basic ATM traffic classes defined by the ATM Forum Traffic Management 4.0 Specification.

17.3.1.1 Constant Bit Rate (CBR)

Constant Bit Rate (CBR) is an ATM traffic class that provides fixed bandwidth. CBR traffic is generally time-sensitive (doesn't tolerate delay). CBR is used for connections that continuously require a specific amount of bandwidth. Examples of connections that need CBR would be high-resolution video and voice.

17.3.1.2 Variable Bit Rate (VBR)

The Variable Bit Rate (VBR) ATM traffic class is used with bursty connections. Connections that use the Variable Bit Rate (VBR) traffic class can be grouped into real time (rt-VBR) or non-real time (nrt-VBR) connections.

The rt-VBR (real-time Variable Bit Rate) type is used with bursty connections that require closely controlled delay and delay variation. An example of an rt-VBR connection would be video conferencing. Video conferencing requires real-time data transfers and the bandwidth requirement varies in proportion to the video image’s changing dynamics.

The nrt-VBR (non real-time Variable Bit Rate) type is used with bursty connections that do not require closely controlled delay and delay variation. An example of an nrt-VBR connection would be non-time sensitive data file transfers.

17.3.1.3 Unspecified Bit Rate (UBR)

The Unspecified Bit Rate (UBR) ATM traffic class is similar to the ABR traffic class for bursty data transfers. However, while ABR gives subscribers a set amount of bandwidth, UBR doesn’t guarantee any bandwidth and only delivers traffic when the network has spare bandwidth.

17.3.2 Traffic Parameters

These are the parameters that control the flow of ATM traffic.

17.3.2.1 Peak Cell Rate (PCR)

Peak Cell Rate (PCR) is the maximum rate at which the sender can send cells. This parameter may be lower (but not higher) than the maximum line speed. 1 ATM cell is 53 bytes (424 bits), so a maximum speed of 832Kbps gives a maximum PCR of 1962 cells/sec. This rate is not guaranteed because it is dependent on the line speed.

17.3.2.2 Sustained Cell Rate (SCR)

Sustained Cell Rate (SCR) is the mean cell rate of each bursty traffic source. It specifies the maximum average rate at which cells can be sent over the virtual connection. SCR may not be greater than the PCR.

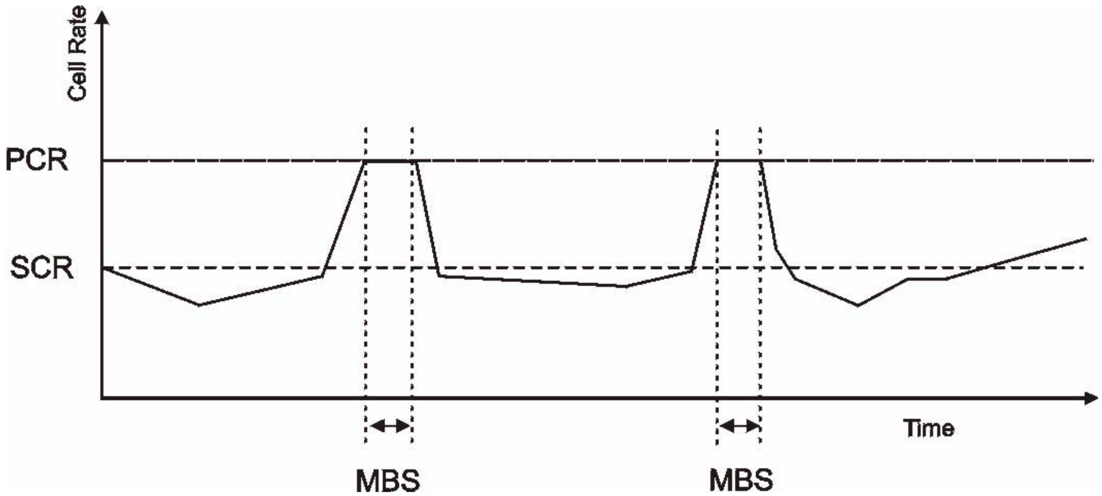
17.3.2.3 Maximum Burst Size (MBS)

Maximum Burst Size (MBS) is the maximum number of cells that can be sent at the PCR. After MBS is reached, cell rates fall below SCR until cell rate averages to the SCR again. At this time, more cells (up to the MBS) can be sent at the PCR again.

Note: If the PCR, SCR or MBS is set to the default of “0”, the system will assign a maximum value that correlates to your upstream line rate.

The following figure illustrates the relationship between PCR, SCR and MBS.

Figure 62 PCR, SCR and MBS in Traffic Shaping



17.3.2.4 Cell Delay Variation Tolerance (CDVT)

Cell Delay Variation Tolerance (CDVT) is the accepted tolerance of the difference between a cell’s transfer delay and the expected transfer delay. CDVT controls the time scale over which the PCR is enforced. CDVT is used to determine if a cell arrived too early in relation to PCR.

17.3.2.5 Burst Tolerance (BT)

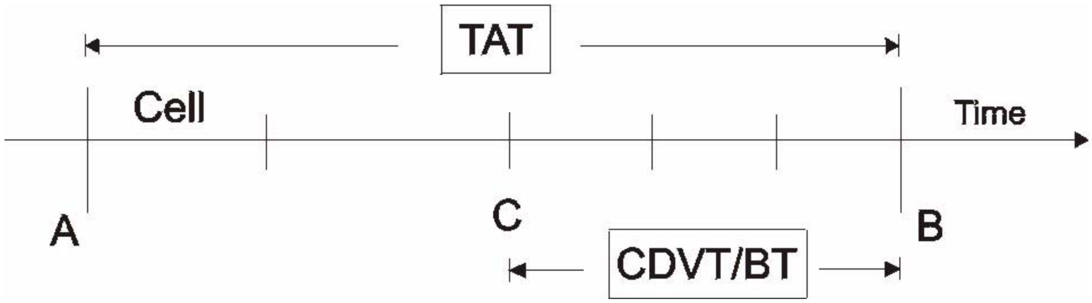
Burst Tolerance (BT) is the maximum number of cells that the port is guaranteed to handle without any discards. BT controls the time scale over which the SCR is enforced. BT is used to determine if a cell arrived too early in relation to SCR. Use this formula to calculate BT: (MBS – 1) x (1 / SCR – 1 / PCR) = BT.

17.3.2.6 Theoretical Arrival Time (TAT)

The Theoretical Arrival Time (TAT) is when the next cell (in an ATM connection’s stream of cells) is expected to arrive. TAT is calculated based on the PCR or SCR.

The following figure illustrates the relationship between TAT, CDVT and BT. If a cell arrives at time A, then according to PCR or SCR, the next cell is expected to arrive at time B. If the next cell arrives earlier than time C, it is discarded or tagged for not complying with the TAT. Time C is calculated based on the CDVT or BT.

Figure 63 TAT, CDVT and BT in Traffic Shaping



17.4 Upstream Policing

Upstream policing is an agreement between the carrier and the subscriber to regulate the average rate and fluctuations of data transmission coming from the subscriber's device to the IES.

Note: Upstream policing controls incoming (upstream) traffic, not outgoing (downstream).

The ATM traffic classes and parameters are identical with downstream shaping.

Upstream policing can control the upstream incoming traffic rate on specific PVCs. Upstream ATM cell traffic that violates the policing profile will be discarded. Traffic shaping must also be enabled on the subscriber's device in order to use upstream policing. If a subscriber attempts to enlarge his device's PVC shaping parameters in order to get more upstream traffic bandwidth, it will violate the IES's upstream policing profile and the traffic will be discarded. Operators can use this feature to prevent subscribers from changing their device settings.

Note: Traffic shaping must also be enabled on the subscriber's device in order to use upstream policing.

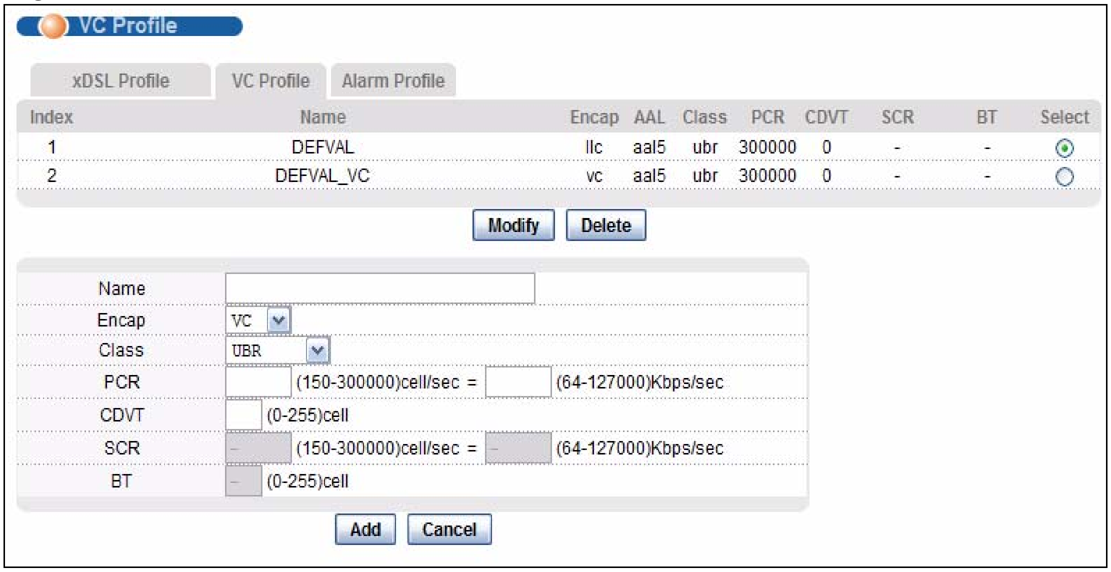
Note that since the IES uses ATM QoS, if the subscriber device's upstream shaping rate is larger than the IES's upstream policing rate, some ATM cells will be discarded. In the worst case, none of the Ethernet packets from the CPE will be able to be reassembled from AAL5, so no packets from the subscriber's device can be received by the IES.

The upstream policing feature can be enabled/disabled per PVC. No matter which ATM traffic class is used for the PVC's upstream traffic (CBR, VBR, or UBR), the IES will drop any upstream traffic that violates the specified ATM VC profile.

17.5 VC Profile Screen

To open this screen, click **Basic Setting** > **xDSL Profiles Setup** > **VC Profile**.

Figure 64 VC Profile



The following table describes the labels in this screen.

Table 27 VC Profile

LABEL	DESCRIPTION
xDSL Profile	Click **xDSL Profile** to configure port profiles and assign them to individual ports (see Section 17.1 on page 151).
Alarm Profile	Click **Alarm Profile** to open the **Alarm Profile** screen where you can configure limits that trigger an alarm when exceeded (see Section 17.6 on page 160)
IGMP Filter Profile	Click **IGMP Filter Profile** to open the **IGMP Filter Profile** screen where you can configure IGMP multicast filter profiles (see Section 20.7 on page 192).
Index	This is the number of the VC profile.
Name	This name identifies the VC profile.
Encap	This field displays the profile's type of encapsulation (**LLC** or **VC**).
AAL	This field displays the ATM adaptation layer used by the VC profile. **aal5** - The VC profile uses ATM adaptation layer 5.
Class	This field displays the type of ATM traffic class: **cbr** (constant bit rate), **vbr** (real-time variable bit rate), **nrt-vbr** (non-real time variable bit rate) or **ubr** (unspecified bit rate).
PCR	This is the Peak Cell Rate (PCR), the maximum number of cells that the sender can send per second.
CDVT	This field displays the accepted tolerance of the difference between a cell's transfer delay and the expected transfer delay.

Table 27 VC Profile (continued)

LABEL	DESCRIPTION
SCR	The Sustained Cell Rate (SCR) sets the average cell rate (long-term) in cells per second that can be transmitted. SCR applies with the **vbr** traffic class.
BT	Burst Tolerance (BT) is the maximum number of cells that the port is guaranteed to handle without any discards. BT applies with the **vbr** traffic class.
Select Modify	Select a VC profile's **Select** radio button and click **Modify** to edit the VC profile
Delete	Select a VC profile's **Select** radio button and click **Delete** to remove the VC profile
	The rest of the screen is for PVC configuration.
Name	When editing a profile, this is the name of this profile. When adding a profile, type a name for the profile. You can use up to 31 ASCII characters; spaces are not allowed.
Encap	Select the encapsulation type (**LLC** or **VC**) for this port.
Class	Select **CBR** (constant bit rate) to specify fixed (always-on) bandwidth for voice or data traffic. Select **UBR** (unspecified bit rate) for applications that are non-time sensitive, such as e-mail. Select **VBR** (real time variable bit rate) or **NRT-VBR** (non real time variable bit rate) for bursty traffic and bandwidth sharing with other applications.
PCR	The Peak Cell Rate (PCR) is the maximum rate at which the sender can send cells. PCR applies with all of the ATM traffic classes. You can type a number of (ATM) cells per second in the first field or type a number of kilobytes per second in the second field to have the system automatically compute the number of ATM cells per second.
CDVT	Cell Delay Variation Tolerance (CDVT) is the accepted tolerance of the difference between a cell's transfer delay and the expected transfer delay. CDVT applies with all of the ATM traffic classes. Type the CDVT here.
SCR	The Sustained Cell Rate (SCR) sets the average cell rate (long-term) that can be transmitted. Type the SCR, which must be less than the PCR. SCR applies with the **VBR** traffic classes. You can type a number of (ATM) cells per second in the first field or type a number of kilobytes per second in the second field to have the system automatically compute the number of ATM cells per second.
BT	Burst Tolerance (BT) sets a maximum number of cells that the port is guaranteed to handle without any discards. Type the BT here. BT applies with the **VBR** traffic classes.
Add	Click **Add** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

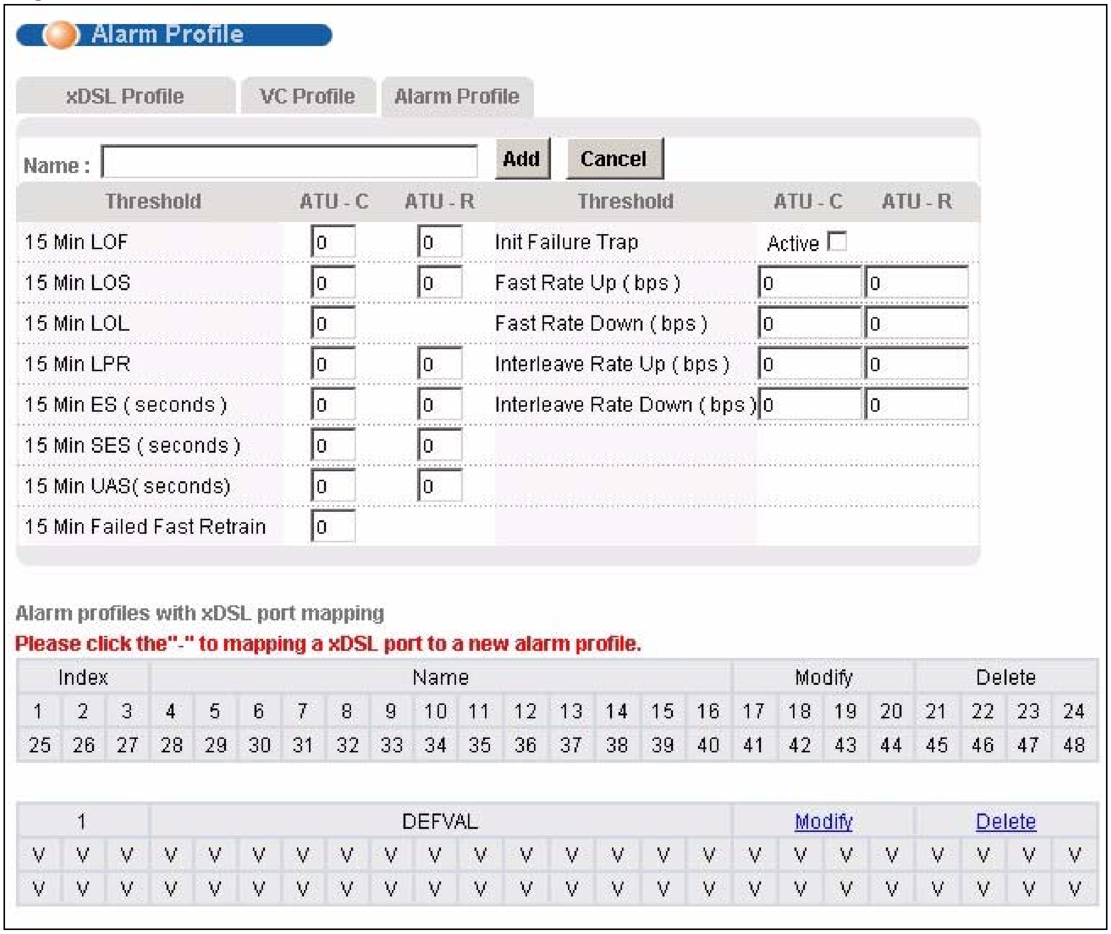
17.6 Alarm Profile Screen

Alarm profiles define ADSL port alarm thresholds. The IES sends an alarm trap and generates a syslog entry when the thresholds of the alarm profile are exceeded.

To open this screen, click **Basic Setting** > **xDSL Profiles Setup** > **Alarm Profile**.

Use the top part of the screen (with the **Add** and **Cancel** buttons) to add or edit alarm profiles. The rest of the screen displays the configured alarm profiles.

Figure 65 Alarm Profile



The following table describes the labels in this screen.

Table 28 Alarm Profile

LABEL	DESCRIPTION
xDSL Profile	Click **xDSL Profile** to open the **Port Profile** screen (see Section 17.1 on page 151). Use the **Port Profile** screen to configure profiles of ADSL port settings (such as the transfer rate, interleave delay and signal to noise ratio settings).
VC Profile	Click **VC Profile** to open the **VC Profile** screen where you can configure virtual channel profiles (see Section 17.5 on page 158).
Name	This field is read-only if you click **Modify** to edit a port profile. Type a name to identify the alarm profile (you cannot change the name of the DEFVAL profile). You can use up to 31 ASCII characters; spaces are not allowed.
Add	Click **Add** to save your changes to the IES’s volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
Threshold	Specify limits for the individual performance counters. The IES sends an alarm trap and generates a syslog entry when one of these thresholds is exceeded. A value of 0 disables the alarm threshold.
ATU-C	These fields are for traffic coming from the subscriber’s device to the IES.
ATU-R	These fields are for traffic going from the IES to the subscriber’s device.
15 Min LOF	This field sets the limit for the number of Loss Of Frame seconds that are permitted to occur within 15 minutes.
15 Min LOS	This field sets the limit for the number of Loss Of Signal seconds that are permitted to occur within 15 minutes.
15 Min LOL	This field sets limit for the number of Loss Of Link seconds that are permitted to occur within 15 minutes.
15 Min LPR	This field sets the limit for the number of Loss of Power (on the ATUR) seconds that are permitted to occur within 15 minutes.
15 Min ES (seconds)	This field sets the limit for the number of Errored Seconds that are permitted to occur within 15 minutes.
15 Min SES (seconds)	This field sets the limit for the number of Severely Errored seconds that are permitted to occur within 15 minutes.
15 Min UAS (seconds)	This field sets the limit for the number of UnAvailable seconds that are permitted to occur within 15 minutes.
15 Min Failed Fast Retrain	This field sets the limit for the number of failed fast retrains that are permitted within 15 minutes.
Init Failure Trap	Select **Active** to trigger an alarm for an initialization failure trap.
Fast Rate Up (bps)	Specify a rate in kilobits per second (kbps). If a fast mode connection’s upstream transmission rate increases by more than this number, then a trap is sent.
Fast Rate Down (bps)	Specify a rate in kilobits per second (kbps). If a fast mode connection’s downstream transmission rate decreases by more than this number, then a trap is sent.

Table 28 Alarm Profile (continued)

LABEL	DESCRIPTION
Interleave Rate Up (bps)	Specify a rate in kilobits per second (kbps). If an interleave mode connection’s upstream transmission rate increases by more than this number, then a trap is sent.
Interleave Rate Down (bps)	Specify a rate in kilobits per second (kbps). If an interleave mode connection’s upstream transmission rate decreases by more than this number, then a trap is sent.
Alarm profiles with xDSL port mapping	After you add an alarm profile, you can click a port number’s “-“ symbol to map the xDSL port to that alarm profile. The port’s “V” symbol in the alarm profile where it was previously mapped changes to “-“.
Modify	Click **Modify** to edit a profile.
Delete	Click **Delete** to remove a profile.

18

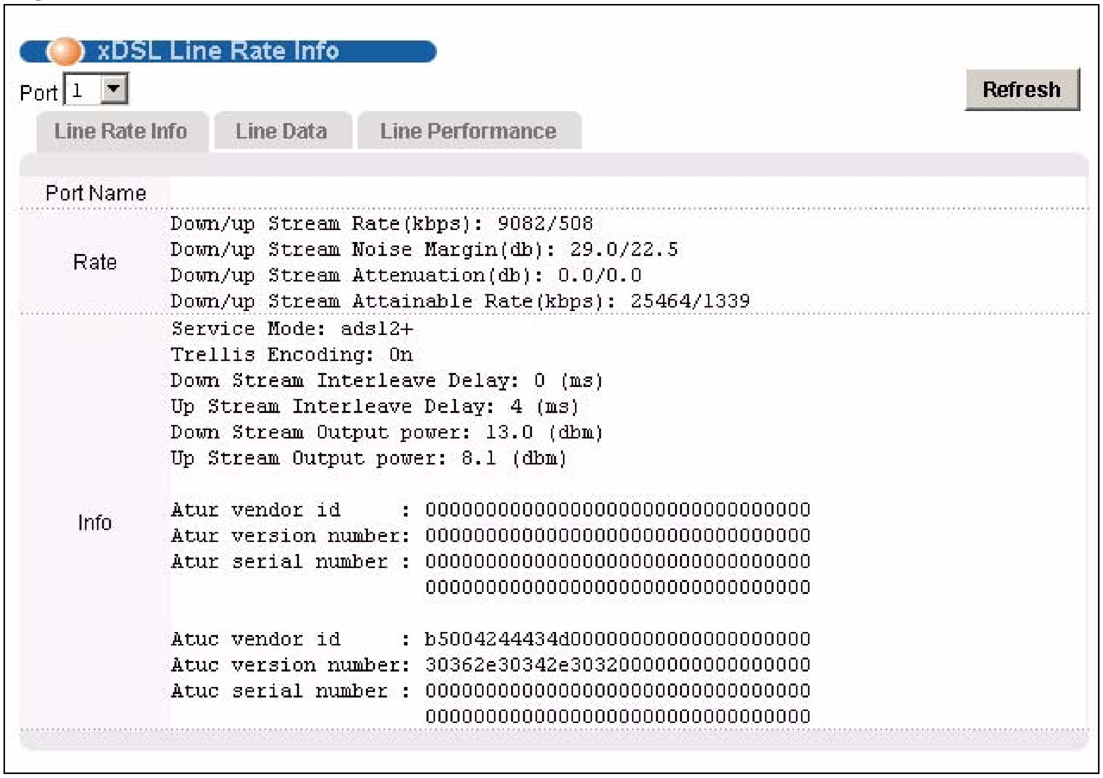
xDSL Line Data

18.1 xDSL Line Rate Info Screen

This screen displays an ADSL port’s line operating values. Information obtained prior to training to steady state transition will not be valid or will be old information.

To open this screen, click **Basic Setting** > **xDSL Line Data**.

Figure 66 xDSL Line Rate Info



The following table describes the labels in this screen.

Table 29 xDSL Line Rate Info

LABEL	DESCRIPTION
Line Performance	Click **Line Performance** to display an ADSL port's line performance counters (see Section 18.3 on page 167).
Line Data	Click **Line Data** to display an ADSL port's line bit allocation (see Section 18.2 on page 165).
Port	Use this drop-down list box to select a port for which you wish to view information.
Refresh	Click **Refresh** to display updated information.
Port Name	This section displays the name of the ADSL port.
	The rate fields display the transmission rates. "Line Down" indicates that the ADSL port is not connected to a subscriber.
Down/up Stream Rate	These are the rates (in Kbps) at which the port has been sending and receiving data.
Down/up Stream Noise Margin	These are the DSL line's downstream and upstream noise margins. Measured in decibels (dB).
Down/up Stream Attenuation	These are the reductions in amplitude of the downstream and upstream DSL signals. Measured in decibels (dB).
Down/up Stream Attainable Rate	These are the highest theoretically possible transfer rates (in Kbps) at which the port could send and receive data.
Service Mode	This field displays the ADSL standard that the port is using: G.dmt, or ANSI T1.413 issue 2.
Trellis Encoding	This field displays whether Trellis encoding is turned on or off. Trellis encoding helps to reduce the noise in ADSL transmissions. Trellis may reduce throughput but it makes the connection more stable.[A]
Down Stream Interleave Delay	This field displays the number of milliseconds of interleave delay for downstream transmissions.
Up Stream Interleave Delay	This field displays the number of milliseconds of interleave delay for upstream transmissions.
Down Stream Output Power	This field displays the amount of power that this port is using to transmit to the subscriber's ADSL modem or router. The total output power of the transceiver varies with the length and line quality. The farther away the subscriber's ADSL modem or router is or the more interference there is on the line, the more power is needed.

Table 29 xDSL Line Rate Info (continued)

LABEL	DESCRIPTION
Up Stream Output Power	This field displays the amount of power that the subscriber's ADSL modem or router is using to transmit to this port. The total output power of the transceiver varies with the length and line quality. The farther away the subscriber's ADSL modem or router is or the more interference there is on the line, the more power is needed.
Info Atur Info Atuc	The **Info Atur** fields show data acquired from the ATUR (ADSL Termination Unit – Remote), in this case the subscriber's ADSL modem or router, during negotiation/provisioning message interchanges. This information can help in identifying the subscriber's ADSL modem or router. The **Info Atuc** fields show data acquired from the ATUC (ADSL Termination Unit – Central), in this case IES, during negotiation/provisioning message interchanges. The vendor ID, vendor version number and product serial number are obtained from vendor ID fields (see ITU-T G.994.1) or R-MSGS1 (see T1.413).

A. At the time of writing, the IES always uses Trellis coding.

18.2 xDSL Line Data Screen

This screen displays an ADSL port's line bit allocation.

Discrete Multi-Tone (DMT) modulation divides up a line's bandwidth into tones. This screen displays the number of bits transmitted for each tone. This can be used to determine the quality of the connection, 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. See the ITU-T G.992.1 recommendation for more information on DMT.

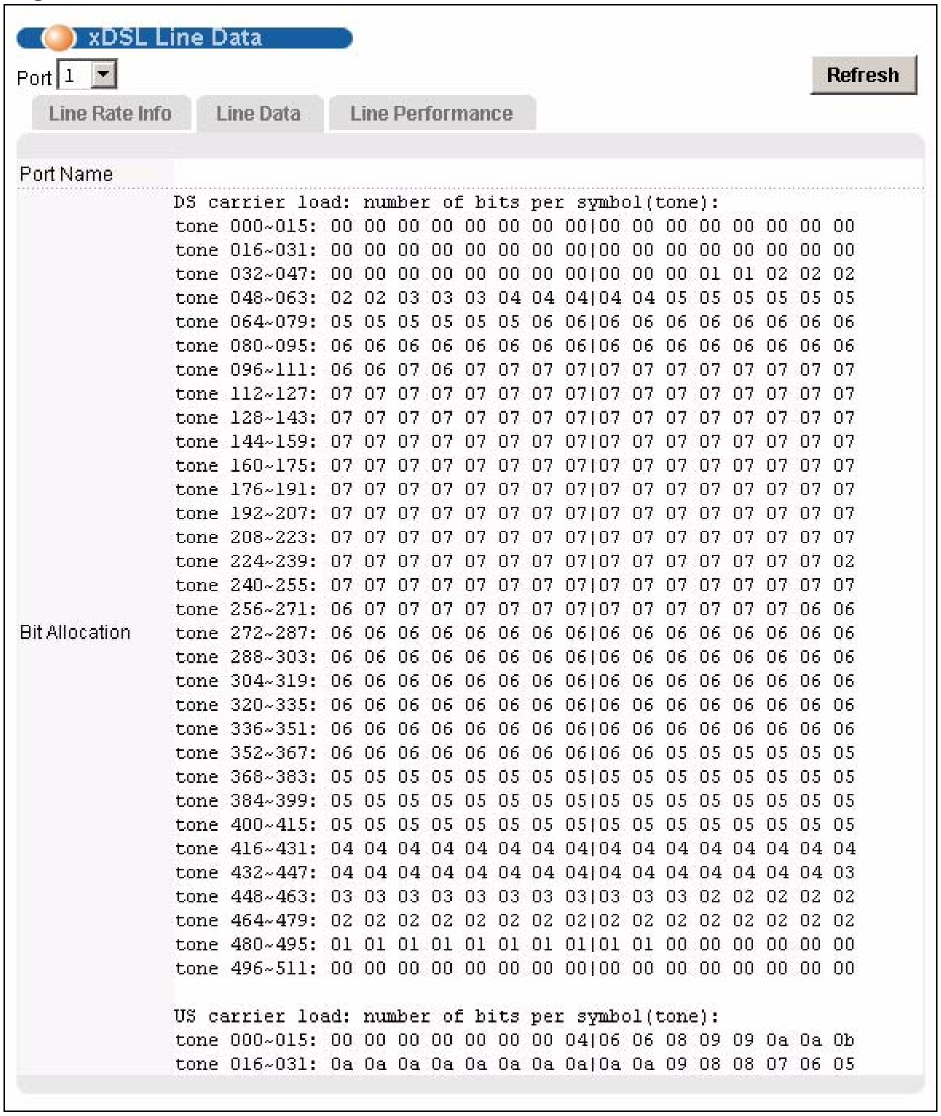
The better (or shorter) the line, the higher the number of bits transmitted for a DMT tone. The maximum number of bits that can be transmitted per DMT tone is 15.

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

To open this screen, click **Basic Setting** > **xDSL Line Data** > **Line Data**.

In the screen shown, the downstream channel is carried on tones 48 to 255 and the upstream channel is carried on tones 16 to 31 (space is left between the channels to avoid interference).

Figure 67 xDSL Line Data



The following table describes the labels in this screen.

Table 30 xDSL Line Data

LABEL	DESCRIPTION
Line Rate	Click **Line Rate** to display an ADSL port's line operating values (see Section 18.1 on page 163).
Line Performance	Click **Line Performance** to display an ADSL port's line performance counters (see Section 18.3 on page 167).
Port	Use this drop-down list box to select a port for which you wish to view information.
Refresh	Click **Refresh** to display updated information.

Table 30 xDSL Line Data (continued)

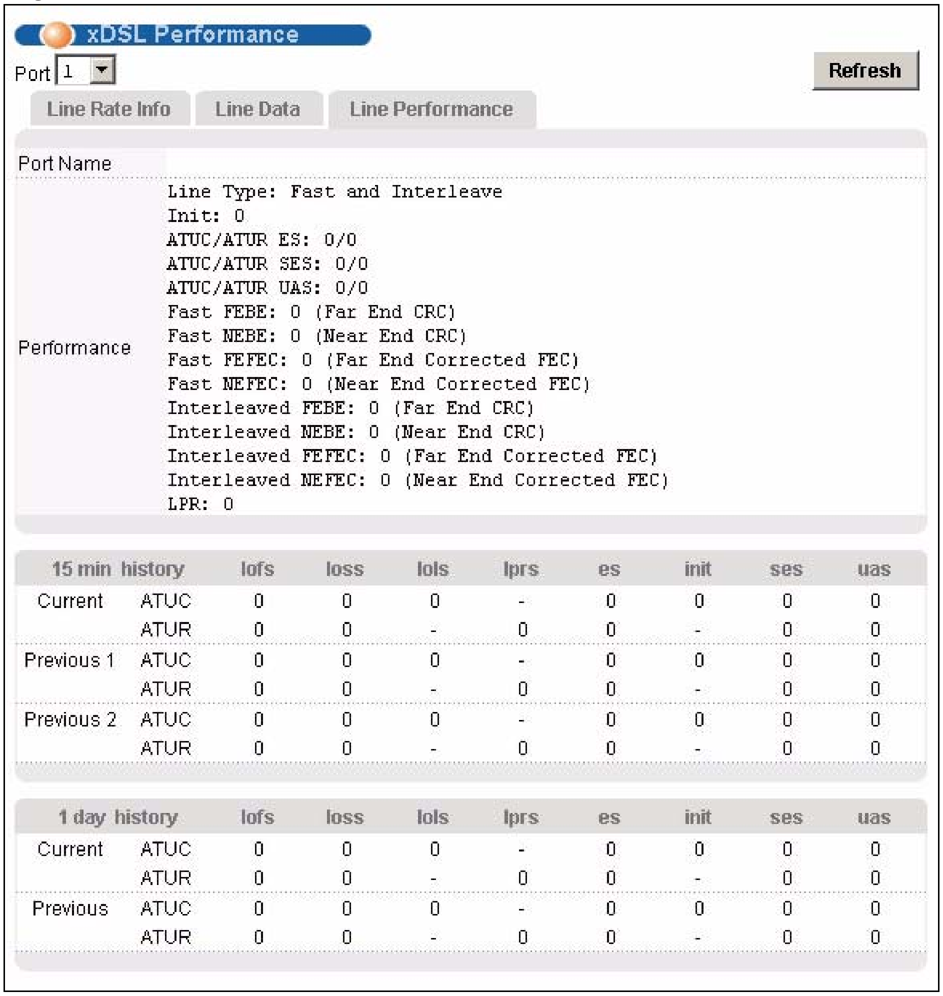
LABEL	DESCRIPTION
Port Name	This section displays the name of the ADSL port.
Bit Allocation	“DS carrier load” displays the number of bits transmitted per DMT tone for the downstream channel (from the IES to the subscriber’s DSL modem or router). “US carrier load” displays the number of bits received per DMT tone for the upstream channel (from the subscriber’s DSL modem or router to the IES).

18.3 xDSL Performance Screen

These counters display line performance data that has been accumulated since the system started. The definitions of near end/far end are always relative to the ATU-C (ADSL Termination Unit-Central Office). ATU-C refers to downstream traffic from the IES. ATU-R (ADSL Termination Unit-Remote) refers to upstream traffic from the subscriber.

To open this screen, click **Basic Setting** > **xDSL Line Data** > **Line Performance**.

Figure 68 xDSL Performance



The following table describes the labels in this screen.

Table 31 xDSL Performance

LABEL	DESCRIPTION
Line Rate	Click **Line Rate** to display an ADSL port's line operating values (see Section 18.1 on page 163).
Line Data	Click **Line Data** to display an ADSL port's line bit allocation (see Section 18.2 on page 165).
Port	Use this drop-down list box to select a port for which you wish to view information.
Refresh	Click **Refresh** to display updated information.
Port Name	This section displays the name of the ADSL port.
Performance (since last linkup)	

Table 31 xDSL Performance (continued)

LABEL	DESCRIPTION
Line Type	“Fast” stands for non-interleaved (fast mode) and “Interleaved” stands for interleaved mode.
Init	This field displays the number of link-ups and link-downs.
ATUC/ATUR ES	The Number of Errored Seconds transmitted (downstream) or received (upstream) on this ADSL port.
ATUC/ATUR SES	The Number of Severely Errored Seconds transmitted (downstream) or received (upstream) on this ADSL port. Severely errored seconds contained 30% or more errored blocks or at least one defect. This is a subset of the **Down/Up Stream ES**.
ATUC/ATUR UAS	The downstream or upstream number of UnAvailable Seconds.
Fast FEBE	In fast mode, the number of Far End Block Errors (Far End Cyclic Redundancy Checks).
Fast NEBE	In fast mode, the number of Near End Block Errors (Near End Cyclic Redundancy Checks).
Fast FEFEC	In fast mode, the Far End number of ADSL frames repaired by Forward Error Correction.
Fast NEFEC	In fast mode, the Near End number of ADSL frames repaired by Forward Error Correction.
Interleaved FEBE	In interleaved mode, the number of Far End Block Errors (Far End Cyclic Redundancy Checks).
Interleaved NEBE	In interleaved mode, the number of Near End Block Errors (Near End Cyclic Redundancy Checks).
Interleaved FEFEC	In interleaved mode, the Far End number of ADSL frames repaired by Forward Error Correction.
Interleaved NEFEC	In interleaved mode, the Near End number of ADSL frames repaired by Forward Error Correction.
LPR	This is the number of times that the subscriber’s ADSL device has experienced a Loss of Power (been off).
15 min, 1day history	This section of the screen displays line performance statistics for the current and previous 15-minute periods, as well as for the current and previous 24 hours.
`lofs`	The number of Loss Of Frame Seconds that have occurred within the period.
`loss`	The number of Loss Of Signal Seconds that have occurred within the period.
`lols`	The number of Loss Of Link Seconds that have occurred within the period.
`lprs`	The number of Loss of Power Seconds that have occurred within the period.
`es`	The number of Errored Seconds that have occurred within the period.
`init`	The number of successful initializations that have occurred within the period.

Table 31 xDSL Performance (continued)

LABEL	DESCRIPTION
ses	The number of Severely Errored Seconds that have occurred within the period.
uas	The number of UnAvailable Seconds that have occurred within the period.

18.4 G.Bond Screen

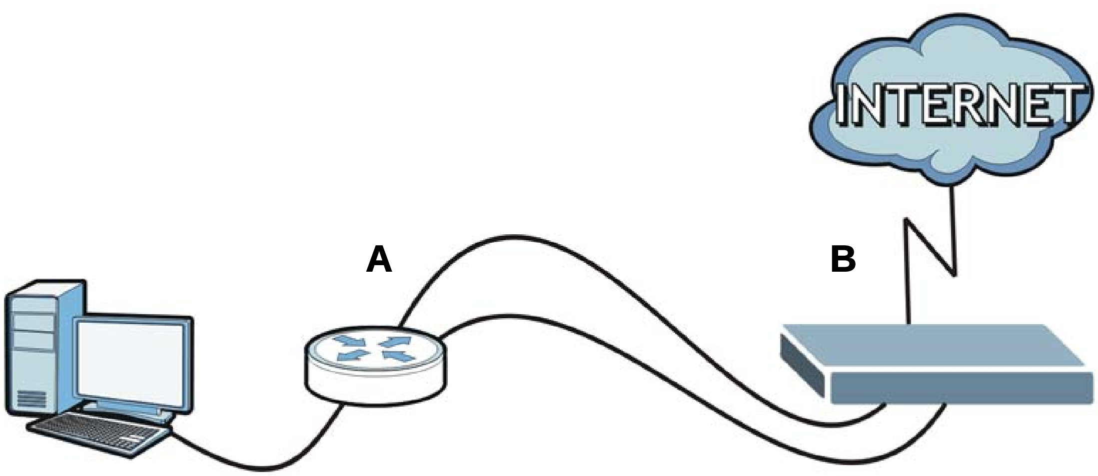
G.bond (also known as port bonding) allows subscribers to connect to an ISP using data streams spread over multiple DSL lines. The total available bandwidth for the subscriber then becomes the sum of the bandwidth available for each of the subscriber's line connections. As well as extra bandwidth, additional DSL lines also provide backup support.

The system only supports ADSL port bonding using ZyXEL's P-663H-51. See the User's Guide of this CPE device for information on its port bonding specifications.

The next figure shows a subscriber using port bonding on two DSL lines between a P-663H-51 (**A**) (using a Y-connector) and the IES (**B**) to connect to the Internet.

Note: Bonded ports must be adjacent. For example, ports 1 and 2 or ports 3 and 4.

Figure 69 ADSL Pair Bonding Example



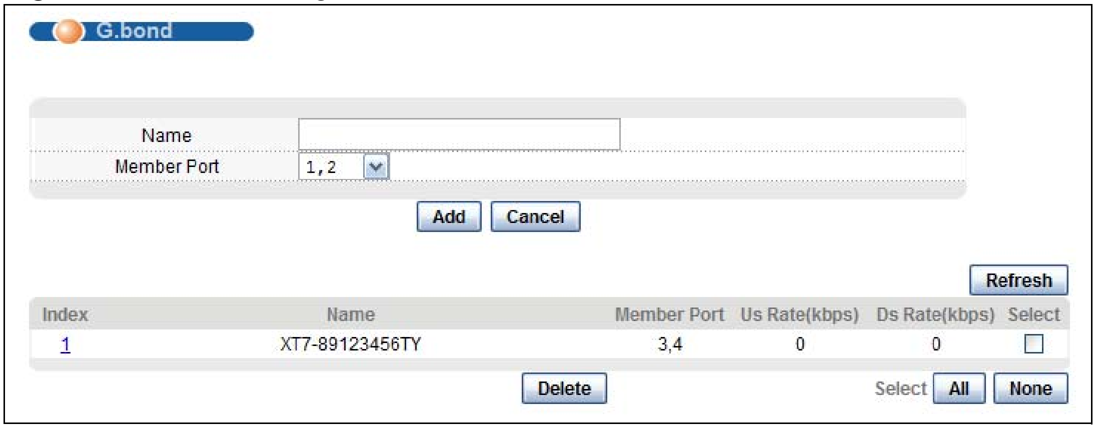
The following shows how to use the G.bond Setup screen to configure port bonding settings:

1 Click **Basic Setting > G.bond** to open the **G.bond** screen.

2 To create a new paired group, enter a **Name** then select a pair bond from the **Member Port** list and click **Add**. The new pair bond is added to the list below.

3 To edit an existing group, select its **Index** number from the list. You can change the pair bond by selecting a new pair from the **Member Port** list. Click **Modify** to save your changes.

Figure 70 Basic Setting > G.bond



The following table describes the labels in this screen.

Table 32 VoIP > G.bond

LABEL	DESCRIPTION
Name	Enter a descriptive name for a group of DSL lines.
Member Port	Select a pair of ports to bond from this menu.
Add	Click the **Add** button to save your changes to the list below as a new pair bond. Clicking **Add** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring this section of the screen again.
Index	This field indicates the item's position on the list. It has no actual bearing on the pair bond in question. Click the **Index** number to load the pair bond port numbers into the **Member Port** list for editing. To save any changes, click the **Modify** button that appears in place of the **Apply** button.
Name	This field displays the descriptive name that you associated with the pair bond.
Member Ports	This field indicates which ports are pair bonded.

Table 32 VoIP > G.bond

LABEL	DESCRIPTION
Us Rate (kbps)	This field indicates the upstream data rate in kilobits per second for the pair bonded ports.
Ds Rate (kbps)	This field indicates the downstream data rate in kilobits per second for the pair bonded ports.
Select	Use these check boxes in this column to select items you want to delete.
Delete	Click this button to delete any items in the listed that have been selected.
All	Click this button to select all the items in the list.
None	Click this button to deselect any currently selected items in the list.

PART III
Advanced Application

19

VLAN

This chapter shows you how to configure IEEE 802.1Q tagged VLANs.

19.1 Introduction to VLANs

A VLAN (Virtual Local Area Network) allows a physical network to be partitioned into multiple logical networks. Devices on a logical network belong to one group. A device can belong to more than one group. With VLAN, a device cannot directly talk to or hear from devices that are not in the same group(s); the traffic must first go through a router.

In MTU (Multi-Tenant Unit) applications, VLAN is vital in providing isolation and security among the subscribers. When properly configured, VLAN prevents one subscriber from accessing the network resources of another on the same LAN, thus a user will not see the printers and hard disks of another user in the same building.

VLAN also 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. With VLAN, all broadcasts are confined to a specific broadcast domain.

Note that a VLAN is unidirectional, it only governs outgoing traffic.

19.2 Introduction to IEEE 802.1Q Tagged VLAN

Tagged VLAN uses an explicit tag (VLAN ID) in the MAC header to identify the VLAN membership of a frame across bridges - they are not confined to the device on which they were created. The VLANs can be created statically by hand or configured dynamically using GVRP.[1] The VLAN ID associates a frame with a specific VLAN and provides the information that devices need to process the frame

1. GVRP (GARP VLAN Registration Protocol) defines a way for switches to automatically configure switches in a VLAN network.

across the network. A tagged frame is four bytes longer than an untagged frame and contains two bytes of TPID (Tag Protocol Identifier, residing within the type/length field of the Ethernet frame) and two bytes of TCI (Tag Control Information, starts after the source address field of the Ethernet frame).

The CFI (Canonical Format Indicator) is a single-bit flag, always set to zero for Ethernet switches. If a frame received at an Ethernet port has a CFI set to 1, then that frame should not be forwarded as it is to an untagged port. The remaining twelve bits define the VLAN ID, giving a possible maximum number of 4,096 (212) VLANs. Note that user priority and VLAN ID are independent of each other. A frame with VID (VLAN Identifier) of null (0) is called a priority frame, meaning that only the priority level is significant and the default VID of the ingress port is given as the VID of the frame. Of the 4096 possible VIDs, a VID of 0 is used to identify priority frames and value 4095 (FFF) is reserved, so the maximum possible VLAN configurations are 4,094.

TPID 2 Bytes	User Priority 3 Bits	CFI 1 Bit	VLAN ID 12 bits

The IES handles up to 4094 VLANs (VIDs 1-4094). The device accepts incoming frames with VIDs 1-4094.

19.2.1 Forwarding Tagged and Untagged Frames

Each port on the device is capable of passing tagged or untagged frames. To forward a frame from an 802.1Q VLAN-aware switch to an 802.1Q VLAN-unaware switch, the IES first decides where to forward the frame and then strips off the VLAN tag. To forward a frame from an 802.1Q VLAN-unaware switch to an 802.1Q VLAN-aware switch, the IES first decides where to forward the frame, and then inserts a VLAN tag reflecting the ingress port's default VID. The default PVID is VLAN 1 for all ports, but this can be changed.

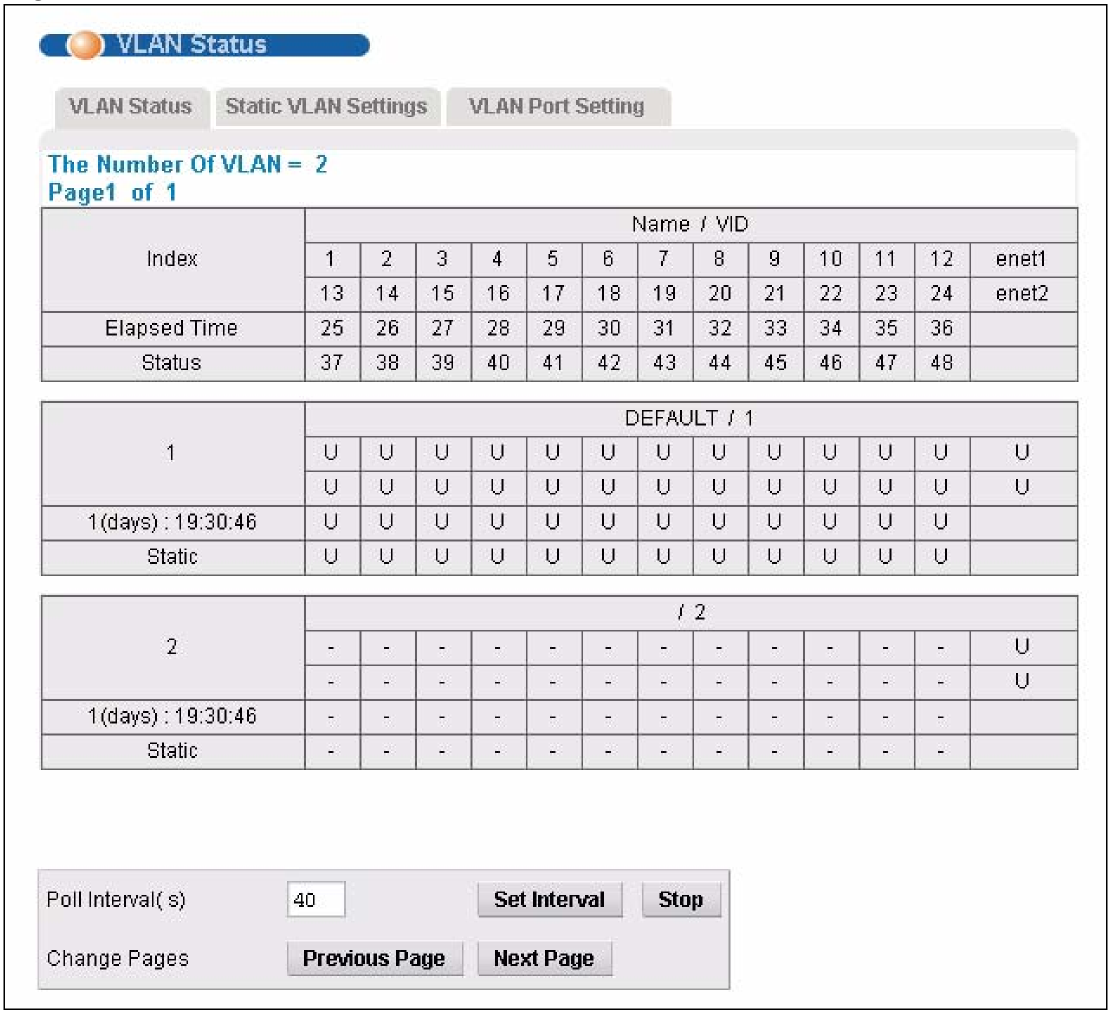
The egress (outgoing) port(s) of a frame is determined on the combination of the destination MAC address and the VID of the frame. For a unicast frame, the egress port (based on the destination MAC address) must be a member of the VID, also; otherwise, the frame is blocked. For a broadcast frame, it is duplicated only on ports (except the ingress port itself) that are members of the VID, thus confining the broadcast to a specific domain.

Whether to tag an outgoing frame depends on the setting of the egress port on a per-VLAN, per-port basis (recall that a port can belong to multiple VLANs). If the tagging on the egress port is enabled for the VID of a frame, then the frame is transmitted as a tagged frame; otherwise, it is transmitted as an untagged frame.

19.3 VLAN Status Screen

To open this screen, click **Advanced Application > VLAN**.

Figure 71 VLAN Status



The following table describes the labels in this screen.

Table 33 VLAN Status

LABEL	DESCRIPTION
Static VLAN Setting	Click **Static VLAN Setting** to configure ports to dynamically join a VLAN group or permanently assign ports to a VLAN group or prohibit ports from joining a VLAN group (see Section 19.4 on page 179).
VLAN Port Setting	Click **VLAN Port Setting** to specify Port VLAN IDs (PVIDs). See Section 19.5 on page 181.
The Number of VLAN	This is the number of VLANs configured on the IES.
Page X of Y	This identifies which page of VLAN status information is displayed and how many total pages of VLAN status information there are.

Table 33 VLAN Status (continued)

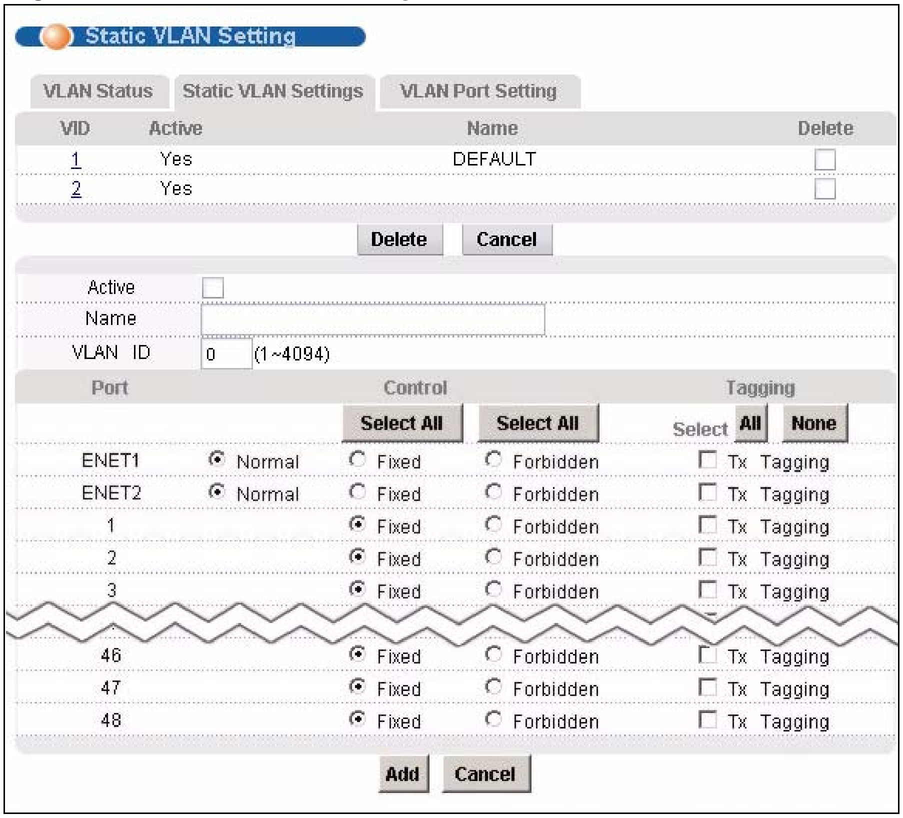
LABEL	DESCRIPTION
	The first table displays the names of the fields. The subsequent tables show the settings of the VLANs.
Index	This is the VLAN index number.
Name / VID	The name identifies an individual VLAN. The vid is the PVID, the Port VLAN ID assigned to untagged frames or priority-tagged frames received on this port.
1~48, enet1, enet2	These columns display the VLAN's settings for each port. A tagged port is marked as **T**, an untagged port is marked as **U** and ports not participating in a VLAN are marked as "**–**".
Elapsed Time	This field shows how long it has been since a normal VLAN was registered or a static VLAN was set up.
Status	This field shows that this VLAN was added to the IES statically, that is, added as a permanent entry.
Poll Interval(s) Set Interval	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to halt polling statistics.
Previous Page Next Page	Click one of these buttons to show the preceding/following screen if the information cannot be displayed in one screen.

19.4 Static VLAN Setting Screen

You can assign a port to be a member of a VLAN group or prohibit a port from joining a VLAN group in this screen. This is an IEEE 802.1Q VLAN.

To open this screen, click **Advanced Application > VLAN** > **Static VLAN Setting**.

Figure 72 Static VLAN Setting



The following table describes the labels in this screen.

Table 34 Static VLAN Setting

LABEL	DESCRIPTION
VID	This field displays the ID number of the VLAN group. Click the number to edit the VLAN settings.
Active	This field indicates whether the VLAN settings are enabled (**Yes**) or disabled (**No**).
Name	This field displays the descriptive name for this VLAN group.
Delete	Select the check boxes of the rule(s) that you want to remove in the **Delete** column and then click the **Delete** button. You cannot delete a VLAN if any PVIDs are set to use the VLAN or the VLAN is the CPU (management) VLAN.
Cancel	Click **Cancel** to clear the **Delete** check boxes.

Table 34 Static VLAN Setting (continued)

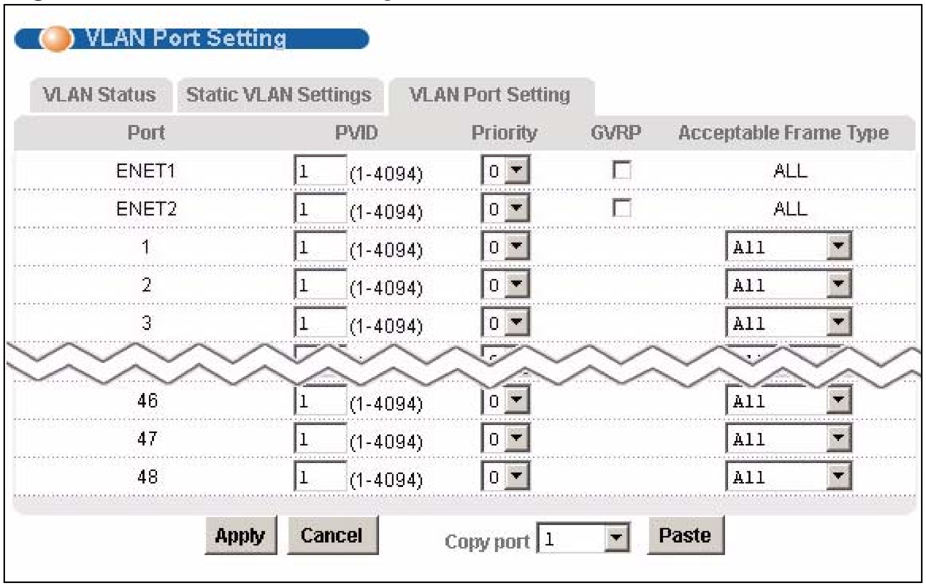
LABEL	DESCRIPTION
Active	Select this check box to enable the VLAN. You cannot disable a VLAN if any PVIDs are set to use the VLAN or the VLAN is the CPU (management) VLAN.
Name	Enter a descriptive name for this VLAN group for identification purposes. Spaces are not allowed.
VLAN ID	Enter the VLAN ID for this static VLAN entry; the valid range is between 1 and 4094.
Port	The port numbers identify the IES's ports.
Control	Select **Fixed** for the port to be a permanent member of this VLAN group. Use the **Select All** button to include every port. Select **Forbidden** if you want to prohibit the port from joining this VLAN group. Use the **Select All** button to include every port.
Tagging	Select **TX Tagging** if you want the port to tag all outgoing frames transmitted with this VLAN ID. Use the **All** button to include every port. Use the **None** button to clear all of the ports check boxes.
Add	Click **Add** to save your settings. The VLAN then displays in the summary table at the top of the screen. Clicking **Add** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields afresh.

19.5 VLAN Port Setting Screen

Use this screen to specify port VLAN IDs and to set whether or not Ethernet ports propagate VLAN information to other devices.

To open this screen, click **Advanced Application > VLAN** > **VLAN Port Setting**.

Figure 73 VLAN Port Setting

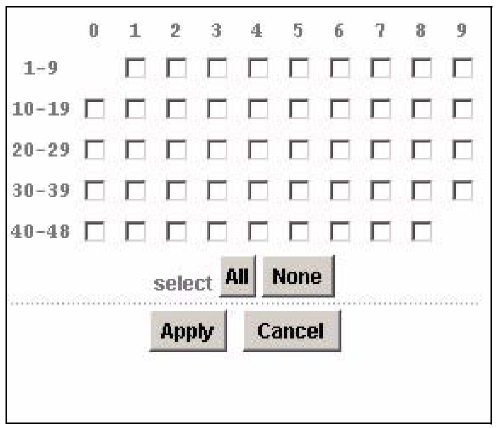


The following table describes the labels in this screen.

Table 35 VLAN Port Setting

LABEL	DESCRIPTION
Port	The port numbers identify the IES's ports.
PVID	Type the Port VLAN ID (PVID) from 1 to 4094. The IES assigns the PVID to untagged frames or priority frames (0 VID) received on this port.
Priority	Select an IEEE 802.1p priority to assign to untagged frames or priority frames (0 VID) received on this port.
GVRP	Select this check box if the IES should use GVRP to automatically register and configure VLAN membership.
Acceptable Frame Type	Select **All** to have the port accept both tagged and untagged incoming frames. [A] Select **Tag Only** to have the port only accept incoming frames that have a VLAN tag.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.

Table 35 VLAN Port Setting (continued)

LABEL	DESCRIPTION
Cancel	Click **Cancel** to begin configuring this screen afresh.
Copy port Paste	Do the following to copy settings from one port to another port or ports. 1. Select the number of the port from which you want to copy settings. 2. Click **Paste** and the following screen appears. 3. Select to which ports you want to copy the settings. Use **All** to select every port. Use **None** to clear all of the check boxes. 4. Click **Apply** to paste the settings. **Figure 74** Select Ports 

A. At the time of writing, the **VLAN Acceptable Frame Type** field is read-only for the Ethernet ports. The IES accepts both tagged and untagged incoming frames on the Ethernet ports.

20

IGMP

This chapter describes the **IGMP** screens.

20.1 IGMP

Traditionally, IP packets are transmitted in one of either two ways - Unicast (1 sender 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 network-layer protocol used to establish membership in a multicast group - it is not used to carry user data. See RFC 1112, RFC 2236, and RFC 3376 for information on IGMP versions 1, 2, and 3, respectively.

20.2 IP Multicast Addresses

In IPv4, a multicast address allows a device to send packets to a specific group of hosts (multicast group) in a different sub-network. A multicast IP address represents a traffic receiving group, not individual receiving devices. IP addresses in the Class D range (224.0.0.0 to 239.255.255.255) are used for IP multicasting. Certain IP multicast numbers are reserved by IANA for special purposes (see the IANA web site for more information).

20.2.1 IGMP Snooping

A layer-2 switch can passively snoop on IGMP Query, Report and Leave (IGMP version 2 or 3) packets transferred between IP multicast routers/switches and IP multicast hosts to learn the IP multicast group membership. It checks IGMP packets passing through it, picks out the group registration information, and configures multicasting accordingly. IGMP snooping allows the IES to learn multicast groups without you having to manually configure them.

The IES forwards multicast traffic destined for multicast groups (that it has learned from IGMP snooping or that you have manually configured) to ports that are members of that group. The IES discards multicast traffic destined for multicast groups that it does not know. IGMP snooping generates no additional network traffic, allowing you to significantly reduce multicast traffic passing through your device.

20.2.2 IGMP Proxy

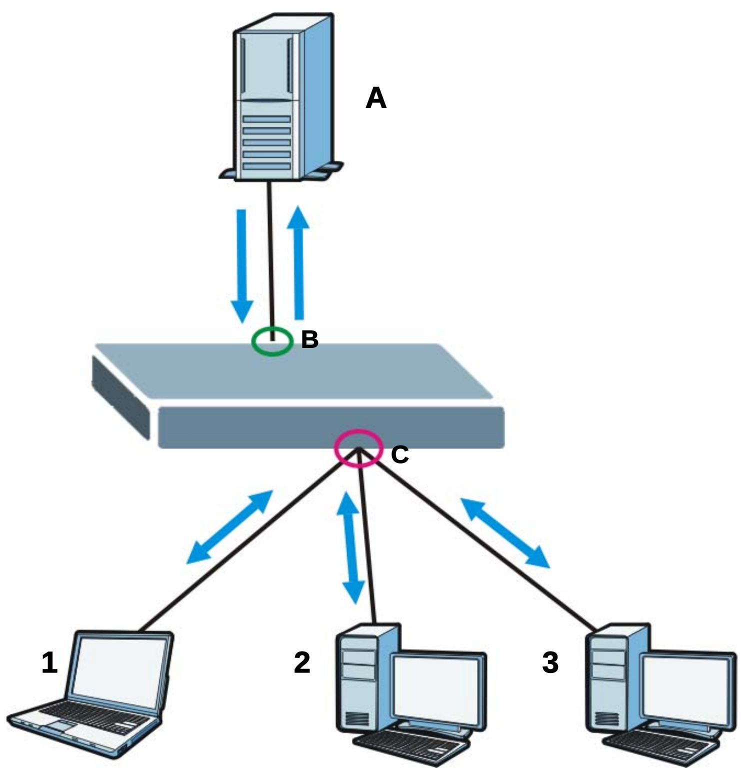
IGMP Proxy is a feature in the IES that allows for the reduction of multicast traffic from an ‘upstream’ multicast server to ‘downstream’ host devices.

In IGMP proxy, an upstream interface is the port that is closer to the source (or the multicast server) and is able to receive multicast traffic. A downstream interface is a port that connects to a host (such as a computer).

The following figure shows a network example where **A** is the multicast server while the computers labled **1**, **2** and **3** are the receiving hosts. In the figure, **A** is connected to the upstream interface (**B**) and 1, 2 and 3 are connected to the downstream interface (**C**).

Note: In daisychain mode, Ethernet interface 1 is set as the upstream interface and Ethernet interface 2 and the DSL ports are set as downstream interfaces.

Figure 75 IGMP Proxy Message Flow Example



The IES functions as a middle manager. The communication sequence is:

1 Host **1** joins a multicast and the IES sends a message upstream letting the multicast server know.

2 The multicast server sends traffic to the IES.

3 The IES manages all Join and Leave requests from Hosts 1, 2, and 3 downstream.

4 When the last leave request is received, the IES sends a Leave request upstream to the multicast server to discontinue the traffic.

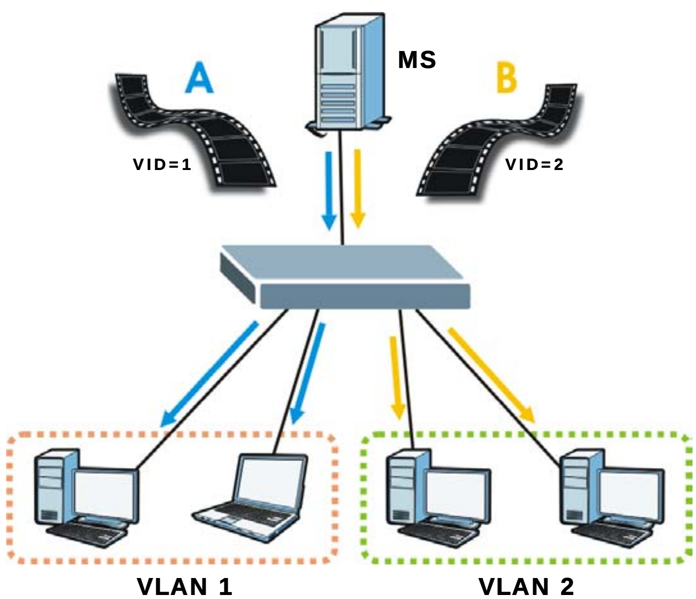
By managing multicast queries in this manner, the IES can present itself as a single recipient to the multicast server. All downstream host traffic is contained at the IES layer, thus freeing the multicast server for other tasks.

20.2.2.1 VLAN Queries and IGMP Proxy

If you are using IGMP Proxy, you can use VLAN ID queries to direct multicast traffic to specific downstream hosts. This allows you to limit which hosts receive a multicast stream by directing a multicast stream to a specific VLAN group

For example, in the figure below the multicast server (**MS**) tags stream **A** with VID= 1; that stream then only goes to the hosts in VLAN 1. Stream **B** is tagged with VID 2 and so that stream only goes to the hosts in VLAN 2. This keeps the multicast traffic segrated from the hosts that do not want it, thus reducing their bandwidth overhead.

Figure 76 Example of Using Multicast with VLAN ID Queries



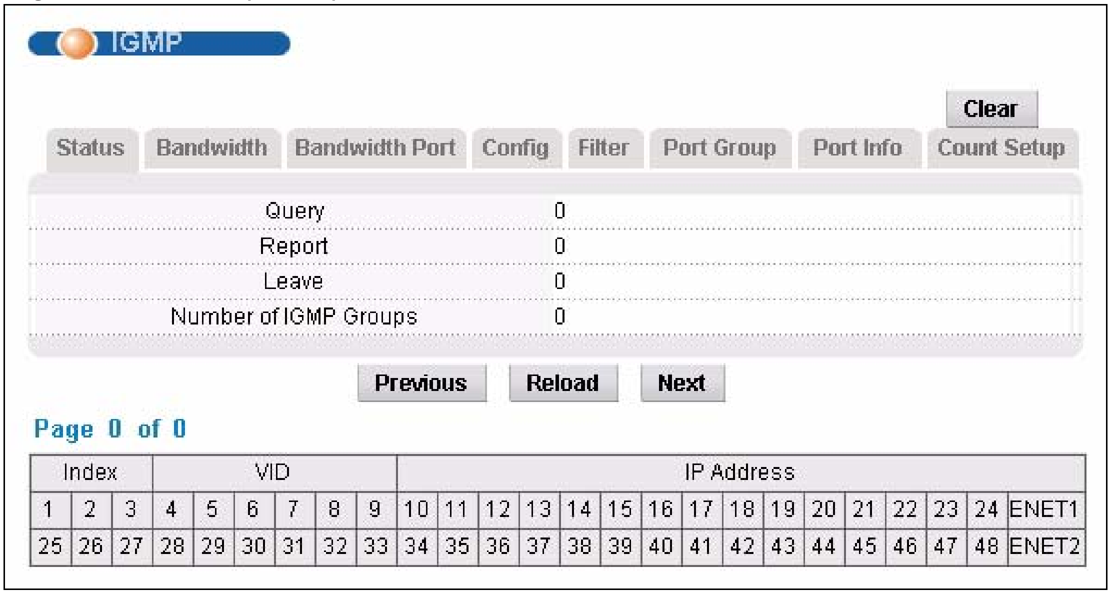
See Section 20.6 on page 191 for details on configuring VLAN queries with IGMP.

20.3 IGMP Status Screen

Use this screen to view current IGMP information.

To open this screen, click **Advanced Application > IGMP**.

Figure 77 IGMP (Status)



The following table describes the labels in this screen.

Table 36 IGMP (Status)

LABEL	DESCRIPTION
Bandwidth	Click **Bandwidth** to open the **IGMP Bandwidth** screen where you can set up bandwidth requirements for multicast channels (see Section 20.4 on page 188).
Bandwidth Port	Click **Bandwidth Port** to open the **Bandwidth Port Setup** screen where you can set up multicast bandwidth requirements for selected ports (see Section 20.5 on page 189).
Config	Click **Config** to open the **Config** screen where you can configure IGMP settings (see Section 20.6 on page 191).
Filter	Click **Filter** to open the **IGMP Filter Profile** screen where you can configure IGMP multicast filter profiles (see Section 20.7 on page 192).
Port Group	Click **Port Group** to open the **IGMP Port Group** screen where you can look at the current list of multicast groups each port has joined (see Section 20.10 on page 197).
Port Info	Click **Port Info** to open the **IGMP Port Info** screen where you can look at the current number of IGMP-related packets received on each port (see Section 20.9 on page 196).

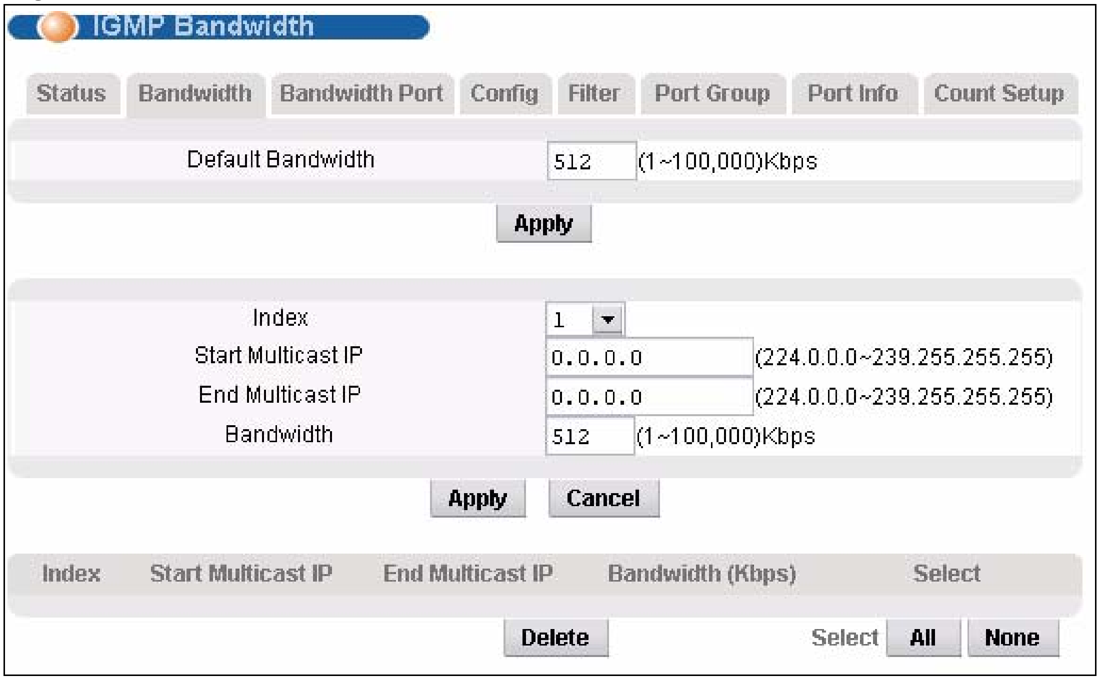
Table 36 IGMP (Status) (continued)

LABEL	DESCRIPTION
Count Setup	Click **Count Setup** to open the **IGMP Count** screen where you can limit the number of IGMP groups a subscriber on a port can join (see Section 20.8 on page 194).
Clear	Click **Clear** to delete the information the IES has learned about multicast groups. This resets every counter in this screen.
Query	This is the total number of Query packets received.
Report	This is the total number of Report packets received.
Leave	This is the total number of Leave packets received.
Number of IGMP Groups	This is how many IGMP groups the IES has identified on the local network.
Previous Next	Click one of these buttons to show the previous/next screen if all of the information cannot be seen in one screen.
Reload	Click this button to refresh the screen.
Page X of X	This identifies which page of information is displayed and the total number of pages of information.
	The first table displays the names of the fields. The subsequent tables show the settings of the IGMP groups.
Index	This is the IGMP group index number.
VID	The VID is the VLAN ID on which the IGMP group is created.
IP Address	This is the IP address of an IGMP multicast group member.
1~48, enet1, enet2	These columns display the ports that are members of the IGMP snooping group.

20.4 IGMP Bandwidth Screen

Use this screen to set up bandwidth requirements for multicast channels. To open this screen, click **Advanced Application > IGMP** > **Bandwidth**.

Figure 78 IGMP Bandwidth



The following table describes the labels in this screen.

Table 37 IGMP Bandwidth

LABEL	DESCRIPTION
Default Bandwidth	Enter the default bandwidth for multicast channels for which you have not configured bandwidth requirements.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Index	Select a unique number for this setting. If you select a number that is already used, the new setting overwrites the old one when you click **Apply**.
Start Multicast IP	Enter the beginning of the multicast range.
End Multicast IP	Enter the end of the multicast range. For one multicast address, enter the start of the multicast range again.
Bandwidth	Enter the bandwidth requirement for the specified multicast range.

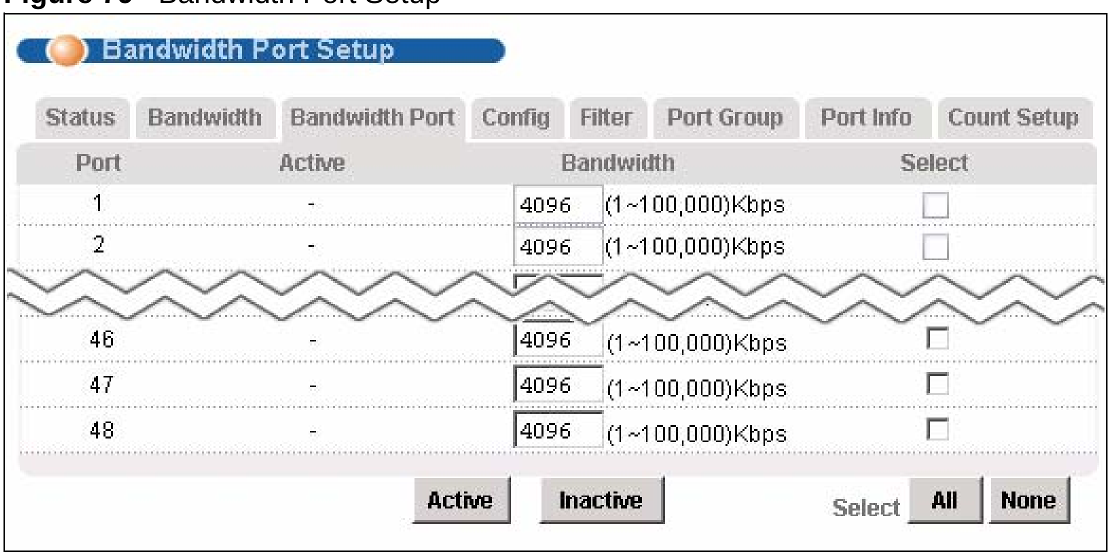
Table 37 IGMP Bandwidth (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save the filter settings. The settings then display in the summary table at the bottom of the screen. Clicking **Apply** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields afresh.
	This table shows the multicast range settings.
Index	This field displays the number that identifies this setting.
Start Multicast IP	This field displays the beginning of the multicast range.
End Multicast IP	This field displays the end of the multicast range.
Bandwidth	This field displays the allowed bandwidth for the specified multicast range.
Select	Select this, and click **Delete** to remove the setting.
Delete	Click this to remove the selected settings.
Select All	Click this to select all entries in the table.
Select None	Click this to un-select all entries in the table.

20.5 Bandwidth Port Setup Screen

Use this screen to set up multicast bandwidth requirements for specific ports. To open this screen, click **Advanced Application > IGMP** > **Bandwidth Port**.

Figure 79 Bandwidth Port Setup



The following table describes the labels in this screen.

Table 38 Bandwidth Port Setup

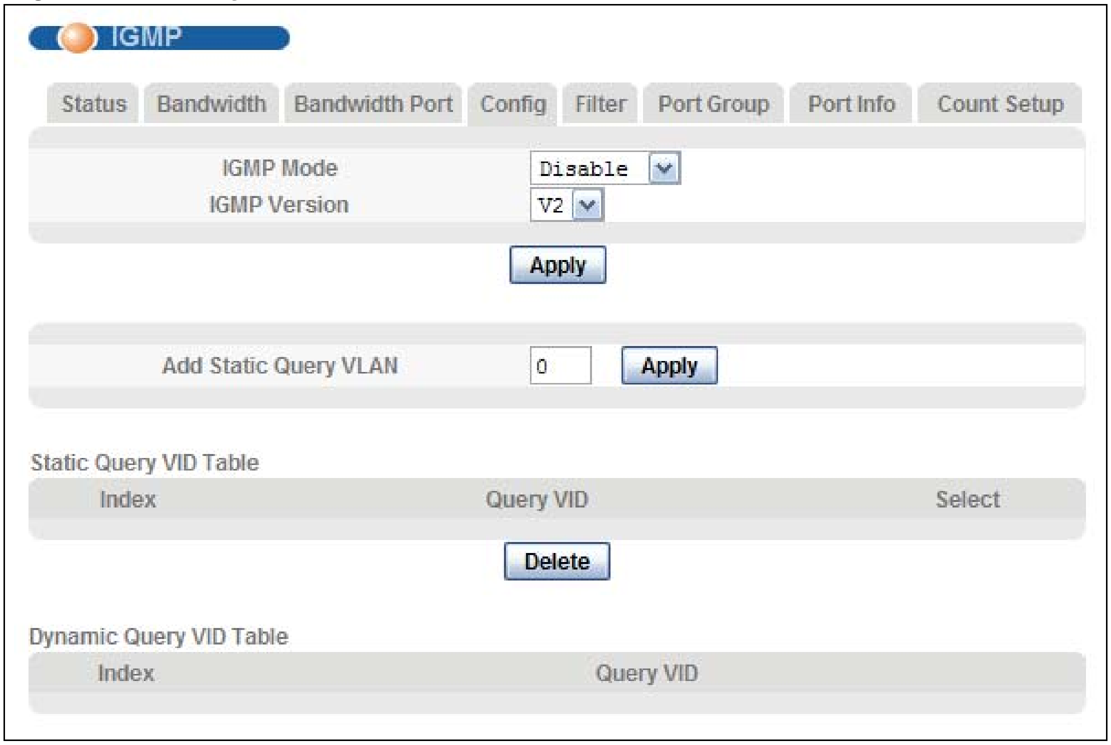
LABEL	DESCRIPTION
Port	This field shows each ADSL port number.
Active	This field shows whether or not multicast bandwidth requirements are enabled on this port. “V” displays if it is enabled and “-“ displays if it is disabled.
Bandwidth	Enter the maximum acceptable multicast bandwidth for this port. This has no effect if bandwidth requirements are disabled.
Select	Select this, and click **Active** or **Inactive** to enable or disable the specified multicast bandwidth requirements on this port.
Active	Click this to enable the specified multicast bandwidth requirements on the selected port.
Inactive	Click this to disable the specified multicast bandwidth requirements on the selected port.
Select All	Click this to select all entries in the table.
Select None	Click this to un-select all entries in the table.

20.6 Config Screen

Use this screen to configure your IGMP settings.

To open this screen, click **Advanced Application** > **IGMP** > **Config**.

Figure 80 Config



The following table describes the labels in this screen.

Table 39 Config

LABEL	DESCRIPTION
IGMP Mode	Select **Proxy** to have the device use IGMP proxy. Select **Snooping** to have the device passively learn multicast groups. Select **Disable** to have the device not use either IGMP proxy or snooping.
IGMP Version	Select which version of IGMP you want the device to support. Select IGMPv2 (**V2**) or IGMPv3 (**V3**). If you select IGMPv2, the device discards IGMPv3 packets. This provides better security if none of the devices in the network use IGMPv3. If you select IGMPv3, the device recognizes both IGMPv2 and IGMPv3.
Apply	Click **Apply** to save your IGMP mode settings. Clicking **Apply** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.

Table 39 Config (continued)

LABEL	DESCRIPTION
Add Static Query VLAN Apply	When the IES has **IGMP Proxy** enabled, it does not forward query messages from multicast source devices as they are received. Instead, the IES determines whether and how often to send a query message to downstream hosts. Type the number of a VLAN to which you want the IES sends query messages on behalf of a multicast server then click **Apply** to add it. The VLAN ID appears in the **Static Query VID Table**. You must configure the system's VLAN settings before you can set static query VIDs. Note: If you use Static Query VLAN, then the IES will send query messages and monitor for join or leave messages indefinitely.
Static Query VID Table	This table lists the manually added VLANs to which the system sends IGMP query messages. These are multicast service subscriber VLANs. Click **Delete** to remove the selected entry.
Dynamic Query VID Table	This table lists the IGMP query VLANs that the system has dynamically learned via IGMP snooping or IGMP proxy. These are VLANs on which the system sends IGMP query messages. They are multicast service subscriber VLANs. Note: If the IES receives no response to its query messages or the hosts do not send join or leave messages after a certain time, then the query function will cease until renewed later by the multicast server.

20.7 IGMP Filter Screen

To open this screen, click **Advanced Application > IGMP** > **Filter**.

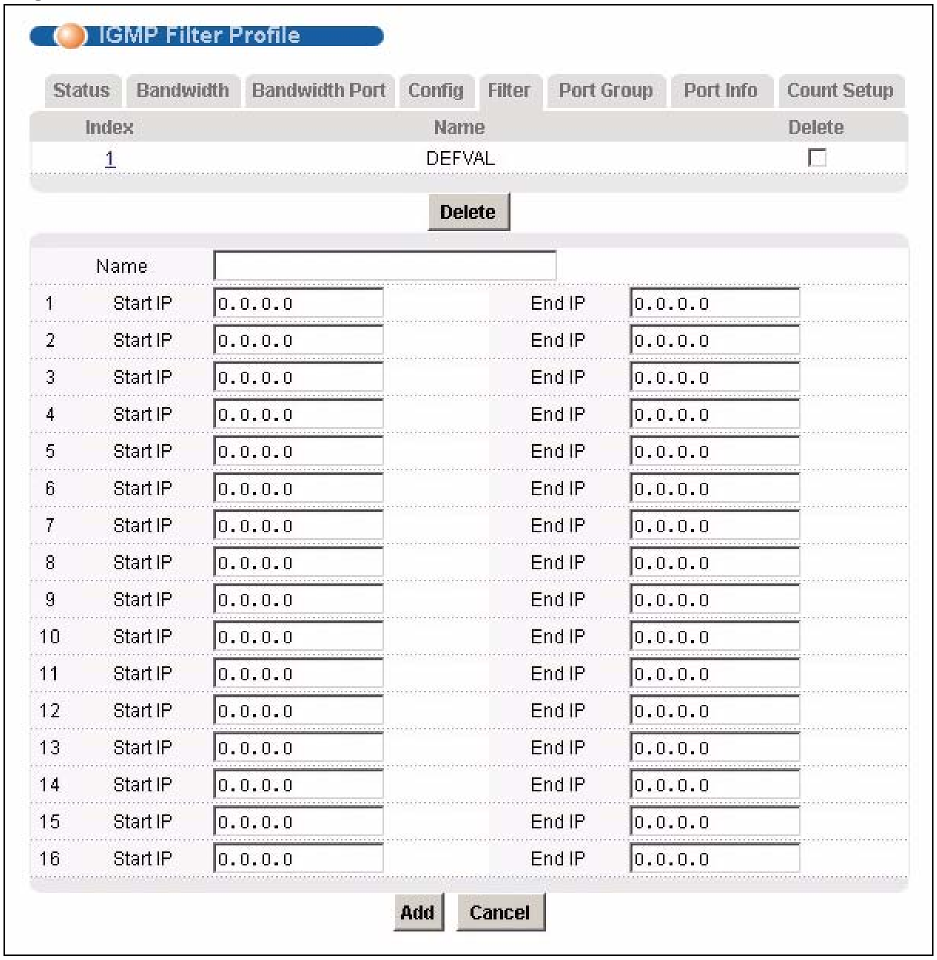
You can use the IGMP filter profiles to control access to a service that uses a specific multicast group (like a SIP server for example). Configure an IGMP filter profile that allows access to that multicast group. Then assign the IGMP filter profile to ADSL ports that are allowed to use the service.

The **DEFVAL** IGMP filter profile is assigned to all of the ADSL ports by default. It allows a port to join all multicast IP addresses (224.0.0.0~239.255.255.255). If you want to allow an ADSL subscriber access to only specific IGMP multicast groups, use the **IGMP Filter Profile** screen to configure a different profile and then assign it to the subscriber's ADSL port in the **XDSL Port Setting** screen (see Section 16.7.1 on page 136).

To open this screen, click **Basic Setting** > **xDSL Profiles Setup** > **IGMP Filter Profile**.

The top of the screen displays the configured IGMP filter profiles. Use the bottom part of the screen (with the **Add** and **Cancel** buttons) to add or edit alarm profiles.

Figure 81 IGMP Filter Profile



The following table describes the labels in this screen.

Table 40 IGMP Filter Profile

LABEL	DESCRIPTION
Index	This is the number of the IGMP filter profile. Click a profile's index number to edit the profile. You cannot edit the **DEFVAL** profile.
Name	This name identifies the IGMP filter profile.
Delete	Select the **Delete** check box and click **Delete** to remove an IGMP filter profile. You cannot delete the **DEFVAL** profile.
Name	Type a name to identify the IGMP filter profile (you cannot change the name of the DEFVAL profile). You can use up to 31 ASCII characters; spaces are not allowed.

Table 40 IGMP Filter Profile (continued)

LABEL	DESCRIPTION
Start IP	Enter the starting multicast IP address for a range of multicast IP addresses to which you want this IGMP filter profile to allow access.
End IP	Enter the ending multicast IP address for a range of IP addresses to which you want this IGMP filter profile to allow access. If you want to add a single multicast IP address, enter it in both the **Start IP** and **End IP** fields.
Add	Click **Add** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

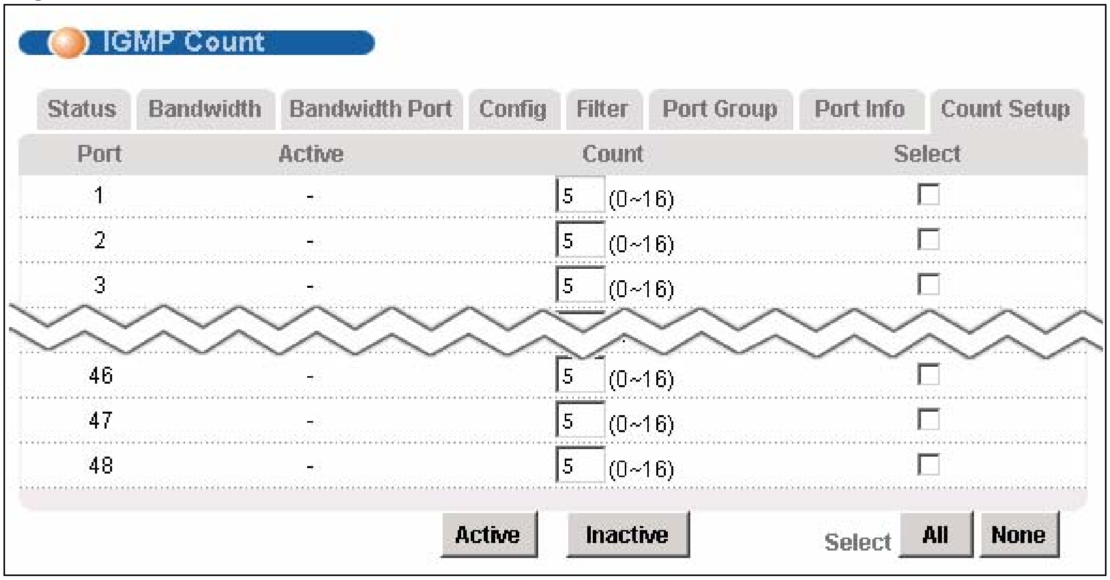
20.8 IGMP Count Screen

Use this screen to limit the number of IGMP groups a subscriber on a port can join. This allows you to control the distribution of multicast services (such as content information distribution) based on service plans and types of subscription.

IGMP count is useful for ensuring the service quality of high bandwidth services like video or Internet Protocol television (IPTV). IGMP count can limit how many channels (IGMP groups) the subscriber connected to a DSL port can use at a time. If each channel requires 4~5 Mbps of download bandwidth, and the subscriber's connection supports 11 Mbps, you can use IGMP count to limit the subscriber to using just 2 channels at a time. This also effectively limits the subscriber to using only two IPTVs with the DSL connection.

To open this screen, click **Advanced Application > IGMP** > **Count Setup**.

Figure 82 IGMP Count



The following table describes the labels in this screen.

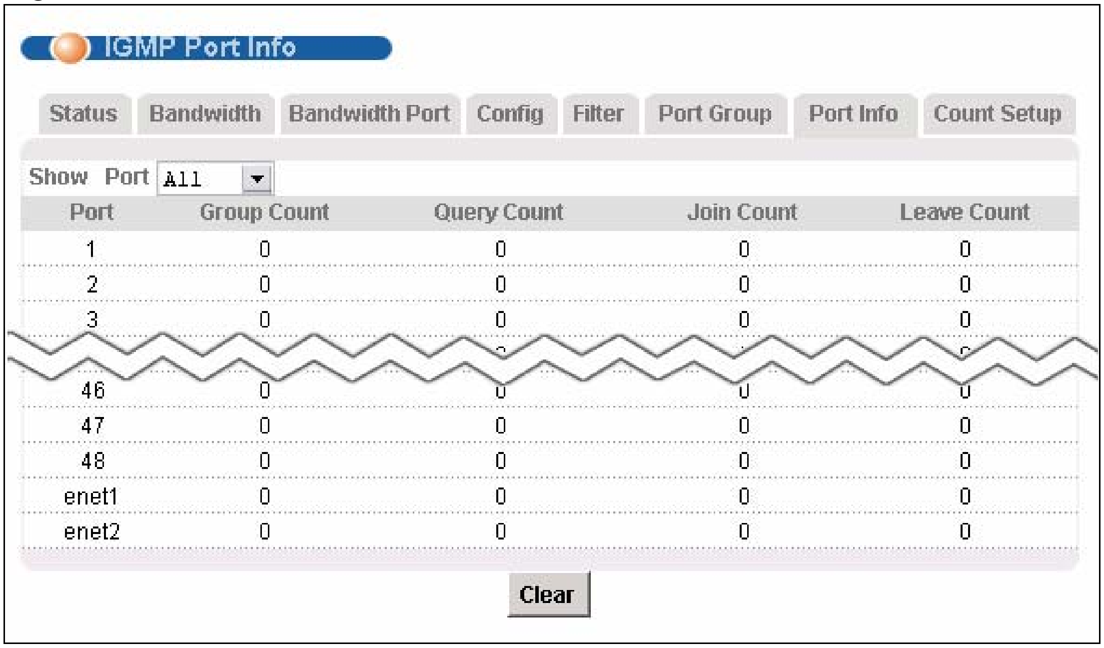
Table 41 IGMP Count

LABEL	DESCRIPTION
Port	This field shows each ADSL port number.
Active	This field shows whether or not the IGMP count limit is enabled on this port. “V” displays if it is enabled and “-“ displays if it is disabled.
Count	Enter the maximum number of IGMP groups a subscriber on this port can join. This has no effect if the IGMP count limit is disabled.
Select	Select this, and click **Active** or **Inactive** to enable or disable the specified IGMP count limit on this port.
Active	Click this to enable the specified IGMP count limits on the selected ports.
Inactive	Click this to disable the specified IGMP count limits on the selected ports.
Select All	Click this to select all entries in the table.
Select None	Click this to un-select all entries in the table.

20.9 IGMP Port Info Screen

Use this screen to display the current number of IGMP-related packets received on each port. To open this screen, click **Advanced Application > IGMP** > **Port Info**.

Figure 83 IGMP Port Info



The following table describes the labels in this screen.

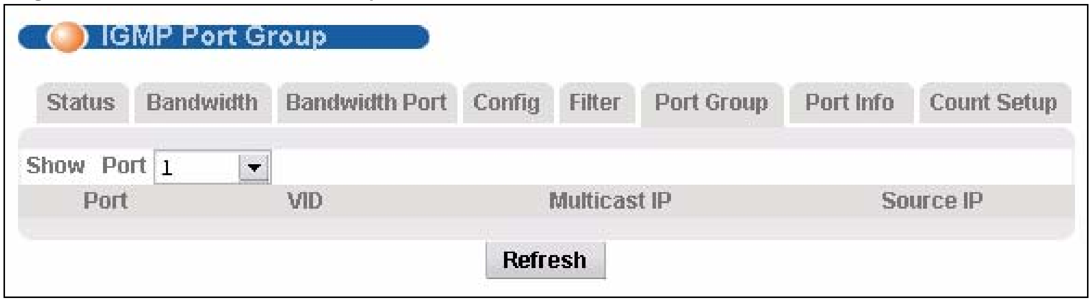
Table 42 IGMP Port Info

LABEL	DESCRIPTION
Show Port	Select a port for which you wish to view information.
Port	This field shows each port number.
Group Count	This is the total number of Group packets received on this port.
Query Count	This is the total number of Query packets received on this port.
Join Count	This is the total number of Join packets received on this port.
Leave Count	This is the total number of Leave packets received on this port.
Clear	Click **Clear** to delete the information the IES has learned about multicast groups. This resets every counter in this screen.

20.10 IGMP Port Group Screen

Use this screen to display the current list of multicast groups each port joins. To open this screen, click **Advanced Application > IGMP** > **Port Group**.

Figure 84 IGMP Port Group



The following table describes the labels in this screen.

Table 43 IGMP Port Group

LABEL	DESCRIPTION
Show Port	Select a port for which you wish to view information.
Port	This field shows each port number.
VID	This field shows the associated VLAN ID.
Multicast IP	This field shows the IP address of the multicast group joined by this port.
Source IP	This field shows the IP address of the client that joined the multicast group on this port.
Refresh	Click **Refresh** to display updated information.

21

Static Multicast

This chapter describes the **Static Multicast** screen.

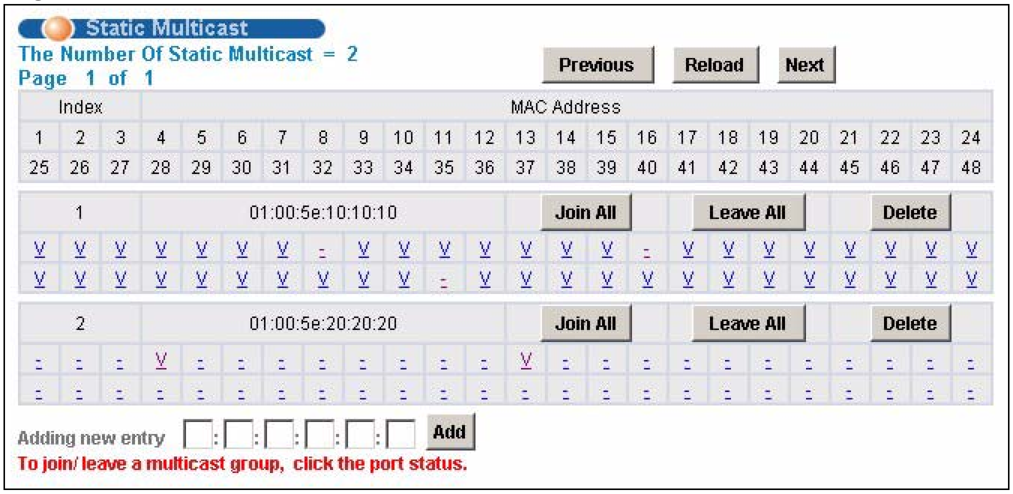
21.1 Static Multicast

Use static multicast to allow incoming frames based on multicast MAC address(es) that you specify. This feature can be used in conjunction with IGMP snooping/ proxy to allow multicast MAC address(es) that are not learned by IGMP snooping or IGMP proxy. Use static multicast to pass routing protocols, such as RIP and OSPF.

21.2 Static Multicast Screen

To open this screen, click **Advanced Application > Static Multicast**.

Figure 85 Static Multicast



The following table describes the labels in this screen.

Table 44 Static Multicast

LABEL	DESCRIPTION
The Number of Static Multicast	This is the number of static multicast entries configured on the IES.
Page X of X	This identifies which page of information is displayed and the total number of pages of information.
Previous Next	Click one of these buttons to show the previous/next screen if all status information cannot be seen in one screen.
Reload	Click this button to refresh the screen.
	The first table displays the names of the fields. The subsequent tables show the settings of the IGMP groups.
Index	This is the static multicast group index number.
MAC Address	This is the multicast MAC address.
1~48	These fields display the static multicast group membership status of the ADSL ports. “V” displays for members and “-“ displays for non-members. Click an ADSL port’s status to change it (clicking a “V” changes it to “-“ and vise versa).
Join All	Click **Join All** to make all of the ADSL ports members of the static multicast group.
Leave All	Click **Leave All** to remove all of the ADSL ports from the static multicast group.
Delete	Click **Delete** to remove a static multicast group.
Adding new entry Add	Type a multicast MAC address in the field, and click the **Add** button to create a new static multicast entry. Multicast MAC addresses must be `01:00:5E:xx:xx:xx`, where `x` is a “don’t care” value. For example, `01:00:5E:10:10:10` is a valid multicast MAC address. Clicking **Add** saves your changes to the IES’s volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.

22

Multicast VLAN

This chapter describes the **Multicast VLAN** screens.

22.1 Multicast VLAN Overview

Multicast VLAN allows one single multicast VLAN to be shared among different subscriber VLANs on the network. This improves bandwidth utilization by reducing multicast traffic in the subscriber VLANs and simplifies multicast group management.

When the IES forwards traffic to a subscriber port, it tries to forward traffic to a normal PVC with the same VLAN ID. If this PVC does not exist, the IES uses the super channel instead. This applies to all downstream traffic, not just multicast traffic.

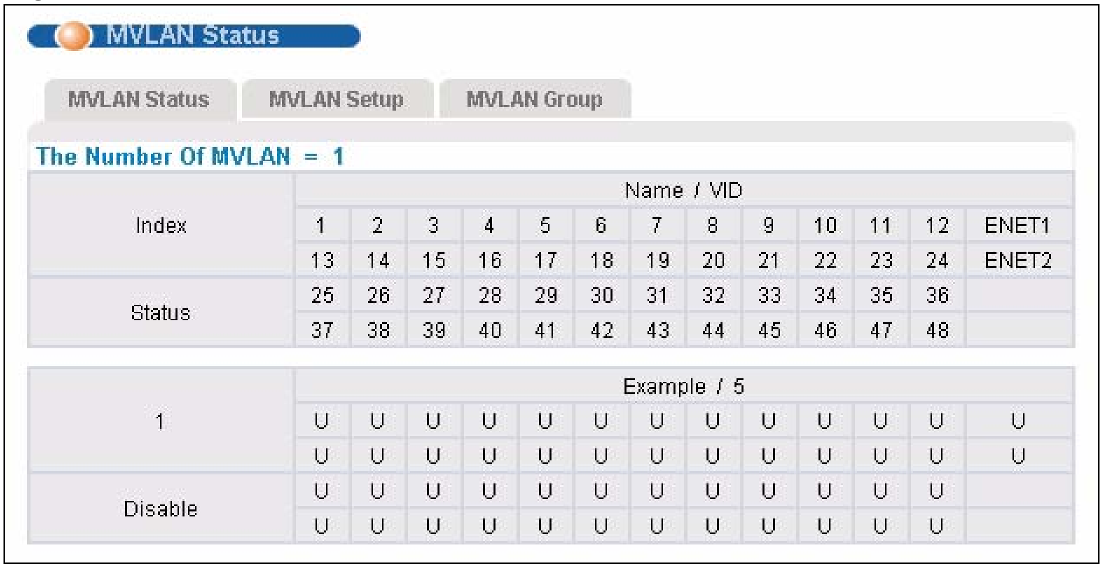
It is suggested to use a super channel for multicast VLAN. If a normal PVC is used and the multicast VLAN ID is not the same as the PVC's VID, the IES does not forward traffic to this PVC even if the subscriber's port has joined the multicast VLAN.

Since the IES might change the subscriber's VLAN ID to the multicast VLAN ID, both the subscriber's port and the Ethernet port should join the multicast VLAN.

22.2 MVLAN Status Screen

Use this screen to look at a summary of all multicast VLAN on the IES. To open this screen, click **Advanced Application > Multicast VLAN**.

Figure 86 MVLAN Status



The following table describes the labels in this screen.

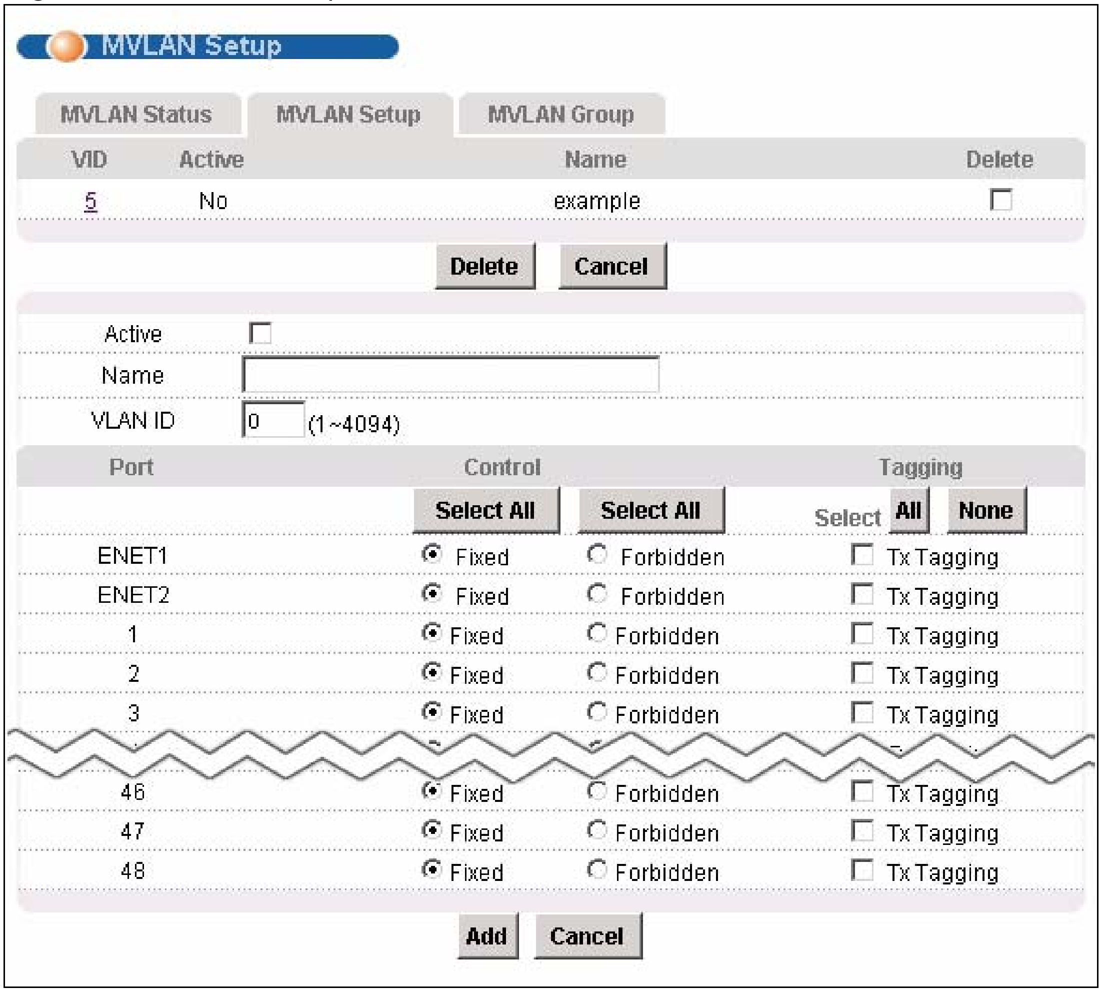
Table 45 MVLAN Status

LABEL	DESCRIPTION
MVLAN Setup	Click **MVLAN Setup** to open the **MVLAN Setup** screen where you can configure basic settings and port members for each multicast VLAN (see Section 22.3 on page 203).
MVLAN Group	Click **MVLAN Group** to open the **MVLAN Group** screen where you can configure ranges of multicast IP addresses for each multicast VLAN (see Section 22.4 on page 205).
The Number of MVLAN	This is the number of multicast VLAN configured on the IES.
	The first table displays the names of the fields. The subsequent tables show the settings for each multicast VLAN.
Index	This is a sequential value and is not associated with this multicast VLAN.
Name / VID	This field shows the name and VLAN ID of this multicast VLAN.
1~48 ENET1-2	These fields display whether or not each port is a member of this multicast VLAN. “V” displays for members and “-“ displays for non-members. You can change these settings in the **MVLAN Setup** screen.
Status	This field shows whether this multicast VLAN is active (**Enable**) or inactive (**Disable**).

22.3 MVLAN Setup Screen

Use this screen to configure basic settings and port members for each multicast VLAN. To open this screen, click **Advanced Application > Multicast VLAN > MVLAN Setup**.

Figure 87 MVLAN Setup



The following table describes the labels in this screen.

Table 46 MVLAN Setup

LABEL	DESCRIPTION
MVLAN Status	Click **MVLAN Status** to open the **MVLAN Status** screen where you can view a summary of all multicast VLAN on the IES (see Section 22.2 on page 202).
MVLAN Group	Click **MVLAN Group** to open the **MVLAN Group** screen where you can configure ranges of multicast IP addresses for each multicast VLAN (see Section 22.4 on page 205).
VID	This field shows the VLAN ID of each multicast VLAN. Click it to edit its basic settings and port members in the fields below.

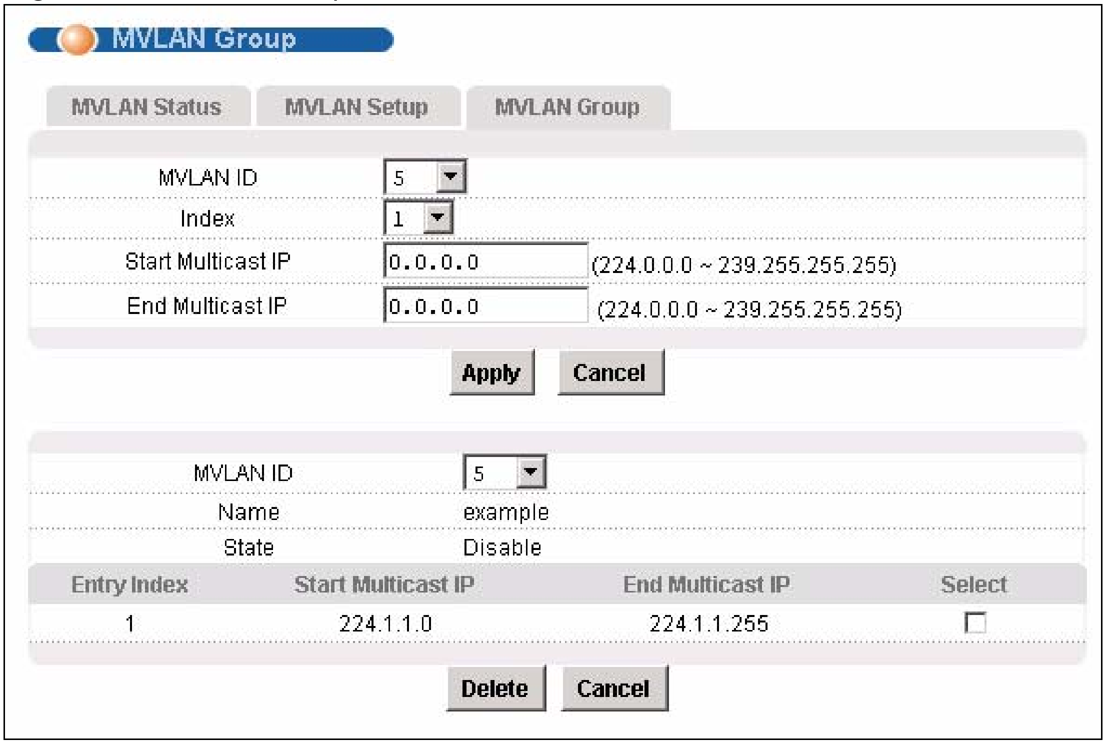
Table 46 MVLAN Setup (continued)

LABEL	DESCRIPTION
Active	This field shows whether this multicast VLAN is active (**Yes**) or inactive (**No**).
Name	This field shows the name of this multicast VLAN.
Delete	Select the check boxes of the rule(s) that you want to remove in the **Delete** column and then click the **Delete** button. You cannot delete a VLAN if any PVIDs are set to use the VLAN or the VLAN is the CPU (management) VLAN.
Cancel	Click **Cancel** to begin configuring the fields afresh.
Active	Select this if you want the multicast VLAN to be active. Clear this if you want the multicast VLAN to be inactive.
Name	Enter a descriptive name for the multicast VLAN. The name can be 1-31 printable ASCII characters long. Spaces are not allowed.
VLAN ID	Enter the VLAN ID of the multicast VLAN; the valid range is between 1 and 4094.
Port	This field displays each port number.
Control	Select **Fixed** for the port to be a permanent member of this multicast VLAN. Use the **Select All** button to include every port. Select **Forbidden** if you want to prohibit the port from joining this multicast VLAN. Use the **Select All** button to include every port.
Tagging	Select **TX Tagging** if you want the port to tag all outgoing frames transmitted with this VLAN ID. Use the **All** button to include every port. Use the **None** button to clear all of the ports check boxes.
Add	Click **Add** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields afresh.

22.4 MVLAN Group Screen

Use this screen to configure ranges of multicast IP addresses for each multicast VLAN. To open this screen, click **Advanced Application > Multicast VLAN > MVLAN Group**.

Figure 88 MVLAN Group



The following table describes the labels in this screen.

Table 47 MVLAN Group

LABEL	DESCRIPTION
MVLAN Status	Click **MVLAN Status** to open the **MVLAN Status** screen where you can view a summary of all multicast VLAN on the IES (see Section 22.2 on page 202).
MVLAN Setup	Click **MVLAN Setup** to open the **MVLAN Setup** screen where you can configure basic settings and port members for each multicast VLAN (see Section 22.3 on page 203).
MVLAN ID	Select the VLAN ID of the multicast VLAN for which you want to configure a range of multicast IP addresses.
Index	Select the index number of the multicast VLAN group (the range of multicast IP addresses) you want to configure for this multicast VLAN. If you want to change the current settings, select an index number that already exists. If you want to add a new multicast VLAN group, select an index number that does not exist.

Table 47 MVLAN Group (continued)

LABEL	DESCRIPTION
Start Multicast IP	Enter the beginning of the range of multicast IP addresses. The IP address must be a valid multicast IP address, between 224.0.0.0 and 239.255.255.255.
End Multicast IP	Enter the end of the range of multicast IP addresses. The IP address must be a valid multicast IP address, between 224.0.0.0 and 239.255.255.255.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields afresh.
MVLAN ID	Select the VLAN ID of the multicast VLAN for which you want to look at or remove the multicast IP addresses currently added to it.
Name	This field displays the name of this multicast VLAN.
State	This field shows whether this multicast VLAN is active (**Enable**) or inactive (**Disable**).
Entry Index	This field displays the index number of each multicast VLAN group (the range of multicast IP addresses) configured for this multicast VLAN.
Start Multicast IP	This field displays the beginning of this range of multicast IP addresses.
End Multicast IP	This field displays the end of this range of multicast IP addresses.
Select	Select this, and click **Delete** to remove the multicast VLAN group.
Delete	Click this to remove the selected multicast VLAN groups.
Cancel	Click **Cancel** to begin configuring the fields afresh.

23

Packet Filtering

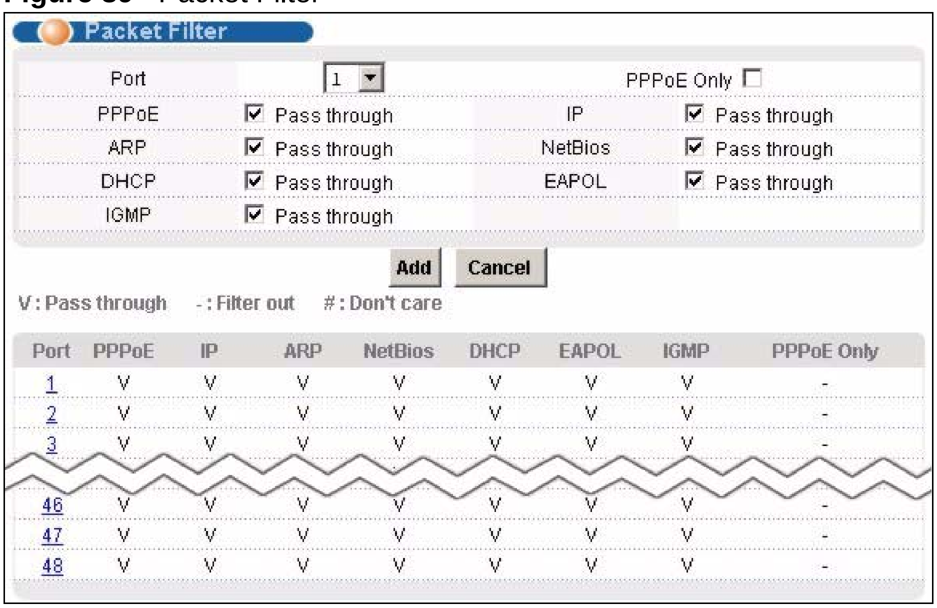
This chapter describes how to configure the **Packet Filter** screen.

23.1 Packet Filter Screen

Use this screen to set which types of packets the IES accepts on individual ADSL ports.

To open this screen, click **Advanced Application > Filtering**.

Figure 89 Packet Filter



The following table describes the labels in this screen.

Table 48 Packet Filter

LABEL	DESCRIPTION
Port	Use this drop-down list box to select an ADSL port for which you wish to configure packet type filtering. This box is read-only after you click on one of the port numbers in the table below.
PPPoE Only	Select this to allow only PPPoE traffic. This will gray out the check boxes for other packet types and the system will drop any non-PPPoE packets.
	Select the check boxes of the types of packets to accept on the ADSL port. When you clear one of these check boxes, the field label changes to **Filter Out** and the system drops the corresponding type of packets
PPPoE Pass through	Point-to-Point Protocol over Ethernet relies on PPP and Ethernet. It is a specification for connecting the users on an Ethernet to the Internet through a common broadband medium, such as a single DSL line, wireless device or cable modem.
IP Pass through	Internet Protocol. The underlying protocol for routing packets on the Internet and other TCP/IP-based networks.
ARP Pass through	Address Resolution Protocol is a protocol for mapping an Internet Protocol address (IP address) to a physical computer address that is recognized in the local network.
NetBios Pass through	NetBIOS (Network Basic Input/Output System) are TCP or UDP packets that enable a computer to find other computers.
DHCP Pass through	Dynamic Host Configuration Protocol automatically assigns IP addresses to clients when they log on. DHCP centralizes IP address management on central computers that run the DHCP server program. DHCP leases addresses, for a period of time, which means that past addresses are “recycled” and made available for future reassignment to other systems.
EAPOL Pass through	EAP (Extensible Authentication Protocol, RFC 2486) over LAN. EAP is used with IEEE 802.1x to allow additional authentication methods (besides RADIUS) to be deployed with no changes to the access point or the wireless clients.
IGMP Pass through	Internet Group Multicast Protocol is used when sending packets to a specific group of hosts.
Apply	Click **Apply** to save the filter settings. The settings then display in the summary table at the bottom of the screen. Clicking **Apply** saves your changes to the IES’s volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields afresh.
	This table shows the ADSL port packet filter settings.

Table 48 Packet Filter (continued)

LABEL	DESCRIPTION
Port	These are the numbers of the ADSL ports. Click this number to edit the port's filter settings in the section at the top.
PPPoE, IP, ARP, NetBios, DHCP, EAPOL, IGMP, PPPoE Only	These are the packet filter settings for each port. "V" displays for the packet types that the IES is to accept on the port. "-" displays for packet types that the IES is to reject on the port (packet types that are not listed are accepted). When you select **PPPoE Only**,"#" appears for all of the packet types. With **PPPoE Only**, the IES rejects all packet types except for PPPoE (packet types that are not listed are also rejected).

24

MAC Filter

This chapter introduces the MAC filter.

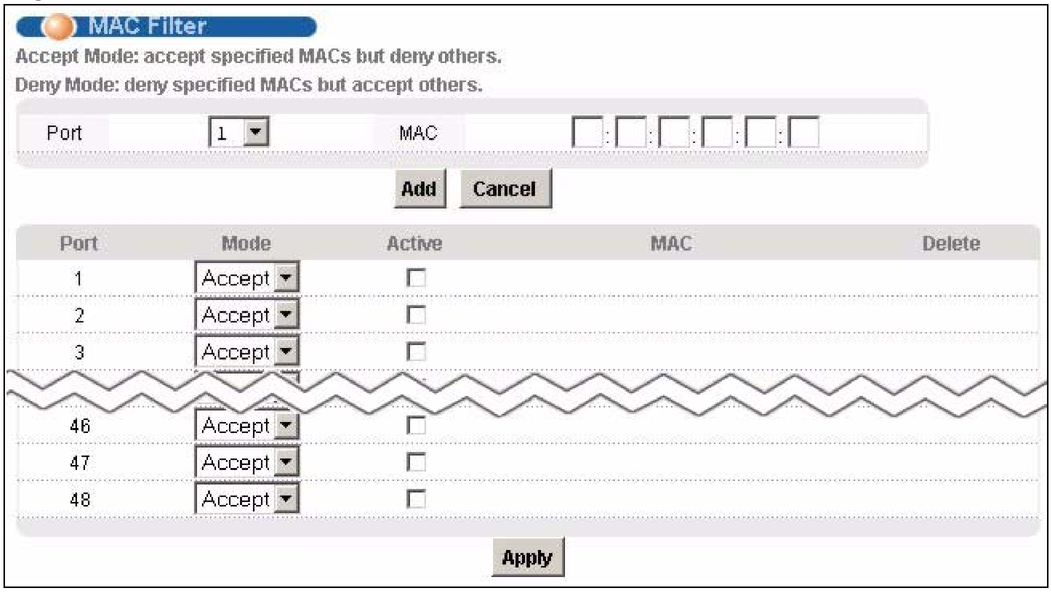
24.1 MAC Filter Introduction

Use the MAC filter to control from which MAC (Media Access Control) addresses frames can (or cannot) come in through a port.

24.2 MAC Filter Screen

To open this screen, click **Advanced Application > MAC Filter**.

Figure 90 MAC Filter



The following table describes the labels in this screen.

Table 49 MAC Filter

LABEL	DESCRIPTION
Port	Use this drop-down list box to select an ADSL port for which you wish to configure MAC filtering.
MAC	Type a device’s MAC address in hexadecimal notation (xx:xx:xx:xx:xx:xx, where x is a number from 0 to 9 or a letter from a to f) in this field. The MAC address must be a valid MAC address.
Add	Click **Add** to save your changes to the IES’s volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.
Port	These are the numbers of the ADSL ports.
Mode	Select **Accept** to only allow frames from MAC addresses that you specify and block frames from other MAC addresses. Select **Deny** to block frames from MAC addresses that you specify and allow frames from other MAC addresses.
Active	Select this check box to turn on MAC filtering for a port.
MAC	This field lists the MAC addresses that are set for this port.
Delete	Click **Delete** to remove a MAC address from the list.
Apply	Click **Apply** to save your changes to the IES’s volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.

25

Spanning Tree Protocol

This chapter introduces the Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP).

25.1 RSTP and STP

RSTP adds rapid reconfiguration capability to STP. The IES supports RSTP and the earlier STP. RSTP and STP detect and break network loops and provide backup links between switches, bridges or routers. They allow a device to interact with other RSTP or STP-aware devices in your network to ensure that only one path exists between any two stations on the network. The Integrated Ethernet Switch uses RSTP by default but can still operate with STP switches (although without RSTP's benefits).

The root bridge is the base of the spanning tree. Path cost is the cost of transmitting a frame onto a LAN through that port. It is assigned according to the speed of the link to which a port is attached. The slower the media, the higher the cost, as illustrated in the following table.

Table 50 Path Cost

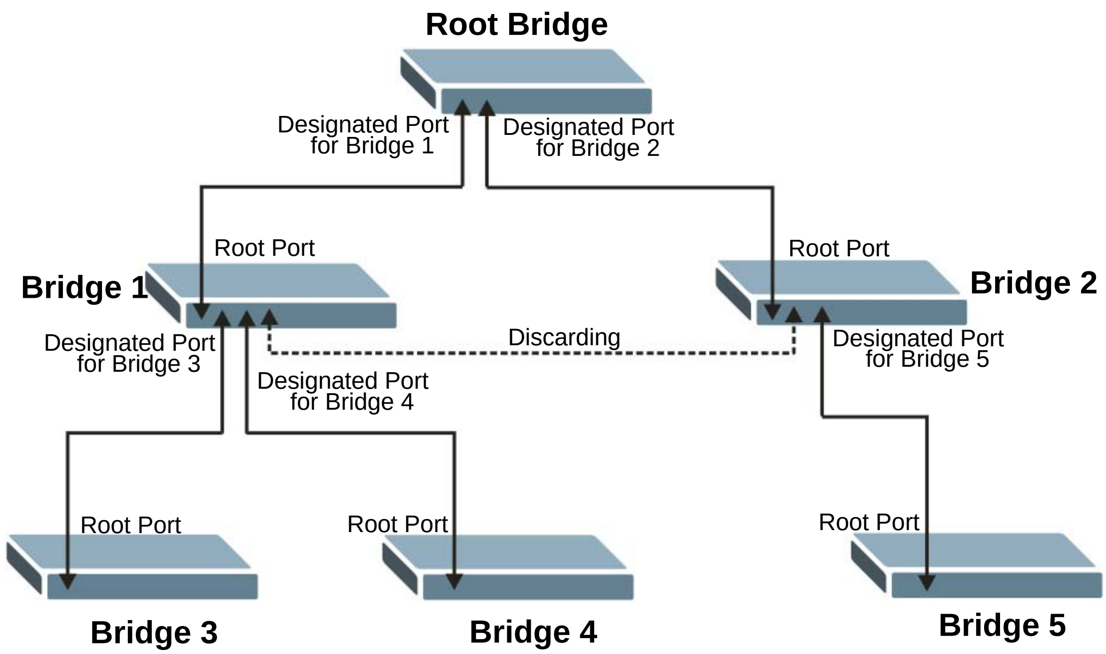
	LINK SPEED	RECOMMENDED VALUE	RECOMMENDED RANGE	ALLOWED RANGE
Path Cost	4Mbps	250	100 to 1000	1 to 65535
Path Cost	10Mbps	100	50 to 600	1 to 65535
Path Cost	16Mbps	62	40 to 400	1 to 65535
Path Cost	100Mbps	19	10 to 60	1 to 65535
Path Cost	1Gbps	4	3 to 10	1 to 65535
Path Cost	10Gbps	2	1 to 5	1 to 65535

On each bridge, the root port is the port through which this bridge communicates with the root. It is the port on this Integrated Ethernet Switch with the lowest path cost to the root (the root path cost). If there is no root port, then this Integrated Ethernet Switch has been accepted as the root bridge of the spanning tree network.

For each LAN segment, a designated bridge is selected. This bridge has the lowest cost to the root among the bridges connected to the LAN.

After a bridge determines the lowest cost-spanning tree with RSTP, it enables the root port and the ports that are the designated ports for the connected LANs, and disables all other ports that participate in RSTP. Network packets are therefore only forwarded between enabled ports, eliminating any possible network loops.

Figure 91 STP Root Ports and Designated Ports



RSTP-aware devices exchange Bridge Protocol Data Units (BPDUs) periodically. When the bridged LAN topology changes, a new spanning tree is constructed.

In RSTP, the devices send BPDUs every Hello Time. If an RSTP-aware device does not get a Hello BPDU after three Hello Times pass (or the Max Age), the device assumes that the link to the neighboring bridge is down. This device then initiates negotiations with other devices to reconfigure the network to re-establish a valid network topology.

In STP, once a stable network topology has been established, all devices listen for Hello BPDUs transmitted from the root bridge. If an STP-aware device does not get a Hello BPDU after a predefined interval (Max Age), the device assumes that the link to the root bridge is down. This device then initiates negotiations with other devices to reconfigure the network to re-establish a valid network topology.

RSTP assigns three port states to eliminate packet looping while STP assigns five (see Table 51 on page 215). A device port is not allowed to go directly from blocking state to forwarding state so as to eliminate transient loops.

Table 51 RSTP Port States

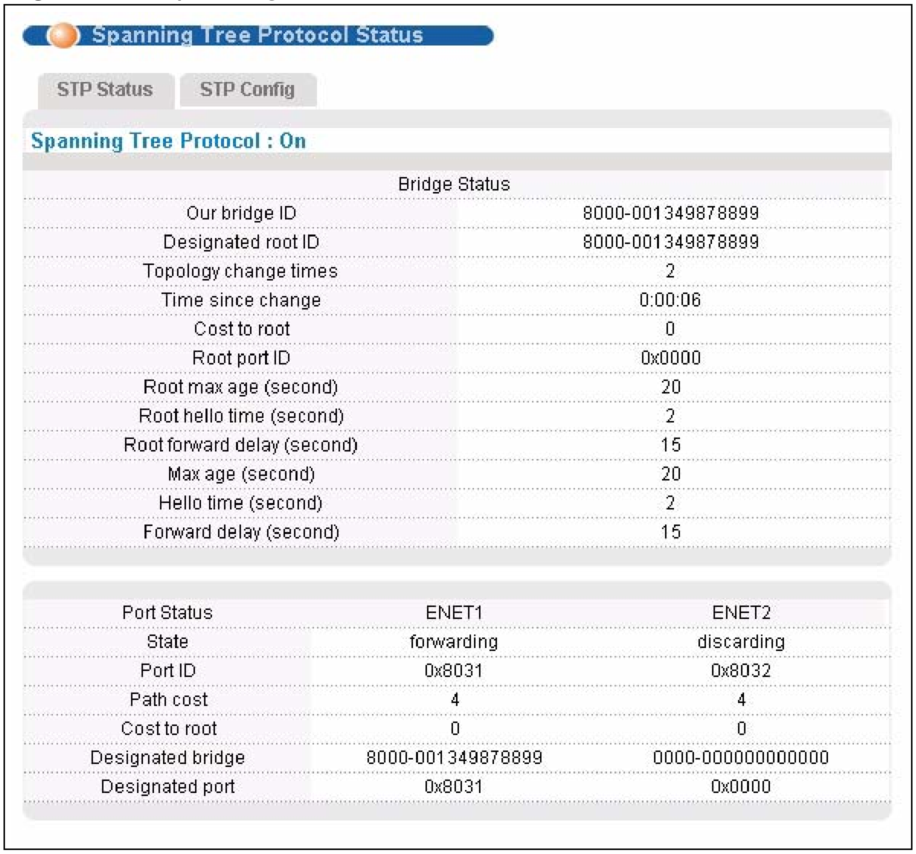
RSTP PORT STATE	STP PORT STATE	DESCRIPTION
Discarding	Disabled	RSTP or STP is disabled (default).
Discarding	Blocking	In RSTP, BPDUs are discarded. In STP, only configuration and management BPDUs are received and processed.
Discarding	Listening	In RSTP, BPDUs are discarded. In STP, all BPDUs are received and processed.
Learning	Learning	All BPDUs are received and processed. Information frames are submitted to the learning process but not forwarded.
Forwarding	Forwarding	All BPDUs are received and processed. All information frames are received and forwarded.

See the IEEE 802.1w standard for more information on RSTP. See the IEEE 802.1D standard for more information on STP.

25.2 Spanning Tree Protocol Status Screen

To open this screen, click **Advanced Application** > **Spanning Tree Protocol**.

Figure 92 Spanning Tree Protocol Status



The following table describes the labels in this screen.

Table 52 Spanning Tree Protocol Status

LABEL	DESCRIPTION
STP Config	Click **STP Config** to modify the IES's STP settings (see Section 25.3 on page 218).
Spanning Tree Protocol	This field displays **On** if STP is activated. Otherwise, it displays **Off**.
Bridge Status	If STP is activated, the following fields appear. If STP is not activated, **Disabled** appears.
Our bridge ID	This is the unique identifier for this bridge, consisting of bridge priority plus MAC address. This ID is the same in **Designated root ID** if the IES is the root switch.
Designated root ID	This is the unique identifier for the root bridge, consisting of bridge priority plus MAC address. This ID is the same in **Our bridge ID** if the IES is the root switch.
Topology change times	This is the number of times the spanning tree has been reconfigured.

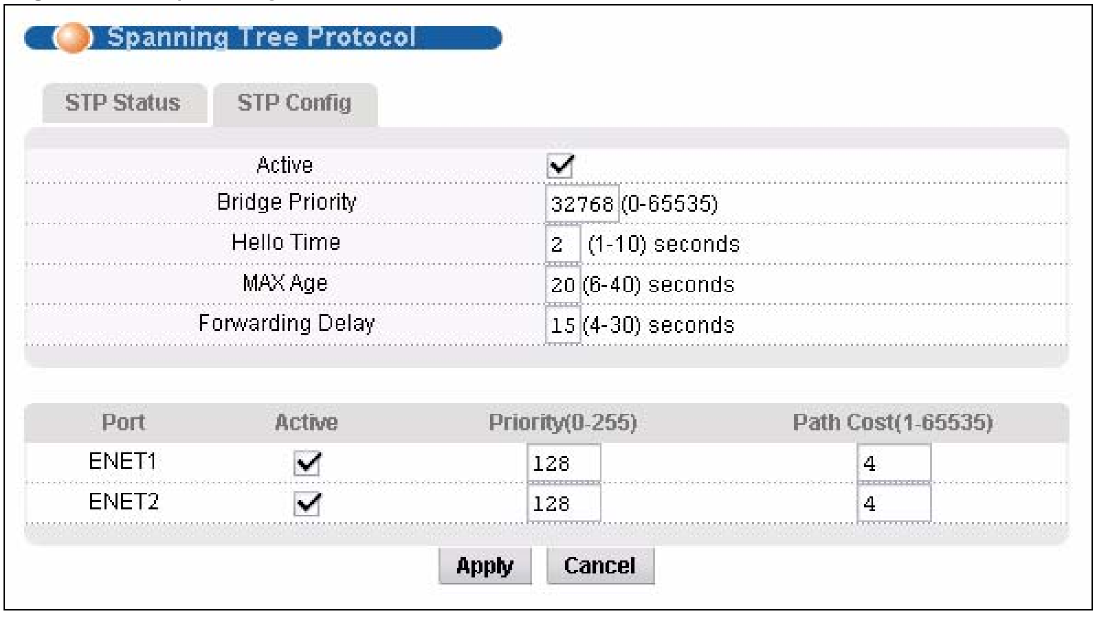
Table 52 Spanning Tree Protocol Status (continued)

LABEL	DESCRIPTION
Time since change	This is the time since the spanning tree was last reconfigured.
Cost to root	This is the path cost from the root port on this switch to the root switch.
Root port ID	This is the priority and number of the port on the switch through which this switch must communicate with the root of the Spanning Tree. “0x0000” displays when this device is the root switch.
Root max age (second)	This is the maximum time (in seconds) the root switch can wait without receiving a configuration message before attempting to reconfigure.
Root hello time (second)	This is the time interval (in seconds) at which the root switch transmits a configuration message. The root bridge determines **Hello Time, Max Age** and **Forwarding Delay**.
Root forward delay (second)	This is the time (in seconds) the root switch will wait before changing states (that is, listening to learning to forwarding).
Max age (second)	This is the maximum time (in seconds) the IES can wait without receiving a configuration message before attempting to reconfigure.
Hello time (second)	This is the time interval (in seconds) at which the IES transmits a configuration message. The root bridge determines **Hello Time, Max Age** and **Forwarding Delay**.
Forward delay (second)	This is the time (in seconds) the IES will wait before changing states (that is, listening to learning to forwarding).
Port Status	This identifies the IES’s ports that support the use of STP. If STP is activated, the following fields appear. If STP is not activated, **Disabled** appears.
State	This field displays the port’s RSTP (or STP) state. With RSTP, the state can be **discarding**, **learning** or **forwarding**. With STP, the state can be **disabled**, **blocking**, **listening**, **learning**, or **forwarding**. **Disabled** appears when RSTP has not been turned on for the individual port or the whole device.
Port ID	This is the priority and number of the port on the switch through which this switch must communicate with the root of the Spanning Tree. “0x0000” displays when this device is the root switch.
Path cost	This is the path cost from this port to the root switch.
Cost to root	This is the path cost from the root port on this switch to the root switch.
Designated bridge	This is the unique identifier for the bridge that has the lowest path cost to reach the root bridge, consisting of bridge priority plus MAC address.
Designated port	This is the port on the designated bridge that has the lowest path cost to reach the root bridge, consisting of bridge priority.
Poll Interval(s) Set Interval	The text box displays how often (in seconds) this screen refreshes. You may change the refresh interval by typing a new number in the text box and then clicking **Set Interval**.
Stop	Click **Stop** to halt STP statistic polling.

25.3 Spanning Tree Protocol Screen

To open this screen, click **Advanced Application > Spanning Tree Protocol** > **STP Config**.

Figure 93 Spanning Tree Protocol



The following table describes the labels in this screen.

Table 53 Spanning Tree Protocol

LABEL	DESCRIPTION
Active	Select this check box to turn on RSTP. Note: It is recommended that you only use STP when you use the IES in standalone mode with a network topology that has loops.
Bridge Priority	Bridge priority is used in determining the root switch, root port and designated port. The switch with the highest priority (lowest numeric value) becomes the STP root switch. If all switches have the same priority, the switch with the lowest MAC address will then become the root switch. The allowed range is 0 to 61440. The lower the numeric value you assign, the higher the priority for this bridge. Bridge Priority determines the root bridge, which in turn determines Hello Time, Max Age and Forwarding Delay.
Hello Time	This is the time interval in seconds between BPDU (Bridge Protocol Data Units) configuration message generations by the root switch. The allowed range is 1 to 10 seconds.

Table 53 Spanning Tree Protocol (continued)

LABEL	DESCRIPTION
MAX Age	This is the maximum time (in seconds) a switch can wait without receiving a BPDU before attempting to reconfigure. All switch ports (except for designated ports) should receive BPDUs at regular intervals. Any port that ages out STP information (provided in the last BPDU) becomes the designated port for the attached LAN. If it is a root port, a new root port is selected from among the switch ports attached to the network. The allowed range is 6 to 40 seconds.
Forwarding Delay	This is the maximum time (in seconds) a switch will wait before changing states. This delay is required because every switch must receive information about topology changes before it starts to forward frames. In addition, each port needs time to listen for conflicting information that would make it return to a blocking state; otherwise, temporary data loops might result. The allowed range is 4 to 30 seconds. As a general rule: 2 * (Forward Delay - 1) >= Max Age >= 2 * (Hello Time + 1)
Port	This field identifies the Ethernet port.
Active	Select this check box to activate STP on this port.
Priority	Configure the priority for each port here. Priority decides which port should be disabled when more than one port forms a loop in a switch. Ports with a higher priority numeric value are disabled first. The allowed range is between 0 and 255 and default value is 128.
Path Cost	Path cost is the cost of transmitting a frame on to a LAN through that port. It is assigned according to the speed of the bridge. The slower the media, the higher the cost.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

26

Port Authentication

This chapter describes the 802.1x authentication method and RADIUS server connection setup.

26.1 Introduction to Authentication

IEEE 802.1x is an extended authentication protocol[2] that allows support of RADIUS (Remote Authentication Dial In User Service, RFC 2138, 2139) for centralized user profile management on a network RADIUS server.

26.1.1 RADIUS

RADIUS (Remote Authentication Dial-In User Service) authentication is a popular protocol used to authenticate users by means of an external server instead of (or in addition to) an internal device user database that is limited to the memory capacity of the device. In essence, RADIUS authentication allows you to validate an unlimited number of users from a central location.

Figure 94 RADIUS Server

26.1.2 Introduction to Local User Database

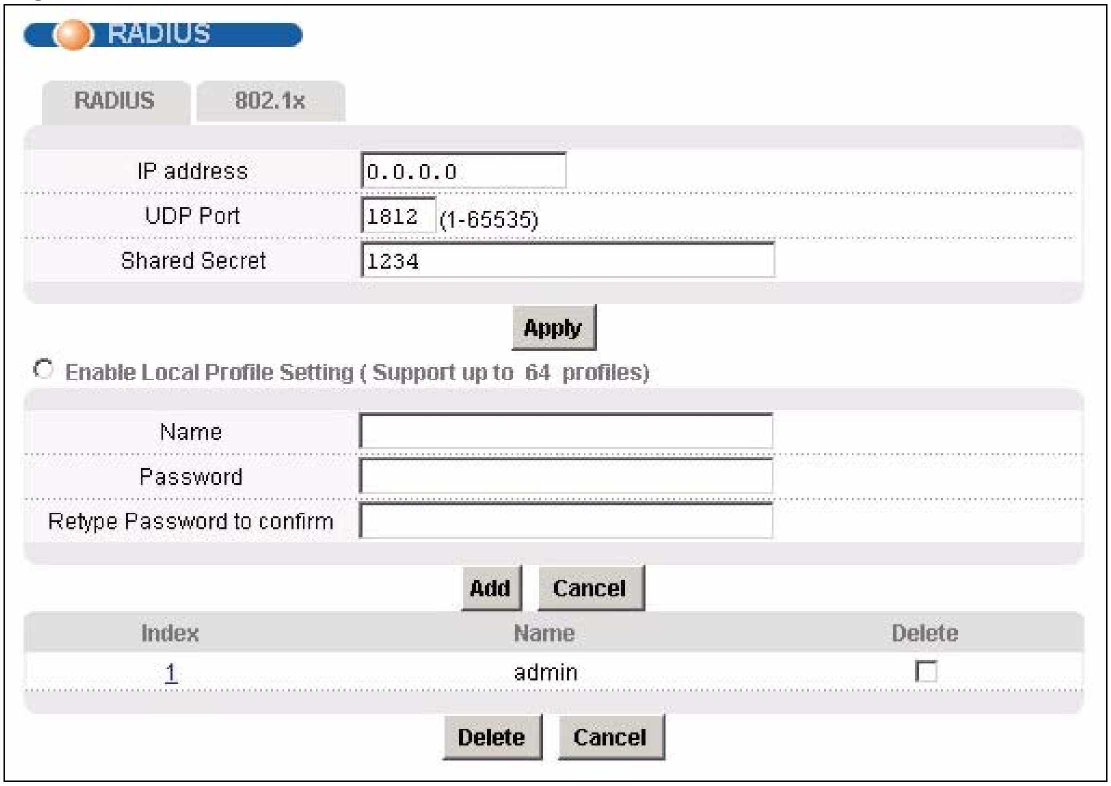
By storing user profiles locally on the IES, your IES is able to authenticate users without interacting

2. At the time of writing, Windows XP of the Microsoft operating systems supports 802.1x. See the Microsoft web site for information on other Windows operating system support. For other operating systems, see its documentation. If your operating system does not support 802.1x, then you may need to install 802.1x client software.

26.2 RADIUS Screen

To open this screen, click **Advanced Application > Port Authentication**.

Figure 95 RADIUS



The following table describes the labels in this screen.

Table 54 RADIUS

LABEL	DESCRIPTION
802.1x	Click 802.1x to configure individual port authentication settings (see Section 26.3 on page 224).
Enable Authentication Server	Select this check box to have the IES use an external RADIUS server to authenticate users.
IP Address	Enter the IP address of the external RADIUS server in dotted decimal notation.
UDP Port	The default port of the RADIUS server for authentication is **1812**. You need not change this value unless your network administrator instructs you to do so.
Shared Secret	Specify a password (up to 31 alphanumeric characters) as the key to be shared between the external RADIUS server and the switch. This key is not sent over the network. This key must be the same on the external RADIUS server and the switch.

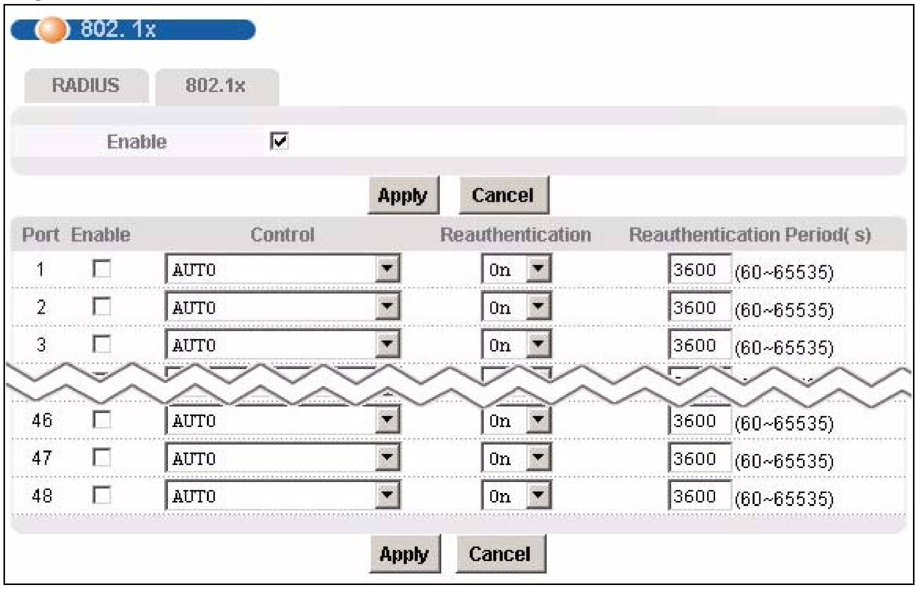
Table 54 RADIUS (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Enable Local Profile Setting	Select this check box to have the IES use its internal database of user names and passwords to authenticate users.
Name	Type the user name of the user profile.
Password	Type a password up to 31 characters long for this user profile.
Retype Password to confirm	Type the password again to make sure you have entered it properly.
Add	Click **Add** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.
	This table displays the configured user profiles.
Index	These are the numbers of the user profiles. Click this number to edit the user profile.
Name	This is the user name of the user profile.
Delete	Select a user profile's **Delete** check box and click **Delete** to remove the user profile.
Cancel	Click **Cancel** to begin configuring this screen afresh and clear any selected **Delete** check boxes.

26.3 802.1x Screen

To open this screen, click **Advanced Application > Port Authentication** > **802.1x**.

Figure 96 802.1x



The following table describes the labels in this screen.

Table 55 802.1x

LABEL	DESCRIPTION
Enable	Select this check box to turn on IEEE 802.1x authentication on the switch.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.
Port	This field displays a port number.
Enable	Select this check box to turn on IEEE 802.1x authentication on this port.
Control	Select **Auto** to authenticate all subscribers before they can access the network through this port. Select **Force Authorized** to allow all connected users to access the network through this port without authentication. Select **Force Unauthorized** to deny all subscribers access to the network through this port.
Reauthentication	Specify if a subscriber has to periodically re-enter his or her username and password to stay connected to the port.
Reauthentication Period(s)	Specify how often a client has to re-enter his or her username and password to stay connected to the port.

Table 55 802.1x (continued)

LABEL	DESCRIPTION
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

27

Port Security

This chapter shows you how to set up port security.

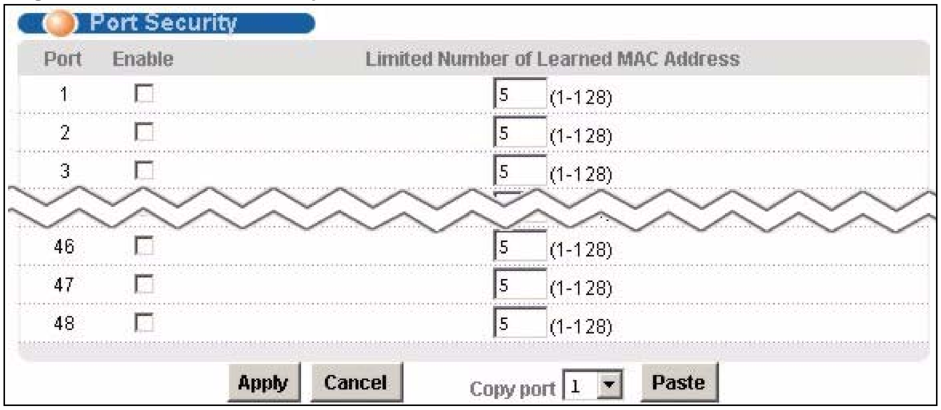
27.1 Port Security Overview

Port security allows you to restrict the number of MAC addresses that can be learned on a port. The IES can learn up to 4K MAC addresses in total.

27.2 Port Security Screen

To open this screen, click **Advanced Application > Port Security**.

Figure 97 Port Security

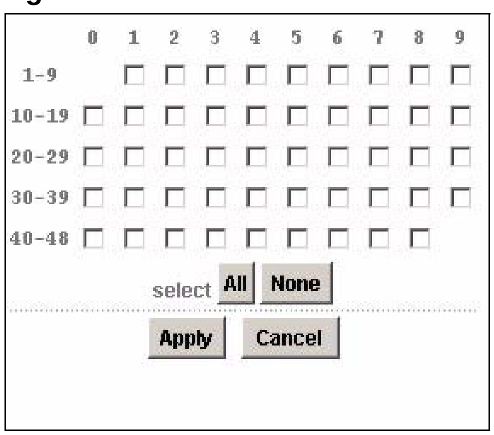


The following table describes the labels in this screen.

Table 56 Port Security

LABEL	DESCRIPTION
Port	This field displays a port number.
Enable	Select this check box to restrict the number of MAC addresses that can be learned on the port. Clear this check box to not limit the number of MAC addresses that can be learned on the port.

Table 56 Port Security (continued)

LABEL	DESCRIPTION
Limited Number of Learned MAC Address	Specify how many MAC addresses the IES can learn on this port. The range is 1~128. Note: If you also use MAC filtering on a port, it is recommended that you set this limit to be equal to or greater than the number of MAC filter entries you configure.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.
Copy port Paste	Do the following to copy settings from one port to another port or ports. 1. Select the number of the port from which you want to copy settings. 2. Click **Paste** and the following screen appears. 3. Select to which ports you want to copy the settings. Use **All** to select every port. Use **None** to clear all of the check boxes. 4. Click **Apply** to paste the settings. **Figure 98** Select Ports 

28

DHCP Relay

This chapter shows you how to set up DHCP relays for each VLAN.

28.1 DHCP Relay

DHCP (Dynamic Host Configuration Protocol, RFC 2131 and RFC 2132) allows individual clients to obtain TCP/IP configuration at start-up from a DHCP server. You can configure the IES to relay DHCP requests to one or more DHCP servers and the server's responses back to the clients. You can specify default DHCP servers for all VLAN, and you can specify DHCP servers for each VLAN.

28.2 DHCP Relay Agent Information Option (Option 82)

The IES can add information to DHCP requests that it relays to a DHCP server. This helps provide authentication about the source of the requests. You can also specify additional information for the IES to add to the DHCP requests that it relays to the DHCP server. Please see RFC 3046 for more details.

28.2.1 DHCP Relay Agent Circuit ID and Remote ID Sub-option Formats

The DHCP relay agent information feature adds an Agent Information field to the option 82 field of the DHCP headers of DHCP request frames that the IES relays to a DHCP server. The Agent Information field that the IES adds contains an "Agent Circuit-ID sub-option" that includes the port number, VLAN ID and optional information about the port where the DHCP request was received.

The following figure shows the format of the Agent Circuit ID sub-option. The 1 in the first field identifies this as an Agent Circuit ID sub-option. The length N gives the total number of octets in the Agent Information Field. If the configuration request was received on a DSL port, a 2-byte Port No field specifies the ingress port number (the first byte is always 0, the second byte is in hexadecimal format). The next field is 2 bytes and displays the DHCP request packet's VLAN ID. The last field (A) can range from 0 to 24 bytes and is optional information (that you specify) about this relay agent.

Figure 99 DHCP Relay Agent Circuit ID Sub-option Format

The Agent Information field that the IES adds also contains an "Agent Remote-ID sub-option" of information that you specify.

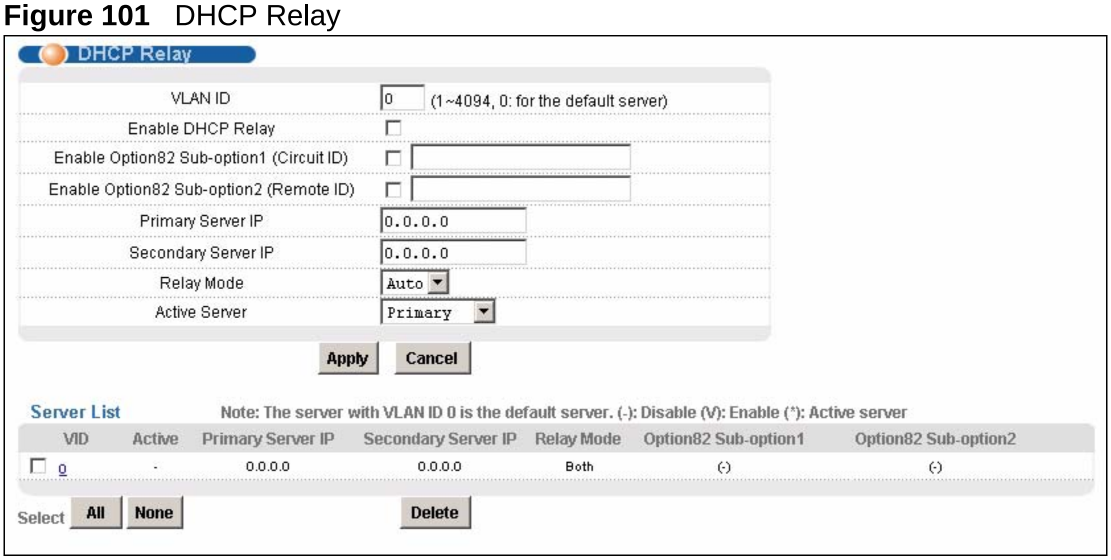
The following figure shows the format of the Agent Remote ID sub-option. The 2 in the first field identifies this as an Agent Remote ID sub-option. The length N gives the total number of octets in the Agent Information Field. Then there is the number of the port (in plain text format) upon which the DHCP client request was received. The next field (B in the figure) is 0 to 23 bytes of optional information that you specify. This is followed by the name and telephone number configured for the ADSL port. The port number, optional information (B in the figure), ADSL name and ADSL telephone number fields are separated by forward slashes.

Figure 100 DHCP Relay Agent Remote ID Sub-option Format

28.3 DHCP Relay Screen

To open this screen, click **Advanced Application > DHCP Relay**.

Figure 101 DHCP Relay



The following table describes the labels in this screen.

Table 57 DHCP Relay

LABEL	DESCRIPTION
VLAN ID	Enter the ID of the VLAN served by the specified DHCP relay(s). Enter 0 to set up the default DHCP relay(s).
Enable DHCP Relay:	Select this to have the IES relay DHCP requests in the selected VLAN to a DHCP server and the server's responses back to the clients.
Enable Option82 Sub-option1 (Circuit ID)	Select this to have the IES add the originating port numbers to DHCP requests in the selected VLAN regardless of whether the DHCP relay is on or off. In the field next to the check box, you can also specify up to 23 ASCII characters of additional information for the IES to add to the DHCP requests that it relays to a DHCP server. Examples of information you could add would be the chassis number of the IES or the ISP's name.
Enable Option82 Sub-option2 (Remote ID)	Enable DHCP relay info to have the IES add the sub-option 2 (Remote ID) to DHCP requests in the selected VLAN regardless of whether the DHCP relay is on or off. In the field next to the check box, you can also specify up to 23 ASCII characters of additional information for the IES to add to the DHCP requests that it relays to a DHCP server.
Primary Server IP	Enter the IP address of one DHCP server to which the switch should relay DHCP requests for the selected VLAN.
Secondary Server IP	Enter the IP address of a second DHCP server to which the switch should relay DHCP requests for the selected VLAN. Enter 0.0.0.0 if there is only one DHCP relay for the selected VLAN.
Relay Mode	Specify how the IES relays DHCP requests for the selected VLAN. **Auto** - The IES routes DHCP requests to the active server for the VLAN. **Both** - The IES routes DHCP requests to the primary and secondary server for the VLAN, regardless of which one is active.
Active Server	This field has no effect if the **Relay Mode** is **Both**. If the **Relay Mode** is **Auto**, select which DHCP server (the primary one or the secondary one) to which the IES should relay DHCP requests for the selected VLAN.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.
Server List	This section lists the current DHCP relay settings for each VLAN. An asterisk in parentheses (*) indicates which DHCP server is active for each VLAN.
VID	This field displays the ID of the VLAN served by the specified DHCP relay(s).
Active	This field displays whether or not the IES relays DHCP requests in the selected VLAN to a DHCP server and the server's responses back to the clients.
Primary Server IP	This field displays the IP address of one DHCP server to which the switch should relay DHCP requests. If this is the active server for the selected VLAN, it is marked with an asterisk (*).

Table 57 DHCP Relay (continued)

LABEL	DESCRIPTION
Secondary Server IP	This field displays the IP address of a second DHCP server to which the switch should relay DHCP requests. This field is 0.0.0.0 if the primary server is the only DHCP relay. If this is the active server for the selected VLAN, it is marked with an asterisk (*).
Relay Mode	This field displays how the IES relays DHCP requests for the selected VLAN. **Auto** - The IES routes DHCP requests to the active server for the VLAN. **Both** - The IES routes DHCP requests to the primary and secondary server for the VLAN, regardless of which one is active.
Option82 Sub-option1	This field displays whether or not the IES adds the originating port numbers (and any additional information) to DHCP requests in the selected VLAN.
Option82 Sub-option2	This field displays whether or not the IES adds the sub-option 2 (and any additional information) to DHCP requests in the selected VLAN.
Delete	Select the check box next to the VLAN ID, and click **Delete** to remove the entry.
Select All	Click this to select all entries in the **Server List**.
Select None	Click this to un-select all entries in the **Server List**.

29

DHCP Snoop

This chapter shows you how to set up DHCP snooping settings on the subscriber ports.

29.1 DHCP Snoop Overview

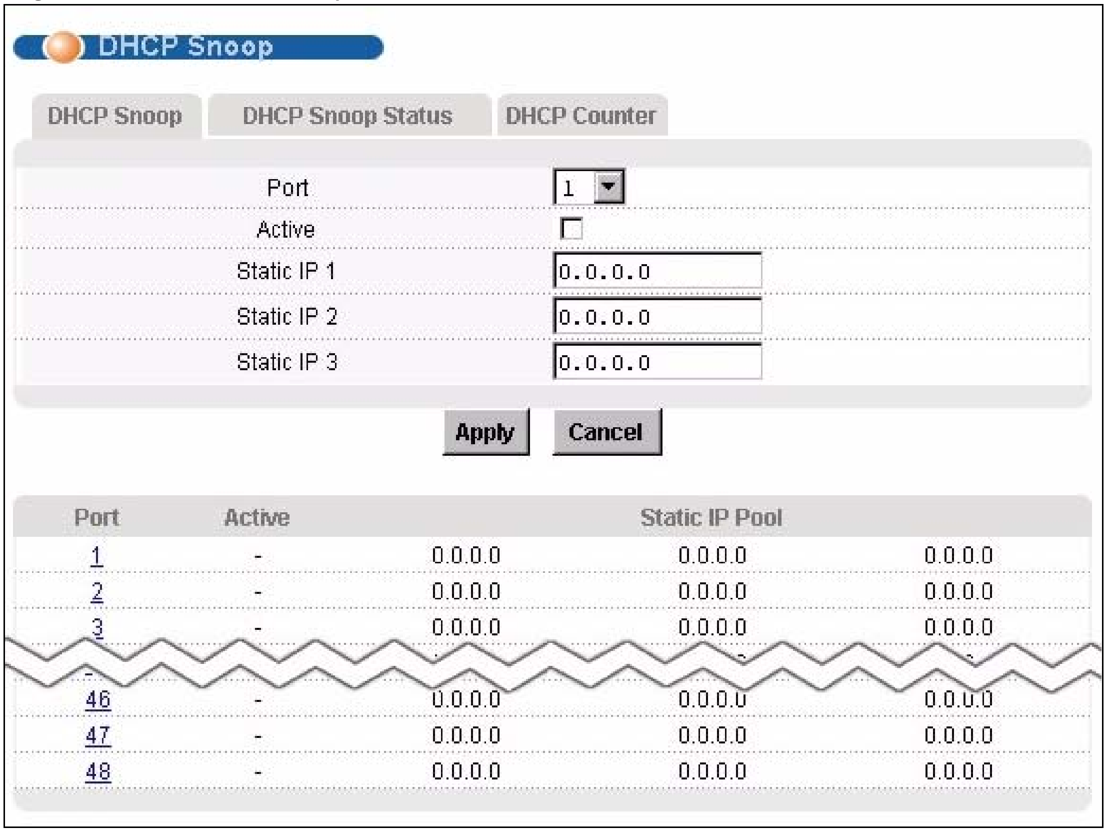
DHCP snooping prevents clients from assigning their own IP addresses. The IES can store every (ADSL port, MAC address, IP address) tuple offered by the DHCP server. Then, it only forwards packets from clients whose MAC address and IP address are recorded. Packets from unknown IP addresses are dropped.

In some cases, you might want to allow packets from an IP address not offered by the DHCP server. This might apply, for example, when a device uses a static IP address. In this case, you can specify the IP address whose packets are allowed, and the IES forwards these packets as well.

29.2 DHCP Snoop Screen

Use this screen to activate or deactivate DHCP snooping on each port. To open this screen, click **Advanced Application > DHCP Snoop**.

Figure 102 DHCP Snoop



The following table describes the labels in this screen.

Table 58 DHCP Snoop

LABEL	DESCRIPTION
DHCP Snoop Status	Click **DHCP Snoop Status** to open the screen where you can look at or clear the current DHCP snooping table on each port (see Section 29.3 on page 235).
DHCP Counter	Click **DHCP Counter** to open the screen where you can look at a summary of the DHCP packets on each port (see Section 29.4 on page 237).
Port	This field displays each ADSL port number.
Active	Specify whether DHCP snooping is active (“V”) or inactive (“-”) on this port.

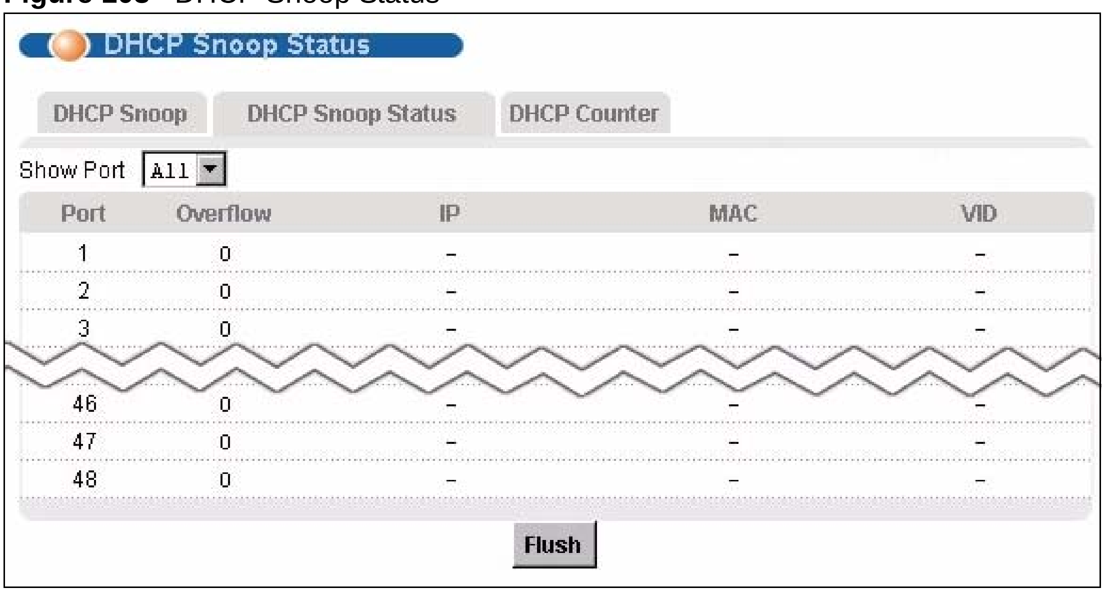
Table 58 DHCP Snoop (continued)

LABEL	DESCRIPTION
Static IP 1~3	These fields are only effective when DHCP snooping is active. Enter up to three IP addresses for which the IES should forward packets, even if the IP address is not assigned by the DHCP server. The IES drops packets from other unknown IP addresses on this port. To delete an existing IP address, enter **0.0.0.0**.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.
Port	This field displays each ADSL port number. Click a port number to edit it in the section above.
Active	This field displays whether DHCP snooping is active ("V") or inactive ("-") on this port.
Static IP Pool	These fields display IP addresses for which the IES should forward packets, even if the IP address is not assigned by the DHCP server. **0.0.0.0** is a blank value.

29.3 DHCP Snoop Status Screen

Use this screen to look at or to clear the DHCP snooping table on each port. To open this screen, click **Advanced Application > DHCP Snoop > DHCP Snoop Status**.

Figure 103 DHCP Snoop Status



The following table describes the labels in this screen.

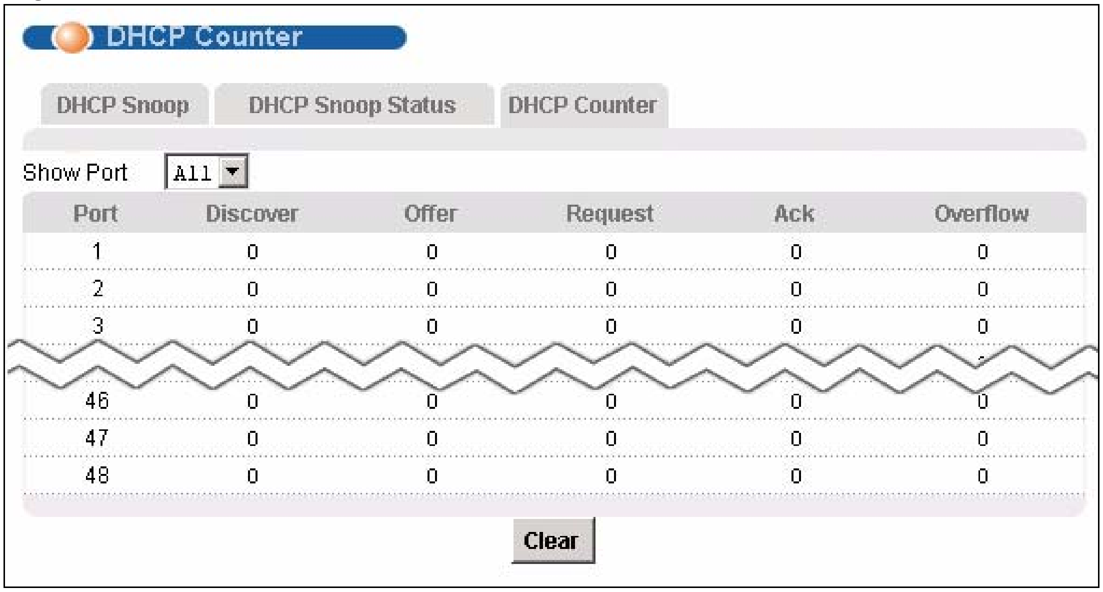
Table 59 DHCP Snoop Status

LABEL	DESCRIPTION
DHCP Snoop	Click **DHCP Snoop** to open the screen where you can activate or deactivate DHCP snooping on each port (see Section 29.2 on page 234).
DHCP Counter	Click **DHCP Counter** to open the screen where you can look at a summary of the DHCP packets on each port (see Section 29.4 on page 237).
Show Port	Select a port for which you wish to view information.
Port	This field displays the selected ADSL port number(s).
Overflow	There is a limit to the number of IP addresses the DHCP server can assign at one time to each port. This field displays the number of requests from DHCP clients above this limit. Overflow requests are dropped by the IES.
IP	This field displays the IP address assigned to a client on this port.
MAC	This field displays the MAC address of a client on this port to which the DHCP server assigned an IP address.
VID	This field displays the VLAN ID, if any, on the DHCP Request packet.
Flush	Click **Flush** to remove all of the entries from the DHCP snooping table for the selected port(s).

29.4 DHCP Counter Screen

Use this screen to look at a summary of the DHCP packets on each port. To open this screen, click **Advanced Application > DHCP Snoop > DHCP Counter**.

Figure 104 DHCP Counter



The following table describes the labels in this screen.

Table 60 DHCP Counter

LABEL	DESCRIPTION
DHCP Snoop	Click **DHCP Snoop** to open the screen where you can activate or deactivate DHCP snooping on each port (see Section 29.2 on page 234).
DHCP Snoop Status	Click **DHCP Snoop Status** to open the screen where you can look at or clear the current DHCP snooping table on each port (see Section 29.3 on page 235).
Show Port	Select a port for which you wish to view information.
Port	This field displays the selected ADSL port number(s).
Discover	This field displays the number of DHCP Discover packets on this port.
Offer	This field displays the number of DHCP Offer packets on this port.
Request	This field displays the number of DHCP Request packets on this port.
Ack	This field displays the number of DHCP Acknowledge packets on this port.
Overflow	There is a limit to the number of IP addresses the DHCP server can assign at one time to each port. This field displays the number of requests from DHCP clients above this limit. Overflow requests are dropped by the IES.
Clear	Click **Clear** to delete the information the IES has learned about DHCP packets. This resets every counter in this screen.

30

2684 Routed Mode

This chapter shows you how to set up 2684 routed mode service.

30.1 2684 Routed Mode

Use the 2684 (formerly 1483) routed mode to have the IES add MAC address headers to 2684 routed mode traffic from a PVC that connects to a subscriber device that uses 2684 routed mode. You also specify the gateway to which the IES sends the traffic and the VLAN ID tag to add. See RFC-2684 for details on routed mode traffic carried over AAL type 5 over ATM.

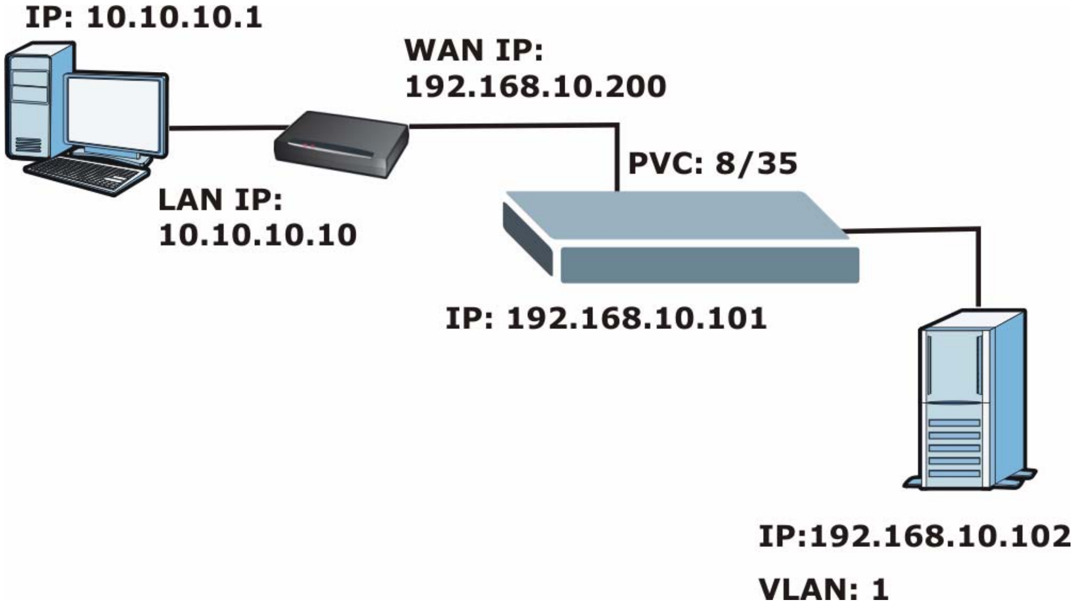
- Use the 2684 Routed PVC Screen to configure PVCs for 2684 routed mode traffic.
- Use the 2684 Routed Domain Screen to configure domains for 2684 routed mode traffic. The domain is the range of IP addresses behind the subscriber's device (the CPE or Customer Premises Equipment). This includes the CPE device's LAN IP addresses and the IP addresses of the LAN computers.
- Use the RPVC Arp Proxy Screen to view the Address Resolution Protocol table of IP addresses of CPE devices using 2684 routed mode and configure how long the device is to store them.
- Use the 2684 Routed Gateway Screen to configure gateway settings.
- For upstream traffic: Since the subscriber's device will not send out a MAC address, after the IES reassembles the Ethernet packets from the AAL5 ATM cells, the IES will append the routed mode gateway's MAC address and the IES's MAC address as the destination/source MAC address.
- For downstream traffic: When the IES sees the destination IP address is specified in the RPVC (or RPVC domain), the IES will strip out the MAC header and send them to the corresponding RPVC.

30.1.1 2684 Routed Mode Example

The following figure shows an example 2684 routed mode set up. The gateway server uses IP address 192.168.10.102 and is in VLAN 1. The IES uses IP address 192.168.10.101. The subscriber's device (the CPE) is connected to DSL port 1 on the IES and the 2684 routed mode traffic is to use the PVC identified by VPI 8 and

VCI 35. The CPE device’s WAN IP address is 192.168.10.200. The routed domain is the LAN IP addresses behind the CPE device. The CPE device’s LAN IP address is 10.10.10.10 and the LAN computer’s IP address is 10.10.10.1. This includes the CPE device’s LAN IP addresses and the IP addresses of the LAN computers.

Figure 105 2684 Routed Mode Example



Note the following.

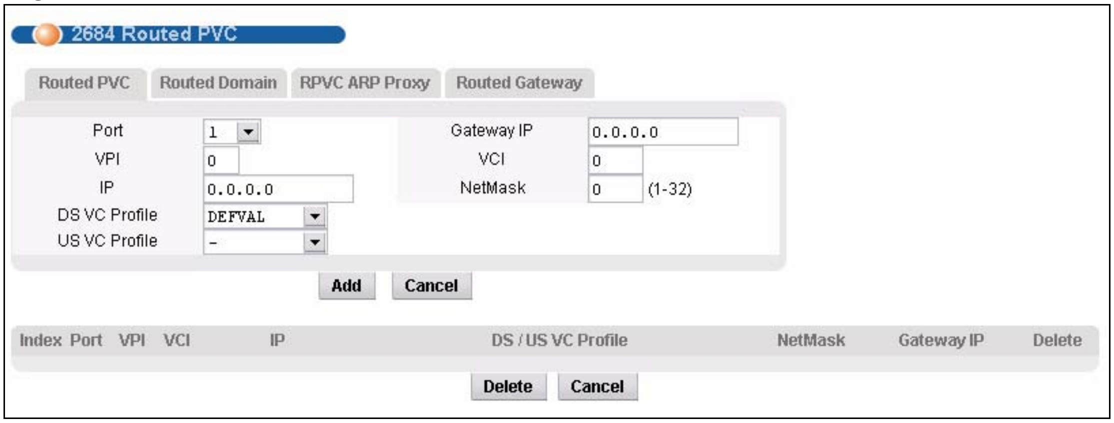
- The CPE device’s WAN IP (192.168.10.200 in this example) must be in the same subnet as the gateway’s IP address (192.168.10.102 in this example).
- The IES's management IP address can be any IP address, it doesn't have any relationship to the WAN IP address or routed gateway IP address.
- The IES’s management IP address should not be in the same subnet as the one defined by the WAN IP address and netmask of the subscriber’s device. It is suggested that you set the netmask of the subscriber’s WAN IP address to 32 to avoid this problem.
- The IES's management IP address should not be in the same subnet range of any RPVC and RPVC domain. It will make the IES confused if the IES0 receives a packet with this IP as destination IP.
- The IES’s management IP address also should not be in the same subnet as the one defined by the LAN IP address and netmask of the subscriber’s device. Make sure you assign the IP addresses properly.
- In general deployment, the computer must set the CPE device’s LAN IP address (10.10.10.10 in this example) as its default gateway.
- The subnet range of any RPVC and RPVC domain must be unique.

30.2 2684 Routed PVC Screen

Use this screen to configure PVCs for 2684 routed mode traffic.

To open this screen, click **Advanced Application > 2684 Routed Mode**.

Figure 106 2684 Routed PVC



The following table describes the labels in this screen.

Table 61 2684 Routed PVC

LABEL	DESCRIPTION
Routed Domain	Click **Routed Domain** to open this screen where you can configure domains for 2684 routed mode traffic (see Section 30.3 on page 243).
RPVC ARP Proxy	Click **RPVC ARP Proxy** to go to the screen where you can view the Address Resolution Protocol table of IP addresses of CPE devices using 2684 routed mode and configure how long the device is to store them (see Section 30.4 on page 244).
Routed Gateway	Click **Routed Gateway** to go to the screen where you can configure gateway settings (see Section 30.5 on page 245).
Port	Use this drop-down list box to select a port for which you wish to configure settings.
Gateway IP	Enter the IP address of the gateway to which you want to send the traffic that the system receives from this PVC. Enter the IP address in dotted decimal notation.
VPI	Type the Virtual Path Identifier for this routed PVC.
VCI	Type the Virtual Circuit Identifier for this routed PVC.
IP	Enter the subscriber's CPE WAN IP address in dotted decimal notation.

Table 61 2684 Routed PVC (continued)

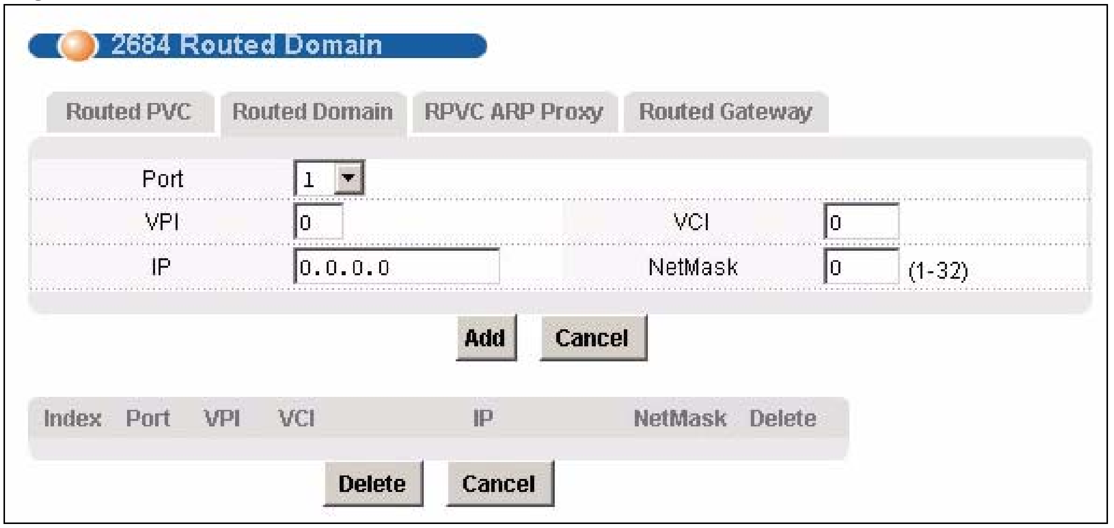
LABEL	DESCRIPTION
NetMask	The bit number of the subnet mask of the subscriber's WAN IP address. To find the bit number, convert the subnet mask to binary and add all of the 1's together. Take "255.255.255.0" for example. 255 converts to eight 1's in binary. There are three 255's, so add three eights together and you get the bit number (24). Make sure that the routed PVC's subnet does not include the IES's IP address.
DS VC Profile	Use the drop-down list box to select a VC profile to use for this channel's downstream traffic shaping.
US VC Profile	Use the drop-down list box to select a VC profile to use for this channel's upstream traffic. The IES does not perform upstream traffic policing if you do not specify an upstream VC profile.
Add	Click **Add** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
Index	This field displays the number of the routed PVC.
Port	This field displays the number of the ADSL port on which the routed PVC is configured.
VPI	This field displays the Virtual Path Identifier (VPI) The VPI and VCI identify a channel on this port.
VCI	This field displays the Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
IP	This field displays the subscriber's IP address.
DS / US VC Profile	This shows which VC profile this channel uses for downstream traffic shaping. The VC profile for upstream policing also displays if the channel is configured to use one.
NetMask	This field displays the bit number of the subnet mask of the subscriber's IP address.
Gateway IP	This field displays the IP address of the gateway to which you want to send the traffic that the system receives from this PVC.
Delete	Select an entry's **Delete** check box and click **Delete** to remove the entry. Clicking **Delete** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

30.3 2684 Routed Domain Screen

Use this screen to configure domains for 2684 routed mode traffic. The domain is the range of IP addresses behind the subscriber's device (the CPE). This includes the CPE device's LAN IP addresses and the IP addresses of the LAN computers.

To open this screen, click **Advanced Application > 2684 Routed Mode** > **Routed Domain**.

Figure 107 2684 Routed Domain



The following table describes the labels in this screen.

Table 62 2684 Routed Domain

LABEL	DESCRIPTION
Port	Use this drop-down list box to select a port for which you wish to configure settings.
VPI	Type the Virtual Path Identifier for this routed PVC.
VCI	Type the Virtual Circuit Identifier for this routed PVC.
IP	Enter the subscriber's CPE LAN IP address in dotted decimal notation.
NetMask	The bit number of the subnet mask of the subscriber's IP address. To find the bit number, convert the subnet mask to binary and add all of the 1's together. Take "255.255.255.0" for example. 255 converts to eight 1's in binary. There are three 255's, so add three eights together and you get the bit number (24).
Add	Click **Add** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
Index	This field displays the number of the routed PVC.

Table 62 2684 Routed Domain (continued)

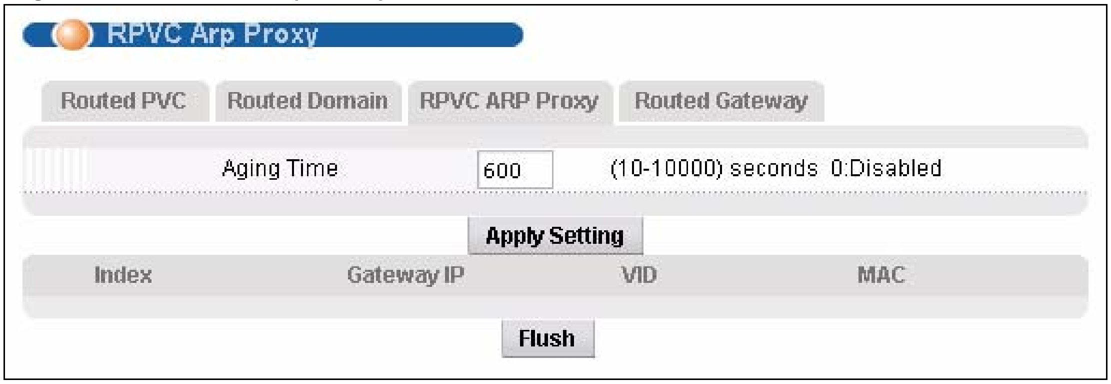
LABEL	DESCRIPTION
Port	This field displays the number of the ADSL port on which the routed PVC is configured.
VPI	This field displays the Virtual Path Identifier (VPI) The VPI and VCI identify a channel on this port.
VCI	This field displays the Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
IP	This field displays the subscriber’s IP address.
NetMask	This field displays the bit number of the subnet mask of the subscriber’s LAN IP address.
Delete	Select an entry’s **Delete** check box and click **Delete** to remove the entry. Clicking **Delete** saves your changes to the IES’s volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

30.4 RPVC Arp Proxy Screen

Use this screen to view the Address Resolution Protocol table of IP addresses of CPE devices using 2684 routed mode and configure how long the device is to store them.

To open this screen, click **Advanced Application > 2684 Routed Mode** > **RPVC ARP Proxy**.

Figure 108 RPVC Arp Proxy



The following table describes the labels in this screen.

Table 63 RPVC Arp Proxy

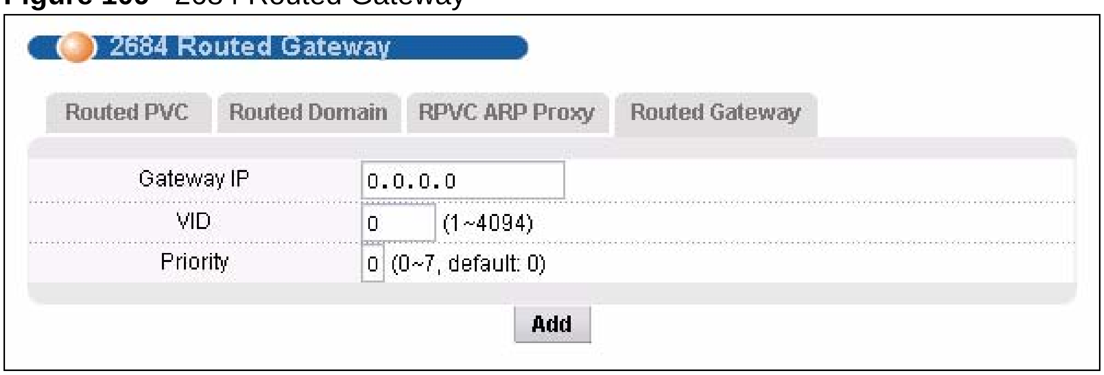
LABEL	DESCRIPTION
Aging Time	Enter a number of seconds (10~10000) to set how long the device keeps the Address Resolution Protocol table's entries of IP addresses of CPE devices using 2684 routed mode. Enter 0 to disable the aging time.
Apply Setting	Click **Apply Setting** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Index	This field displays the number of the IP address entry.
Gateway IP	This field displays the IP address of the gateway to which the device sends the traffic that it receives from this entry's IP address.
VID	This field displays the VLAN Identifier that the device adds to Ethernet frames that it sends to this gateway.
MAC	This field displays the subscriber's MAC (Media Access Control) address.
Flush	Click **Flush** to remove all of the entries from the ARP table.

30.5 2684 Routed Gateway Screen

Use this screen to configure gateway settings.

To open this screen, click **Advanced Application > 2684 Routed Mode** > **Routed Gateway**.

Figure 109 2684 Routed Gateway



The following table describes the labels in this screen.

Table 64 2684 Routed Gateway

LABEL	DESCRIPTION
Gateway IP	Enter the IP address of the gateway to which you want to send the traffic that the system receives from this PVC. Enter the IP address in dotted decimal notation.
VID	Specify a VLAN Identifier to add to Ethernet frames that the system routes to this gateway.
Priority	Select the IEEE 802.1p priority (0~7) to add to the traffic that you send to this gateway.
Add	Click **Add** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Index	This field displays the number of the gateway entry.
Gateway IP	This field displays the IP address of the gateway.
VID	This field displays the VLAN Identifier that the system adds to Ethernet frames that it sends to this gateway.
Priority	This field displays the IEEE 802.1p priority (0~7) that is added to traffic sent to this gateway.
Delete	Select an entry's **Delete** check box and click **Delete** to remove the entry. Clicking **Delete** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

31

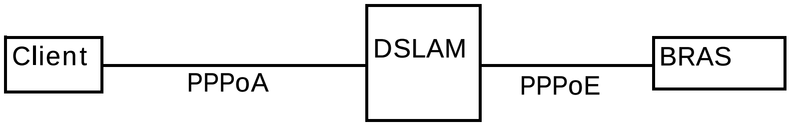
PPPoA to PPPoE

This chapter shows you how to set up the IES to convert PPPoA frames to PPPoE traffic and vice versa.

31.1 PPPoA to PPPoE Overview

Before migrating to an Ethernet infrastructure, a broadband network might consist of PPPoA connections between the CPE devices and the DSLAM and PPPoE connections from the DSLAM to the Broadband Remote Access Server (BRAS). The following figure shows a network example.

Figure 110 Mixed PPPoA-to-PPPoE Broadband Network Example



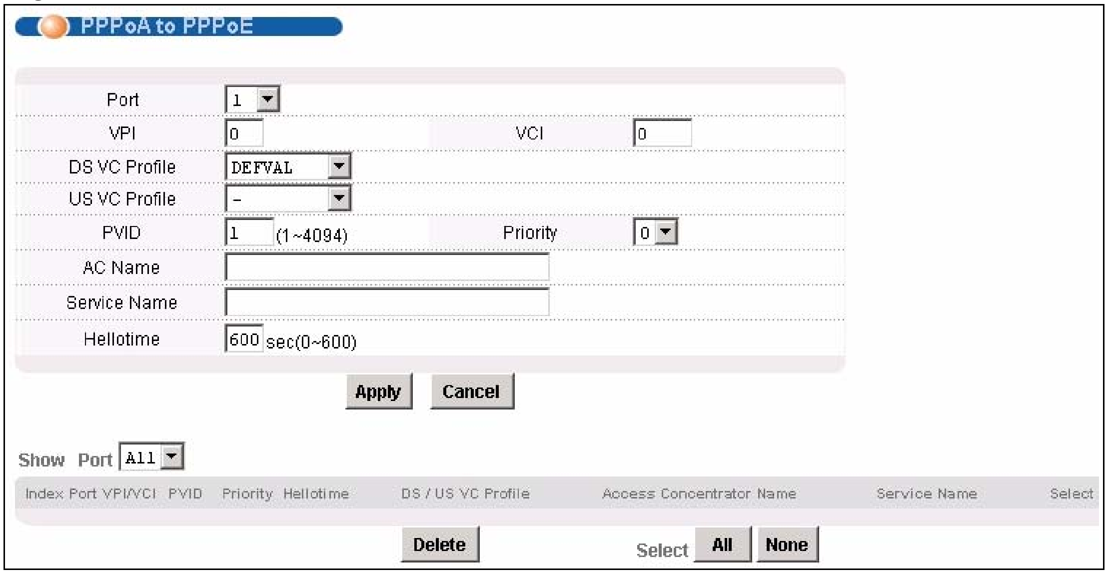
In order to allow communication between the end points (the CPE devices and the BRAS), you need to configure the DSLAM (the IES) to translate PPPoA frames to PPPoE packets and vise versa.

When PPPoA packets are received from the CPE, the ATM headers are removed and the IES adds PPPoE and Ethernet headers before sending the packets to the BRAS. When the IES receives PPPoE packets from the BRAS, PPPoE and Ethernet headers are stripped and necessary PVC information (such as encapsulation type) is added before forwarding to the designated CPE.

31.2 PPPoA to PPPoE Screen

Use this screen to set up PPPoA to PPPoE conversions on each port. This conversion is set up by creating a PAE PVC. See Chapter 16 on page 131 for background information about creating PVCs. To open this screen, click **Advanced Application > PPPoA to PPPoE**.

Figure 111 PPPoA to PPPoE



The following table describes the labels in this screen.

Table 65 PPPoA to PPPoE

LABEL	DESCRIPTION
Port	Use this drop-down list box to select a port for which you wish to set up PPPoA to PPPoE conversions. This field is read-only once you click on a port number below.
VPI	Type the Virtual Path Identifier for a channel on this port.
VCI	Type the Virtual Circuit Identifier for a channel on this port.
DS VC Profile	Use the drop-down list box to select a VC profile to use for this channel's downstream traffic shaping.
US VC Profile	Use the drop-down list box to select a VC profile to use for this channel's upstream traffic. The IES does not perform upstream traffic policing if you do not specify an upstream VC profile. Note: Upstream traffic policing should be used in conjunction with the ATM shaping feature on the subscriber's device. If the subscriber's device does not apply the appropriate ATM shaping, all upstream traffic will be discarded due to upstream traffic policing.

Table 65 PPPoA to PPPoE (continued)

LABEL	DESCRIPTION
PVID	Type a PVID (Port VLAN ID) to assign to untagged frames received on this channel. Note: Make sure the VID is not already used for multicast VLAN or TLS PVC.
Priority	Use the drop-down list box to select the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.
AC Name	This field is optional. Specify the hostname of a remote access concentrator if there are two access concentrators (or BRAS) on the network or if you want to allow PAE translation to the specified access concentrator. In this case, the IES checks the AC name field in the BRAS's reply PDU. If there is a mismatch, the IES drops this PDU. (This is not recorded as an **PPPoE AC System Error** in the **PPPoA to PPPoE Status** screen, however.)
Service Name	This field is optional. Specify the name of the service that uses this PVC. This must be a service name that you configure on the remote access concentrator.
Hellotime	Specify the timeout, in seconds, for the PPPoE session. Enter 0 if there is no timeout.
Apply	Click this to add or save channel settings on the selected port. This saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
Show Port	Select which ADSL port(s) for which to display PPPoA to PPPoE conversion settings.
Index	This field displays the number of the PVC. Click a PVC's index number to open the screen where you can look at the current status of this PPPoA-to-PPPoE conversion. (See Section 31.3 on page 251.) Note: At the time of writing, you cannot edit the VPI and VCI. If you want to change them, add a new PVC with the desired settings. Then, delete any unwanted PVCs.
Port	This field displays the number of the ADSL port on which the PVC is configured.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
PVID	This is the PVID (Port VLAN ID) assigned to untagged frames or priority frames (0 VID) received on this channel.
Priority	This is the priority value (0 to 7) added to incoming frames without a (IEEE 802.1p) priority tag.
Hellotime	This field displays the timeout for the PPPoE session, in seconds.
DS / US VC Profile	This shows which VC profile this channel uses for downstream traffic shaping. The VC profile for upstream policing also displays if the channel is configured to use one.

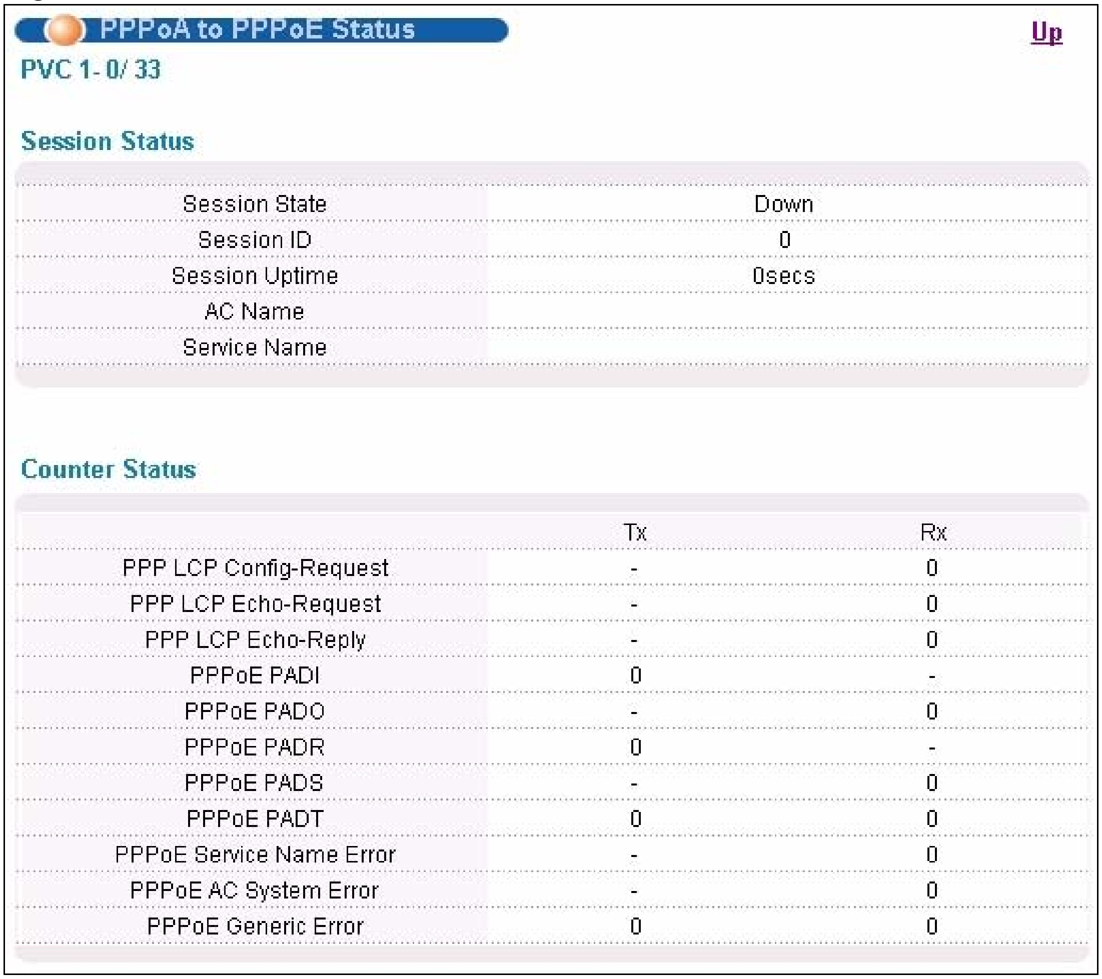
Table 65 PPPoA to PPPoE (continued)

LABEL	DESCRIPTION
Access Concentrator Name	This field displays the name of the specified remote access concentrator, if any.
Service Name	This field displays the name of the service that uses this PVC on the remote access concentrator.
Select Delete	Select the check box in the **Select** column for an entry, and click **Delete** to remove the entry.
Select All	Click this to select all entries in the table.
Select None	Click this to un-select all entries in the table.

31.3 PPPoA to PPPoE Status Screen

Use this screen to look at the current status of each PPPoA to PPPoE conversion. To open this screen, click **Advanced Application > PPPoA to PPPoE**, and then click an index number.

Figure 112 PPPoA to PPPoE Status



The following table describes the labels in this screen.

Table 66 PPPoA to PPPoE Status

LABEL	DESCRIPTION
PPPoA to PPPoE	Click **PPPoA to PPPoE** to open the screen where you can set up PPPoA-to-PPPoE conversions on each port (see Section 31.2 on page 248).
PVC	This field displays the port number, VPI, and VCI of the PVC.
Session Status	
Session State	This field displays whether or not the current session is **Up** or **Down**.

Table 66 PPPoA to PPPoE Status (continued)

LABEL	DESCRIPTION
Session ID	This field displays the ID of the current session. It displays **0** if there is no current session.
Session Uptime	This field displays how long the current session has been up.
AC Name	This field displays the hostname of the remote access concentrator if there are two access concentrators (or BRAS) on the network or if you want to allow PAE translation to the specified access concentrator.
Service Name	This field specifies the name of the service that uses this PVC.
Counter Status	
Tx/Rx	The values in these columns are for packets transmitted (`tx`) or received (`rx`) by the IES.
PPP LCP Config-Request	This field displays the number of config-request PDUs received by the IES from the CPE (client) device.
PPP LCP Echo-Request	This field displays the number of echo-request PDUs received by the IES from the CPE (client) device.
PPP LCP Echo-Reply	This field displays the number of echo-reply PDUs received by the IES from the CPE (client) device.
PPPoE PADI	This field displays the number of padi PDUs sent by the IES to the BRAS.
PPPoE PADO	This field displays the number of pado PDUs sent by the BRAS to the IES.
PPPoE PADR	This field displays the number of padr PDUs sent by the IES to the BRAS.
PPPoE PADS	This field displays the number of pads PDUs sent by the BRAS to the IES.
PPPoE PADT	This field displays the number of padt PDUs sent and received by the IES.
PPPoE Service Name Error	This field displays the number of service name errors; for example, the IES's specified service is different than the BRAS's setting.
PPPoE AC System Error	This field displays the number of times the access concentrator experienced an error while performing the Host request; for example, when resources are exhausted in the access concentrator. This value does not include the number of times the IES checks the AC name field in the BRAS's reply PDU and finds a mismatch, however.
PPPoE Generic Error	This field displays the number of other types of errors that occur in the PPPoE session between the IES and the BRAS.

32

DSCP

This chapter shows you how to set up DSCP on each port and how to convert DSCP values to IEEE 802.1p values.

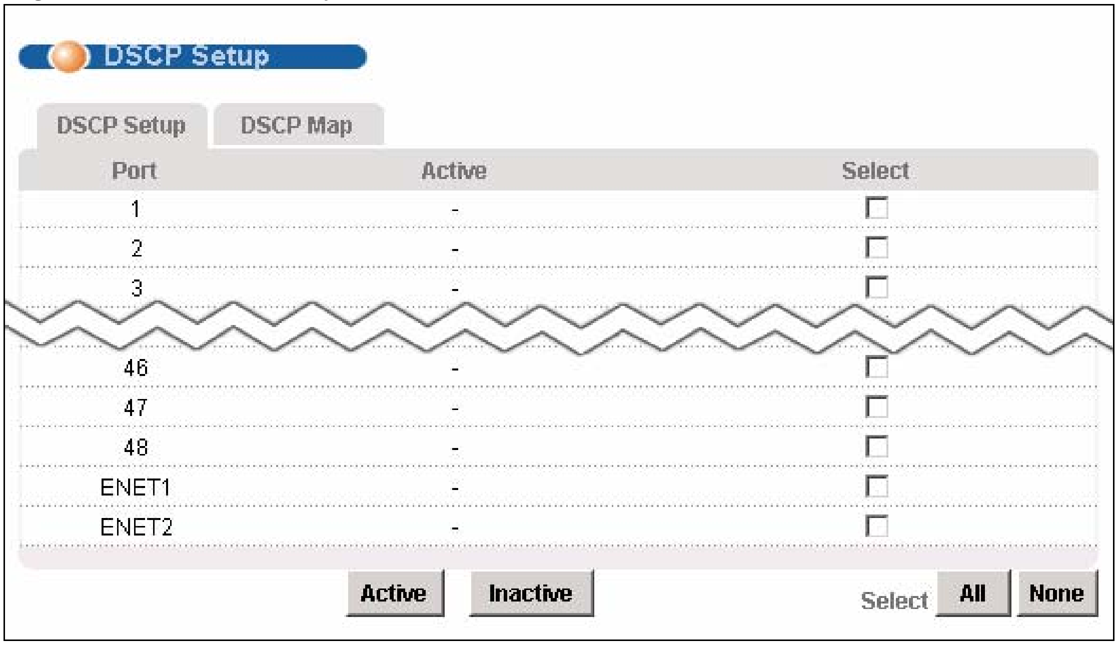
32.1 DSCP Overview

DiffServ Code Point (DSCP) is a field used for packet classification on DiffServ networks. The higher the value, the higher the priority. Lower-priority packets may be dropped if the total traffic exceeds the capacity of the network.

32.2 DSCP Setup Screen

Use this screen to activate or deactivate DSCP on each port. To open this screen, click **Advanced Application > DSCP**.

Figure 113 DSCP Setup



The following table describes the labels in this screen.

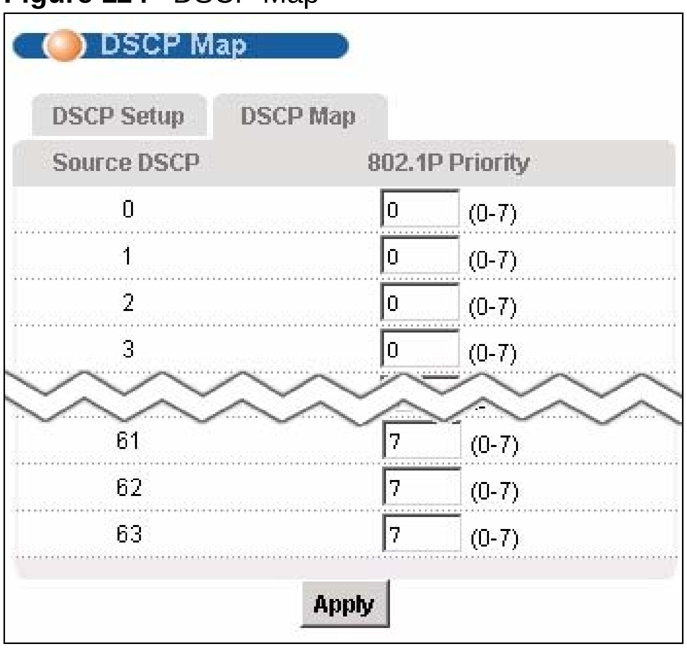
Table 67 DSCP Setup

LABEL	DESCRIPTION
DSCP Map	Click **DSCP Map** to open the screen where you can set up the mapping between source DSCP priority and IEEE 802.1p priority (see Section 32.3 on page 254).
Port	This field displays each port number.
Active	This field displays whether DSCP is active ("V") or inactive ("-") on this port.
Select	Select this, and click **Active** or **Inactive** to enable or disable the DSCP on this port.
Active	Click this to enable DSCP on the selected ports.
Inactive	Click this to disable DSCP on the selected ports.
All	Click this to select all entries in the table.
None	Click this to un-select all entries in the table.

32.3 DSCP Map Screen

Use this screen to convert DSCP priority to IEEE 802.1p priority. To open this screen, click **Advanced Application > DSCP** > **DSCP Map**.

Figure 114 DSCP Map



The following table describes the labels in this screen.

Table 68 DSCP Map

LABEL	DESCRIPTION
DSCP Map	Click **DSCP Setup** to open the screen where you can activate or deactivate DSCP on each port (see Section 32.2 on page 253).
Source DSCP	This field displays each DSCP value.
802.1P Priority	Enter the IEEE 802.1p priority to which you would like to map this DSCP value.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.

33

TLS PVC

This chapter shows you how to set up Transparent LAN Service (VLAN stacking, Q-in-Q) on each port.

33.1 Transparent LAN Service (TLS) Overview

Transparent LAN Service (also known as VLAN stacking or Q-in-Q) allows a service provider to distinguish multiple customers VLANs, even those with the same (customer-assigned) VLAN ID, within its network.

Use TLS to add an outer VLAN tag to the inner IEEE 802.1Q tagged frames that enter the network. By tagging the tagged frames ("double-tagged" frames), the service provider can manage up to 4,094 VLAN groups with each group containing up to 4,094 customer VLANs. This allows a service provider to provide different services, based on specific VLANs, for many different customers.

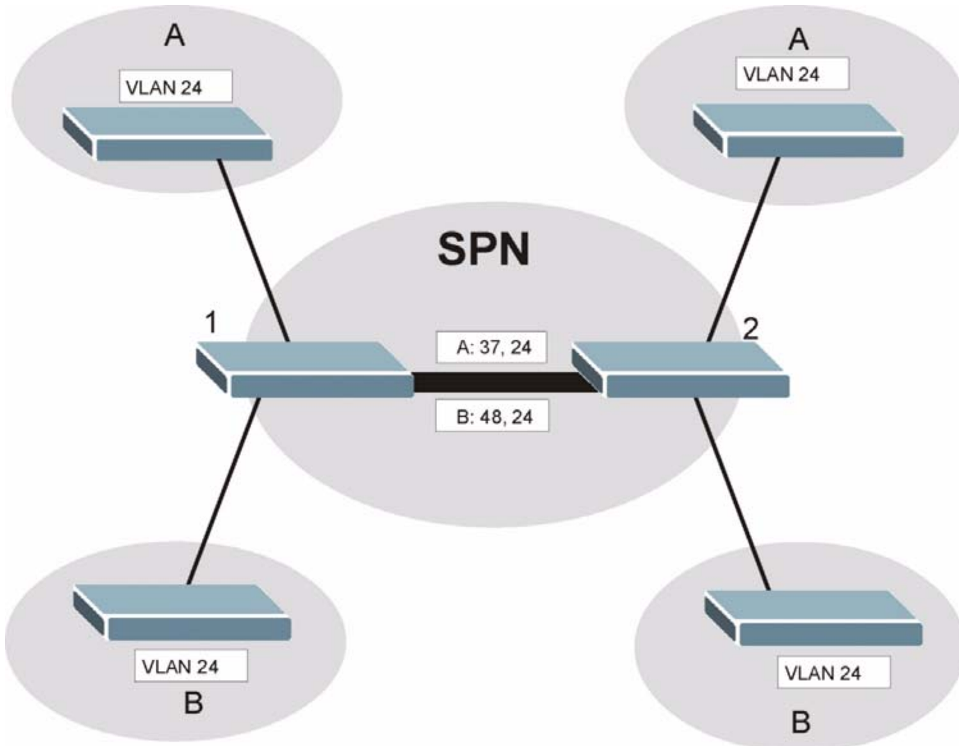
A service provider's customers may require a range of VLANs to handle multiple applications. A service provider's customers can assign their own inner VLAN tags to traffic. The service provider can assign an outer VLAN tag for each customer. Therefore, there is no VLAN tag overlap among customers, so traffic from different customers is kept separate.

Before the IES sends the frames from the customers, the VLAN ID is added to the frames. When packets intended for specific customers are received on the IES, the outer VLAN tag is removed before the traffic is sent.

33.1.1 TLS Network Example

In the following example figure, both A and B are Service Provider's Network (SPN) customers with VPN tunnels between their head offices and branch offices, respectively. Both have an identical VLAN tag for their VLAN group. The service provider can separate these two VLANs within its network by adding tag 37 to distinguish customer A and tag 48 to distinguish customer B at edge device 1 and then stripping those tags at edge device 2 as the data frames leave the network.

Figure 115 Transparent LAN Service Network Example

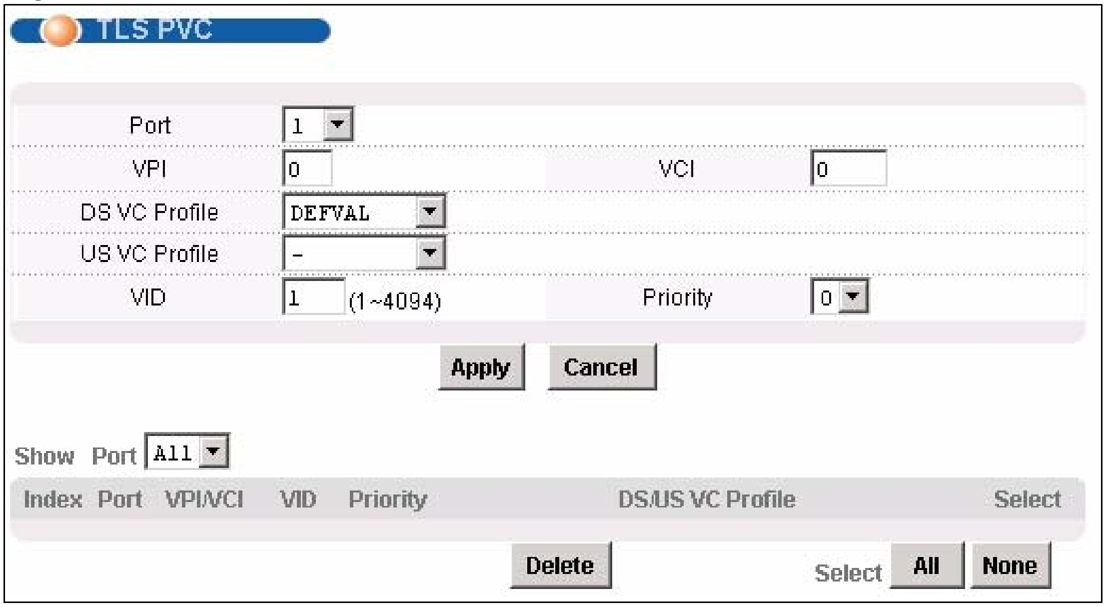


33.2 TLS PVC Screen

Use this screen to set up Transparent LAN Services on each port. This is set up by creating a TLS PVC. See Chapter 16 on page 131 for background information about creating PVCs. To open this screen, click **Advanced Application > TLS PVC**.

Note: You can NOT configure PPPoA-to-PPPoE and TLS settings on the same PVC.

Figure 116 TLS PVC



The following table describes the labels in this screen.

Table 69 TLS PVC

LABEL	DESCRIPTION
Port	Use this drop-down list box to select a port for which you wish to set up a TLS PVC. This field is read-only once you click on a port number below.
VPI	Type the Virtual Path Identifier for a channel on this port.
VCI	Type the Virtual Circuit Identifier for a channel on this port.
DS VC Profile	Use the drop-down list box to select a VC profile to use for this channel's downstream traffic shaping.
US VC Profile	Use the drop-down list box to select a VC profile to use for this channel's upstream traffic. The IES does not perform upstream traffic policing if you do not specify an upstream VC profile. Note: Upstream traffic policing should be used in conjunction with the ATM shaping feature on the subscriber's device. If the subscriber's device does not apply the appropriate ATM shaping, all upstream traffic will be discarded due to upstream traffic policing.
VID	Type a VLAN ID to assign to frames received on this channel. Note: Make sure the VID is not already used for PPPoA-to-PPPoE conversions.
Priority	Use the drop-down list box to select the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.

Table 69 TLS PVC (continued)

LABEL	DESCRIPTION
Apply	Click this to add or save channel settings on the selected port. This saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
Show Port	Select which ADSL port(s) for which to display TLS PVC settings.
Index	This field displays the number of the PVC. Click a PVC's index number to use the top of the screen to edit the PVC. Note: At the time of writing, you cannot edit the VPI and VCI. If you want to change them, add a new PVC with the desired settings. Then you can delete any unwanted PVCs.
Port	This field displays the number of the ADSL port on which the PVC is configured.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
VID	This is the VLAN ID assigned to frames received on this channel.
Priority	This is the priority value (0 to 7) added to incoming frames without a (IEEE 802.1p) priority tag.
DS/US VC Profile	This shows which VC profile this channel uses for downstream traffic shaping. The VC profile for upstream policing also displays if the channel is configured to use one.
Select Delete	Select the check box in the **Select** column for an entry, and click **Delete** to remove the entry.
Select All	Click this to select all entries in the table.
Select None	Click this to un-select all entries in the table.

34

ACL

This chapter shows you how to set up ACL profiles on each port.

34.1 Access Control List (ACL) Overview

An ACL (Access Control List) profile allows the IES to classify and perform actions on the upstream traffic. Each ACL profile consists of a rule and an action, and you assign ACL profiles to PVCs.

34.1.1 ACL Profile Rules

Each ACL profile uses one of 14 rules to classify upstream traffic. These rules are listed below by rule number.

1 etype <etype> vlan <vid>

2 etype <etype> smac <mac>

3 etype <etype> dmac <mac>

4 vlan <vid> smac <mac>

5 vlan <vid> dmac <mac>

6 smac <mac> dmac <mac>

7 vlan <vid> priority <priority>

8 etype <etype>

9 vlan <vid>

10 smac <mac>

11 dmac <mac>

12 priority <priority>

13 protocol <protocol>

14 {srcip <ip>/<mask>{|dstip <ip>/<mask>{|tos <stos> <etos> {|srcport <sport> <eport> {|dstport <sport> <eport>}}}}}

The input values for these values have the following ranges.

- <vid>: 1~4094
- <priority>: 1~7
- <etype>: 0~65535
- <protocol>: tcp|udp|ospf|igmp|ip|gre|icmp|<ptype>
- <ptype>: 0~255
- <mask>: 0~32
- <tos>: 0~255
- <port>: 0~65535

If you apply multiple profiles to a PVC, the IES checks the profiles by rule number. The lower the rule number, the higher the priority the rule (and profile) has. For example, there are two ACL profiles assigned to a PVC. Profile1 is for VLAN ID 100 (rule number 9) traffic, and Profile2 is for IEEE 802.1p priority 0 traffic (rule number 12). The IES checks Profile1 first. If the traffic is VLAN ID 100, the IES follows the action in Profile1 and does not check Profile2. You cannot assign profiles that have the same rule numbers to the same PVC.

34.1.2 ACL Profile Actions

The IES can perform the following actions after it classifies upstream traffic.

- rate <rate>: change the rate to the specified value (1~65535 kbps)
- rvlan <rvlan>: change the VLAN ID to the specified value (1~4094)
- rpri <rpri>: change the IEEE 802.1p priority to the specified value (0~7)
- deny: do not forward the packet

The IES can apply more than one action to a packet, unless you select deny.

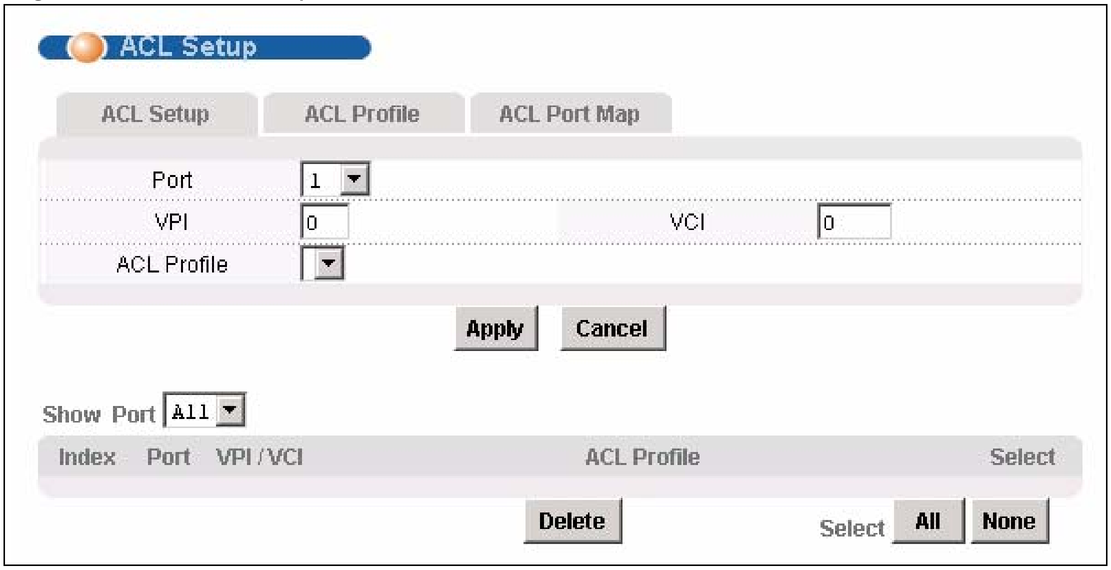
If you select the rvlan action, the IES replaces the VLAN ID before it compares the VLAN ID of the packet to the VID of the PVC. As a result, it is suggested that you replace VLAN ID on super channels, not normal PVC, since super channels accept any tagged traffic. If you replace the VLAN ID for a normal PVC, the IES drops the traffic because the new VLAN ID does not match the VID of the PVC. This is illustrated in the following scenario.

There is a normal PVC, and its PVID is 900. You create an ACL rule to replace the VLAN ID with 901. Initially, the traffic for the PVC belongs to VLAN 900. Then, the IES checks the ACL rule and changes the traffic to VLAN 901. When the IES finally compares the VLAN ID of the traffic (901) to the VID of the PVC (900), the IES drops the packets because they do not match.

34.2 ACL Setup Screen

Use this screen to assign ACL profiles to each PVC. To open this screen, click **Advanced Application > ACL**.

Figure 117 ACL Setup



The following table describes the labels in this screen.

Table 70 ACL Setup

LABEL	DESCRIPTION
ACL Profile	Click **ACL Profile** to open the screen where you can set up ACL profiles (see Section 34.3 on page 265).
ACL Profile Map	Click **ACL Profile Map** to open the screen where you can look at which ACL profiles are assigned to which PVCs (see Section 34.4 on page 267).
Port	Use this drop-down list box to select a port to which you wish to assign an ACL profile. This field is read-only once you click on a port number below.
VPI	Type the Virtual Path Identifier for a channel on this port.
VCI	Type the Virtual Circuit Identifier for a channel on this port.
ACL Profile	Use the drop-down list box to select the ACL profile you want to assign to this PVC.
Apply	Click this to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.

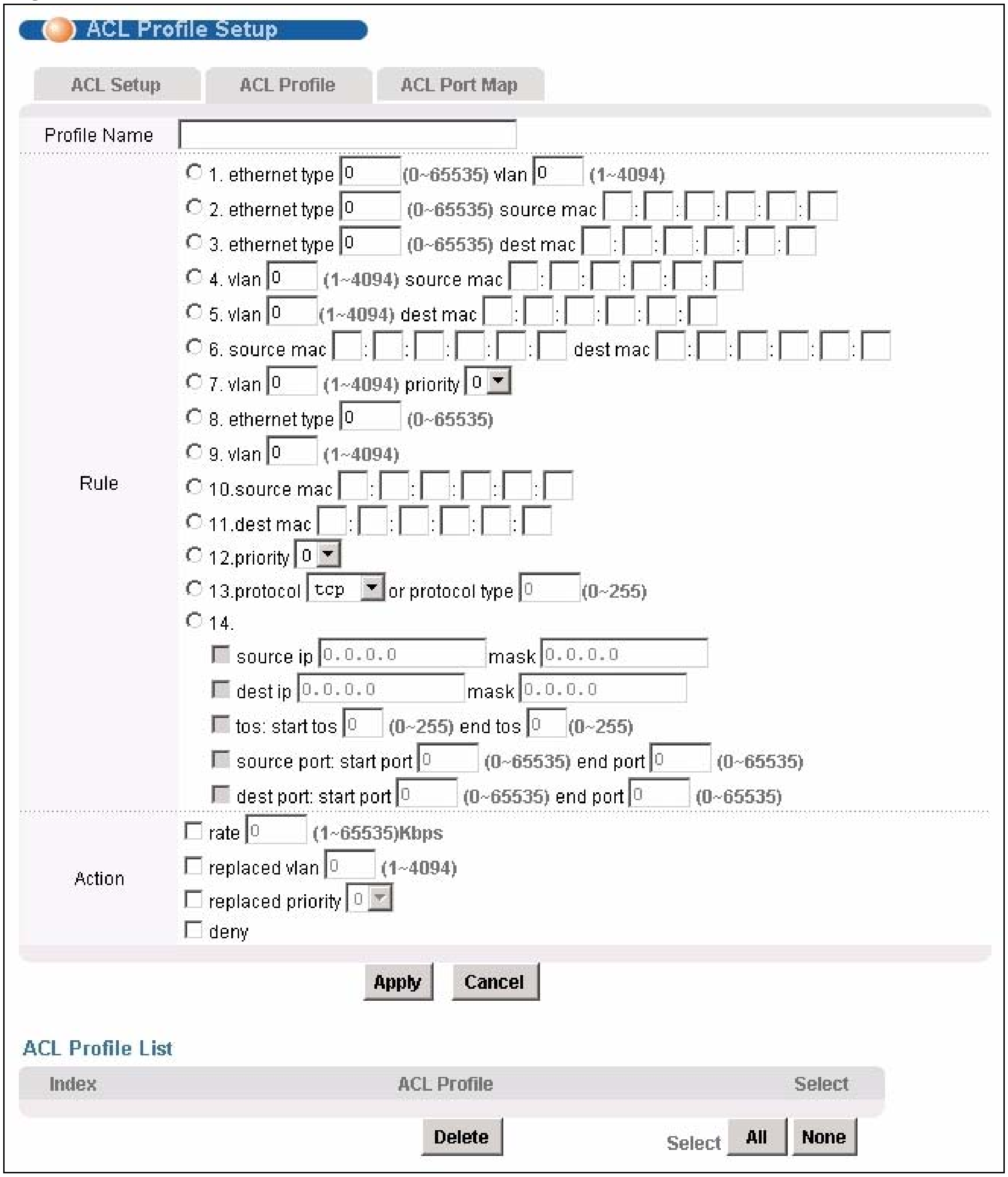
Table 70 ACL Setup (continued)

LABEL	DESCRIPTION
Cancel	Click **Cancel** to start configuring the screen again.
Show Port	Select which ADSL port(s) for which to display ACL profile settings.
Index	This field displays the number of the PVC. Click a PVC's index number to use the top of the screen to edit the PVC. Note: At the time of writing, you cannot edit the VPI and VCI. If you want to change them, add a new PVC with the desired settings. Then you can delete any unwanted PVCs.
Port	This field displays the number of the ADSL port on which the PVC is configured.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
ACL Profile	This field shows the ACL profile assigned to this PVC.
Select Delete	Select the check box in the **Select** column for an entry, and click **Delete** to remove the entry.
Select All	Click this to select all entries in the table.
Select None	Click this to un-select all entries in the table.

34.3 ACL Profile Screen

Use this screen to set up ACL profiles. To open this screen, click **Advanced Application > ACL > ACL Profile**.

Figure 118 ACL Profile



The following table describes the labels in this screen.

Table 71 ACL Profile

LABEL	DESCRIPTION
Profile Name	Enter a descriptive name for the ACL profile. The name can be 1-31 printable ASCII characters long. Spaces are not allowed.
Rule	Select which type of rule to use. Note: The lower the number (1-14), the higher the priority the rule has. Provide additional information required for the selected rule. Additional rules consist of one or more of the following criteria.
ethernet type	Enter the 16-bit EtherType value between 0 and 65535.
vlan	Enter a VLAN ID between 1 and 4094.
source mac	Enter the source MAC address.
dest mac	Enter the destination MAC address.
priority	Select the IEEE 802.1p priority.
protocol	Select the IP protocol used.
protocol type	Enter the IP protocol number (between 0 and 255) used.
source ip	Enter the source IP address and subnet mask in dotted decimal notation.
dest ip	Enter the source IP address and subnet mask in dotted decimal notation.
tos	Enter the start and end Type of Service between 0 and 255.
source port	Enter the source port or range of source ports.
dest port	Enter the destination port or range of destination ports.
Action	Select which action(s) the IES should follow when the criteria are satisfied.
rate	Enter the maximum bandwidth this traffic is allowed to have.
replaced vlan	Enter the VLAN ID that this traffic should use.
replaced priority	Select the IEEE 802.1p priority that this traffic should have.
deny	Select this if you want the IES to reject this kind of traffic.
ACL Profile List	
Index	This field displays a sequential value. The sequence in this table is not important. Click this to edit the associated ACL profile in the section above.
ACL Profile	This field displays the name of this ACL profile.
Select Delete	Select the check box in the **Select** column for an entry, and click **Delete** to remove the entry.
Select All	Click this to select all entries in the table.
Select None	Click this to un-select all entries in the table.

34.4 ACL Profile Map Screen

Use this screen to look at all the ACL profiles and the PVCs to which each one is assigned. To open this screen, click **Advanced Application > ACL** > **ACL Profile Map**.

Figure 119 ACL Profile Map

The following table describes the labels in this screen.

Table 72 ACL Profile Map

LABEL	DESCRIPTION
ACL Profile	Select the ACL profile(s) for which you want to see which PVCs are assigned to it.
Index	This field displays the number of an entry.
Profile	This field shows the ACL profile assigned to this PVC.
Port	This field displays the ADSL port number on which the PVC is configured.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.

35

Downstream Broadcast

This chapter shows you how to allow or block downstream broadcast traffic.

35.1 Downstream Broadcast

Downstream broadcast allows you to block downstream broadcast packets from being sent to specified VLANs on specified ports.

35.2 Downstream Broadcast Screen

To open this screen, click **Advanced Application > Downstream Broadcast**.

Figure 120 Downstream Broadcast

The following table describes the labels in this screen.

Table 73 Downstream Broadcast

LABEL	DESCRIPTION
Port	Use this drop-down list box to select a port for which you wish to configure settings.
VLAN	Specify the number of a VLAN (on this entry's port) to which you do not want to send broadcast traffic. The VLAN must already be configured in the system.

Table 73 Downstream Broadcast (continued)

LABEL	DESCRIPTION
Add	Click **Add** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Blocking Table	
Port	Use this drop-down list box to select a port for which you wish to display settings.
Index	This field displays the number of the downstream broadcast blocking entry.
Port	This is the number of a DSL port through which you will block downstream broadcast traffic (on a specific VLAN).
VLAN	This field displays the number of a VLAN to which you do not want to send broadcast traffic (on the entry's port).
Select	Select an entry's **Select** check box and click **Delete** to remove the entry. Clicking **Delete** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Select All	Click **All** to mark all of the check boxes.
Select None	Click **None** to un-mark all of the check boxes.

36

Syslog

This chapter explains how to set the syslog parameters.

36.1 Syslog

The syslog feature sends logs to an external syslog server.

36.2 SysLog Screen

To open this screen, click **Advanced Application > SysLog**.

Figure 121 SysLog

The following table describes the labels in this screen.

Table 74 SysLog

LABEL	DESCRIPTION
Enable Unix Syslog	Select this check box to activate syslog (system logging) and then configure the syslog parameters described in the following fields.
Syslog Server IP	Enter the IP address of the syslog server.
Apply	Click **Apply** to save your changes to the IES’s volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

37

Access Control

This chapter describes how to configure access control.

37.1 Access Control Screen

Use this screen to configure SNMP and enable/disable remote service access.

To open this screen, click **Advanced Application > Access Control**.

Figure 122 Access Control

37.2 Access Control Overview

A console port or Telnet session can coexist with one FTP session, a web configurator session and/or limitless SNMP access control sessions.

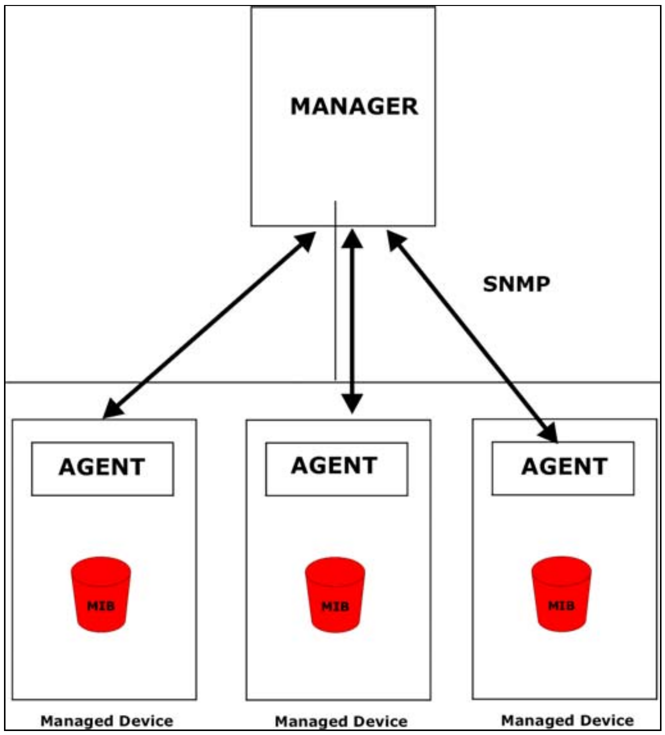
Table 75 Access Control Summary

	CONSOLE PORT	TELNET	FTP	WEB	SNMP
Number of sessions allowed	1	5	1	No limit	No limit

37.3 SNMP

Simple Network Management Protocol is a protocol used for exchanging management information between network devices. SNMP is a member of TCP/IP protocol suite. A manager station can manage and monitor the IES through the network via SNMP version one (SNMPv1) and/or SNMP version 2c. The next figure illustrates an SNMP management operation. SNMP is only available if TCP/IP is configured.

Figure 123 SNMP Management Model



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

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

The managed devices contain object variables/managed objects that define each piece of information to be collected about a device. Examples of variables include such as number of packets received, node port status etc. A Management Information Base (MIB) is a collection of managed objects. SNMP allows a 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:

Table 76 SNMP Commands

COMMAND	DESCRIPTION
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.

37.3.1 Supported MIBs

MIBs let administrators collect statistics and monitor status and performance. The IES supports the following MIBs:

- MIB II IF MIB and ADSL line MIB (RFC-2662)
- SNMP MIB II (RFC-1215)
- BRIDGE MIB: FDB status

The IES can also respond with specific data from the DSLAM private MIBs:

- dslam.mib
- dslam-AS-ATM.mib
- dslam-AS.mib
- dslam-AESCommon.mib
- dslam-iesCommon.mib
- ies1248.mib

37.3.2 SNMP Traps

The IES can send the following SNMP traps to an SNMP manager when an event occurs. ATUC refers to the downstream channel (for traffic going from the IES to the subscriber). ATUR refers to the upstream channel (for traffic coming from the subscriber to the IES).

Table 77 SNMPv2 Traps

TRAP NAME	DESCRIPTION
coldStart	This trap is sent when the IES is turned on.
warmStart	This trap is sent when the IES restarts.

Table 77 SNMPv2 Traps (continued)

TRAP NAME	DESCRIPTION
linkDown	This trap is sent when the Ethernet link is down. Enterprise specific (adsl_atuc_los) traps are sent when an ADSL link is down.
linkUp	This trap is sent when the Ethernet or ADSL link comes up.
authenticationFailure	This trap is sent when the SNMP community check fails.
reboot	This trap is sent when the system is going to reboot. The variable is the reason for the system reboot.
overheat	This trap is sent when the system is overheated. The variable is the current system temperature in Celsius.
overheatOver	This trap is sent when the system is no longer overheated. The variable is the current system temperature in Celsius.
fanRpmLow	This trap is sent when the RPM of the fan is too low. The variable is the current RPM of the fan.
fanRpmNormal	This trap is sent when the RPM of the fan is back within the normal range. The variable is the current RPM of the fan.
voltageOutOfRange	This trap is sent when the voltage of the system is out of the normal range. The variable is the current voltage of the system in volts.
voltageNormal	This trap is sent when the voltage of the system is back within the normal range. The variable is the current voltage of the system in volts.
extAlarmInputTrigger	This trap is sent when there is an external alarm input.
extAlarmInputRelease	This trap is sent when the external alarm input stops.
thermalSensorFailure	This trap is sent when the thermal sensor fails.
adslAtucLof	This trap is sent when a Loss Of Frame is detected on the ATUC.
adslAturLof	This trap is sent when a Loss Of Frame is detected on the ATUR.
adslAtucLos	This trap is sent when a Loss Of Signal is detected on the ATUC.
adslAturLos	This trap is sent when a Loss Of Signal is detected on the ATUR.
adslAturLpr	This trap is sent when a Loss Of Power is detected on the ATUR.
adslAtucLofClear	This trap is sent when the Loss Of Frame detected on the ATUC is over.
adslAturLofClear	This trap is sent when the Loss Of Frame detected on the ATUR is over.
adslAtucLosClear	This trap is sent when the Loss Of Signal detected on the ATUC is over.
adslAturLosClear	This trap is sent when the Loss Of Signal detected on the ATUR is over.
adslAturLprClear	This trap is sent when the Loss Of Power detected on the ATUR is over.

Table 77 SNMPv2 Traps (continued)

TRAP NAME	DESCRIPTION
adslAtucPerfLofsThreshTrap	The number of times a Loss Of Frame has occurred within 15 minutes for the ATUC has reached the threshold. currValue is the number of times a Loss Of Frame has occurred within the 15-minute interval.
adslAtucPerfLossThreshTrap	The number of times a Loss Of Signal has occurred within 15 minutes for the ATUC has reached the threshold. currValue is the number of times a Loss Of Signal has occurred within the 15 minute interval.
adslAtucPerfLprsThreshTrap	The number of times a Loss Of Power has occurred within 15 minutes for the ATUC has reached the threshold. currValue is the number of times a Loss Of Power has occurred within the 15-minute interval.
adslAtucPerfESsThreshTrap	The number of error seconds within 15 minutes for the ATUC has reached the threshold. currValue is the number of error seconds that have occurred within the 15-minute interval.
adslAtucPerfLolsThreshTrap	The number of times a Loss Of Link has occurred within 15 minutes for the ATUC has reached the threshold. currValue is the number of times a Loss Of Link has occurred within the 15-minute interval.
adslAturPerfLofsThreshTrap	The number of times a Loss Of Frame has occurred within 15 minutes for the ATUR has reached the threshold. currValue is the number of times a Loss Of Frame has occurred within the 15-minute interval.
adslAturPerfLossThreshTrap	The number of times a Loss Of Signal has occurred within 15 minutes for the ATUR has reached the threshold. currValue is the number of times a Loss Of Signal has occurred within the 15-minute interval.
adslAturPerfLprsThreshTrap	The number of times a Loss Of Power has occurred within 15 minutes for the ATUR has reached the threshold. currValue is the number of times a Loss Of Power has occurred within the 15-minute interval.
adslAturPerfESsThreshTrap	The number of error seconds within 15 minutes for the ATUR has reached the threshold. currValue is the number of error seconds that have occurred within the 15-minute interval.
adslAtucSesLThreshTrap	The number of severely errored seconds within 15 minutes for the ATUC has reached the threshold. currValue is the number of severely errored seconds that have occurred within the 15-minute interval.
adslAtucUasLThreshTrap	The number of Unavailable seconds within 15 minutes for the ATUC has reached the threshold. currValue is the number of Unavailable seconds that have occurred within the 15-minute interval.
adslAturSesLThreshTrap	The number of severely errored seconds within 15 minutes for the ATUR has reached the threshold. currValue is the number of severely errored seconds that have occurred within the 15-minute interval.
adslAturUasLThreshTrap	The number of Unavailable seconds within 15 minutes for the ATUR has reached the threshold. currValue is the number of Unavailable seconds that have occurred within the 15-minute interval.

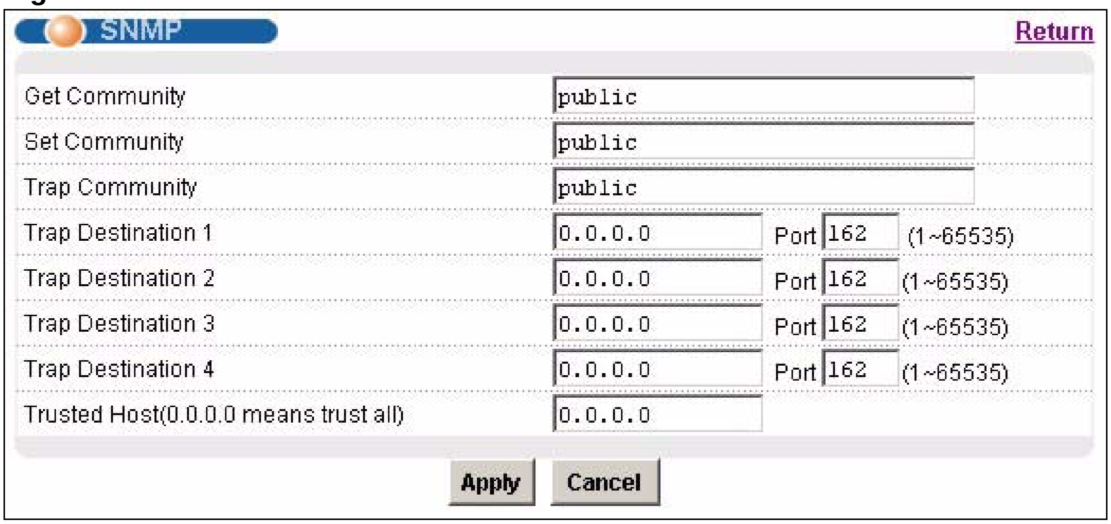
Table 77 SNMPv2 Traps (continued)

TRAP NAME	DESCRIPTION
sysMacAntiSpoofing	This trap is spent when spoofing MAC address is detected.
alarmRisingThreshold	This trap is sent when an observed RMON statistics counter is greater than or equal to its configured ringing threshold.
alarmFallingThreshold	This trap is sent when an observed RMON statistics counter is less than or equal to its configured falling threshold

37.4 SNMP Screen

To open this screen, click **Advanced Application > Access Control** > **SNMP**.

Figure 124 SNMP



The following table describes the labels in this screen.

Table 78 SNMP

LABEL	DESCRIPTION
Return	Click **Return** to go back to the previous screen.
Get Community	Enter the get community, which is the password for the incoming Get- and GetNext- requests from the management station.
Set Community	Enter the set community, which is the password for incoming Set- requests from the management station.
Trap Community	Enter the trap community, which is the password sent with each trap to the SNMP manager.
Trap Destination 1~4 Port	Enter the IP address of a station to send your SNMP traps to. Enter the port number upon which the station listens for SNMP traps.

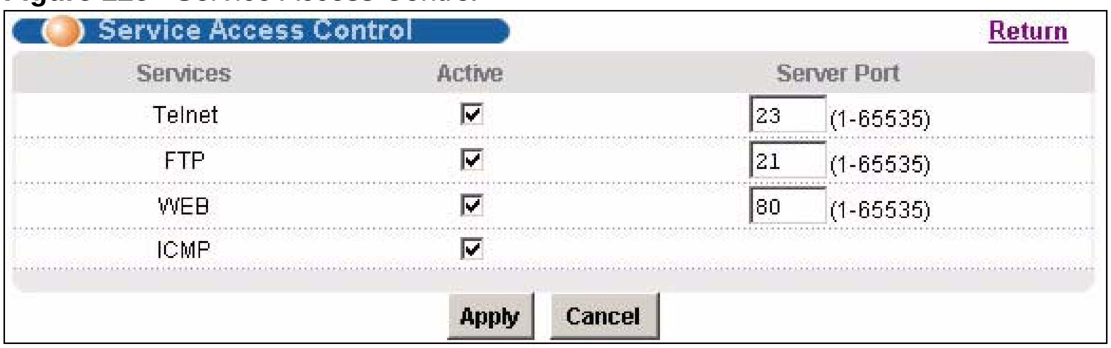
Table 78 SNMP (continued)

LABEL	DESCRIPTION
Trusted Host	A “trusted host” is a computer that is allowed to use SNMP with the IES. **0.0.0.0** allows any computer to use SNMP to access the IES. Specify an IP address to allow only the computer with that IP address to use SNMP to access the IES.
Apply	Click **Apply** to save your changes to the IES’s volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

37.5 Service Access Control Screen

To open this screen, click **Advanced Application > Access Control** > **Service Access Control**.

Figure 125 Service Access Control



The following table describes the labels in this screen.

Table 79 Service Access Control

LABEL	DESCRIPTION
Return	Click **Return** to go back to the previous screen.
Services	Services you may use to access the IES are listed here.
Active	Select the **Active** check boxes for the corresponding services that you want to allow to access the IES.
Server Port	For Telnet, FTP or web services, you may change the default service port by typing the new port number in the **Server Port** field. If you change the default port number then you will have to let people (who wish to use the service) know the new port number for that service.

Table 79 Service Access Control (continued)

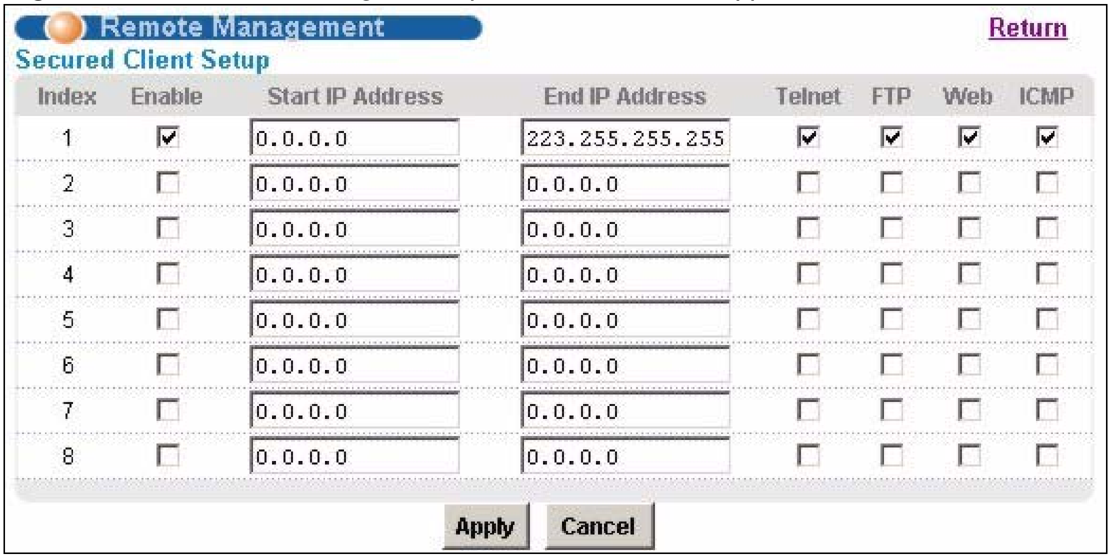
LABEL	DESCRIPTION
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

37.6 Remote Management Screen

Use this screen to configure the IP address ranges of trusted computers that may manage the IES.

To open this screen, click **Advanced Application > Access Control** > **Secured Client**.

Figure 126 Remote Management (Secured Client Setup)



The following table describes the labels in this screen.

Table 80 Remote Management (Secured Client Setup)

LABEL	DESCRIPTION
Return	Click **Return** to go back to the previous screen.
Index	This is the client set index number. A "client set" is a group of one or more "trusted computers" from which an administrator may use a service to manage the IES.
Enable	Select this check box to activate this secured client set. Clear the check box if you wish to temporarily disable the set without deleting it.

Table 80 Remote Management (Secured Client Setup) (continued)

LABEL	DESCRIPTION
Start IP Address End IP Address	Configure the IP address range of trusted computers from which you can manage the IES. The IES checks if the client IP address of a computer requesting a service or protocol matches the range set here. The IES immediately disconnects the session if it does not match.
Telnet/FTP/Web/ ICMP	Select services that may be used for managing the IES from the specified trusted computers.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring this screen afresh.

38

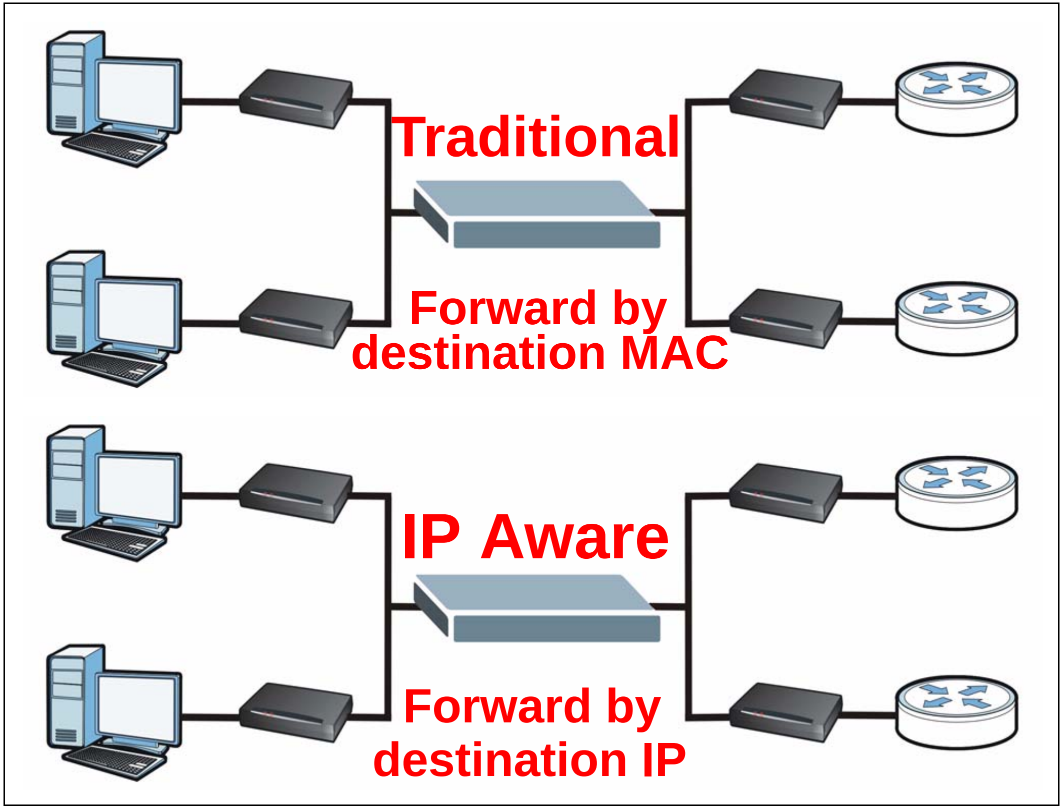
IP Bridge

This chapter explains how to set up the IP bridge function in the IES.

38.1 IP Bridge Overview

The IP bridge function is designed for large-scale, flat, access networks, and it is ideal when the network is based on Ethernet. When the IP bridge is enabled, the IES forwards frames based on the destination IP address, instead of the destination MAC address, and it replaces the source MAC address with its own MAC address.

Figure 127 IP Bridge: Traditional vs. IP-aware DSLAM



The IP-aware IES does not modify the IP packet header, but it uses the destination IP address to modify the layer-2 header, in particular the source MAC address, destination MAC address, and VLAN tag. As a result, the IES prevents the MAC addresses and VLAN ID downstream of the IES (in other words, the subscribers' MAC addresses and VLAN ID) from propagating into the network upstream of the IES, and vice versa.

In the end, the IP-aware IES makes the network more secure and more scalable, as explained below.

- User-to-user security. The IES does not forward subscribers' MAC addresses upstream of the IES, so there is no way for subscribers to know each other's MAC addresses. This prevents the spoofing of MAC addresses and IP addresses upstream of the IES.
- Scalability. The scale of access networks is typically limited by the number of MAC addresses in the network. Since the IES does not forward subscribers' MAC addresses or VLAN ID upstream, the upstream network is more scalable, and it is simpler to use the same VLAN ID upstream of several IES. In addition, the IES drastically reduces the scale of ARP traffic storms.

The IES itself is transparent in the network.

38.1.1 Upstream and Downstream Traffic

When the IES forwards upstream traffic, it makes the following changes in the layer-2 header.

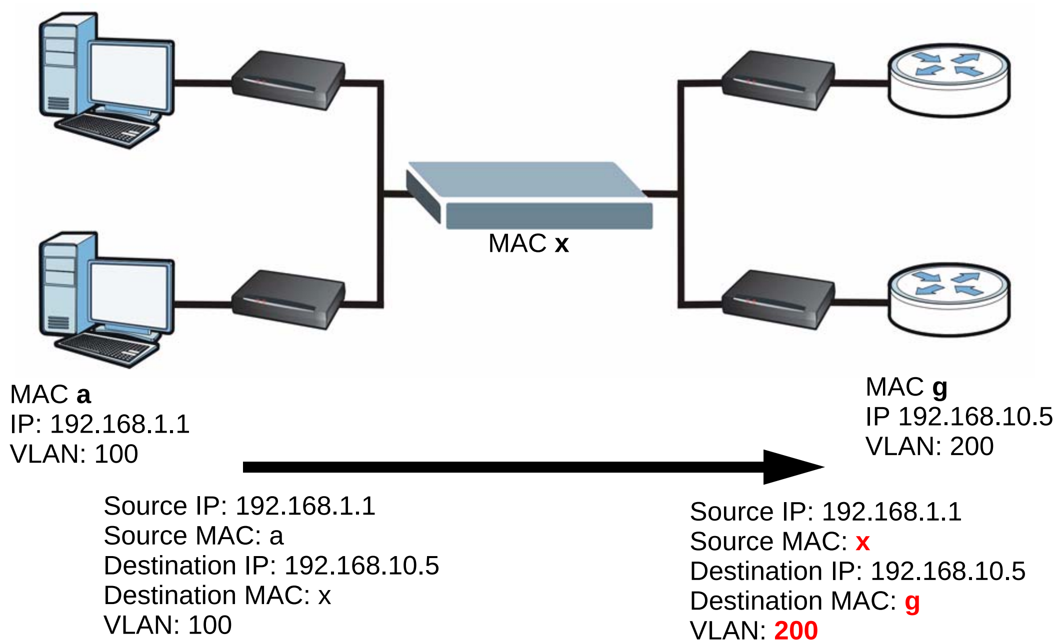
Table 81 IP Bridge: Layer-2 Header for Upstream Traffic

	ORIGINAL	UPDATED
Source MAC address	Subscriber's MAC address	IES's MAC address
Destination MAC address	IES's MAC address	Destination IP's MAC address
VLAN ID	Subscriber's VLAN ID	Destination IP's VLAN ID

The original frame has the IES's MAC address as the destination MAC address because the IES, not the device that really has the destination IP, responded to the ARP request for the destination IP. (This is part of the ARP proxy feature for IP bridges.) Once the IES receives the frame, it updates the MAC addresses and VLAN ID and forwards it to the device that really has the destination IP.

This is illustrated in the following example.

Figure 128 IP Bridge: Upstream Traffic Example



Notice that the IES does not change the IP packet header.

The process is reversed but otherwise similar for downstream traffic. The IES learns how to forward frames to the appropriate subscriber from one of the following sources.

- DHCP snooping. The IP-aware IES snoops DHCP packets, so it knows what IP addresses have been assigned to subscribers.
- ARP. The IES uses ARP to find out which subscriber has a particular IP address.
- Static information. You should provide forwarding information manually for subscribers that have static IP addresses and do not respond to ARP queries.

38.1.2 IP Bridge Settings

The IP bridge function consists of the following settings.

- Domains and VLANs
- Edge routers
- Downlink interfaces
- Routing tables
- PVCs
- ARP proxy settings

Each set of settings is discussed in more detail in the following sections.

38.1.2.1 Domains and VLAN

A domain represents an ISP. Each domain is defined by (and dominates) the VLAN that are in it and has its own routing table and ARP table. As a result, two or more VLANs in different domains can use the same IP subnet, and one network can support multiple ISPs.

VLANs in IP bridges are exclusive. They can be in at most one domain. In addition, VLANs in IP bridges share the same VLAN space as regular VLANs, so VLANs in IP bridges must have different VLAN IDs than regular VLANs.

38.1.2.1.1 Configuring VLANs for Domains

To add a VLAN to a domain,

1 Add (Join) a new (undefined) VLAN ID to the domain.

2 Create the VLAN in the system using the regular screens or commands for VLANs.

To remove a VLAN from a domain,

1 Delete the VLAN from the system using the regular screens or commands for VLANs.

2 Remove (Leave) the VLAN ID from the domain.

38.1.2.2 Edge Routers

Edge routers are usually the gateways that are provided to the subscribers. They can also be gateways that are specified in static routing table entries. Each edge router, in addition to its IP address, has an associated VLAN ID. When the IES forwards a frame to an edge router, it uses this VLAN ID to replace whatever VLAN ID the subscriber specified. The IES also uses the VLAN ID to identify the domain the edge router is in.

If two edge routers are in different domains, it is possible for them to have the same IP address.

38.1.2.3 Downlink Interfaces

Downlink interfaces provide forwarding information for downstream traffic. The IES learns some of this information by snooping DHCP packets. For static IP addresses, you should provide this information manually. In this case, specify the VLAN ID and, optionally, the PVC for a range of IP addresses. The IES uses the

VLAN ID to identify the domain the downlink interface is in. Downlink interfaces in the same domain cannot have overlapping IP addresses.

38.1.2.4 Routing Tables

Each domain has its own routing table. Each routing table contains entries that, based on the destination IP address, control where the IES forwards packets (for upstream and downstream traffic). The IES automatically creates routing table entries for each downlink interface and for each edge router in the domain. You can create additional entries by specifying the edge router to which the IES should forward traffic for a particular destination IP address or IP subnet.

38.1.2.5 PVCs

IP bridge PVCs are similar to regular PVCs and are endpoints of the IP bridge. In addition, IP bridge PVCs are one of two types, IP over Ethernet or IP over ATM, depending on the underlying network.

The PVID is used to identify the domain the PVC is in, so the PVID must be in a domain.

38.1.2.6 ARP Proxy Settings

The IES is an ARP proxy for edge routers and subscribers in an IP bridge. You can configure basic settings for this, and you can look at (and flush, in some cases) the (PVC, MAC, IP, VID) information the IES has learned using DHCP snooping and ARP.

38.1.3 IP Bridge Configuration

Follow these steps to set up a simple IP bridge.

1 Create a domain. (Each domain is an ISP.)

2 Create one or more VLANs in the domain. (For example, one VLAN is for high-speed Internet, and another VLAN is for VoIP.)

3 Create the VLAN in the system using the regular screens or commands for VLANs.

4 Specify one or more edge routers for the domain.

5 Create routing table entries, so the IES forwards frames to the appropriate edge router.

6 Create downlink interfaces, so the IES forwards frames to the appropriate subscribers.

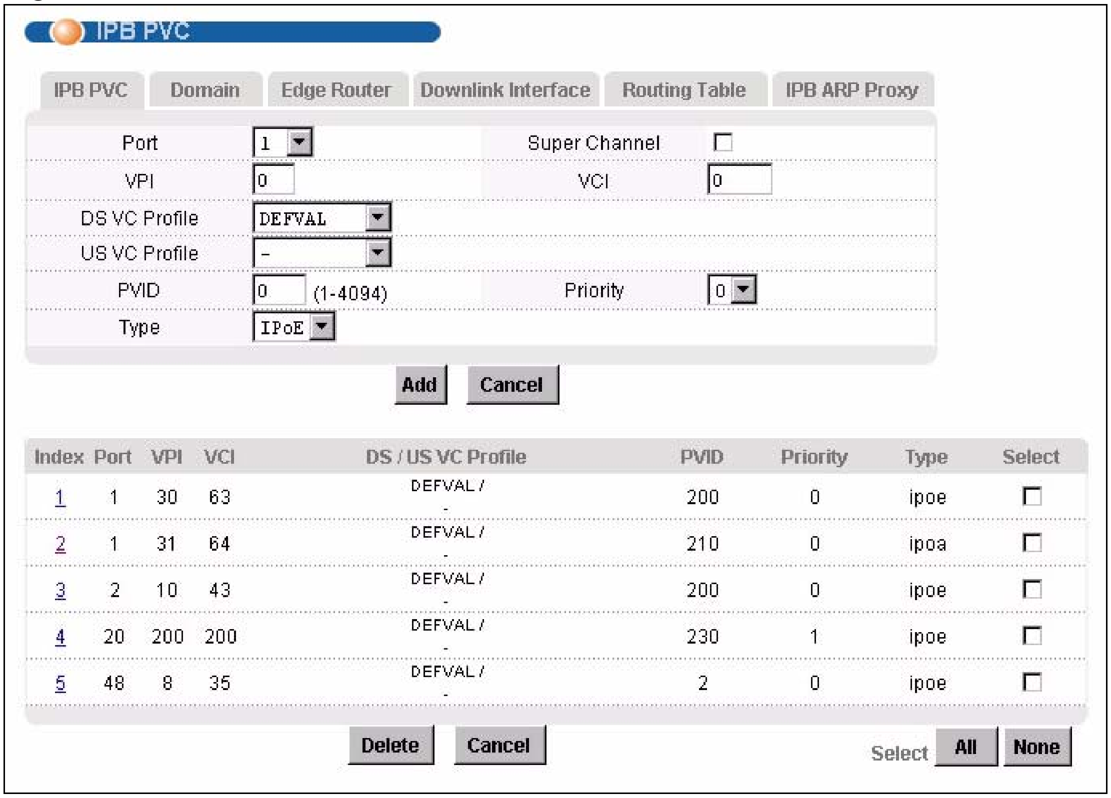
7 Create PVCs for the subscribers.

38.2 IPB PVC Screen

Use this screen to set up and maintain PVCs for subscribers in an IP bridge.

To open this screen, click **Advanced Application > IP Bridge** > **IPB PVC**.

Figure 129 IPB PVC



The following table describes the labels in this screen.

Table 82 IPB PVC

LABEL	DESCRIPTION
Domain	Click **Domain** to open the screen where you can set up and maintain domains in an IP bridge (see Section 38.3 on page 290).
Edge Router	Click **Edge Router** to open the screen where you can set up and maintain edge routers in an IP bridge (see Section 38.4 on page 294).
Downlink Interface	Click **Downlink Interface** to open the screen where you can set up and maintain forwarding information for downstream traffic (see Section 38.5 on page 295).

Table 82 IPB PVC (continued)

LABEL	DESCRIPTION
Routing Table	Click **Routing Table** to open the screen where you can set up and maintain the routing table for each domain (see Section 38.6 on page 299).
IPB ARP Proxy	Click **IPB ARP Proxy** to open the screen where you can look at and flush the ARP table for each domain (see Section 38.7 on page 303).
Port	Use this drop-down list box to select a port for which you wish to set up an IP bridge PVC.
Super Channel	The IES forwards frames belonging to VLAN groups that are not assigned to specific channels to the super channel. Enable the super channel option to have this channel forward frames belonging to multiple VLAN groups (that are not assigned to other channels). The super channel functions in the same way as the channel in a single channel environment.
VPI	Type the Virtual Path Identifier for a channel on this port.
VCI	Type the Virtual Circuit Identifier for a channel on this port.
DS VC Profile	Use the drop-down list box to select a VC profile to use for this channel's downstream traffic shaping.
US VC Profile	Use the drop-down list box to select a VC profile to use for this channel's upstream traffic. The IES does not perform upstream traffic policing if you do not specify an upstream VC profile. Note: Upstream traffic policing should be used in conjunction with the ATM shaping feature on the subscriber's device. If the subscriber's device does not apply the appropriate ATM shaping, all upstream traffic will be discarded due to upstream traffic policing.
PVID	Type the VLAN ID to assign to frames received on this channel. This VLAN ID must be in an IP bridge domain.
Priority	Use the drop-down list box to select the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.
Type	Use the drop-down list box to specify whether the PVC is running on Ethernet (**IPoE**) or on ATM (**IPoA**).
Add Apply	Click this to add or save channel settings on the selected port. Clicking **Add** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
Index	This field displays the number of the PVC. Click a PVC's index number to use the top of the screen to edit the PVC. Note: At the time of writing, you cannot edit the VPI and VCI. If you want to change them, add a new PVC with the desired settings. Then you can delete any unwanted PVCs.

Table 82 IPB PVC (continued)

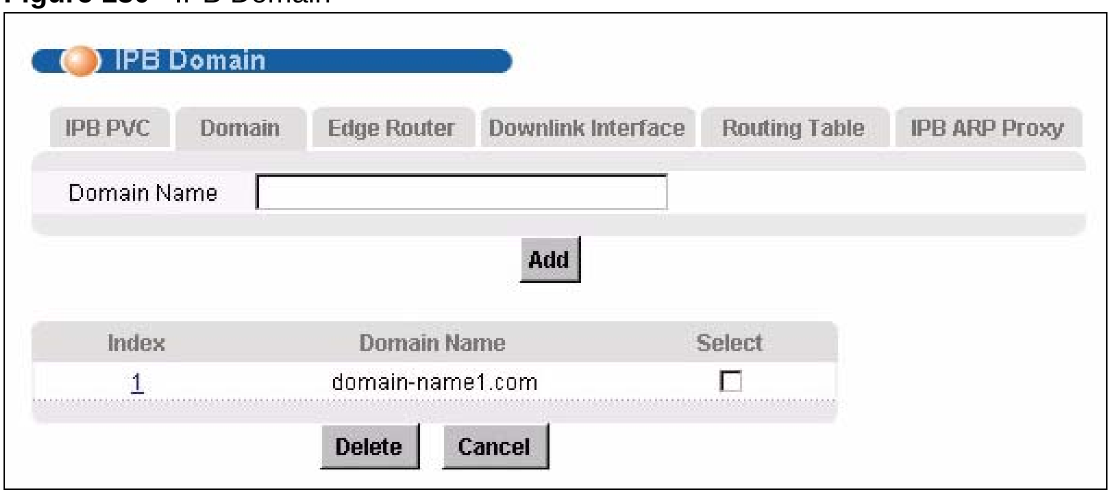
LABEL	DESCRIPTION
Port	This field displays the number of the ADSL port on which the PVC is configured.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI). The VPI and VCI identify a channel on this port.
DS/US VC Profile	This shows which VC profile this channel uses for downstream traffic shaping. The VC profile for upstream policing also displays if the channel is configured to use one.
PVID	This is the VLAN ID assigned to frames received on this channel.
Priority	This is the priority value (0 to 7) added to incoming frames without a (IEEE 802.1p) priority tag.
Type	This specifies whether the PVC is running on Ethernet (**ipoe**) or on ATM (**ipoa**).
Select Delete	Select the check box in the **Select** column for an entry, and click **Delete** to remove the entry.
Cancel	Click **Cancel** to start configuring the screen again.
Select All	Click this to select all entries in the table.
Select None	Click this to un-select all entries in the table.

38.3 IPB Domain Screen

Use this screen to set up and maintain domains in an IP bridge. A domain represents an ISP. Each domain is defined by (and dominates) the VLAN that are in it and has its own routing table and ARP table.

To open this screen, click **Advanced Application > IP Bridge** > **Domain**.

Figure 130 IPB Domain



The following table describes the labels in this screen.

Table 83 IPB Domain

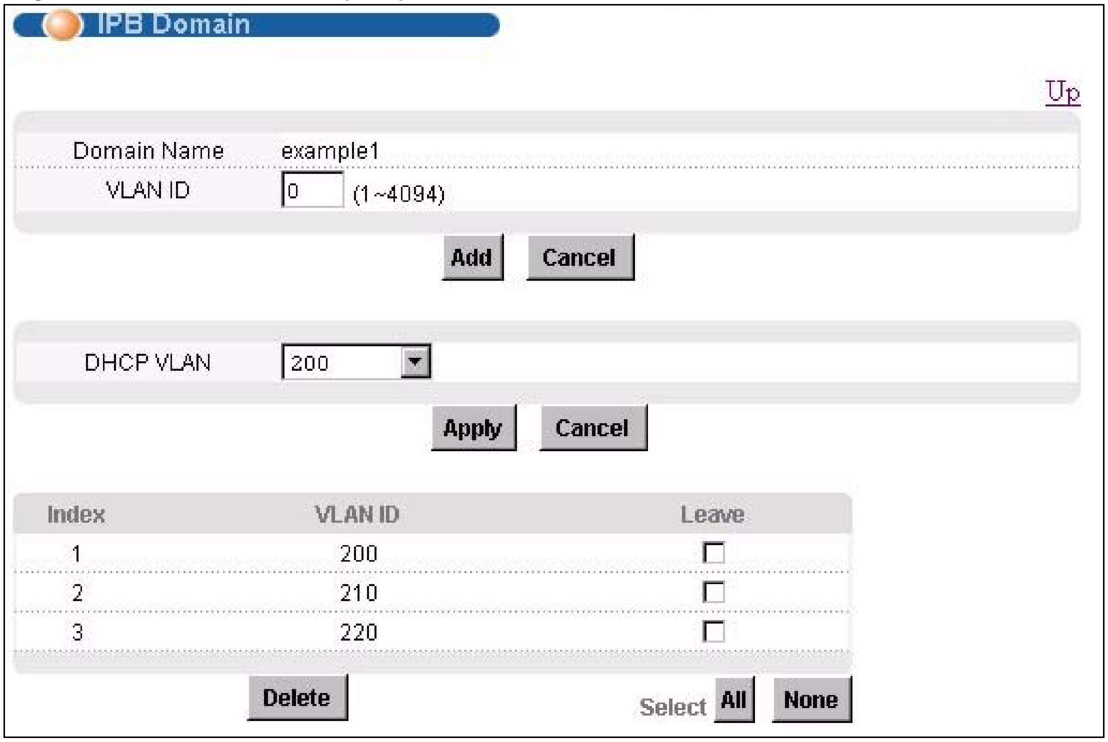
LABEL	DESCRIPTION
Domain Name	Enter the name of the domain you want to create. You can use 1-31 printable ASCII characters, except for right angle brackets (>). Spaces are allowed.
Add	Click **Add** to create the domain. It is then displayed in the summary table at the bottom of the screen. Clicking **Add** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Index	This field displays the number of the domain. Click a domain's index number to edit the VLAN that are in it. (See Section 38.3.1 on page 292.)
Domain Name	This field displays the name of each domain.
Select Delete	Select the check box in the **Select** column for an entry, and click **Delete** to remove the entry.
Cancel	Click **Cancel** to start configuring the screen again.

38.3.1 Configure IPB Domain Screen

Use this screen to edit the VLAN that are in a domain.

To open this screen, click **Advanced Application > IP Bridge** > **Domain**, and click on the index (**Index**) number of the domain.

Figure 131 IPB Domain (Edit)



The following table describes the labels in this screen.

Table 84 IPB Domain (Edit)

LABEL	DESCRIPTION
Return	Click this to return to the previous screen without saving changes.
Domain Name	This field displays the name of the domain.
VLAN ID	Enter the ID of the VLAN you want to add to the domain. Use the regular VLAN screens to configure this VLAN (see Chapter 19 on page 175).
Add	Click **Add** to add the VLAN to the domain. It is then displayed in the summary table at the bottom of the screen. Clicking **Add** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

Table 84 IPB Domain (Edit) (continued)

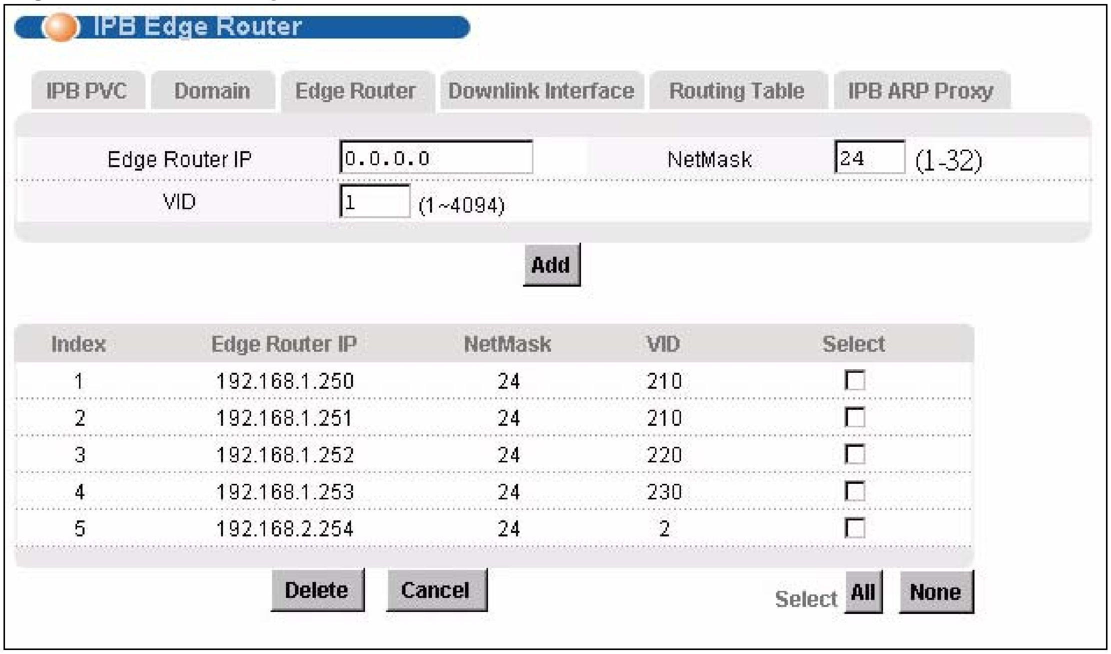
LABEL	DESCRIPTION
DHCP VLAN	This setting has no effect on DHCP packets that come from VLANs where the IES's DHCP relay settings are active. (See Chapter 28 on page 229. The DHCP relay settings take precedence over the IP bridge DHCP VLAN setting.) Select the VLAN where the domain's DHCP server is located. If you select a specific VLAN, the IES forwards subscribers' DHCP packets to the selected VLAN and changes the source MAC address to the IES's MAC address. Select **Disabled** if there is no DHCP server for the domain, in which case the IES does not change the source MAC address in DHCP packets. Regardless of this setting, the IES still adds whatever Option 82 information is specified for the VLAN in the DHCP relay settings. (See Chapter 28 on page 229.)
Apply	Click **Apply** to save the domain settings. Clicking **Apply** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
Index	This field displays the index number of the VLAN in the domain.
VLAN ID	This field displays the ID of each VLAN in the domain.
Leave Delete	Select the check box in the **Leave** column for an entry, and click **Delete** to remove the entry. Note: You have to delete every IP bridge setting (including DHCP VLAN) that uses the selected VLAN before you can remove it from the domain.
Select All	Click this to select all entries in the table.
Select None	Click this to deselect all entries in the table.

38.4 IPB Edge Router Screen

Use this screen to set up and maintain edge routers in an IP bridge. Edge routers are usually the gateways that are provided to the subscribers. They can also be the gateways that are specified in static routing table entries. If two edge routers are in different domains, it is possible for them to have the same IP address.

To open this screen, click **Advanced Application > IP Bridge** > **Edge Router**.

Figure 132 IPB Edge Router



The following table describes the labels in this screen.

Table 85 IPB Edge Router

LABEL	DESCRIPTION
Edge Router IP	Enter the IP address of the edge router.
NetMask	Enter the number of bits in the subnet mask of the edge router.
VID	Enter the ID of the VLAN of which the edge router is a member. The IES uses this VLAN ID when it forwards frames to the edge router. It also uses the VLAN ID to identify the domain the edge router is in. You have to add the VLAN ID to an IP bridge domain before you can enter it here.
Add	Click **Add** to create the edge router. It is then displayed in the summary table at the bottom of the screen. Clicking **Add** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Index	This field displays the number of the edge router.

Table 85 IPB Edge Router (continued)

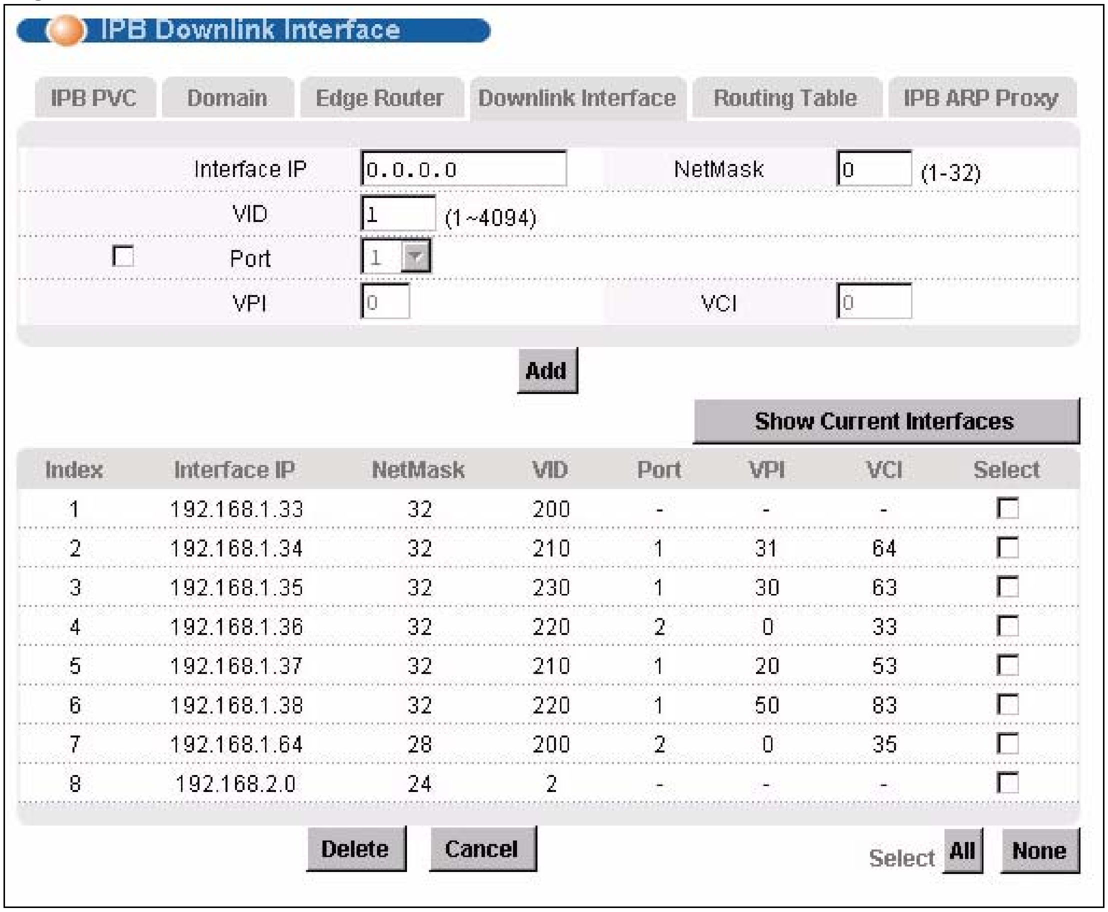
LABEL	DESCRIPTION
Edge Router IP	This field displays the IP address of the edge router.
NetMask	This field displays the number of bits in the subnet mask of the edge router.
VID	This field displays the VLAN ID of the edge router.
Select Delete	Select the check box in the **Select** column for an entry, and click **Delete** to remove the entry.
Cancel	Click **Cancel** to start configuring the screen again.
Select All	Click this to select all entries in the table.
Select None	Click this to un-select all entries in the table.

38.5 IPB Downlink Interface Screen

Use this screen to set up and maintain forwarding information for downstream traffic. The IES learns some of this information by snooping DHCP packets. For static IP addresses, you should provide this information manually. Downlink interfaces in the same domain cannot have overlapping IP addresses.

To open this screen, click **Advanced Application > IP Bridge** > **Downlink Interface**.

Figure 133 IPB Downlink Interface



The following table describes the labels in this screen.

Table 86 IPB Downlink Interface

LABEL	DESCRIPTION
	Use the top section to create downlink interfaces manually.
Interface IP NetMask	Enter the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this downlink interface applies. If the destination IP address of a packet is in this range, the IES tries to forward the frame to a subscriber in the specified VLAN or PVC. Downlink interfaces in the same domain cannot have overlapping IP addresses.
VID	Enter the VLAN ID the subscriber is in. The IES uses this VLAN ID when it forwards frames to the subscriber. It also uses the VLAN ID to identify the domain the downlink interface is in. You have to add the VLAN ID to an IP bridge domain before you can enter it here.

Table 86 IPB Downlink Interface (continued)

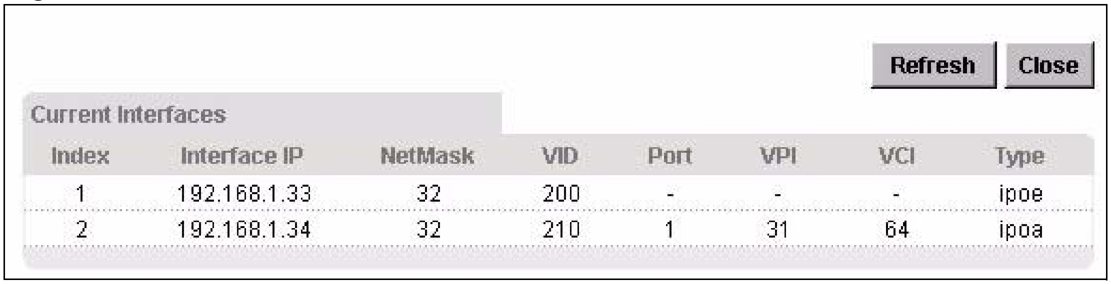
LABEL	DESCRIPTION
Port	Select the check box next to this field if you want the IES to forward frames to a specific channel in the specified VLAN. Use this drop-down list box to select the port for the channel. Note: Make sure you specify a valid IP bridge PVC. Do not specify PVCs that are not defined in the IPB PVC screen in Section 38.2 on page 288.
VPI	This field is enabled if the check box next to **Port** is selected. Type the Virtual Path Identifier for a channel on this port.
VCI	This field is enabled if the check box next to **Port** is selected. Type the Virtual Circuit Identifier for a channel on this port.
Add	Click **Add** to create the downlink interface. It is then displayed in the summary table at the bottom of the screen. Clicking **Add** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Show Current Interfaces	Click this to look at all the forwarding information for downstream traffic, whether learned by snooping DHCP packets or provided manually. (See Section 38.5.1 on page 298.)
	The bottom section displays downlink interfaces created manually. It does not show forwarding information learned by snooping DHCP packets.
Index	This field displays the index number of the downlink interface.
Interface IP NetMask	This field displays the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this downlink interface applies. If the destination IP address of a packet is in this range, the IES tries to forward the frame to a subscriber in the specified VLAN and PVC, if any.
VID	This field displays the VLAN ID the subscriber is in.
Port	This field displays the number of the ADSL port to which the IES forwards frames. It displays "**-**" if the IES looks for the subscriber in the whole VLAN and not a specific PVC.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI), if any. The VPI and VCI identify a channel on this port.
Select Delete	Select the check box in the **Select** column for an entry, and click **Delete** to remove the entry.
Cancel	Click **Cancel** to start configuring the screen again.
Select All	Click this to select all entries in the table.
Select None	Click this to un-select all entries in the table.

38.5.1 Current Interfaces Screen

Use this screen to look at all the forwarding information for downstream traffic, whether learned by snooping DHCP packets or provided manually.

To open this screen, click **Advanced Application > IP Bridge** > **Downlink Interface** > **Show Current Interfaces**.

Figure 134 Current Interfaces



The following table describes the labels in this screen.

Table 87 Current Interfaces

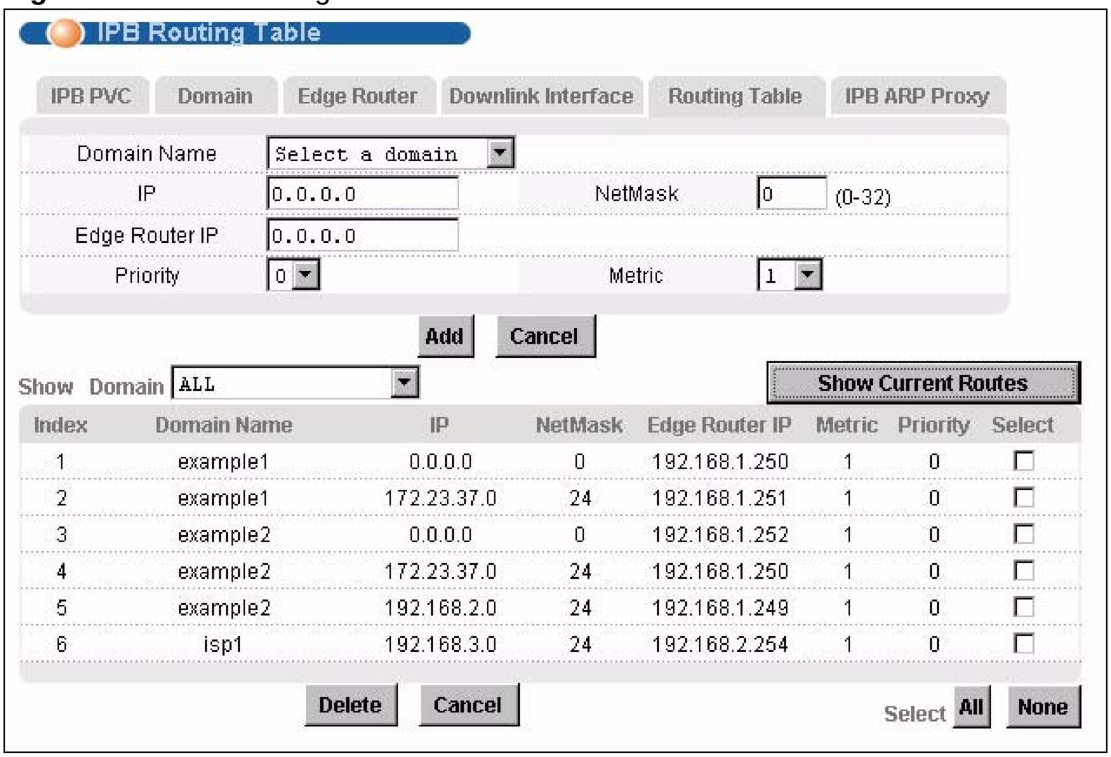
LABEL	DESCRIPTION
Refresh	Click this to update the information in this screen.
Close	Click this to close this window.
Index	This field displays the index number of the downlink interface.
Interface IP NetMask	This field displays the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this downlink interface applies. If the destination IP address of a packet is in this range, the IES tries to forward the frame to a subscriber in the specified VLAN and PVC, if any.
VID	This field displays the VLAN ID the subscriber is in.
Port	This field displays the number of the ADSL port to which the IES forwards frames. It displays "**-**" if the IES looks for the subscriber in the whole VLAN and not a specific PVC.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI), if any. The VPI and VCI identify a channel on this port.
Type	This field specifies whether the downlink interface is running on Ethernet (**ipoe**) or on ATM (**ipoa**).

38.6 IPB Routing Table Screen

Use this screen to set up and maintain the routing table for each domain. Each routing table contains entries that, based on the destination IP address, control where the IES forwards packets. The IES automatically creates routing table entries for each downlink interface and for each edge router in the domain that the associated VLAN is in. You can create additional entries by specifying the edge router to which the IES should forward traffic for a particular destination IP address or IP subnet.

To open this screen, click **Advanced Application > IP Bridge** > **Routing Table**.

Figure 135 IPB Routing Table



The following table describes the labels in this screen.

Table 88 IPB Routing Table

LABEL	DESCRIPTION
	Use the top section to create routing table entries manually.
Domain Name	Select the domain whose routing table you want to add this entry.
IP NetMask	Enter the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this entry applies. If the destination IP address of a packet is in this range, the IES forwards the frame to the specified edge router.

Table 88 IPB Routing Table (continued)

LABEL	DESCRIPTION
Edge Router IP	Enter the IP address to which the IES forwards frames if the destination IP address of a packet is in the specified range. If this IP address corresponds to an edge router in the edge router screen (see Section 38.4 on page 294), the IES uses the associated VLAN ID. In addition, • If the edge router is in the same domain as the entry, the entry is used for upstream traffic. • If the edge router is in a different domain than the entry, the entry is used for downstream traffic. If the specified edge router is not set up in the edge router screen, the IES uses the entry for downstream traffic and does not change the VLAN ID.
Priority	Use the drop-down list box to select the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.
Metric	The metric represents the "cost" of transmission for routing purposes. IP routing uses hop count as the measurement of cost, with a minimum of 1 for directly-connected networks. Select the number that approximates the cost for this link The number need not be precise, but it must be between 1 and 15. In practice, 2 or 3 is usually a good number. If two entries have the same metric, the IES uses the one with the lower IP address.
Add	Click **Add** to create the routing table entry. It is then displayed in the summary table at the bottom of the screen. Clicking **Add** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.
Show Domain	Select a domain for which you wish to view information.
Show Current Routes	Click this to look at the routing table(s) for the selected domain(s). This table includes all the entries, whether added automatically by the IES or provided manually. (See Section 38.6.1 on page 301.)
	The bottom section displays routing table entries created manually. It does not show entries added automatically by the IES.
Index	This field displays the number of the entry.
IP NetMask	This field displays the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this entry applies. If the destination IP address of a packet is in this range, the IES forwards the frame to the specified edge router.
Edge Router IP	This field displays the IP address to which the IES forwards frames if the destination IP address of a packet is in the specified range.
Metric	This field displays the "cost" of transmission for routing purposes.
Priority	This field displays the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag.

Table 88 IPB Routing Table (continued)

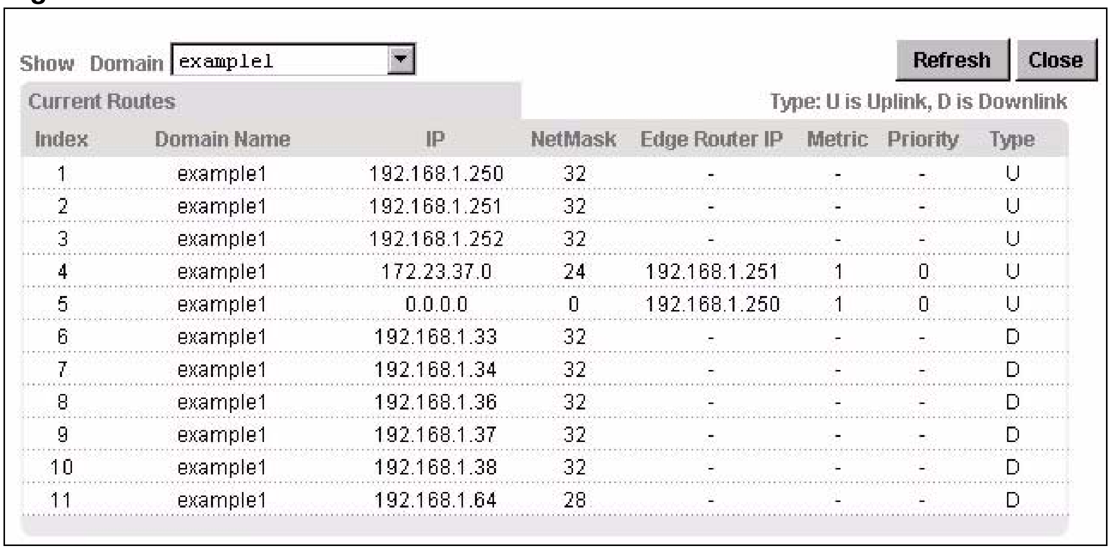
LABEL	DESCRIPTION
Select Delete	Select the check box in the **Select** column for an entry, and click **Delete** to remove the entry.
Cancel	Click **Cancel** to start configuring the screen again.
Select All	Click this to select all entries in the table.
Select None	Click this to un-select all entries in the table.

38.6.1 Current Routes Screen

Use this screen to look at the routing table for a domain. This table includes all the entries, whether added automatically by the IES or provided manually.

To open this screen, click **Advanced Application > IP Bridge** > **Routing Table** > **Show Current Routes**.

Figure 136 Current Routes



The following table describes the labels in this screen.

Table 89 Current Routes

LABEL	DESCRIPTION
Show Domain	Select a domain for which you wish to view information.
Refresh	Click this to update the information in the screen.
Close	Click this to close this window.
Index	This field displays the number of the entry.
Domain Name	This field displays the name of the domain to which this entry applies.

Table 89 Current Routes (continued)

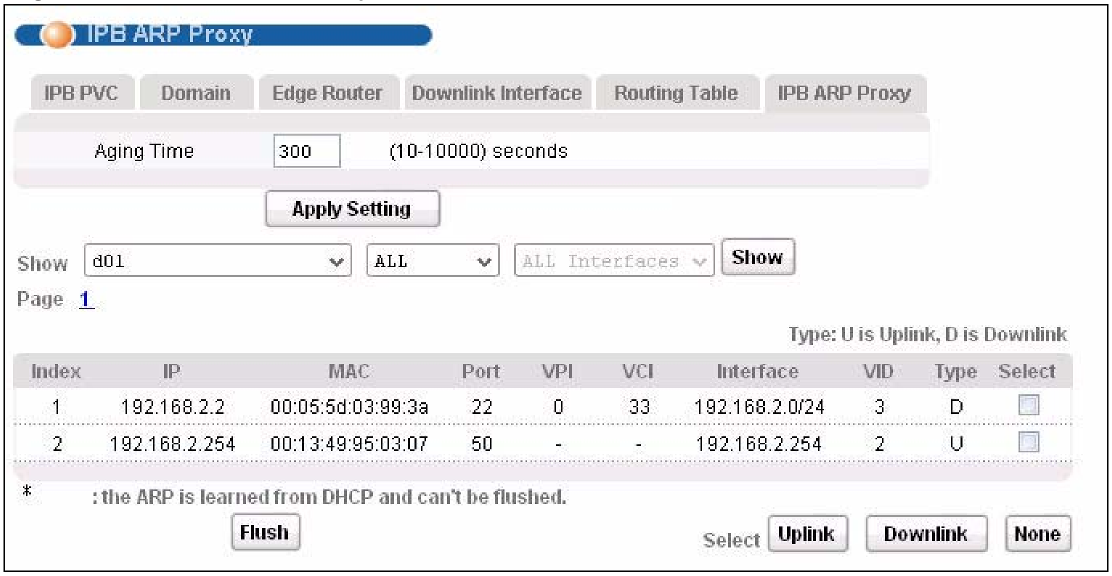
LABEL	DESCRIPTION
IP NetMask	This field displays the IP address and the number of bits in the subnet mask that define the range of IP addresses to which this entry applies. If the destination IP address of a packet is in this range, the IES forwards the frame to the specified edge router.
Edge Router IP	This field displays the IP address to which the IES forwards frames if the destination IP address of a packet is in the specified range. It displays "**-**" if the field does not apply to the entry (for example, in entries created automatically by the IES).
Metric	This field displays the "cost" of transmission for routing purposes. It displays "**-**" if the field does not apply to the entry (for example, in entries created automatically by the IES).
Priority	This field displays the priority value (0 to 7) to add to incoming frames without a (IEEE 802.1p) priority tag. It displays "**-**" if the field does not apply to the entry (for example, in entries created automatically by the IES).
Type	This field indicates whether this entry is used for upstream traffic (**U**, or uplink interface) or downstream traffic (**D**, or downlink interface). By default, all entries are for downstream traffic, unless the edge router is configured in the edge router screen (see Section 38.4 on page 294).

38.7 IPB ARP Proxy Screen

Use this screen to look at and flush the Address Resolution Protocol (ARP) table for each domain. You can also configure how long the IES keeps entries in the ARP table.

To open this screen, click **Advanced Application > IP Bridge** > **IPB ARP Proxy**.

Figure 137 IPB ARP Proxy



The following table describes the labels in this screen.s

Table 90 IPB ARP Proxy

LABEL	DESCRIPTION
Aging Time	Enter a number of seconds (10~10000) to set how long the IES keeps ARP table entries for IP bridge domains. Enter 0 to disable the aging time.
Apply Setting	Click **Apply Setting** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Show	Select the domain at whose ARP table you want to look. You can also look at the ARP table entries for a specific type of interface or a specific interface in the domain. Click **Show** to display the requested entries below.
Index	This field displays the number of the IP address entry.
IP	This field displays the IP address assigned to the specific device.
MAC	This field displays the MAC (Media Access Control) address of the device.

Table 90 IPB ARP Proxy (continued)

LABEL	DESCRIPTION
Port	This field displays the port number to which the device is connected.
VPI/VCI	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI) the device is using. The VPI and VCI identify a channel on this port.
Interface	This field displays the name of the interface the device is using.
VID	This field displays the ID of the VLAN to which the device belongs.
Type	This field indicates whether this entry is used for upstream traffic (**U**, or uplink interface) or downstream traffic (**D**, or downlink interface). By default, all entries are for downstream traffic, unless the **Edge Router IP** is configured in the edge router screen (see Section 38.4 on page 294).
Select Flush	Select the check box in the **Select** column for an entry, and click **Flush to** remove the entry from the ARP table.
Select Uplink	Click **Uplink** to mark all of the check boxes for entries using uplink interfaces.
Select Downlink	Click **Downlink** to mark all of the check boxes for entries using downlink interfaces.
Select None	Click **None** to deselect all check boxes.

39

PPPoE Intermediate Agent

This chapter describes how the IES gives a PPPoE termination server additional information that the server can use to identify and authenticate a PPPoE client.

39.1 PPPoE Intermediate Agent Tag Formate

If the PPPoE Intermediate Agent is enabled, the IES adds a vendor-specific tag to PADI (PPPoE Active Discovery Initialization) and PADR (PPPoE Active Discovery Request) packets from PPPoE clients. This tag is defined in RFC 2516 and has the following format for this feature.

Table 91 PPPoE Intermediate Agent Vendor-specific Tag Format

Tag_Type (0x0105)	Tag_Len	Value	i1	i2

The Tag_Type is 0x0105 for vendor-specific tags, as defined in RFC 2516. The Tag_Len indicates the length of Value, i1 and i2. The Value is the 32-bit number 0x00000DE9, which stands for the "ADSL Forum" IANA entry. i1 and i2 are PPPoE intermediate agent sub-options, which contain additional information about the PPPoE client. The IES supports two formats for the PPPoE intermediate agent sub-options: private and TR-101.

39.1.0.1 Private Format

There are two types of sub-option: "Agent Circuit ID Sub-option" and "Agent Remote ID Sub-option". They have the following formats.

Table 92 PPPoE Intermediate Agent Vendor-specific Tag Format

SubOpt (0x01)	Length	Slot ID (1 byte)	Port No (1 byte)	VLAN ID (2 bytes)	Extra Information (0~23 bytes)

Table 93 PPPoE Intermediate Agent Remote ID Sub-option Format

SubOpt (0x02)	Length	MAC (6 bytes)

The IES adds the slot ID of the PPPoE client, the port number of the PPPoE client, the VLAN ID on the PPPoE packet, and any extra information (for example, the device name) into the Agent Circuit ID Sub-option. In addition, the IES puts the PPPoE client's MAC address into the Agent Remote ID Sub-option. The slot ID is zero, if this value is not applicable. If the IES adds extra information, it does not append a trailing 0x00 (00h).

39.1.0.2 TR-101 Format

The PPPoE Intermediate Agent sub-option includes the system name or IP address, slot ID, port number, VPI, and VCI on which the TCP/IP configuration request was received.

The following figure shows the format of the TR-101 PPPoE Intermediate Agent sub-option. The 1 in the first field identifies this as an Agent Circuit ID sub-option. The next field specifies the length of the field. The hostname field displays the system name, if it has been configured, the extra information field (A) if the hostname was not configured, or the IP address in dotted decimal notation (w.x.y.z), if neither the system name nor the extra information field was been configured. In either case, the hostname is truncated to 23 characters, and trailing spaces are discarded. The hostname field is followed by a space, the string "atm", and another space. Then, a 1-byte Slot ID field specifies the ingress slot number, and a 1-byte Port No field specifies the ingress port number. Next, the VPI and VCI denote the virtual circuit that received the DHCP request message from the subscriber. If the VID is turned on, there is a colon and then the VLAN ID (1 ~ 4094). If the VID is turned off, there is neither colon nor VID.

The slot ID, port number, VPI, VCI and MAC are separated from each other by a forward slash (/) colon (:) or period (.). An example is "SYSNAME atm 3/10:0.33:12".

Table 94 PPPoE Intermediate Agent Sub-option Format: TR-101 (VID on)

1	N	hostname / A / IP	" atm "	Slot ID	/	Port No.	:	VPI	.	VCI	:	VLAN ID

Table 95 PPPoE Intermediate Agent Sub-option Format: TR-101 (VID off)

1	N	hostname / A / IP	" atm "	Slot ID	/	Port No.	:	VPI	.	VCI

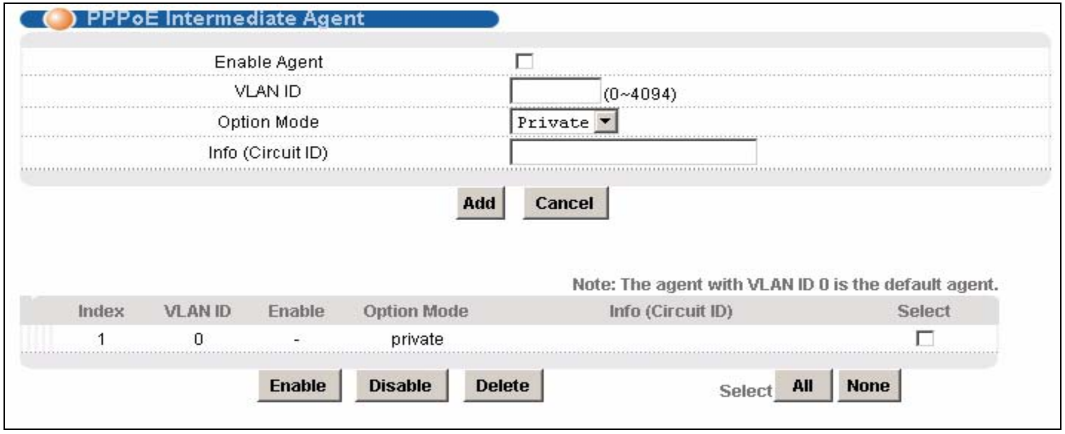
Unlike the private format for PPPoE intermediate agent, the TR-101 format for PPPoE intermediate agent does not include the Remote ID Sub-option.

39.2 PPPoE Intermediate Agent Screen

Use this screen to configure the IES to give a PPPoE termination server additional information that the server can use to identify and authenticate a PPPoE client.

To open this screen, click **Advanced Application > PPPoE Intermediate Agent**.

Figure 138 PPPoE Intermediate Agent



The following table describes the labels in this screen.

Table 96 PPPoE Intermediate Agent

LABEL	DESCRIPTION
Enable Agent	Select this if you want the IES to add a vendor-specific tag to PADI (PPPoE Active Discovery Initiation) and PADR (PPPoE Active Discovery Request) packets from PPPoE clients in the specified VLAN. This tag contains information that a PPPoE termination server can use to identify and authenticate a PPPoE client. This information includes the slot ID, port number, VLAN ID, and MAC address of the PPPoE client, as well as any additional information specified in the **Info** field. Clear this if you do not want the IES to add a vendor-specific tag to PADI and PADR packets from PPPoE clients in the specified VLAN.
VLAN ID	Enter the source VLAN ID for which the PPPoE intermediate agent settings apply. Enter **0** if you want to configure the default settings for all VLAN.
Option Mode	Select either **Private** or **TR-101** PPPoE Intermediate Agent sub-option.
Info (Circuit ID)	Enter any extra information the IES adds to PADI and PADR packets in the specified VLAN. You can enter up to 23 printable ASCII characters or spaces.

Table 96 PPPoE Intermediate Agent (continued)

LABEL	DESCRIPTION
Add	Click **Add** to save the settings. The settings then display in the summary table at the bottom of the screen. Clicking **Add** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields afresh.
Index	This field displays the index number of the entry.
VLAN ID	This field displays the source VLAN ID for which the PPPoE intermediate agent settings apply.
Enable	This field displays whether or not the IES adds a vendor-specific tag to PADI (PPPoE Active Discovery Initiation) and PADR (PPPoE Active Discovery Request) packets from PPPoE clients in the specified VLAN.
Info (Circuit ID)	This field displays any extra information the IES adds to PADI and PADR packets in the specified VLAN, if the PPPoE intermediate agent is turned on.
Select Enable	Select the check box in the **Select** column for an entry, and click **Enable** to add a vendor-specific tag to PADI and PADR packets for PPPoE clients in the selected VLAN(s).
Select Disable	Select the check box in the **Select** column for an entry, and click **Disable** to not add a vendor-specific tag to PADI and PADR packets for PPPoE clients in the selected VLAN(s).
Select Delete	Select the check box in the **Select** column for an entry, and click **Delete** to delete the PPPoE intermediate agent settings for subscribers in the selected VLAN(s). This also disables this feature for PPPoE clients in the selected VLAN(s).
Select All	Click **All** to mark all of the check boxes.
Select None	Click **None** to deselect all of the check boxes.

40

Maximum MTU Size

This chapter describes how to configure the Maximum Transmission Unit (MTU) for the Ethernet interfaces. The Ethernet interfaces discard any packets larger than this.

40.1 Maximum MTU Size Screen

Use this screen to configure the Maximum Transmission Unit (MTU) for the Ethernet interfaces. The Ethernet interfaces discard any packets larger than this.

To open this screen, click **Advanced Application > Maximum MTU Size**.

Figure 139 Maximum MTU

The following table describes the labels in this screen.

Table 97 Maximum MTU

LABEL	DESCRIPTION
Maximum MTU Size	Enter the size, in bytes, of the Maximum Transmission Unit (MTU) for the Ethernet interfaces. The Ethernet interfaces discard any packets larger than this.
Apply Setting	Click **Apply Setting** to save your MTU settings. Clicking **Apply Setting** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.

41

PVC Upstream Limit

This chapter describes how to limit the transmission rate for upstream traffic by PVC.

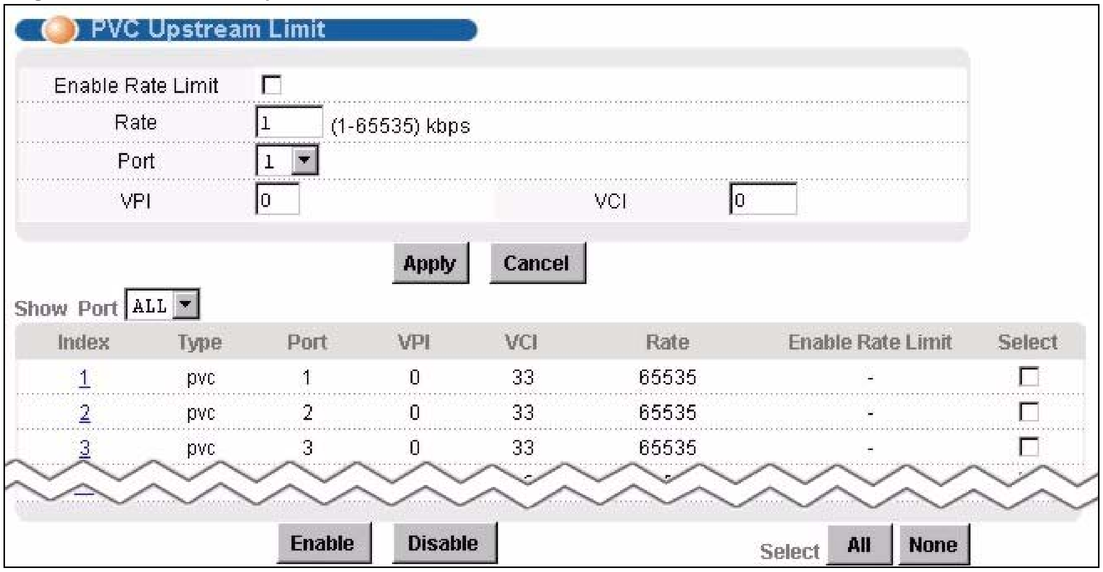
Note: You can set this limit for regular PVCs, priority PVCs, TLS PVCs, and IP bridge PVCs.

41.1 PVC Upstream Limit Screen

Use this screen to limit the transmission rate for upstream traffic by PVC.

To open this screen, click **Advanced Application > PVC Upstream Limit**.

Figure 140 PVC Upstream Limit



The following table describes the labels in this screen.

Table 98 PVC Upstream Limit

LABEL	DESCRIPTION
Enable Rate Limit	Select this to set a limit on the upstream transmission rate for the specified PVC. Clear this if there is no limit.
Rate	This field has no effect unless **Enable Rate Limit** is selected. Enter the maximum upstream transmission rate, in kbps, for the specified PVC.
Port	Use this drop-down list box to select the port for the PVC for which you wish to configure the maximum upstream transmission rate.
VPI	Type the Virtual Path Identifier for the PVC for which you wish to configure the maximum upstream transmission rate.
VCI	Type the Virtual Circuit Identifier for the PVC for which you wish to configure the maximum upstream transmission rate.
Apply	Click **Apply** to save the settings. The settings then display in the summary table at the bottom of the screen. Clicking **Apply** saves your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to begin configuring the fields afresh.
Show Port	Select a port for which you wish to view information.
Index	This field displays the index number for each PVC. Click it to edit the settings for the maximum upstream transmission rate.
Type	This field displays what type of PVC the specified PVC is.
Port	This field displays the port number for the specified PVC.
VPI	This field displays the Virtual Path Identifier for the specified PVC.
VCI	This field displays the Virtual Circuit Identifier for the specified PVC.
Rate	This field displays the maximum upstream transmission rate for the specified PVC. This has no effect, however, unless **Enable Rate Limit** is enabled.
Select Enable	Select the check box in the **Select** column for an entry, and click **Enable** to activate the limit on the upstream transmission rate for the select PVC(s).
Select Disable	Select the check box in the **Select** column for an entry, and click **Disable** to deactivate the limit on the upstream transmission rate for the select PVC(s).
Select All	Click **All** to mark all of the check boxes.
Select None	Click **None** to deselect all of the check boxes.

42

OUI Filter

This chapter describes how to configure an OUI (Organizationally Unique Identifier) filter to block or forward packets from other devices with the specified OUI in the MAC address.

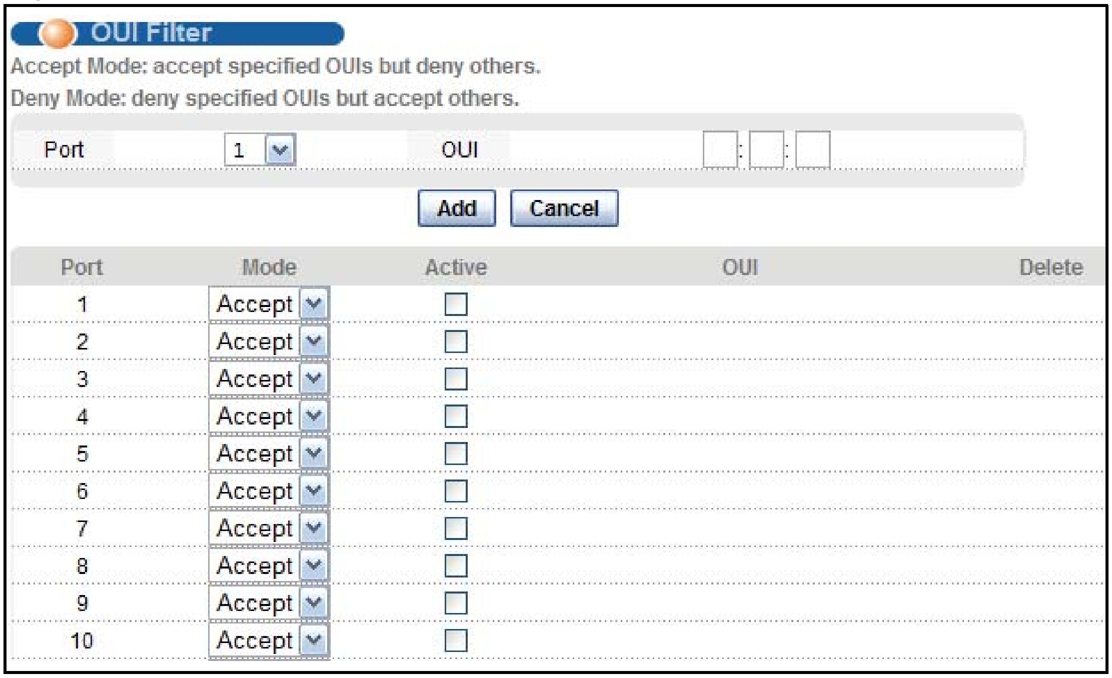
The OUI field is the first three octets in a MAC address. An OUI uniquely identifies the manufacturer of a network device and allows you to identify from which device brands the switch will accept traffic or send traffic to. The OUI value is assigned by the Internet Assign Numbers Authority (IANA).

42.1 OUI Filter Screen

Click **Advanced Application > OUI Filter** to display the configuration screen.

Note: If you enable both MAC filtering and OUI filtering, MAC filtering takes priority.

Figure 141 The OUI Filter Screen



The following table describes the labels in this screen.

Table 99 OUI Filter

LABEL	DESCRIPTION
Port OUI	Select a **Port** number and enter the OUI for the device that you want to filter on that port.
Add	Click this button to add the Port/OUI filter pair to the list below.
Cancel	Click the button to configure the Port/OUI filter pair anew.
Port	This indicates a port number.
Mode	Select a filtering mode for the port. • **Accept** - The IES allows other devices that match the OUI associated with this port. • **Deny** - The IES denies other devices that match the OUI associated with this port.
Active	Select this option to turn a filtering rule on, or deselect it to turn it off.
OUI	This indicates the OUI associated with this port.
Delete	Click this hyperlink to remove the filtering parameters from this port.
Apply	Click this button to save your changes.

PART IV
Routing Protocol, Alarm, VoIP and Management

43

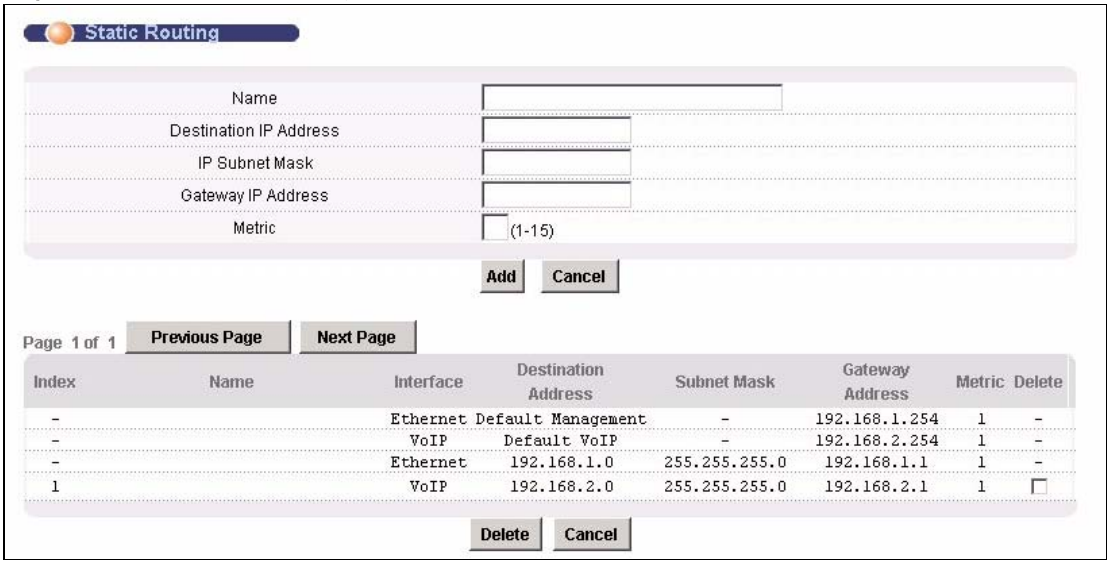
Static Routing

This chapter shows you how to configure the static routing function.

Static routes tell the IES how to forward the IES's own IP traffic when you configure the TCP/IP parameters manually. This is generally useful for allowing management of the device from a device with an IP address on a different subnet from that of the device's IP address (remote management).

To open this screen, click **Routing Protocol > Static Routing**.

Figure 142 Static Routing



The following table describes the labels in this screen.

Table 100 Static Routing

LABEL	DESCRIPTION
	Use this section to create a new static route.
Name	Type a name to identify this static route. Use up to 31 ASCII characters. Spaces and tabs are not allowed.
Destination IP Address	This parameter specifies the IP network address of the final destination. Routing is always based on network number. If you need to specify a route to a single host, use a subnet mask of 255.255.255.255 in the subnet mask field to force the network number to be identical to the host ID.

Table 100 Static Routing (continued)

LABEL	DESCRIPTION
IP Subnet Mask	Enter the subnet mask for this destination.
Gateway IP Address	Enter the IP address of the gateway. The gateway is an immediate neighbor of your device that will forward the packet to the destination. The gateway must be a router on the same segment as your device.
Metric	The metric represents the “cost” of transmission for routing purposes. IP routing uses hop count as the measurement of cost, with a minimum of 1 for directly connected networks. Enter a number that approximates the cost for this link. The number need not be precise, but it must be between 1 and 15. In practice, 2 or 3 is usually a good number.
Add	Click **Add** to save the new rule to the IES’s volatile memory. It then displays in the summary table at the bottom of the screen. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to reset the fields to your previous configuration.
	Use this section to look at a summary of all static routes in the IES.
Previous Page	Click this to display the preceding page of static route entries.
Next Page	Click this to display the following page of static route entries.
Index	This field displays the index number of the route.
Name	This field displays the name of this static route.
Destination Address	This field displays the IP network address of the final destination.
Subnet Mask	This field displays the subnet mask for this destination.
Gateway Address	This field displays the IP address of the gateway. The gateway is an immediate neighbor of your device that will forward the packet to the destination.
Metric	This field displays the cost of transmission for routing purposes.
Delete	Select the rule(s) that you want to remove in the **Delete** column, and then click the **Delete** button.
Cancel	Click **Cancel** to clear the selected check boxes in the **Delete** column.

44

Alarm

This chapter shows you how to display the alarms, sets the severity level of an alarm(s) and where the system is to send the alarm(s) and set port alarm severity level threshold settings.

44.1 Alarm

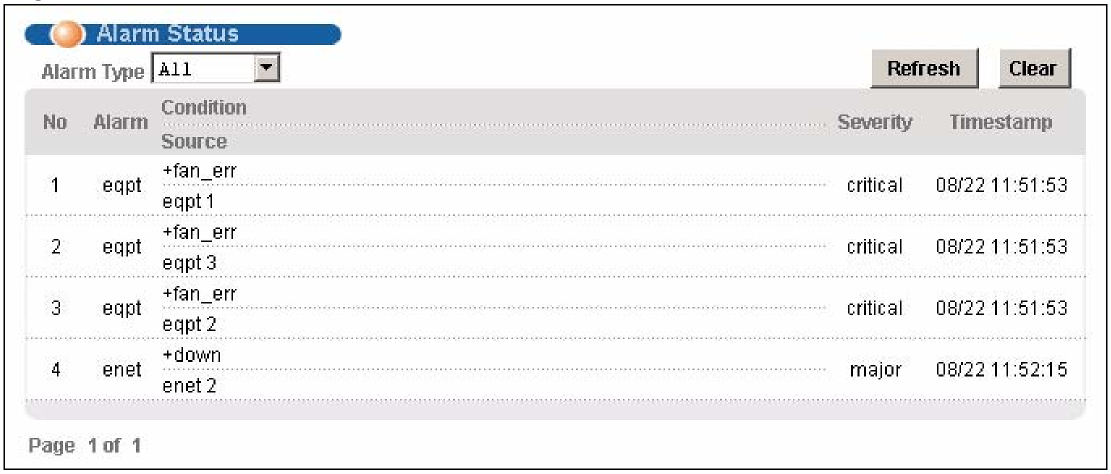
The IES monitors for equipment, DSL and system alarms and can report them via SNMP or syslog. You can specify the severity level of an alarm(s) and where the system is to send the alarm(s). You can also set the alarm severity threshold for recording alarms on an individual port(s). The system reports an alarm on a port if the alarm has a severity equal to or higher than the port's threshold.

44.2 Alarm Status Screen

This screen displays the alarms that are currently in the system.

To open this screen, click **Alarm > Alarm Status**.

Figure 143 Alarm Status



The following table describes the labels in this screen.

Table 101 Alarm Status

LABEL	DESCRIPTION
Alarm Type	Select which type of alarms to display by **Severity**, or select **All** to look at all the alarms.
Refresh	Click this button to update this screen.
Clear	Click this button to erase the clearable alarm entries.
No	This field displays the index number of the alarm entry in the system.
Alarm	This field displays the alarm category to which the alarm belongs.
Condition	This field displays a text description for the condition under which the alarm applies.
Severity	This field displays the alarm severity level (critical, major, minor or info).
Timestamp	This field displays the month, day, hour, minute and second that the system created the log.
Source	This field displays where the alarm originated. This is either a DSL port number, one of the Ethernet ports (enet 1 or 2), or “eqpt” for the system itself.
Page X of X	This identifies which page of information is displayed and the total number of pages of information.
Previous Page	Click this to display the preceding page of entries.
Next Page	Click this to display the following page of entries.

44.3 Alarm Descriptions

This table describes alarms that the system can send.

ATUC refers to the downstream channel (for traffic going from the IES to the subscriber). ATUR refers to the upstream channel (for traffic coming from the subscriber to the IES). A “V” in the **CLEARABLE** column indicates that an administrator can remove the alarm.

Table 102 Alarm Descriptions

ALARM	CONDITION	SEVERITY	CLEARABLE	DESCRIPTION
dsl	(5000)line_up	info		The DSL link is up.
dsl	(5001)line_down	minor	V	The DSL link is down.
dsl	(5002)ad_perf_lol_thresh	info	V	The number of times a Loss Of Link has occurred within 15 minutes (for the ATUC) has reached the threshold.

Table 102 Alarm Descriptions (continued)

ALARM	CONDITION	SEVERITY	CLEARABLE	DESCRIPTION
dsl	(5003)ad_perf_lof_thresh	info	V	The number of times a Loss Of Frame has occurred within 15 minutes for the ATU (C or R) has reached the threshold.
dsl	(5004)ad_perf_los_thresh	info	V	The number of times a Loss Of Signal has occurred within 15 minutes for the ATU (C or R) has reached the threshold.
dsl	(5005)ad_perf_lop_thresh	info	V	The number of times a Loss Of Power has occurred within 15 minutes for the ATU (C or R) has reached the threshold.
dsl	(5006)ad_perf_es_thresh	info	V	The number of error seconds within 15 minutes for the ATU (C or R) has reached the threshold.
dsl	(5007)ad_perf_ses_thresh	info	V	The number of severely errored seconds within 15 minutes for the ATU (C or R) has reached the threshold.
dsl	(5008)ad_perf_uas_thresh	info	V	The number of unavailable error seconds within 15 minutes for the ATU (C or R) has reached the threshold.
dsl	(5009)ad_atuc_loftrap	minor		A Loss Of Frame was detected on the ATUC.
dsl	(5010)ad_atuc_lostrap	minor		A Loss Of Signal was detected on the ATUC.
dsl	(5011)ad_atur_loftrap	minor		A Loss Of Frame was detected on the ATUR.
dsl	(5012)ad_atur_lostrap	minor		A Loss Of Signal was detected on the ATUR.
dsl	(5013)ad_atur_lprtrap	minor		A Loss of Power was detected on the ATUR.
eqpt	(10000)vol_err	critical		The input voltage (Vn) is lower than the low-threshold or higher than the high-threshold.
eqpt	(10001)temp_err	critical		The temperature (Tn) is higher than the high-threshold or lower than the low-threshold.
eqpt	(10002)fan_err	critical		The fan RPM ‘n’ is over the high-threshold or lower than the low-threshold.
eqpt	(10003)hw_rtc_fail	critical		The Real Time Chip diagnosis test failed.
eqpt	(10004)hw_mon_fail	critical		The hardware monitor diagnosis test failed.

Table 102 Alarm Descriptions (continued)

ALARM	CONDITION	SEVERITY	CLEARABLE	DESCRIPTION
eqpt	(10005)cold_start	info		System cold-start.
eqpt	(10006)warm_start	info		System warm-start.
eqpt	(10007)alm_input	critical		There is an external alarm input.
eqpt	(10008)voip_battery_fail	critical		There is a VoIP battery fault.
eqpt	(10009)voip_clocl_fail	critical		There is a VoIP clock fault.
sys	(15000)reboot	info		The system restarted.
sys	(15001)aco	info		An administrator cutoff (canceled) an alarm.
sys	(15002)alm_clear	info		An administrator cleared the alarms.
sys	(15003)login_fail	minor	V	Someone used the wrong name or password and failed to log in.
sys	15004anti_spoofing	minor		The IES has detected the same MAC address on more than one subscriber port.
enet	(20000)up	info		A Gigabit Ethernet interface is up.
enet	(20001)down	major	V	A Gigabit Ethernet interface is down.
voip	(25000)voip_temp_error	critical		The temperature of VoIP module has reached 165 °C. The IES releases this alarm when the temperature goes down to 150 °C.
voip	(25001)voip_dc_power_fail	critical		A DC power fault.
voip	(25002)voip_ac_power_fail	critical		An AC power fault.
voip	(25003)voip_ring_timer_fail	info		A firmware fault occurs when the IES fails to start in SIP mode.
voip	(25004)voip_ring_rsrce_fail	info		The number of current incoming VoIP calls has exceeded the total RENs (ringer equivalency numbers) the IES can support. The IES only supports 1 REN for each subscriber port at the time.
voip	(25505)voip_ring_chd_fail	info		This alarm is no longer used.

44.4 Alarm Event Setup Screen

This screen lists the alarms that the system can generate along with the severity levels of the alarms and where the system is to send them.

To open this screen, click **Alarm > Alarm Event Setup**.

Figure 144 Alarm Event Setup

Alarm Event Setup

Index	Alarm Condition Code		Condition	Facility	SNMP	Syslog	Severity	Clearable
1	dsl	5000	line_up	local1	V	V	info	-
2	dsl	5001	line_down	local1	V	V	minor	V
3	dsl	5002	ad_perf_lol_thresh	local1	V	V	minor	V
4	dsl	5003	ad_perf_lof_thresh	local1	V	V	minor	V
5	dsl	5004	ad_perf_los_thresh	local1	V	V	minor	V
6	dsl	5005	ad_perf_lop_thresh	local1	V	V	minor	V
7	dsl	5006	ad_perf_es_thresh	local1	V	V	minor	V
8	dsl	5007	ad_perf_ses_thresh	local1	V	V	minor	V
9	dsl	5008	ad_perf_uas_thresh	local1	V	V	minor	V
10	dsl	5009	ad_atuc_loftrap	local1	V	V	minor	-
11	dsl	5010	ad_atuc_lostrap	local1	V	V	minor	-
12	dsl	5011	ad_atur_loftrap	local1	V	V	minor	-
13	dsl	5012	ad_atur_lostrap	local1	V	V	minor	-
14	dsl	5013	ad_atur_lprtrap	local1	V	V	minor	-
15	eqpt	10000	vol_err	local1	V	V	critical	-
16	eqpt	10001	temp_err	local1	V	V	critical	-
17	eqpt	10002	fan_err	local1	V	V	critical	-
18	eqpt	10003	hw_rtc_fail	local1	V	V	critical	-
19	eqpt	10004	hw_mon_fail	local1	V	V	critical	-
20	eqpt	10005	cold_start	local1	V	V	info	-
21	eqpt	10006	warm_start	local1	V	V	info	-
22	eqpt	10007	alm_input	local1	V	V	critical	-
23	eqpt	10008	voip_battery_fail	local1	V	V	critical	-
24	eqpt	10009	voip_clock_fail	local1	V	V	critical	-
25	sys	15000	reboot	local1	V	V	info	-
26	sys	15001	aco	local1	V	V	info	-
27	sys	15002	alm_clear	local1	V	V	info	-
28	sys	15003	login_fail	local1	V	V	minor	V
29	sys	15004	anti_spoofing	local1	V	V	minor	V
30	enet	20000	up	local1	V	V	info	-
31	enet	20001	down	local1	V	V	major	V
32	voip	25000	voip_temp_error	local1	V	V	critical	-
33	voip	25001	voip_dc_power_fail	local1	V	V	critical	-
34	voip	25002	voip_ac_power_fail	local1	V	V	critical	-
35	voip	25003	voip_ring_timer_fail	local1	V	V	info	-
36	voip	25004	voip_ring_rsrce_fail	local1	V	V	info	-
37	voip	25005	voip_ring_ohd_fail	local1	V	V	info	-

The following table describes the labels in this screen.

Table 103 Alarm Event Setup

LABEL	DESCRIPTION
Index	This field displays the index number of the alarm in the list. Click this to specify the severity level of an alarm(s) and where the system is to send the alarm(s). See Section 44.4.1 on page 324.
Alarm	This field displays the alarm category to which the alarm belongs. **eqpt** represents equipment alarms. **dsl** represents Digital Subscriber Line (DSL) alarms. **enet** represents Ethernet alarms. **sys** represents system alarms. **voip** represents Voice over IP alarms.
Condition Code	This field displays the condition code number for the specific alarm message.
Condition	This field displays a text description for the condition under which the alarm applies.
Facility	This field displays the log facility (Local 1~ Local 7) on the syslog server where the system is to log this alarm. This is for alarms that send alarms to a syslog server.
SNMP	This field displays “V” if the system is to send this alarm to an SNMP server. It displays “-“ if the system does not send this alarm to an SNMP server.
Syslog	This field displays “V” if the system is to send this alarm to a syslog server. It displays “-“ if the system does not send this alarm to a syslog server.
Severity	This field displays the alarm severity level (critical, major, minor or info).
Clearable	This displays “V” if the alarm clear command removes the alarm from the system. It displays “-“if the alarm clear command does not remove the alarm from the system.

44.4.1 Edit Alarm Event Setup Screen

Use this screen to specify the severity level of an alarm(s) and where the system is to send the alarm(s).

To open this screen, click **Alarm > Alarm Status**. Then, click an alarm’s index number.

Figure 145 Alarm Event Setup Edit

The following table describes the labels in this screen.

Table 104 Alarm Event Setup Edit

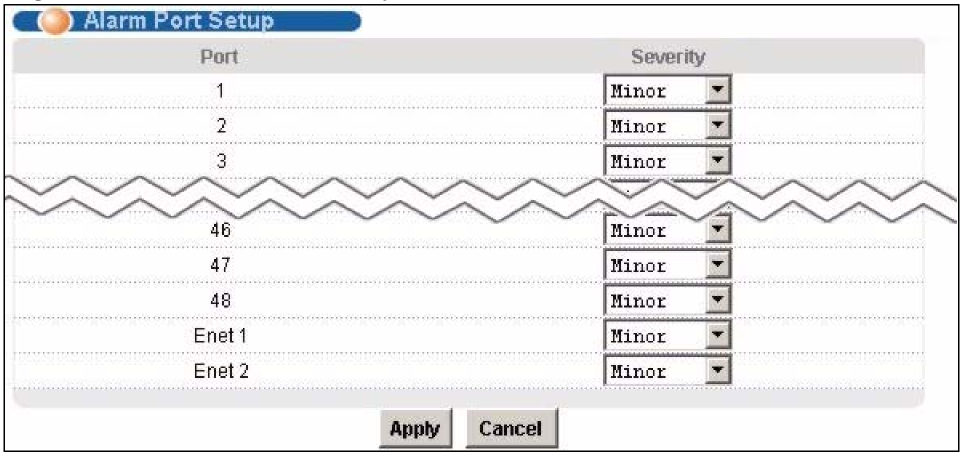
LABEL	DESCRIPTION
Alarm	This field displays the alarm category to which the alarm belongs. **eqpt** represents equipment alarms. **dsl** represents Digital Subscriber Line (DSL) alarms. **enet** represents Ethernet alarms. **sys** represents system alarms.
Condition Code	This field displays the condition code number for the specific alarm message.
Condition	This field displays a text description for the condition under which the alarm applies.
Facility	The log facility (Local 1 ~ Local 7) has the device log the syslog messages to a particular file in the syslog server. Select a log facility (Local 1 ~ Local 7) from the drop-down list box if this entry is for sending alarms to a syslog server. See your syslog program's documentation for details.
SNMP	Select this check box to have the system send this alarm to an SNMP server.
Syslog	Select this check box to have the system send this alarm to a syslog server.
Severity	Select an alarm severity level (critical, major, minor or info) for this alarm. Critical alarms are the most severe, major alarms are the second most severe, minor alarms are the third most severe and info alarms are the least severe.
Clearable	Select this check box to allow administrators to use the management interface to remove an alarm report generated by this alarm event entry. Select this check box to keep an alarm report generated by this alarm event in the system until the conditions that caused the alarm report are no longer present.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Close	Click **Close** to exit the screen without saving your changes.

44.5 Alarm Port Setup Screen

Use this screen to set the alarm severity threshold for recording alarms on an individual port(s). The system reports an alarm on a port if the alarm has a severity equal to or higher than the port's threshold.

To open this screen, click **Alarm > Alarm Port Setup**.

Figure 146 Alarm Port Setup



The following table describes the labels in this screen.

Table 105 Alarm Port Setup

LABEL	DESCRIPTION
Port	This column lists the device's individual DSL and Ethernet interfaces.
Severity	Select an alarm severity level (critical, major, minor or info) as the threshold for recording alarms on this port. Critical alarms are the most severe, major alarms are the second most severe, minor alarms are the third most severe and info alarms are the least severe.
Apply	Click **Apply** to save your changes to the IES's volatile memory. The IES loses these changes if it is turned off or loses power, so use the **Config Save** link on the navigation panel to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

45

VoIP

This chapter shows you how to configure the Voice over Internet Protocol (VoIP) features on your IES.

45.1 SIP Overview

VoIP (Voice over IP) is the sending of voice signals over the Internet Protocol. This allows you to make phone calls and send faxes over the Internet at a fraction of the cost of using the traditional circuit-switched telephone network. You can also use servers to run telephone service applications like PBX services and voice mail. Internet Telephony Service Provider (ITSP) companies provide VoIP service.

Circuit-switched telephone networks require 64 kilobits per second (kbps) in each direction to handle a telephone call. VoIP can use advanced voice coding techniques with compression to reduce the required bandwidth.

The IES connects POTS (Plain Old Telephone System) end-user telephone subscribers to the IP network by converting the analog voice signal into data packets and transmitting them over the network.

45.1.1 Introduction to SIP

The Session Initiation Protocol (SIP) is an application-layer control (signaling) protocol that handles the setting up, altering and tearing down of voice and multimedia sessions over the Internet.

SIP signaling is separate from the media for which it handles sessions. The media that is exchanged during the session can use a different path from that of the signaling. SIP handles telephone calls and can interface with traditional circuit-switched telephone networks.

45.1.1.1 SIP Registration

Each IES is an individual SIP User Agent (UA). To provide voice service, it has an IP address for SIP and RTP protocols to communicate with other servers.

A SIP user agent has to register with the SIP registrar and must provide information about the users it represents, as well as its current IP address (for the routing of incoming SIP requests). After successful registration, the SIP server knows that the users (identified by their dedicated SIP URIs; see Section 45.1.2 on page 328) are represented by the UA, and knows the IP address to which the SIP requests and responses should be sent.

Registration is initiated by the User Agent Client (UAC) running in the VoIP gateway (the IES). The gateway must be configured with information letting it know where to send the REGISTER message, as well as the relevant user and authorization data.

A SIP registration has a limited lifespan. The lifespan value is sent from the SIP server to the UAC when the UAC first registers. The UAC must renew its registration within this lifespan. If it does not do so, the registration data will be deleted from the SIP registrar's database and the connection broken.

The IES attempts to register all enabled subscriber ports when it is switched on. When you enable a subscriber port that was previously disabled, the IES attempts to register the port immediately.

45.1.1.2 Authorization Requirements

SIP registrations (and subsequent SIP requests) require a username and password for authorization. These credentials are validated via a challenge / response system using the HTTP digest mechanism (as detailed in RFC3261, "SIP: Session Initiation Protocol").

45.1.2 SIP Identities

A SIP account uses an identity (sometimes referred to as a SIP address). A complete SIP identity is called a SIP URI (Uniform Resource Identifier). A SIP account's URI identifies the SIP account in a way similar to the way an e-mail address identifies an e-mail account. The format of a SIP identity is SIP-Number@SIP-Service-Domain.

45.1.2.1 SIP Number

The SIP number is the part of the SIP URI that comes before the “@” symbol. A SIP number can use letters like in an e-mail address (johndoe@your-ITSP.com for example) or numbers like a telephone number (1122334455@VoIP-provider.com for example).

45.1.2.2 SIP Service Domain

The SIP service domain of the VoIP service provider (the company that lets you make phone calls over the Internet) is the domain name in a SIP URI. For example, if the SIP address is 1122334455@VoIP-provider.com, then “VoIP-provider.com” is the SIP service domain.

45.1.3 SIP Servers and Clients

SIP is a client-server protocol. A SIP client is an application program or device that sends SIP requests. A SIP server responds to the SIP requests.

When you use SIP to make a VoIP call, it originates at a client and terminates at a server. A SIP client could be a computer or a SIP phone. One device can act as both a SIP client and a SIP server.

45.1.3.1 SIP User Agent

A SIP user agent can make and receive VoIP telephone calls. A User Agent Client (UAC) is a logical entity that initiates a SIP request, and a User Agent Server (UAS) is a logical entity that creates a response to a SIP request. These logical entities last only as long as the duration of the transaction they have initiated or responded to. So, a piece of software can act as the UAC in one call and the UAS in another.

45.1.3.2 SIP Proxy Server

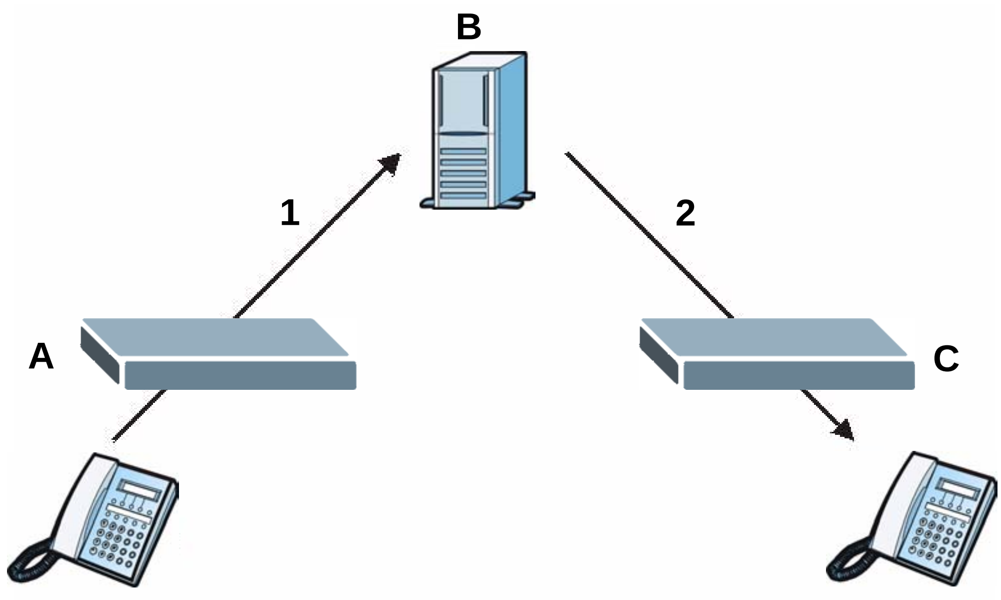
A SIP proxy server receives requests from clients and forwards them to another server.

In the following example, you want to use a telephone connected to client device **A** to call someone who is using a telephone connected to client device **C**. In this example, **A** is the UAC and **C** is the UAS.

1 The client device (**A** in the figure) sends a call invitation to the SIP proxy server (**B**).

2 The SIP proxy server forwards the call invitation to **C**.

Figure 147 SIP Proxy Server



45.1.3.3 SIP Registrar Server

A SIP registrar server (also known as a register server) maintains a database of SIP identity-to-IP address (or domain name) mapping. The registrar server checks your user name and password when you register.

45.1.4 RTP

When you make a VoIP call using SIP, the RTP (Real time Transport Protocol) is used to handle voice data transfer. See RFC 1889 for details on RTP.

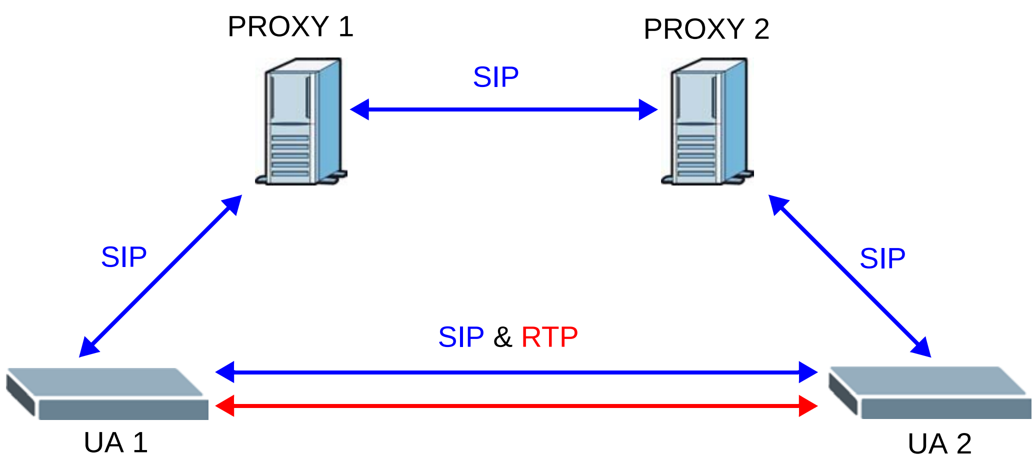
45.1.5 SIP Call Progression

Usually, the SIP UAC sets up a phonecall by sending a request to the SIP proxy server. Then, the proxy server looks up the destination to which the call should be forwarded (according to the URI requested by the SIP UAC). The request may be forwarded to more than one proxy server before arriving at its destination.

The response to the request goes to all the proxy servers through which the request passed, in reverse sequence. Once the session is set up, session traffic is sent between the UAs directly, bypassing all the proxy servers in between.

The following figure shows the SIP and session traffic flow between the user agents (**UA 1** and **UA 2**) and the proxy servers (this example shows two proxy servers, **PROXY 1** and **PROXY 2**).

Figure 148 SIP Call Through Proxy Servers



The following table shows the SIP call progression.

Table 106 SIP Call Progression

UA 1		PROXY 1		PROXY 2		UA 2
Invite	→					
		Invite	→			
	←	100 Trying		Invite	→	
			←	100 Trying		
					←	180 Ringing
			←	180 Ringing		
	←	180 Ringing				
					←	200 OK
			←	200 OK		
	←	200 OK				
ACK	→					
RTP	↔					RTP
	←					BYE
200 OK	→					

1 **User Agent 1** sends a SIP INVITE request to **Proxy 1**. This message is an invitation to **User Agent 2** to participate in a SIP telephone call. **Proxy 1** sends a response indicating that it is trying to complete the request.

2 **Proxy 1** sends a SIP INVITE request to **Proxy 2**. **Proxy 2** sends a response indicating that it is trying to complete the request.

3 **Proxy 2** sends a SIP INVITE request to **User Agent 2**.

4 **User Agent 2** sends a response back to **Proxy 2** indicating that the phone is ringing. The response is relayed back to **User Agent 1** via **Proxy 1**.

5 **User Agent 2** sends an OK response to **Proxy 2** after the call is answered. This is also relayed back to **User Agent 1** via **Proxy 1**.

6 **User Agent 1** and **User Agent 2** exchange RTP packets containing voice data directly, without involving the proxies.

7 When **User Agent 2** hangs up, he sends a BYE request.

8 **User Agent 1** replies with an OK response confirming receipt of the BYE request, and the call is terminated.

45.1.6 Voice Coding

A codec (coder/decoder) codes analog voice signals into digital signals and decodes the digital signals back into voice signals. The IES supports the following codecs.

- **G.711** is a Pulse Code Modulation (PCM) waveform codec. PCM measures analog signal amplitudes at regular time intervals (sampling) and converts them into digital bits (quantization). Quantization “reads” the analog signal and then “writes” it to the nearest digital value. For this reason, a digital sample is usually slightly different from its analog original (this difference is known as “quantization noise”).

  G.711 provides very good sound quality but requires 64kbps of bandwidth.

- **G.723.1** uses Low-Delay Code-Excited Linear Prediction (LD-CELP) to code audio in 30-millisecond frames. The standard supports two bitrates, 6.3 kbps and 5.3 kbps.[3] G.723.1 provides toll-quality sound and requires very little bandwidth.

3. At the time of writing, the IES supports the 5.3 kbps bitrate only.

- **G.726** is an Adaptive Differential Pulse Code Modulation (ADPCM) waveform codec that uses a lower bitrate than standard PCM conversion.

  Differential (or Delta) PCM is similar to PCM, but encodes the audio signal based on the difference between one sample and a prediction based on previous samples, rather than encoding the sample's actual quantized value. Many thousands of samples are taken each second, and the differences between consecutive samples are usually quite small, so this saves space and reduces the bandwidth necessary.

  However, DPCM produces a high quality signal (high signal-to-noise ratio or SNR) for high difference signals (where the actual signal is very different from what was predicted) but a poor quality signal (low SNR) for low difference signals (where the actual signal is very similar to what was predicted). This is because the level of quantization noise is the same at all signal levels. Adaptive DPCM solves this problem by adapting the difference signal's level of quantization according to the audio signal's difference level. A low difference signal is given a higher quantization level, increasing its signal-to-noise ratio. This provides a similar sound quality at all signal levels.

  G.726 operates at 16, 24, 32 or 40 kbps.

- **G.729** is an Analysis-by-Synthesis (AbS) hybrid waveform codec. It uses a filter based on information about how the human vocal tract produces sounds. The codec analyzes the incoming voice signal and attempts to synthesize it using its list of voice elements. It tests the synthesized signal against the original and, if it is acceptable, transmits details of the voice elements it used to make the synthesis. Because the codec at the receiving end has the same list, it can exactly recreate the synthesized audio signal.

  G.729 provides good sound quality and reduces the required bandwidth to 8kbps.

45.1.7 PSTN Call Setup Signaling

PSTNs (Public Switched Telephone Networks) use DTMF or pulse dialing to set up telephone calls.

Dual-Tone Multi-Frequency (DTMF) signaling uses pairs of frequencies (one lower frequency and one higher frequency) to set up calls. It is also known as Touch Tone®. Each of the keys on a DTMF telephone corresponds to a different pair of frequencies.

Pulse dialing sends a series of clicks to the local phone office in order to dial numbers.[4]

45.1.7.1 VoIP VLAN

Virtual Local Area Network (VLAN) allows a physical network to be partitioned into multiple logical networks. Only stations within the same VLAN can communicate with each other.

4. The IES supports DTMF at the time of writing.

Your IES can add IEEE 802.1Q VLAN ID tags to voice frames that it sends to the network. This allows the IES to communicate with a SIP server that is a member of the same VLAN group. Some ISPs use the VLAN tag to identify voice traffic and give it priority over other traffic.

45.2 Using Call Services

The IES supports a variety of call services such as call hold, call waiting, do not disturb, and so on. These services can be accessed by a user from a telephone connected to the IES (if the service is activated in the **VoIP** > **Call Service Profile** screen - see Section 45.5 on page 347). The following table shows the default key patterns used to access the supported services.

Table 107 Using Call Services

FUNCTION	KEY CODE
Turn do not disturb on.	*99#
Turn do not disturb off.	#99#
Enable call waiting.	*43#
Disable call waiting.	#43#
Call waiting: reject new call.	Flash 0
Call waiting: accept new call and disconnect current call.	Flash 1
Call waiting: accept new call and put current call on hold.	Flash 2
Turn Caller Line Identification Restriction (CLIR) on.	##
Call Transfer.	*98#

Note: If the IES is restarted, the do not disturb setting returns to its default (off).

45.2.1 Do Not Disturb

When Do Not Disturb (DND) is activated on a port, all incoming calls on that port are rejected.

45.2.1.1 Activating Do Not Disturb

Take the following steps to activate DND on one of the IES's ports.

Using a telephone connected to the port:

1 Dial "*99#".

2 Enter the number of hours and minutes from the present time that DND should take effect in the format **hhmm** (so you would enter 0145 for one hour and forty-five minutes, for example). Allowed digits for hours are 0~9 and allowed digits for minutes are 0~5.

3 Enter the number of hours and minutes that DND should remain in effect in the format **hhmm**. Allowed digits for hours are 0~9 and allowed digits for minutes are 0~5.

If you hear two beeps, the procedure was successful.

45.2.1.2 Deactivating Do Not Disturb

To deactivate DND on one of the IES's ports, dial "#99#" using a telephone connected to the port. Alternatively, dial "*99#0000".

If you hear two beeps, the procedure was successful.

45.2.2 Call Waiting

Call waiting allows a user, engaged in a call, to hear an indication that a second call is incoming. The user can then chooe to reject the second call, accept the second call and hold the first call, or accept the second call and terminate the first call.

45.2.2.1 Activating Call Waiting

To activate call waiting on one of the IES's ports, dial "*43#" using a telephone connected to the port.

If you hear two beeps, the procedure was successful.

45.2.2.2 Deactivating Call Waiting

To deactivate call waiting on one of the IES's ports, dial "#43#" using a telephone connected to the port.

If you hear two beeps, the procedure was successful.

45.2.2.3 Rejecting and Accepting Incoming Calls

To reject a second incoming call, press **Flash** then **0**.

To accept a second incoming call and terminate the first call, press **Flash** then **1**.

To accept a second incoming call and put the first call on hold, press **Flash** then **2**.

45.2.3 CLIR/CLIP

When Calling Line Identification Restriction (CLIR) is active on one of the IES's ports, Caller ID is not sent for outgoing calls on the port.

On the other hand, Calling Line Identification Presentation (CLIP) does the exact opposite; it sends Caller ID for outgoing calls on that port. This feature is always on by default.

- To activate CLIR on one of the IES's ports, dial "##" on a telephone connected to the port before you dial the phone number.

Note: This activates CLIR on the current call only.

45.2.4 CLIDCW

When Calling Line Identification on Call Waiting (CLIDCW) is active on one of the IES's ports, a Caller ID is displayed on your phone for any call sent to call waiting while you are currently talking on the line.

45.2.5 Call Return

This feature allows allows you to redial the last call received simply by pressing "*97#" on a telephone connected to the port for which this is configured.

45.2.6 MWI

Message Waiting Indicator sends a beeping tone to the phone connected to the port on which this is configured if it has least one voicemail.

45.2.7 Call Transfer

Call transfer allows a user to forward an incoming call to another phone number. The IES supports three types of call transfer: blind transfer, attendant transfer and consultative transfer.

45.2.7.1 Making a Blind Transfer

In a blind transfer the caller (A) is transferred by the callee (B) to the second callee (C). B and C do not talk to one another.

Take the following steps to make a blind transfer on a phone connected to the IES.

1 During a call, press the Flash key. This puts the caller on hold.

2 Dial "*98#" then the number to which you want to transfer the call.

3 Hang up. The call is transferred.

45.2.7.2 Making a Consultative Transfer

In a consultative transfer, the caller (A) is transferred by the callee (B) to the second callee (C) after B and C talk to one another. In a consultative transfer, A does not have the option of not transferring A's call to C.

Take the following steps to make a consultative transfer on a phone connected to the IES.

1 During a call, press the Flash key. This puts the caller on hold.

2 Dial "*98#" then the number to which you want to transfer the call.

3 Hang up. The call is transferred.

45.2.7.3 Making an Attendant Transfer

In an attendant transfer, the caller (A) is transferred by the callee (B) to the second callee (C) after B and C talk to one another. However, in an attendant transfer B has the option of not transferring A's call to C.

Take the following steps to make an attendant transfer on a phone connected to the IES.

1 During a call, press the Flash key. This puts the caller on hold.

2 Dial the number to which you want to transfer the call.

3 When the call is picked up - and you find out whether the other person wants to accept the call or not - press the Flash key and then dial "*98#". The call is transferred.

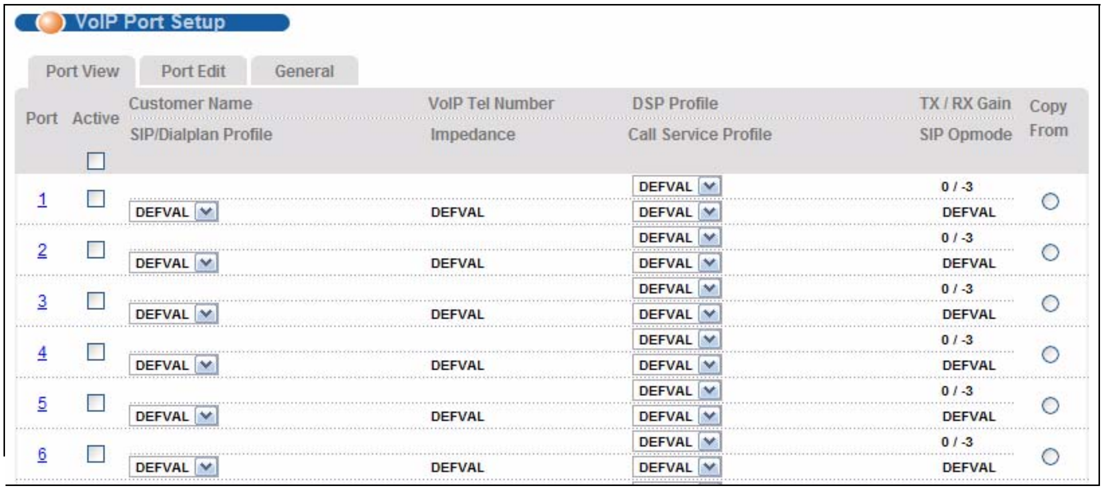
45.3 VoIP Port Setup Screens

Use these screens to configure the Voice over IP (VoIP) settings of each of the IES's ports. You can activate ports, assign SIP, call service and DSP profiles to each, configure customer information and set the region in which the IES is to operate.

45.3.1 Port View Screen

Use this screen to see details of the VoIP settings configured on all of the IES's ports. You can also change the SIP profile, DSP profile and call service profile each port uses, and copy the VoIP settings from one port to all the other ports. Click **VoIP > VoIP Port Setup > Port View**. The following screen displays.

Figure 149 VoIP > VoIP Port Setup > Port View



The following table describes the labels in this screen.

Table 108 VoIP > VoIP Port Setup > Port View

LABEL	DESCRIPTION
Port	This is the port number. Click a number to go to that port's **Port Edit** screen, where you can configure customer and profile information.
Active	Select this to activate VoIP on the port.
Customer Name	If you configured a name in the **Basic Setting** > **xDSL Port Setup** > **xDSL Port Setting** screen's **Customer Info** field, it displays here.
SIP/Dialplan Profile	Select the SIP profile that the port is to use. If you have not configured any profiles, only the default profile **DEFVAL** can be selected. Configure SIP profiles in the **VoIP** > **SIP Profile** screen.

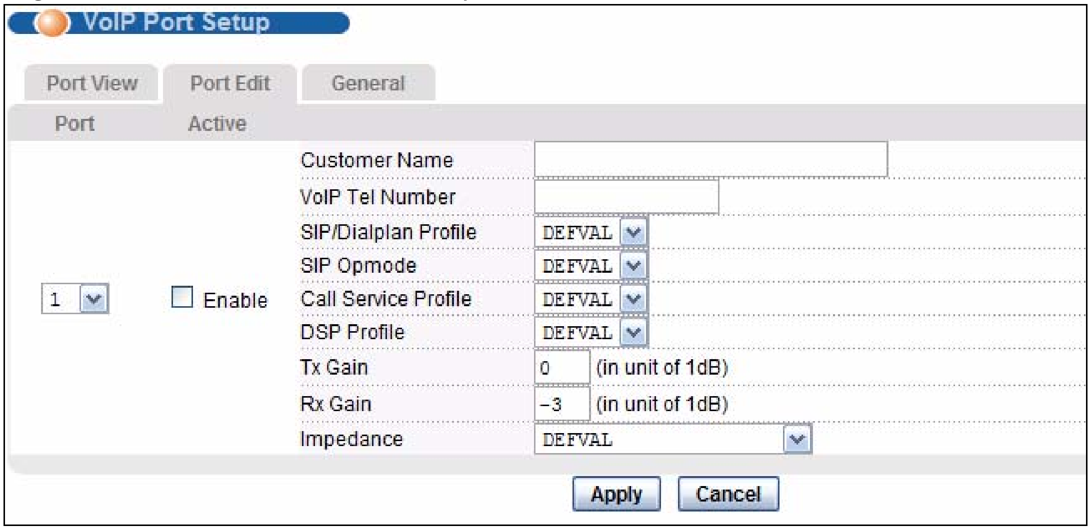
Table 108 VoIP > VoIP Port Setup > Port View

LABEL	DESCRIPTION
VoIP Tel Number	The customer telephone number you configured in the port's **Port Edit** screen displays here.
Impedance	Impedence indicates the default VoIP port AC impedance. The default impedance value depends on the country code. For more information on impedance and country code, see Section 68.3 on page 560.
DSP Profile	This is the name of the Digital Signal Processing (DSP) profile used by the specified port displays here. Configure DSP profiles in the **VoIP** > **DSP Profile** screen.
Call Service Profile	Select the call service profile the port is to use. If you have not configured any profiles, only the default profile **DEFVAL** can be selected. Configure call service profiles in the **VoIP** > **Call Service Profile** screen.
TX/RX Gain	**Tx**: Indicates the amount of gain (increase in volume) you applied to the signal received from the subscriber and transmitted to the SIP server. **Rx**: Indicates the amount of gain (increase in volume) you applied to the signal received from the SIP server and transmitted to the subscriber. These are measured in tenths of a decibel and the range can be from -20 to 20. A negative value indicates a decreased volume.
SIP Opmode	This indicates the port's VoIP operation mode. **DEFVAL** means SIP is being used to connect to a server. **v5sip** means V5.2 is being used to connect to a traditional class 5 POTS switch.
Copy From	Select this to prepare to copy the specified port's settings to all the other ports. Click the **Copy** button to complete the procedure.
Apply	Click this to save your changes.
Copy	Click this to copy VoIP settings from the selected port to all other ports. You must first select a port's **Copy From** field.
Cancel	Click this to return the fields in this screen to their last-saved values.

45.3.2 Port Edit Screen

Use this screen to configure the VoIP settings of each of the IES's ports. Click **VoIP > VoIP Port Setup > Port Edit**. The following screen displays.

Figure 150 VoIP > VoIP Port Setup > Port Edit



The following table describes the labels in this screen.

Table 109 VoIP > VoIP Port Setup > Port Edit

LABEL	DESCRIPTION
Port	Select the port you want to configure.
Active	Select this to enable VoIP on the selected port.
Customer Name	If you configured a name in the **Basic Setting** > **xDSL Port Setup** > **xDSL Port Setting** screen's **Customer Info** field, it displays here.
VoIP Tel Number	Enter the customer's telephone number.
SIP/Dialplan Profile	Select the SIP or Dialplan profile that the port is to use. If you have not configured any profiles, only the default profile **DEFVAL** can be selected. Configure SIP profiles in the **VoIP** > **SIP Profile** screen.
SIP Opmode	Set the port's VoIP operation mode. Select **DEFVAL** to use SIP to connect to a server. Select **v5sip** to use V5.2 to connect to a traditional class 5 POTS switch.
Call Service Profile	Select the call service profile the port is to use. If you have not configured any profiles, only the default profile **DEFVAL** can be selected. Configure call service profiles in the **VoIP** > **Call Service Profile** screen.
DSP Profile	Select the Digital Signal Processing (DSP) profile the port is to use. If you have not configured any profiles, only the default profile **DEFVAL** can be selected. Configure DSP profiles in the **VoIP** > **DSP Profile** screen.

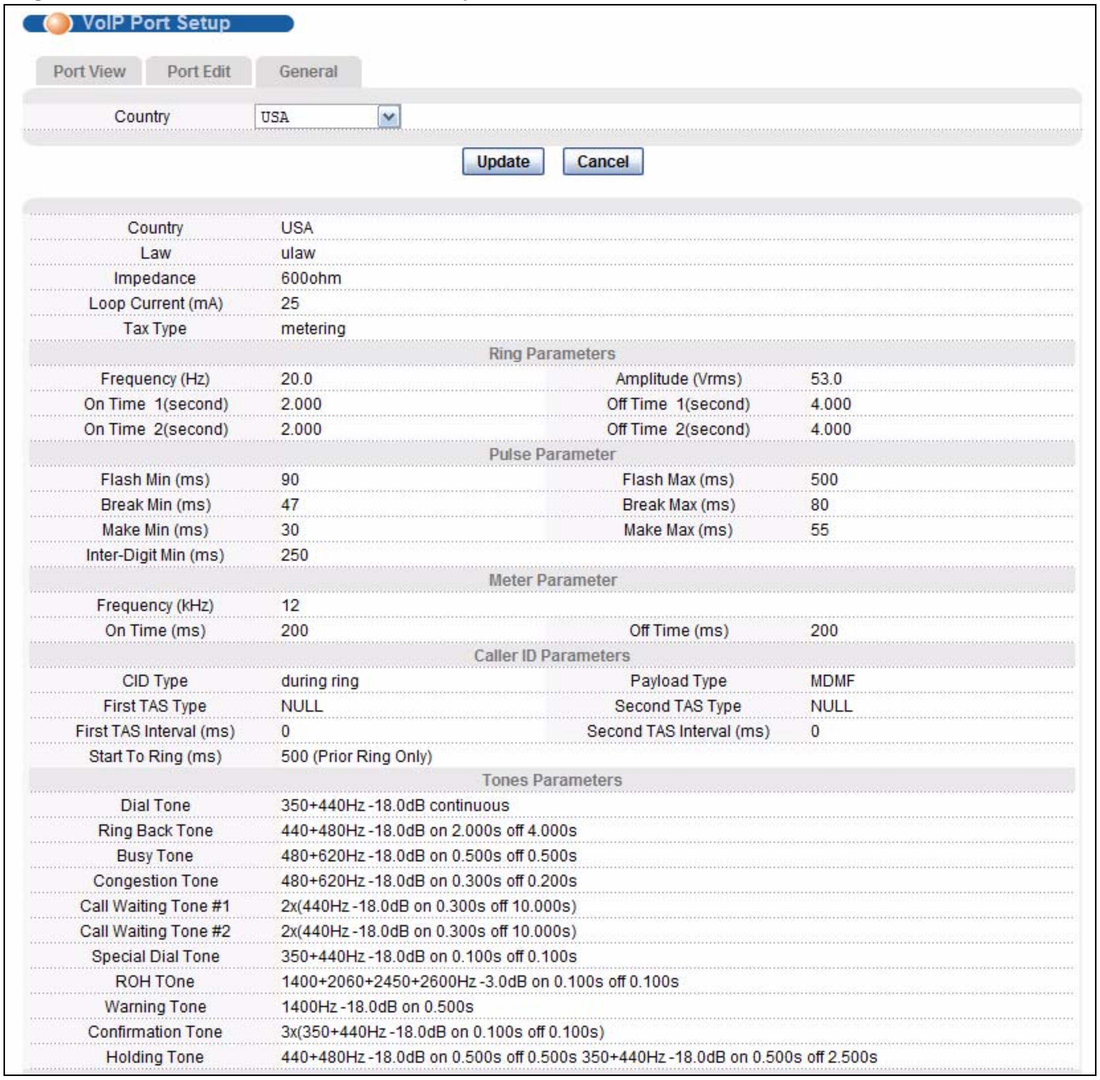
Table 109 VoIP > VoIP Port Setup > Port Edit

LABEL	DESCRIPTION
TX Gain	Enter the amount of gain (increase in volume) you want to apply to the signal received from the subscriber and transmitted to the SIP server. These are measured in tenths of a decibel and the range can be from -20 to 20. Enter a negative value to decrease the volume.
RX Gain	Enter the amount of gain (increase in volume) you want to apply to the signal received from the SIP server and transmitted to the subscriber. These are measured in tenths of a decibel and the range can be from -20 to 20. Enter a negative value to decrease the volume.
Impedance	Impedence indicates the default VoIP port AC impedance. The default impedance value depends on the country code. If you do not want to use the default impedance, select the required AC impedance of the VoIP port from the list.
Apply	Click this to save your changes.
Cancel	Click this to return the fields in this screen to their last-saved values.

45.3.3 General Screen

Use this screen to configure the regional VoIP settings of the IES, and to see details of the VoIP settings affected by the country of operation you select. Click **VoIP > VoIP Port Setup > General**. The following screen displays.

Figure 151 VoIP > VoIP Port Setup > General



The following table describes the labels in this screen.

Table 110 VoIP > VoIP Port Setup > General

LABEL	DESCRIPTION
Country	Select the country in which the IES will be used.
Update	Click this to save your changes and display the region-specific VoIP settings below.
Cancel	Click this to return this screen to its last-saved values.

Table 110 VoIP > VoIP Port Setup > General

LABEL	DESCRIPTION
Country	This field displays the country you select from the **Country** drop-down list box.
Law	This displays either **alaw** or **ulaw**. The a-law companding algorithm is commonly used in Europe, while the u-law (mu-law or µ-law) algorithm is commonly used in the USA and Japan.
Impedance	Displays the line impedance or impedance range in ohms.
Loop Current (mA)	Displays the supplied line current in milliamps.
Tax Type	Displays the payphone charging signal type; **metering** (12/16 Hz signal) or **reversebattery** (polarity reversal signal).
Ring Parameters	This section displays region-specific information about the phone's ring.
Frequency (Hz)	This displays the frequency of the phone ring in Hertz.
On Time 1 (second)	This displays the duration of the first ring (in seconds).
Off Time 1 (second)	This displays the length of time between the first and second ring (in seconds).
On Time 2 (second)	This displays the duration of the second ring (in seconds).
Off Time 2 (second)	This displays the wait time after the second ring before the first ring is sent again (in seconds).
Pulse Parameter	This section displays region-specific information about pulse dialling.
Flash Min / Max (ms)	These display the minimum and maximum hook flash times.
Break Min / Max (ms)	These display the minimum and maximum times for ending a pulse.
Make Min / Max (ms)	These display the minimum and maximum times for beginning a pulse.
Inter-Digit Min (ms)	This displays the minimum waiting time between pulsed digits.
Meter Parameter	This section displays region-specific information about call metering.
Frequency (kHz)	This displays the frequency of the call-metering tone (in kilohertz).
On Time (ms)	This displays the duration of the call-metering tone (in milliseconds).
Off Time (ms)	This displays the time between call-metering tones (in milliseconds).
Caller ID Parameters	This section displays region-specific information about caller ID
CID Type	This displays whether the caller ID information is sent before the ring (**prior ring** displays) or at the same time as the ring (**during ring** displays).

Table 110 VoIP > VoIP Port Setup > General

LABEL	DESCRIPTION
Payload Type	This displays the caller ID payload type. **SDMF** displays if caller ID uses the Single Data Message Format (which transmits caller number, date and time). **MDMF** displays if caller ID uses the Multiple Data Message Format (which transmits caller name, number, date and time).
First TAS Type	TAS (Telephone equipment Alerting Signal) is a tone sent by prior to the transmission of caller ID information. This is the primary TAS signal type. The possible values are: NULL: No TAS signal is sent. DT_AS: Dual Tone Alerting Signal. RP_AS: Ringing Pulse Alerting Signal. Line_Reversal: Simple line polarity inversion.
First TAS Interval (ms)	This is the first TAS timeout period in milliseconds.
Second TAS Type	This is the secondary TAS signal type. NULL: No TAS signal is sent. DT_AS: Dual Tone Alerting Signal. RP_AS: Ringing Pulse Alerting Signal.
Second TAS Interval (ms)	This is the second TAS timeout period in milliseconds.
Start To Ring (ms)	This is the wait time between the caller ID information being sent and the ring signal being sent (available for the prior ring type only).
Tones Parameters	This section displays region-specific information about call progress tones.
Dial Tone	This is the tone sent to indicate that a call can be dialled.
Ring Back Tone	This is the tone sent to indicate that the callee's phone is ringing.
Busy Tone	This is the tone sent to indicate that the callee's line is busy.
Reorder Tone	This is the tone sent to indicate that an invalid number has been dialled.
Congestion Tone	This is the tone sent to indicate that the network is busy.
Special Dial Tone	This is the tone sent to indicate that certain three-way calling, conference and call transfer services are available.
Call Waiting Tone #1	This is the tone sent to indicate that a second call is incoming while the first is still in progress.
Call Waiting Tone #2	This is reserved for future use.
MWI Tone	This is the tone sent to indicate that a voice message is awaiting the user's attention.

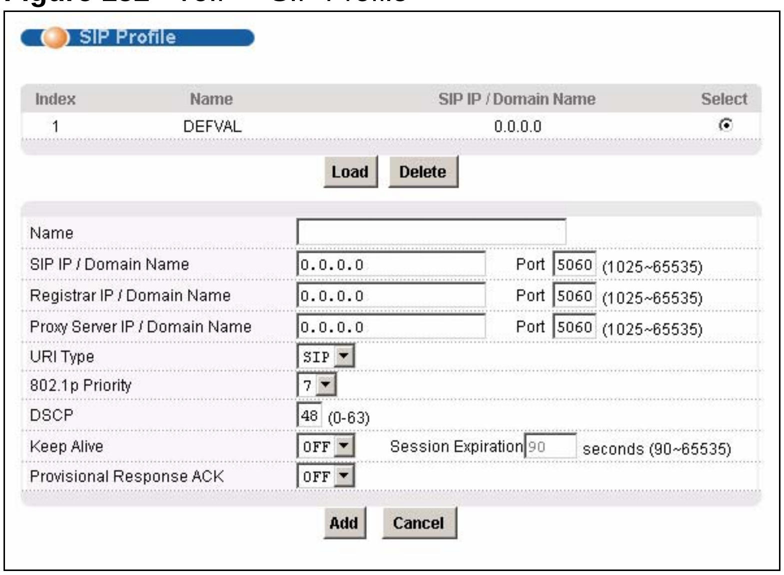
Table 110 VoIP > VoIP Port Setup > General

LABEL	DESCRIPTION
ROH Tone	This is the tone sent at the end of a call to indicate that the other party has hung up.
Warning Tone	This is the tone sent to indicate that the telephone circuit is operating abnormally.
Confirmation Tone	This is the tone sent to indicate that user-entered information has been successfully received.
Holding Tone	This is the tone sent to indicate that a call is on hold.

45.4 SIP Profile Screen

Use this screen to configure basic information about the SIP accounts used by the IES. Click **VoIP > SIP Profile**. The following screen displays.

Figure 152 VoIP > SIP Profile



The following table describes the labels in this screen.

Table 111 VoIP > SIP Profile

LABEL	DESCRIPTION
Index	This is an incremental number indicating the order in which the SIP profiles were created.
Name	This is the SIP profile name.
SIP IP / Domain Name	This is the IP address or domain name of your VoIP provider's SIP server. This information is used in the request line of SIP request messages, and is not used to initiate communication with the SIP server.
Select	Select the SIP profile you wish to load or delete.

Table 111 VoIP > SIP Profile

LABEL	DESCRIPTION
Load	Select a SIP profile and click this in order to edit its configuration in the lower portion of this screen.
Delete	Select a SIP profile and click this to delete the profile. Once deleted, information cannot be retrieved.
Name	Enter a name for this SIP profile.
SIP IP / Domain Name	Enter the IP address or domain name of your VoIP provider's SIP server. You can use up to 64 printable ASCII characters. It does not matter whether the SIP server is a proxy, redirect or register server.
Port	Enter the SIP server's listening port number, if the VoIP service provider gave you one. Otherwise, keep the default value.
Registrar IP / Domain Name	Enter the IP address or domain name of the SIP registrar server, if the VoIP service provider gave you one. Otherwise, enter the same address you entered in the **SIP IP / Domain Name** field. You can use up to 64 printable ASCII characters.
Port	Enter the SIP registrar server's listening port number, if the VoIP service provider gave you one. Otherwise, enter the same port number you entered in the **SIP IP / Domain Name Port** field.
Proxy Server IP / Domain Name	Enter the IP address or domain name of the SIP server or outbound proxy SIP server (if supplied by your VoIP service provider). The IES uses this address to communicate with the SIP server.
Port	Enter the SIP outbound server's listening port number, if the VoIP service provider gave you one. Otherwise, enter the same port number you entered in the **SIP IP / Domain Name Port** field.
URI Type	Use this to configure how Universal Resource Indicators (URIs) are sent. Select **SIP** where SIP messages are sent to a domain name or IP address. Select **TEL** where SIP messages are sent to addresses represented as telephone numbers.
802.1p Priority	Set the IEEE 802.1p priority value for traffic using this SIP profile.
DSCP	Set the DiffServ Code Point (DSCP) value for traffic using this SIP profile.
Keep Alive	Turn SIP session keepalive on or off. When this is on, the SIP UA periodically sends SIP session refresh requests.
Session Expiration	Enter the minimum number of seconds after which the IES tears down the session (if no successful session refresh has occured).

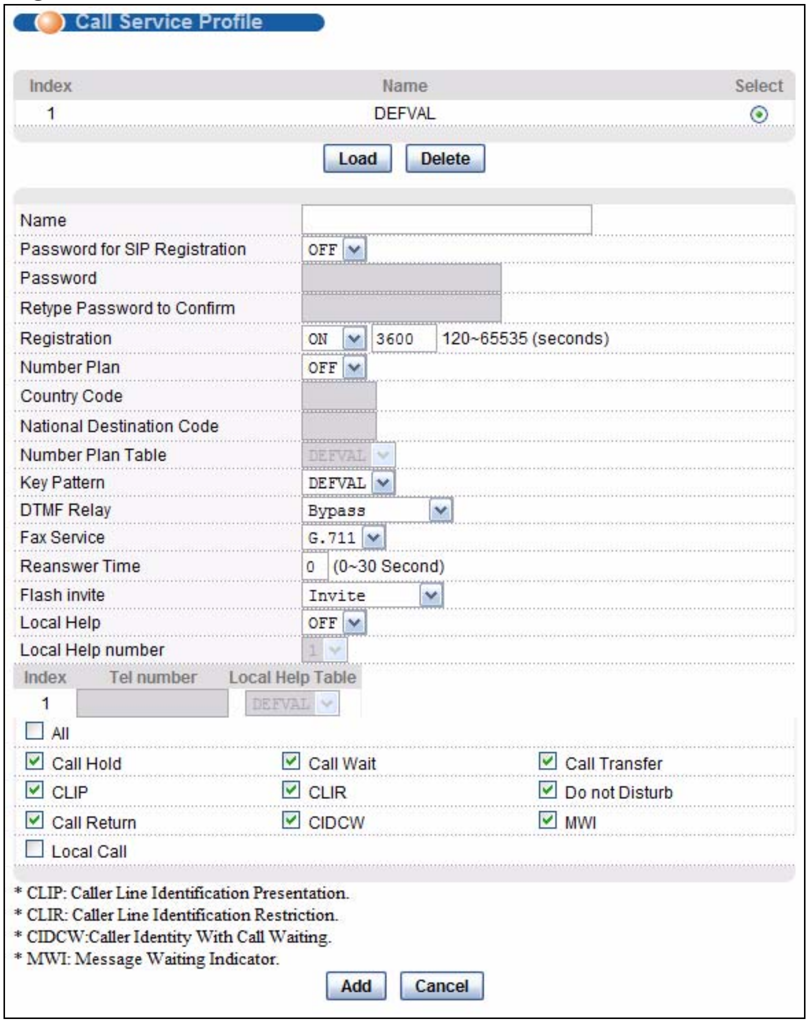
Table 111 VoIP > SIP Profile

LABEL	DESCRIPTION
Provisional Response ACK	Sets whether the IES sends provisional acknowledgment messages (**ON**), or does not send them (**OFF**).
Add	This button appears when you are configuring a new profile. Click this to save the profile and add it to the list.
Modify	This button appears when you are editing an existing profile. Click this to save your changes.
Cancel	Click this to set all fields in this screen to their last-saved values.

45.5 Call Service Profile Screen

Use this screen to configure information about the call service profiles used by the IES. Click **VoIP > Call Service Profile**. The following screen displays.

Figure 153 VoIP > Call Service Profile



The following table describes the labels in this screen.

Table 112 VoIP > Call Service Profile

LABEL	DESCRIPTION
Index	This is an incremental number indicating the order in which the call service profiles were created.
Name	This is the name of the call service profile.
Select	Select the call service profile you wish to load or delete.
Load	Select a call service profile and click this in order to edit its configuration in the lower portion of this screen.
Delete	Select a call service profile and click this to delete the profile. Once deleted, information cannot be retrieved.
Name	Enter a name for this call service profile.
Password for SIP Registration	Select **OFF** if the SIP account this profile uses does not require a password for user authentication. Select **ON** if the SIP account this profile uses requires a password for user authentication.
Password	If you selected **ON** in the **Password for SIP Registration** field, enter the password for this user here.
Re-type Password to Confirm	Re-enter the password.
Number Plan	Select **ON** to use the number plan table specified in the **Number Plan Table** field. Select **OFF** to use no number plan table.
Country Code	Enter the numeric code for the country of operation. This value is used by the number plan table's "\c" function.
National Destination Code	Enter the numeric code for the region of operation. This value is used by the number plan table's "\d" function.
Number Plan Table	Select the number plan you want to use for this call service profile. Configure number plans in the **VoIP** > **Number Plan Table** screens.

Table 112 VoIP > Call Service Profile

LABEL	DESCRIPTION
Key Pattern	Enter the name of a key pattern table for supplementary services. The default key pattern table “DEFVAL” has the following settings: • *99#: enable DND (Do Not Disturb). • #99#: disable DND. • *43#: enable call-waiting. • #43#: disable call-waiting. • 0: call-waiting reject. • 1: call-waiting accept and disconnect. • 2: call-waiting accept and on-hold. • 3: call back on busy. • ##: calling line identifier restriction. • *98#: call transfer. • *97#: call return. • #14: call in. Key pattern tables can be configured using the command line interface only.
DTMF Relay	Select **Bypass** to not relay DTMF (Dual-Tone Multi-Frequency) tones. Select **RFC2833** to relay DTMF tones according to RFC 2833. Select **RFC2833 Like** to relay DTMF tones in SIP INFO packets, but carried as RFC 2833 payload. Select **SIP Info** to relay DTMF tones as SIP INFO messages. Select **Plaintext** to relay DTML tones as human-readable characters and symbols.
Fax Service	Select **T.38** to send fax signals according to ITU-T T-38. Select **G.711** to send fax signals according to ITU-T G.711.
Reanswer Time	Use this field to set the reanswer time period. The reanswer time is the length of time between the user hanging up the phone, and the call being disconnected (the BYE request being sent). Within this time, a user can pick up the receiver again, or move to another telephone on the same line and pick up the receiver, and resume the call.

Table 112 VoIP > Call Service Profile

LABEL	DESCRIPTION
Flash Invite	Use this field to select the method the system uses to process the flash signal from a user. **Invite**: relays flash by SIP INVITE signal. The flash type cannot be **Invite** when you use the **v5sip Op Mode**. **Rfc2833**: relays flash according to RFC 2833. **RFC2833 Like**: relays flash in SIP INFO packets, but carried as RFC 2833 payload **SIP Info 1**: relays flash in SIP INFO packets (a `signal=16` message) **SIP Info 2**: relays flash in SIP INFO packets (a `signal=hf` message) **SIP Info 3**: relays flash in SIP INFO packets (a `signal=hook-flash` message) **SIP Info 4**: relays flash in SIP INFO packets (a plain text "FLASH" message). **SIP Info 5**: relays flash in SIP INFO packets (multiple SIP messages). The message content is determined by the characters you enter in the field that appears to the right of the list. A separate SIP INFO message is sent for each character you enter. **SIP Info 6**: relays flash in SIP INFO packets (where the content of the message is determined by the text you enter in the field that appears to the right of the list).
Local Help	Select **ON** if you want to implement the local help feature. Select **OFF** if you do not want to use the local help feature. The local help feature allows users to call other users in the event that the connection to the regular telephony service provider is not available.
Local Help Number	Select the number of local help tables you want to use.
Index	This is the local help number index number.
Tel Number	Enter the telephone number users dial to access the subscribers listed in the corresponding local help table. When a user dials this number, and the connection to the regular telephony service provider is not available, the first number in the corresponding local help table rings. If the call is not answered, the second number in the table rings, and so on.
Localhelp table	Select the local help table you want users to access when they call the number in the **Tel Number** field.
All	Select this to allow subscribers to perform any of the call functions listed below.
Call Hold	Select this to allow subscribers to place calls on Hold.
Call Wait	Select this to allow subscribers to use Call Waiting.
Call Return	Select this to allow subscribers to use Call Return.

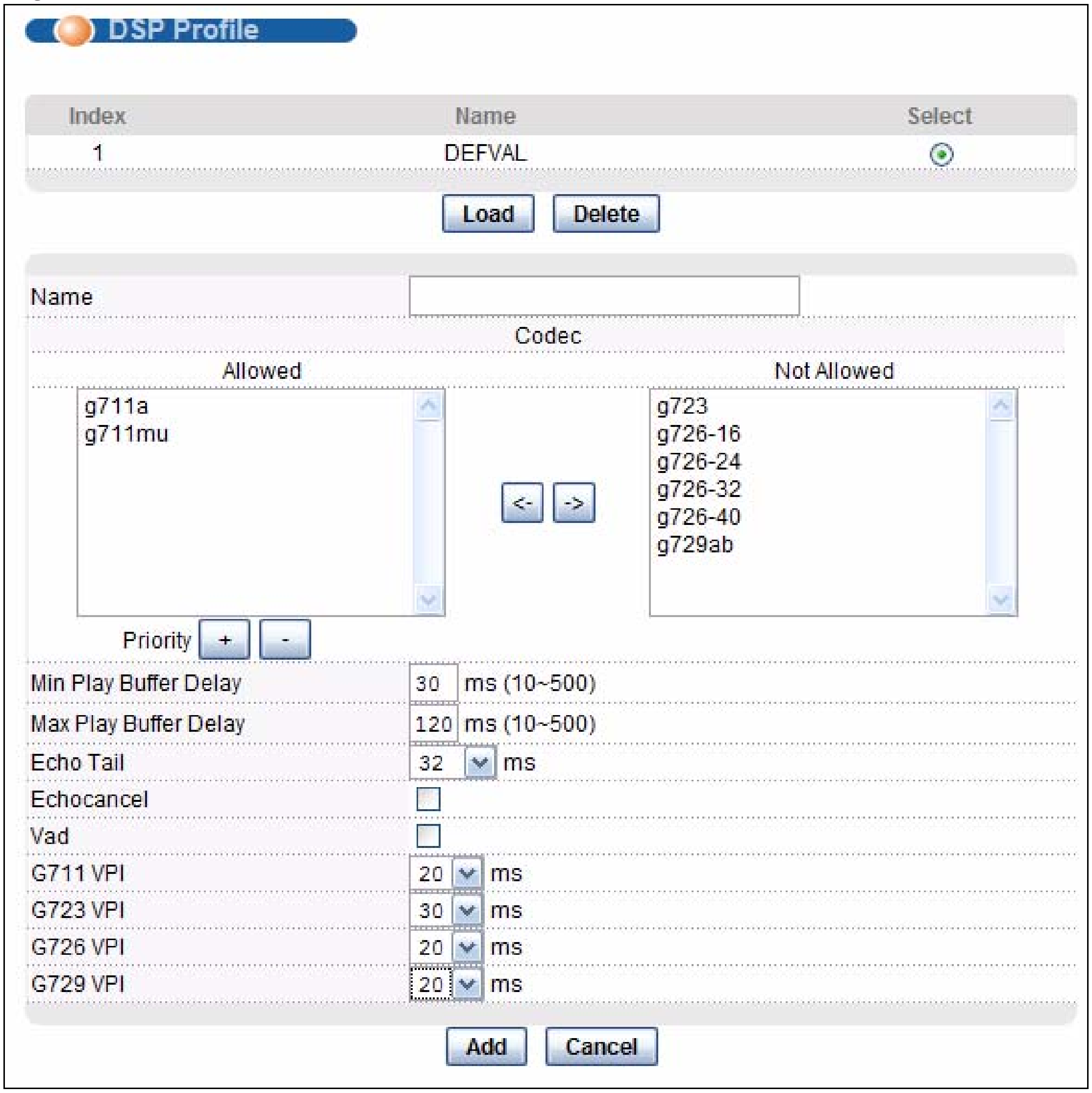
Table 112 VoIP > Call Service Profile

LABEL	DESCRIPTION
Call Transfer	Select this to allow subscribers to transfer a call to another phone number.
CLIP	Select this to allow subscribers to present caller ID to the called party (Calling Line Identification Presentation).
CLIR	Select this to allow subscribers to not present caller ID to the called party (Calling Line Identification Restriction).
Do Not Disturb	Select this to allow subscribers to forbid incoming calls.
Local Call	Select this to allow subscribers to make calls to other subscribers if the system's connection to the SIP server is not available.
CIDCW	Select this to allow Calling Identity Delivery on Call Waiting on this call service profile.
MWI	Select this to enable the Message Waiting Indicator for this call service profile.
Add	This button appears when you are configuring a new profile. Click this to save the profile and add it to the list.
Cancel	Click this to set all fields in this screen to their last-saved values.

45.6 DSP Profile Screen

Use this screen to configure information about the Digital Signal Processing (DSP) profiles used by the IES. Click **VoIP > DSP Profile**. The following screen displays.

Figure 154 VoIP > DSP Profile



The following table describes the labels in this screen.

Table 113 VoIP > DSP Profile

LABEL	DESCRIPTION
Index	This is an incremental number indicating the order in which the DSP profiles were created.
Name	This is the name of the DSP profile.
Select	Select the DSP profile you wish to load or delete.

Table 113 VoIP > DSP Profile

LABEL	DESCRIPTION
Load	Select a DSP profile and click this in order to edit its configuration in the lower portion of this screen.
Delete	Select a DSP profile and click this to delete the profile. Once deleted, information cannot be retrieved.
Name	Enter a name for this DSP profile.
Allowed	This is the list of codecs to use in negotiation for this DSP profile. The codecs are listed by priority: the system tries to use the codec at the top of the list first and, if that is not possible, tries the second, and so on.
Not Allowed	This is the list of codecs supported by the system but not used in this DSP profile.
<-	Use this to move the selected codec from the **Not Allowed** list to the **Allowed** list.
->	Use this to move the selected codec from the **Allowed** list to the **Not Allowed** list.
Priority +	Use this to increase the priority of the selected codec by moving it up one place in the list.
Priority -	Use this to decrease the priority of the selected codec by moving it down one place in the list.
Min Play Buffer Delay (10~500)	This is the minimum time delay of the play buffer (10 ~ 500 milliseconds, must be less than or equal to the **Max Play Buffer Delay**).
Max Play Buffer Delay (10~500)	This is the maximum time delay of the play buffer (10 ~ 500 milliseconds, must be greater than or equal to the **Min Play Buffer Delay**).
Echo Tail	This is the echo-cancellation echo tail period (8/16/32/128 milliseconds).
Echo Cancel	Select this to enable echo cancellation.
Vad	Select this to enable Voice Activity Detection (VAD).
G711 VPI	Set the Voice Packetization Interval for G.711.
G723 VPI	Set the Voice Packetization Interval for G.723.
G726 VPI	Set the Voice Packetization Interval for G.726.
G729 VPI	Set the Voice Packetization Interval for G.729.
Add	This button appears when you are configuring a new profile. Click this to save the profile and add it to the list.
Modify	This button appears when you are editing an existing profile. Click this to save your changes.
Cancel	Click this to set all fields in this screen to their last-saved values.

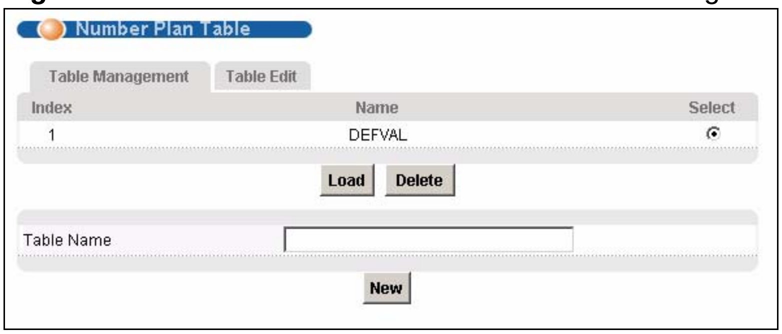
45.7 Number Plan Table Screens

Number plans are used by the IES to identify specific types of phone numbers dialed by a user, and to process the number before transmission by deleting, replacing or adding digits according to the relevant rule. The rule can also automatically add the country code, national destination (region) code, or deny the number pattern entirely.

45.7.1 Table Management Screen

Use this screen to see, load and delete number plan tables. Click **VoIP > Number Plan Table > Table Management**. The following screen displays.

Figure 155 VoIP > Number Plan Table > Table Management



The following table describes the labels in this screen.

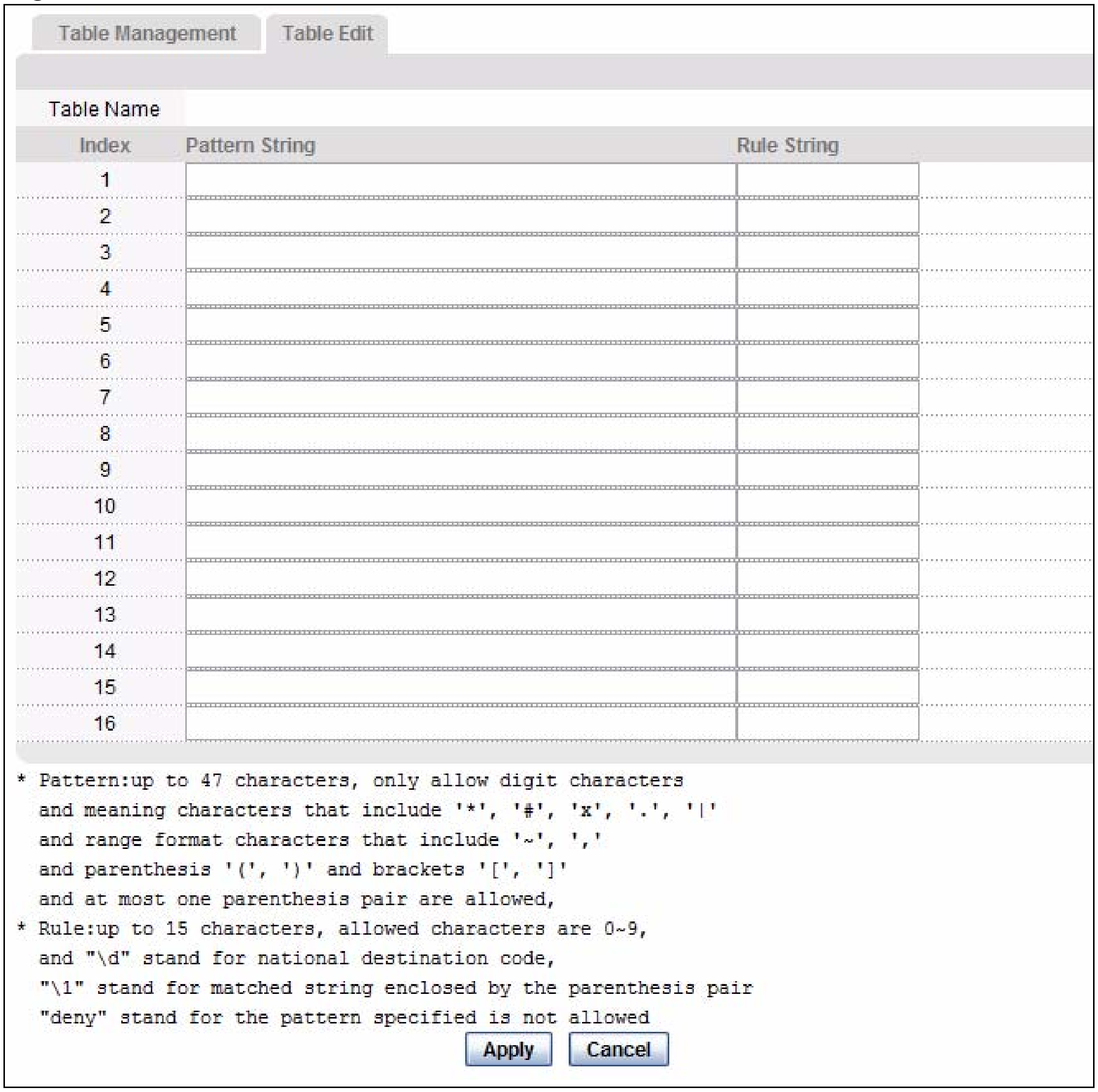
Table 114 VoIP > Number Plan Table > Table Management

LABEL	DESCRIPTION
Index	This is an incremental number indicating the order in which the DSP profiles were created.
Name	This is the name of the number plan table.
Select	Select the number plan table you wish to load or delete.
Load	Select a number plan table and click this in order to edit its configuration in the **Table Edit** screen.
Delete	Select a number plan table and click this to delete the profile. Once deleted, information cannot be retrieved.
Table Name	Enter a name for the new blank number plan table, then click **New**.
New	When you have entered a **Table Name**, click this to add the new blank number plan table to the list. You can then configure the number plan in the **Table Edit** screen.

45.7.2 Table Edit Screen

Use this screen to configure the number plan tables you set up in the **Table Management** screen (see Section 45.7.1 on page 354). Click **VoIP > Number Plan Table**, select a number plan table to edit, then click **Load**. The following screen displays.

Figure 156 VoIP > Number Plan Table > Table Edit



The following table describes the labels in this screen.

Table 115 VoIP > Number Plan Table > Table Edit

LABEL	DESCRIPTION
Table Name	This is the name you entered in the **Number Plan Table** > **Table Management** screen.
Index	This is the pattern / rule number. When the IES checks a dialed number against the table, it checks the patterns in numerical order from 1 ~ 16, so ordering is important.
Pattern String	This is the dialed number for which this table entry applies. Allowed characters are: • Numerals "0" ~ "9" • Asterisks "*" • A maximum of one pair of parentheses "(" and ")" For example, if a **Pattern String** entry is "0021*", the corresponding **Rule String** is applied to any dialed number starting from "00210" to "00219".
Rule String	This is the rule applied to the corresponding **Pattern String**. Allowed characters are: • "\c" = the **Pattern String** is replaced by the countrycode (specified in the relevant call service profile). • "\d" = the **Pattern String** is replaced by the national destination (region) code (specified in the relevant call service profile). • "\1" = the **Pattern String** is replaced by the numbers enclosed by the parentheses "(" and ")" in the **Pattern String** • "deny" = the **Pattern String** is not allowed. For example: • If the Pattern String is "002(*)", the Rule String is "\c\1" and the countrycode in the relevant call service profile is "28", the dialed number "00244123456" becomes "28123456". • If the Pattern String is "010(*)", the Rule String is "\d\1" and the national destination code in the relevant call service profile is "01473", the dialed number "010456789" becomes "01473456789". • If the Pattern String is "0440(1*)" and the Rule String is "\1", the dialed number "04401473987654" becomes "473987654".
Apply	Click this to save your changes.
Cancel	Click this to set all fields to their last-saved values.

45.8 The Local Help Screens

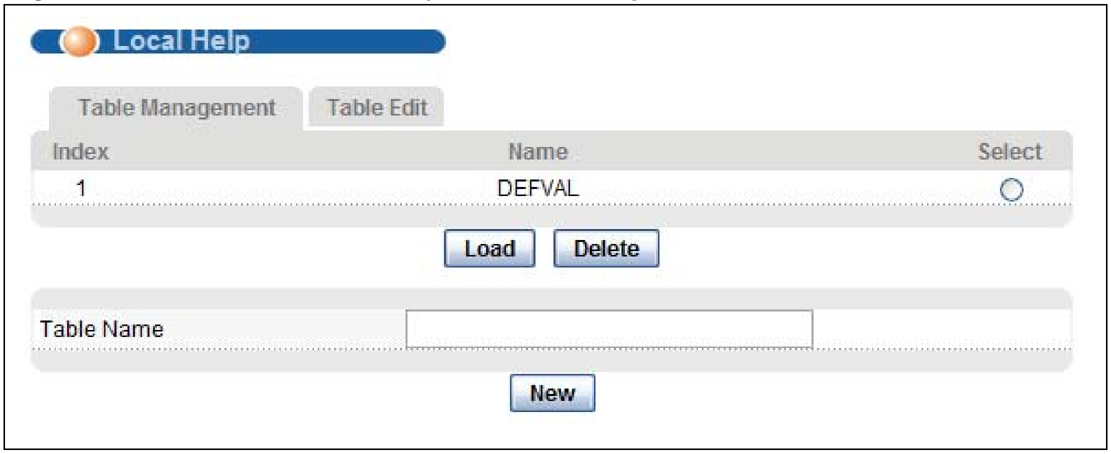
The local help feature allows subscribers to place calls to other extensions when the system's connection to the regular service provider is not available.

You can use this feature to provide an alternative to emergency calls. For example, if users cannot call 911 (in order to reach an emergency dispatcher at a public safety answering point) you can route 911 calls to a company medical office or security guardhouse. When a user dials the number, the first number in the corresponding table rings. If the call is not answered, the second number in the table rings, and so on.

45.8.1 The Table Management Screen

Click **VoIP** > **Local Help**. The following screen displays.

Figure 157 The VoIP Local Help > Table Management Screen



The following table describes the labels in this screen.

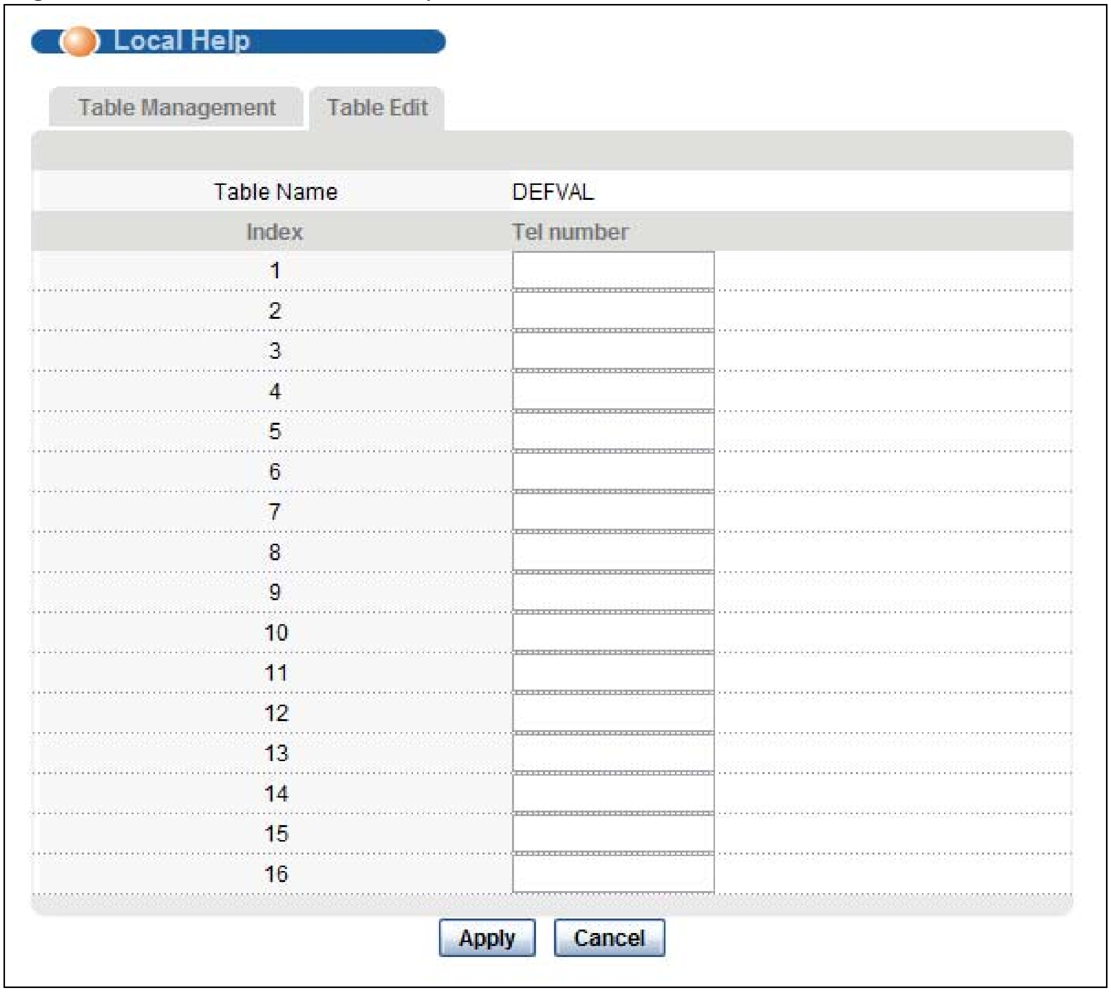
Table 116 The VoIP > Local Help > Table Management Screen

LABEL	DESCRIPTION
Index	This is the local help table index.
Name	These are the names of individual local help tables.
Select	Select the local help table you wish to modify or delete.
Load	Select a local help table and click this in order to edit its configuration.
Delete	Select a local help table and click this to delete the profile. Once deleted, information cannot be retrieved.
Name	Enter a name for this local help profile (up to 31 ASCII characters; spaces are not allowed).
New	While you are modifying a profile, you can click this to start configuring a fresh table without saving your changes.

45.8.2 The Table Edit Screen

Click **VoIP** > **Local Help > Table Edit**. The following screen displays.

Figure 158 The VoIP Local Help > Table Edit Screen



The following table describes the labels in this screen.

Table 117 The VoIP > Local Help > Table Edit Screen

LABEL	DESCRIPTION
Table Name	Enter a name for this local help profile (up to 31 ASCII characters; spaces are not allowed).
Index 1~16	This is the local help phone number index.
Tel Number	Enter the telephone number of an extension on any of the VoIP line cards in the system that other extensions should be able to call in the event that the connection to the service provider is not available.

Table 117 The VoIP > Local Help > Table Edit Screen

LABEL	DESCRIPTION
Apply	Click this to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click this to start configuring the screen again.

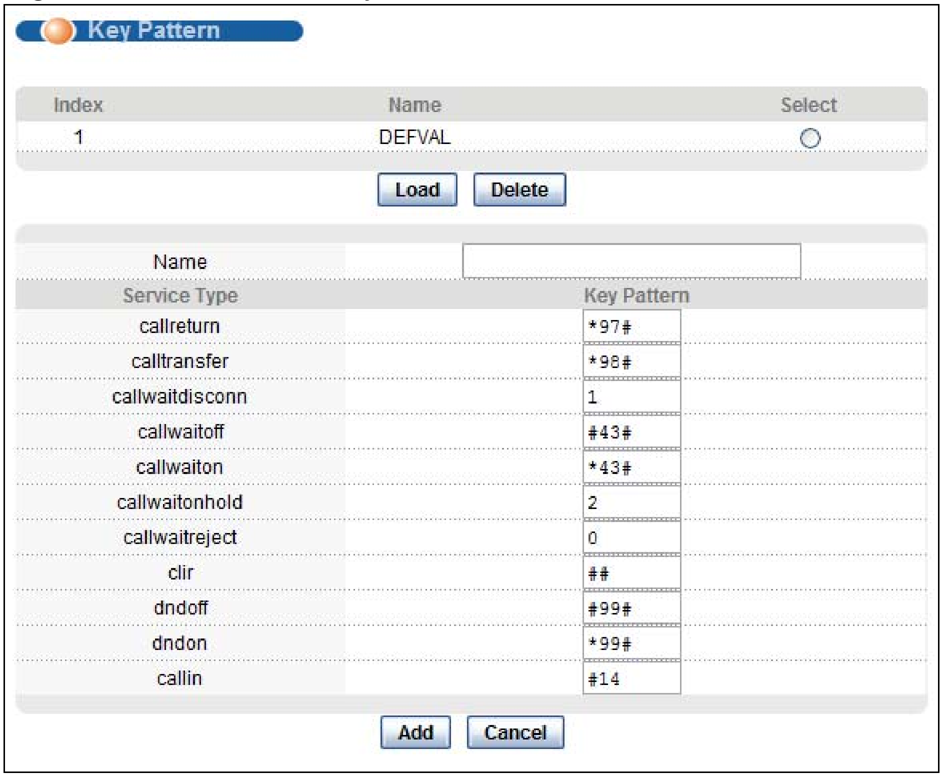
45.9 The Key Pattern Screen

Use this screen to configure key pattern profiles. A key pattern profile is a set of telephone key-presses that allows users to access a variety of features such as call hold, call transfer, and so on.

Note: Before a user can access a feature, you must enable it in the SIP call service profile (use the **VoIP > SIP Profile** screen).

Click **VoIP** > **Key Pattern**. The following screen displays.

Figure 159 The VoIP > Key Pattern Screen.



The following table describes the labels in this screen.

Table 118 The VoIP > Key Pattern Screen

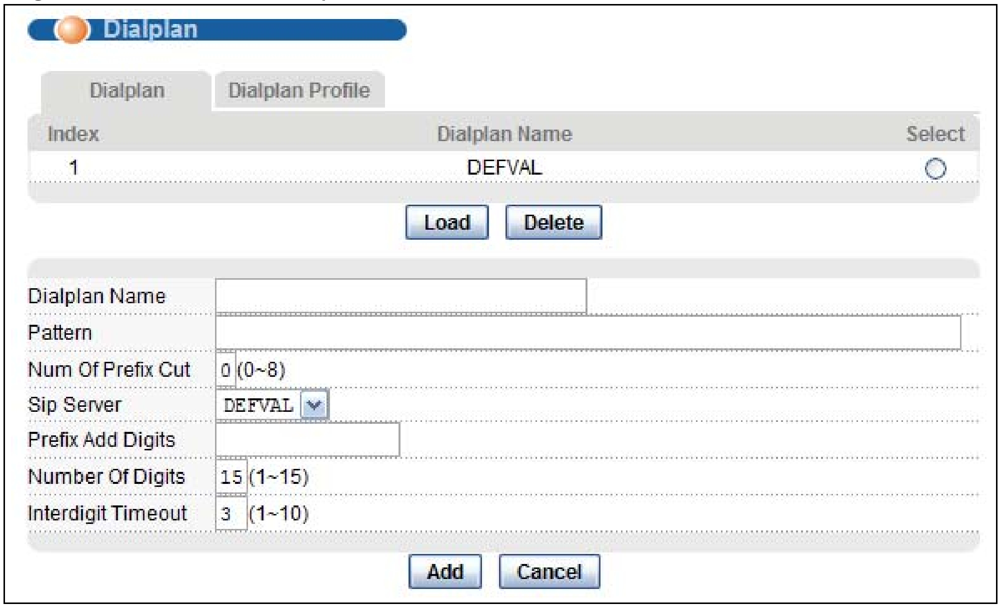
LABEL	DESCRIPTION
Index	This is an incremental number indicating the order in which the profiles were created.
Name	This is the name of the profile.
Select	Select the profile you wish to modify or delete.
Load	Select a profile and click this to edit its configuration.
Delete	Select a profile and click this to delete the profile. Once deleted, information cannot be retrieved.
Name	Enter a name for this key pattern profile (up to 31 ASCII characters; spaces are not allowed).
Service Type	These fields control the telephone keys a user presses to access a particular service. Characters are limited to the numerals 0~9, the pound (#) and asterisk (*).
callreturn	Enter the sequence of keys the user presses to dial the last number to call the user (1~7 characters).
calltransfer	Enter the sequence of keys the user presses to enable a call transfer (1~7 characters).
callwaitdisconn	Enter the key the user presses to disconnect a current call and accept a waiting call (one character only).
callwaitoff	Enter the sequence of keys the user presses to turn call waiting off (1~7 characters).
callwaiton	Enter the sequence of keys the user presses to enable call waiting (1~7 characters).
callwaitonhold	Enter the key the user presses to place a current call on hold and accept a waiting call (one character only).
callwaitreject	Enter the key the user presses to reject a waiting call (one character only).
clir	Enter the sequence of keys the user presses to restrict his/her phone number by not sending caller ID information (1~7 characters).
dndoff	Enter the sequence of keys the user presses to turn off Do Not Disturb (1~7 characters).
dndon	Enter the sequence of keys the user presses to turn on Do Not Disturb (1~7 characters).
callin	Enter the sequence of keys the user presses to turn on the Call In feature. When the Call In feature is active, the system limits call ringing time to ten seconds.
Add	Click **Add** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

45.10 Dialplan Screen

The system uses dial plans to identify specific types of phone numbers dialed by a user, and to process the number before transmission by deleting or adding digits according to the relevant rule. The dial plan can also forward the call to a specific SIP server. Use a dial plan profile to unify a group of dial plans. Then assign the dial plan profile to a port to apply all of the dial plans included in the profile.

Click **VoIP** > **Dialplan** to open the following screen. Use this screen to configure individual dial plans.

Figure 160 VoIP > Dialplan Screen



The following table describes the labels in this screen.

Table 119 VoIP > Dialplan Screen

LABEL	DESCRIPTION
Index	This is an incremental number indicating the order in which the dialplans were created.
Dialplan Name	These are the names of individual tables. The DEFVAL table always exists, and is assigned to all ports by default.
Select	Select an entry you wish to modify or delete.
Load	Select an entry and click this in order to edit its configuration.
Delete	Select an entry and click this to delete the profile. Once deleted, information cannot be retrieved.
Dialplan Name	Enter the name of the dialplan. If you are configuring a new dialplan, you can enter the name. If you are editing an existing dialplan, this field is not editable.

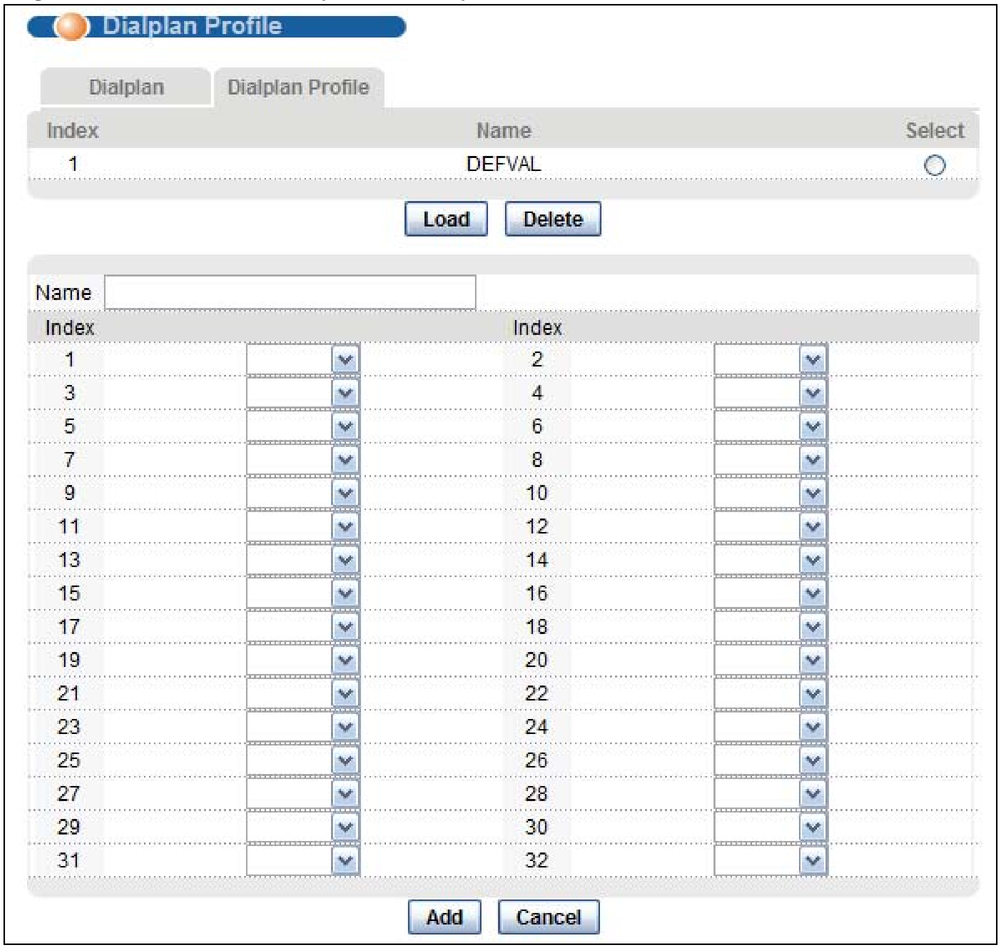
Table 119 VoIP > Dialplan Screen

LABEL	DESCRIPTION
Pattern	This is the dialed number to which this table entry applies. Allowed characters are: • Numerals “0” ~ “9” • Asterisks “*” • A maximum of one pair of parentheses “(” and “)” For example, if a **Pattern String** entry is “0021*”, the corresponding **Rule** is applied to any dialed number starting from “00210” to “00219”.
Num of Prefix Cut	Select how many digits to remove from the dialed number. For example, enter 1 to have the system remove the first digit of the dialed number.
SIP Server	Select the SIP server to which the system sends calls that match this dialplan.
Prefix Add Digits	Enter digits to add to the beginning of the dialed callee number.
Number Of Digits	Enter the maximum number of digits of the dialed callee number. Once a caller dials this number of digits, the system processes the call. It does not wait for or accept any further digits.
Interdigit Timeout	Enter the maximum number of seconds the system waits for each digit input of a complete callee number after you press the flash key on the phone. If the system does not receive the next digit entered within this time period, the system processes digits the caller has dialed.
Add	Click **Add** to save the changes in this screen to the system’s volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

45.10.1 The Dialplan Profile Screen

Click **VoIP** > **Dialplan > Dialplan Profile** to open the following screen. Use this screen to configure individual dial plan profiles.

Figure 161 VoIP > Dialplan > Dialplan Profile Screen



The following table describes the labels in this screen.

Table 120 VoIP > Dialplan > Dialplan Profile Screen

LABEL	DESCRIPTION
Index	This is an incremental number indicating the order in which the dialplans were created.
Name	These are the names of individual tables. The DEFVAL table always exists, and is assigned to all ports by default.
Select	Select an entry you wish to modify or delete.
Load	Select an entry and click this in order to edit its configuration.
Delete	Select an entry and click this to delete the profile. Once deleted, information cannot be retrieved.

Table 120 VoIP > Dialplan > Dialplan Profile Screen

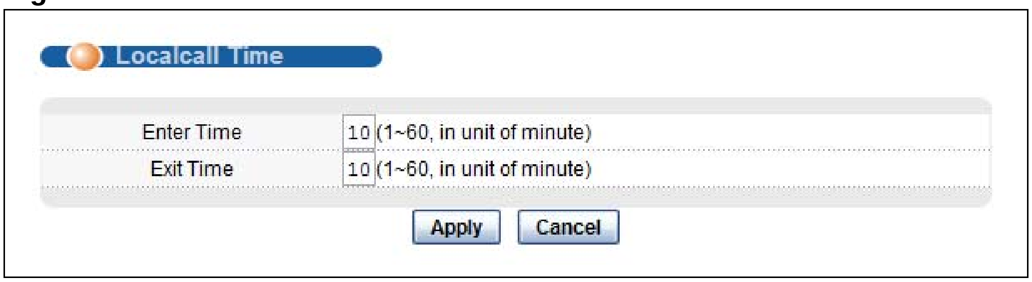
LABEL	DESCRIPTION
Name	Enter the name of the dialplan. If you are configuring a new dialplan, you can enter the name. If you are editing an existing dialplan, this field is not editable.
Add	Click **Add** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

45.11 The Localcall Time Screen

The local call time feature allows subscribers to call other subscribers if the system cannot connect to the SIP server.

Click **VoIP** > **Localcall Time** to open the following screen. Use this screen to configure the system's local call settings.

Figure 162 VoIP > Localcall



The following table describes the labels in this screen.

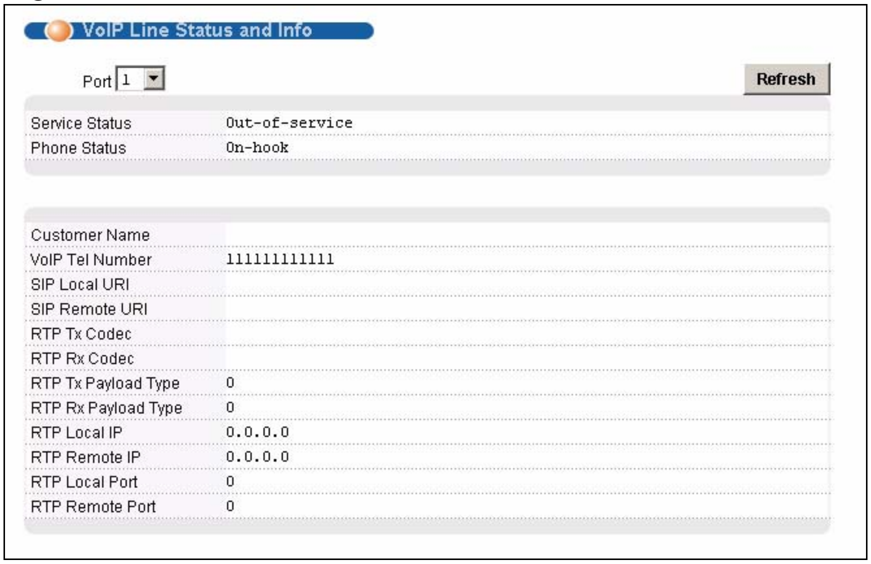
Table 121 VoIP > Localcall Time

LABEL	DESCRIPTION
Enter Time	Set how long the system should wait after losing the connection to the SIP server before using the local call feature.
Exit Time	Set how long the system should wait after regaining the connection to the SIP server before it stops using the local call feature.
Apply	Click **Apply** to save the changes in this screen to the system's volatile memory. The system loses these changes if it is turned off or loses power, so use the **Config Save** on the navigation panel and then the **Save** button to save your changes to the non-volatile memory when you are done configuring.
Cancel	Click **Cancel** to start configuring the screen again.

45.12 VoIP Line Status and Info Screen

Use this screen to see detailed information about the VoIP configuration currently active on each of the IES's analog phone ports. Click **VoIP > VoIP Line Status and Info**. The following screen displays.

Figure 163 VoIP > VoIP Line Status and Info



The following table describes the labels in this screen.

Table 122 VoIP > VoIP Line Status and Info

LABEL	DESCRIPTION
Port	Select the number of the analog phone port you want to view from the list.
Refresh	Click this to update the information in this screen.

Table 122 VoIP > VoIP Line Status and Info

LABEL	DESCRIPTION
Service Status	This field displays the current state of the analog port. Possible values are: **Disabled** **Out-of-service** **Idle** **Waiting-for-dialing** **Dialing-out** **Ringing** **Conversation-caller** **Conversation-callee** **Fax/Modem-caller** **Fax/Modem-callee** **Waiting-for-on-hook** **Alerting-off-hook** **Power-cut-down**
Phone Status	This displays the state of the analog phone connected to the port. The possible values are: **Disabled** **On-hook** **Off-hook** **Ringing** **Testing** **Power-cut-down** **Fault** **Bad** **Uninitialized**
Customer Name	If you configured a name in the **Basic Setting** > **xDSL Port Setup** > **xDSL Port Setting** screen's **Customer Info** field, it displays here.
VoIP Tel Number	This is the telephone number you configured in the **VoIP** > **VoIP Port Setup** > **Port Edit** screen.

Table 122 VoIP > VoIP Line Status and Info

LABEL	DESCRIPTION
SIP Local URI	This is the Universal Resource Indicator of the port. If a local URI is “aaa@bbb”, “aaa” is the telephone number configured in the **VoIP** > **VoIP Port Setup** > **Port Edit** screen, and “bbb” is the domain name of the SIP server configured in the **VoIP > SIP Profile** screen.
SIP Remote URI	This shows the URI of the remote VoIP device (the person at the other end of the line).
RTP Tx Codec	This shows the voice codec used for transmitting data.
RTP Rx Codec	This shows the voice codec used for receiving data.
RTP Tx Payload Type	This shows the voice codec currently used for transmitting voice on this port. The supported codecs can be configured in each DSP profile (in the **VoIP > DSP Profile** screen). The value displayed here depends on the result of the codec negotiation between the IES and the remote VoIP device. Possible values are: G711a: **0** G711µ: **8** G723: **4** G729: **18** T.38: **32** G726-16: **96** G726-24: **97** G726-32: **98** G726-40: **99**

Table 122 VoIP > VoIP Line Status and Info

LABEL	DESCRIPTION
RTP Rx Payload Type	This shows the voice codec currently used for receiving voice on this port. The supported codecs can be configured in each DSP profile (in the **VoIP > DSP Profile** screen). The value displayed here depends on the result of the codec negotiation between the IES and the remote VoIP device. Possible values are: G711a: **0** G711mu: **8** G723: **4** G729: **18** T.38: **32** G726-16: **96** G726-24: **97** G726-32: **98** G726-40: **99**
RTP Local IP	This is the local IP address.
RTP Remote IP	This is the remote IP address.
RTP Local Port	This is the local port used for SIP.
RTP Remote Port	This is the port on the remote device used for SIP.

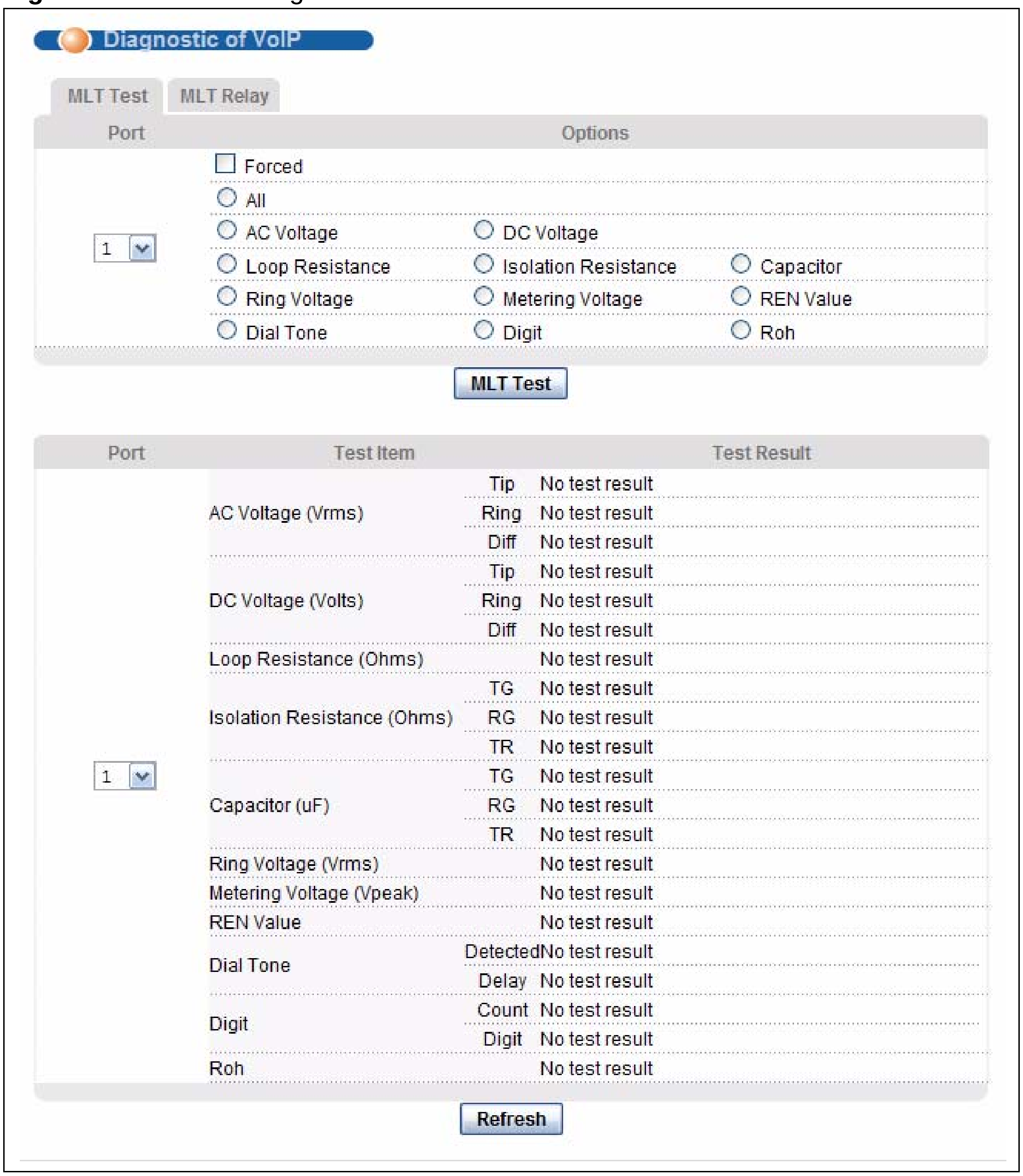
45.13 Diagnostic Screens

Use these screens to test analog lines connected to the IES.

45.13.1 MLT Test Screen

Use this screen to perform a variety of standard Metallic Line Tests on the lines connected to IES's ports. Click **VoIP > Diagnostic > MLT Test**. The following screen displays.

Figure 164 VoIP > Diagnostic > MLT Test



The following table describes the labels in this screen.

Table 123 VoIP > Diagnostic > MLT Test

LABEL	DESCRIPTION
Port	Select the analog port on the IES you want to test from the list.
Options	Select the tests you want to perform in this section.
Forced	Perform the test(s) immediately, even if the specified port is in use.
All	Perform all the MLT tests.
AC Voltage	Select this to test the line's AC voltage only.
DC Voltage	Select this to test the line's DC voltage only.
Loop Resistance	Select this to test the line's loop resistance only.
Isolation Resistance	Select this to test the line's isolation resistance only.
Capacitor	Select this to test the line's capacitance only.
Ring Voltage	Select this to test the line's ring voltage only.
Metering Voltage	Select this to test the line's metering voltage only.
REN Value	Select this to test the line's ringer equivalent number only.
Dial Tone	Select this to test the line's dial tone only. The tested port must be enabled, on hook and in-service.
Digit	Select this to test the pulse digit and DTMF tone digit handling. Digits can be generated by the system or pressed by the user. The tested port must be enabled, on hook and in-service.
Roh	Select this to test whether the port is on hook, off hook, short or open. (Roh means 'Receiver Off Hook'.)
MLT Test	Click this to perform the specified test or tests.
Port	Select the port whose MLT statistics you wish to see from the list. Ensure that this **Port** number matches the **Port** number in the upper part of this screen to view the results of a test you just performed. When you switch between ports, click the **Refresh** button to update the information to that of the new port.
Test Item	This section shows the statistics derived from the last test performed on this port.
AC Voltage (Vrms)	This is the port's alternating current shown in volts root mean square (Vrms)
DC Voltage (Volts)	This is the port's direct current voltage shown in volts.
Loop Resistance (Ohms)	This is the port's loop resistance (between TIP and RING) shown in Ohms.
Isolation Resistance (Ohms)	This is the port's isolation resistance shown in Ohms.
Capacitor (µF)	This is the port's capacitance shown in millifarads.
Ring Voltage (Vrms)	This is the port's ring voltage shown in volts root mean square.
Metering Voltage (Vpeak)	This is the port's metering peak voltage.

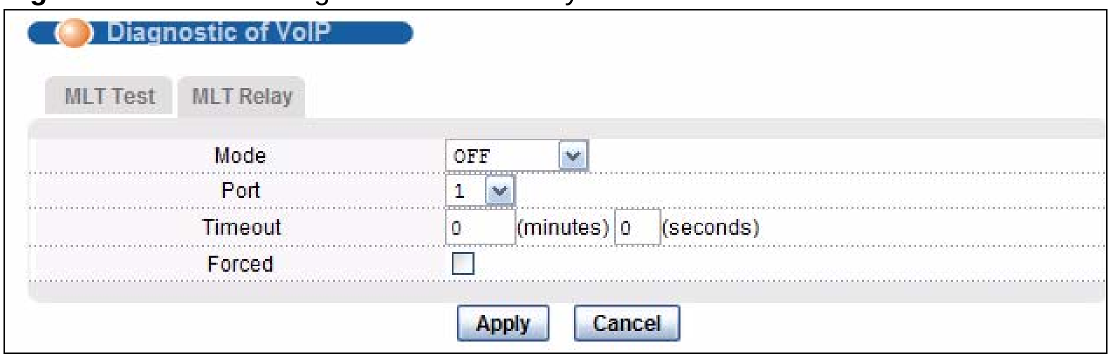
Table 123 VoIP > Diagnostic > MLT Test

LABEL	DESCRIPTION
REN Value	This is the port's ringer equivalent number.
Test Result	This section shows the result of the test or tests you performed.
Refresh	Click this to reload the information in the **Test Result** section. Do this when you change the **Port** number to see the statistics for the new port.

45.13.2 MLT Relay

Use this screen to allow or prohibit line tests using diagnostic equipment connected via the **Test In** and **Test Out** ports on the IES. Click **VoIP > Diagnostic > MLT Relay**. The following screen displays.

Figure 165 VoIP > Diagnostic > MLT Relay



The following table describes the labels in this screen.

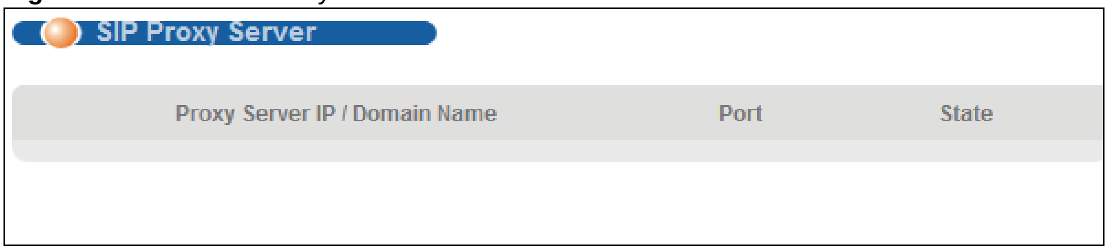
Table 124 VoIP > Diagnostic > MLT Relay

LABEL	DESCRIPTION
Mode	Select the MLT test relay mode: **OFF**: forbid MLT relay testing. **In**: allow diagnostic inner loop tests to be initiated by an external device. **Out**: allow diagnostic outer loop tests to be initiated by an external device. **Both**: allow both inner and outer loop diagnostic tests to be initiated by an external device.
Port	Select the port on which you want the test to be made.
Timeout	Enter the number of minutes and seconds that passes before the relays automatically turn off.
Forced	Select this to force the relays to set even if the port is in use.
Apply	Click this to save your changes.
Cancel	Click this to return this screen to its last saved settings.

45.14 The SIP Proxy Server Screen

To view a list of SIP proxy servers and their status, click **VoIP > SIP Proxy Server** in the navigation panel.

Figure 166 The SIP Proxy Server Screen



The following table describes the labels in this screen.

Table 125 Proxy Server Statistics

LABEL	DESCRIPTION
Proxy Server IP/ Domain Name	This field displays the IP address or domain name of the outbound proxy SIP server.
Port	This field displays the SIP outbound server's listening port number.
State	This displays the SIP proxy server's current status (**alive**, **loss**, or **unknown**).

46

Maintenance

This chapter explains how to use the maintenance screens.

46.1 Maintenance Screen

To open this screen, click **Management > Maintenance**.

Figure 167 Maintenance

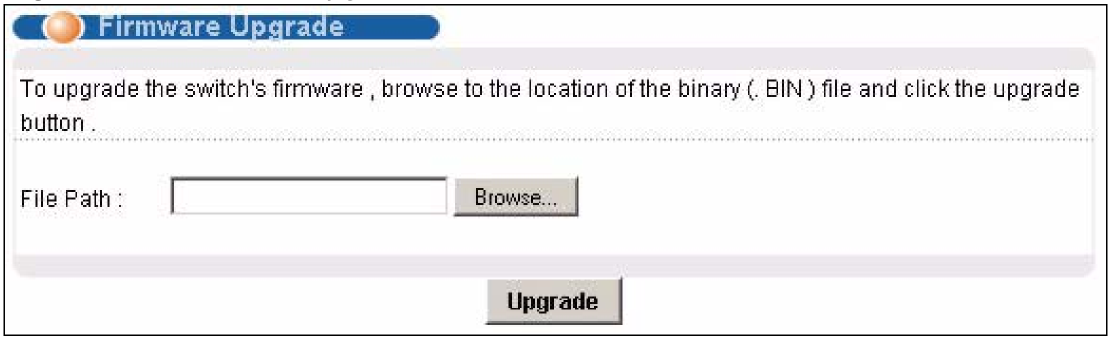
46.2 Firmware Upgrade Screen

Use this screen to upgrade your device firmware. See the **System Info** screen to verify your current firmware version number. Make sure you have downloaded (and unzipped) the correct model firmware and version to your computer before uploading to the device.

Be sure to upload the correct model firmware as uploading the wrong model firmware may damage your device.

To open this screen, click **Management > Maintenance** > **Click here** (Firmware Upgrade).

Figure 168 Firmware Upgrade



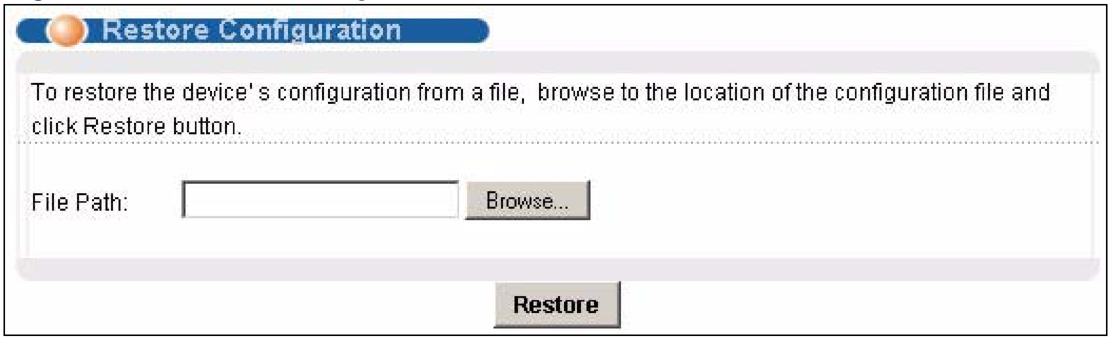
Type the path and file name of the firmware file you wish to upload to the device in the **File Path** text box or click **Browse** to locate it. After you have specified the file, click **Upgrade**.

46.3 Restore Configuration Screen

Use this screen to load a configuration file from your computer to the device.

To open this screen, click **Management > Maintenance** > **Click here** (Restore Text Configuration).

Figure 169 Restore Configuration



Type the path and file name of the configuration file you wish to restore in the **File Path** text box or click **Browse** to display a **Choose File** screen from which you can locate it. After you have specified the file, click **Restore**. "conf-0" is the name of the configuration file on the device, so your backup configuration file is automatically renamed when you restore using this screen.

If you load an invalid configuration file, it may corrupt the settings, and you might have to use the console to reconfigure the system.

46.4 Backing Up a Configuration File

Backing up your device configurations allows you to create various "snap shots" of your device from which you may restore at a later date.

Click **Management > Maintenance**, and do the following to save your device's configuration to your computer.

1 Right-click the **Click here** (Backup Text Configuration) link and click **Save Target As**.

Or:

Click the **Click here** (Backup Text Configuration) link and then click **File**, **Save As**.

2 In the **Save As** screen, choose a location to save the file on your computer from the **Save in** drop-down list box and type a descriptive name for it in the **File name** list box. Click **Save** to save the configuration file to your computer.

Note: See the chapters on commands to edit the configuration text file.

Note: You can change the ".dat" file to a ".txt" file and still upload it back to the IES.

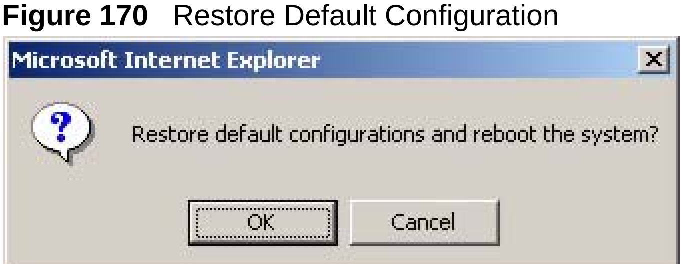
46.5 Load Factory Defaults

Use this function to clear all device configuration information you configured and return to the factory defaults.

Note: Restoring the default configuration deletes all the current settings. It is recommended to back up the configuration file before restoring the default configuration.

To do this, click **Management > Maintenance**, **Click here** (Restore Default Configuration).

Figure 170 Restore Default Configuration



Click **OK** to begin resetting all device configurations to the factory defaults and then wait for the device to restart. This takes up to two minutes. If you want to access the device web configurator again, you may need to change the IP address of your computer to be in the same subnet as that of the default device IP address (192.168.1.1).

Figure 171 Restore Factory Default Settings, Reboot

46.6 Reboot System

Use this function to restart the device without physically turning the power off.

To open this screen, click **Management > Maintenance** > **Click here** (Reboot System).

Figure 172 Reboot System

Click **OK**. You then see the screen as shown in Figure 171 on page 376. Click **OK** again and wait for the device to restart. This takes up to two minutes. This does not affect the device's configuration.

46.7 Command Line FTP

See Chapter 69 on page 583 for how to upload or download files to or from the device using FTP commands.

47 Diagnostic

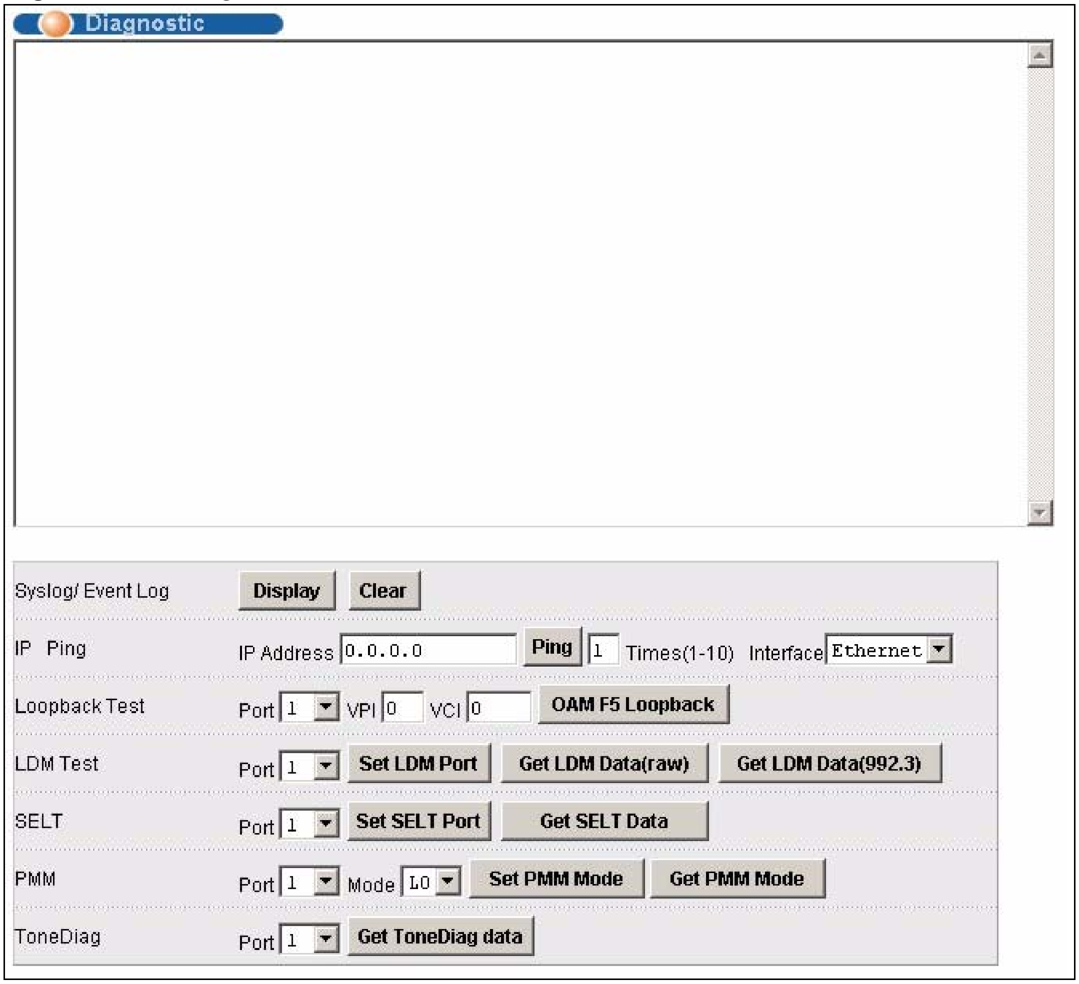
This chapter explains the Diagnostic screens.

47.1 Diagnostic Screen

Use this screen to check system logs, ping IP addresses or perform loopback tests.

To open this screen, click **Management > Diagnostic**.

Figure 173 Diagnostic



The following table describes the labels in this screen.

Table 126 Diagnostic

LABEL	DESCRIPTION
Syslog/ Event Log	Click **Display** to display a log of events in the multi-line text box. Click **Clear** to empty the text box and reset the log.
IP Ping	Type the **IP Address** of a device that you want to ping in order to test a connection. In the **Times** field specify how often you want to ping the IP address. Select the **Interface** from which you want to ping the IP address (**Ethernet** or **VoIP**). Click **Ping** to have the device ping the IP address (in the field to the left).
Loopback Test	Select a port number from the **Port** drop-down list box and enter a VPI/VCI to specify a PVC. Click **OAM F5 Loopback** to perform an OAMF5 loopback test on the specified DSL port. An Operational, Administration and Maintenance Function 5 test is used to test the connection between two DSL devices. First, the DSL devices establish a virtual circuit. Then the local device sends an ATM F5 cell to be returned by the remote DSL device (both DSL devices must support ATM F5 in order to use this test). The results ("Passed" or "Failed") display in the multi-line text box.
LDM Test	Select a port number from the **Port** drop-down list box and click **Set LDM Port** to have the IES perform line diagnostics on the specified port. The ADSL port must be set to ADSL2 or ADSL2+ ADSL operational mode and have a connection. It takes about one minute for the line diagnostics to finish. The screen displays a message confirming upon which ADSL port line diagnostics will be performed. Click **Get LDM Data** to display the line diagnostics results after using the **Set LDM Port** button on an ADSL port. Use the line diagnostics results to analyze problems with the physical ADSL line. Click **Get LDM Data(raw)** to display the unformatted line diagnostics results. Click **Get LDM Data(992.3)** to display the line diagnostics results in the format defined in the ITU-T G.992.3 standard. Note: Wait at least one minute after using Set LDM Port before using Get LDM Data.

Table 126 Diagnostic (continued)

LABEL	DESCRIPTION
SELT	Select a port number from the **Port** drop-down list box and click **Set SELT Port** to perform a Single End Loop Test (SELT) on the specified port. This test checks the distance to the subscriber's location. Note: The port must have an open loop. There cannot be a DSL device, phone, fax machine or other device connected to the subscriber's end of the telephone line. The SELT takes at least fifteen seconds. To check the status of the SELT or to look at the results when the SELT is complete, select a port number from the **Port** drop-down list box and click **Get SELT Data**. The results tell you what gauge of telephone wire is connected to the port and the approximate length of the line.
PMM	Select a port number from the **Port** drop-down list box and a power management mode from the **Mode** drop-down list box and click **Set PMM Mode** to have the specified port use the specified power management mode. Select **L0** to turn off power management on the port. Select **L2** to scale back the power usage to just support the transmission rate that the subscriber is using. Select **L2** to have the ADSL connection use power saving mode and reduce the rate when there is no traffic. The rate comes back up when there is traffic. The ADSL port must be set to ADSL2 or ADSL2+ ADSL operational mode. Click **Get PMM Mode** to display which power mode the ADSL port is currently set to use.
ToneDiag	Select a port number from the **Port** drop-down list box. The ADSL port must be set to ADSL2 or ADSL2+ ADSL operational mode and have a connection. Click **Get ToneDiag data** to display the ADSL port's tone diagnostics. The tone diagnostic information displays in the format defined in the ITU-T G.992.3 standard. Use the information to analyze problems with the physical ADSL line. Note: ToneDiag is faster than the LDM test but displays less information.

47.2 Log Format

The common format of the system logs is: `<item no> <time> <process> <type> <log message>`.

Table 127 Log Format

LABEL	DESCRIPTION
<item no>	This is the index number of the log entry.
<time>	This is the time and date when the log was created.
<process>	This is the process that created the log.
<type>	This identifies what kind of log it is. "INFO" identifies an information log. "WARN" identifies a warning log.
<log message>	This is the log's detailed information (see Table 128 on page 380).

47.2.1 Log Messages

The following table lists and describes the system log messages.

Table 128 Log Messages

LOG MESSAGE	TYPE	DESCRIPTION
ADSL <port> Link Up(SN=<seq no>): <ds rate>/<us rate>! or ADSL Link Info: NM:<ds NM>/<us NM>!	INFO	An ADSL port established a connection. <port> - port number <seq no> - sequence number of the connection <ds rate> - downstream rate <us rate> - upstream rate <us NM> - upstream noise margin <ds NM> - downstream noise margin
ADSL <port> Link Down(SN=<seq no>)!	WARN	An ADSL port lost its connection. <port> - port number <seq no> - sequence number of the connection
Session Begin!	INFO	A console, telnet or FTP session has begun (see the <process> field for the type of session).
Session End!	INFO	A console telnet or FTP session has terminated (see the <process> field for the type of session).
Incorrect Password!	WARN	Someone attempted to use the wrong password to start a console, telnet or FTP session (see the <process> field for the type of session).
Received Firmware Checksum Error!	WARN	A checksum error was detected during an attempted FTP firmware upload.
Received Firmware Size too large!	WARN	The file size was too large with an attempted FTP firmware upload.

Table 128 Log Messages (continued)

LOG MESSAGE	TYPE	DESCRIPTION
`Received Firmware Invalid!`	WARN	Someone attempted to upload a firmware file with a wrong identity via FTP.
`Received File <file>!`	INFO	A file was uploaded to the IES by FTP. <file> - received file's name
`THERMO OVER TEMPERATURE: dev:<id> threshold:<threshold>(degree C) value:<temp>(degree C)!`	WARN	The temperature was too high at one of the temperature sensors. <id> - 0: sensor near the ADSL chipset 1: sensor near the CPU 2: thermal sensor chip itself <threshold> - threshold temperature <temp> - temperature when the entry was logged
`THERMO OVER TEMPERATURE released: dev:<id> threshold:<threshold>(degree C) value:<temp>(degree C)!`	INFO	The temperature at one of the temperature sensors has come back to normal. <id> 0: sensor near the ADSL chipset 1: sensor near the CPU 2: thermal sensor chip itself <threshold> - threshold temperature <temp> - temperature when the entry was logged
`THERMO OVER VOLTAGE: nominal:<nominal>(mV) value:<voltage> mV)!`	WARN	The voltage went outside of the accepted operating range. <nominal> - nominal voltage of the DC power <voltage> - voltage of the DC power when logged
`THERMO OVER VOLTAGE released: nominal:<nominal>(mV) value:<voltage> (mV)!`	INFO	The voltage is back inside the accepted operating range. <nominal> - nominal voltage of the DC power <voltage> - voltage of the DC power when logged

47.3 LDM Test Parameters

The following table lists the line diagnostics test parameters that display, see the ITU-T's G.992.3 for more information.

Table 129 LDM Test Parameters

LABEL	DESCRIPTION
number_of_ subcarries	Discrete Multi-Tone (DMT) modulation divides up a line's bandwidth into sub-carriers (sub-channels) of 4.3125 KHz each. The first number is the total number of DMT sub-carriers the ADSL connection is using. The second number indicates how many upstream DMT sub-carriers the ADSL connection is using.
hlinScale:	The channel characteristics function is represented in linear format by a scale factor and a complex number. These are the maximum upstream and downstream scale factors used in producing the channel characteristics function.
latn:	This is the upstream and downstream Line Attenuation (in dB).
satn:	This is the upstream and downstream Signal Attenuation (in dB).
snrm:	This is the upstream and downstream Signal-to-Noise Ratio Margin (in dB). A DMT sub-carrier's SNR is the ratio between the received signal power and the received noise power. The signal-to-noise ratio margin is the maximum that the received noise power could increase with the IES still being able to meet its transmission targets.
attndr:	This is the upstream and downstream Attainable Net Data Rate (in bit/s).
farEndActatp:	This is the upstream and downstream Far End Actual Aggregate Transmit Power (in dBm)
i	This is the index number of the DMT sub-carrier.
li.rl	The channel characteristics function is represented in linear format by a scale factor and a complex number. This is the real part of the complex number used in producing the channel characteristics function for this sub-carrier.
li.im	The channel characteristics function is represented in linear format by a scale factor and a complex number. This is the imaginary part of the complex number used in producing the channel characteristics function for this sub-carrier
log	This is a format for providing channel characteristics. It provides magnitude values in a logarithmic scale. This can be used in analyzing the physical condition of the ADSL line.
QLN	The Quiet Line Noise for a DMT sub-carrier is the rms (root mean square) level of the noise present on the line, when no ADSL signals are present. It is measured in dBm/Hz. The QLN can be used in analyzing crosstalk.
SNR	This is the upstream and downstream Signal-to-Noise Ratio (in dB). A DMT sub-carrier's SNR is the ratio between the received signal power and the received noise power. The SNR can be used in analyzing time dependent changes in crosstalk levels and line attenuation (such as those caused by temperature variations and moisture).

47.4 ToneDiag Parameters

The following table lists the tone diagnostic parameters that display, see the ITU-T's G.992.3 for more information.

Table 130 ToneDiag Parameters

LABEL	DESCRIPTION
`number_of_subcarries`	Discrete Multi-Tone (DMT) modulation divides up a line's bandwidth into sub-carriers (sub-channels) of 4.3125 KHz each. This number indicates how many upstream and downstream DMT sub-carriers the ADSL connection is using.
`hlinScale:`	The channel characteristics function is represented in linear format by a scale factor and a complex number. This is the maximum upstream and downstream scale factor used in producing the channel characteristics function.
`latn:`	This is the upstream and downstream Line Attenuation (in dB).
`satn:`	This is the upstream and downstream Signal Attenuation (in dB).
`snrm:`	This is the upstream and downstream Signal-to-Noise Ratio Margin (in dB). A DMT sub-carrier's SNR is the ratio between the received signal power and the received noise power. The signal-to-noise ratio margin is the maximum that the received noise power could increase with the IES still being able to meet its transmission targets.
`attndr:`	This is the upstream and downstream Attainable Net Data Rate (in bit/s).
`farEndActatp:`	This is the upstream and downstream Far End Actual Aggregate Transmit Power (in dBm)
`i`	This is the index number of the DMT sub-carrier.
`logdB)`	This is a format for providing channel characteristics. It provides magnitude values in a logarithmic scale. This can be used in analyzing the physical condition of the ADSL line.
`QLN(dBm)`	The Quiet Line Noise for a DMT sub-carrier is the rms (root mean square) level of the noise present on the line, when no ADSL signals are present. It is measured in dBm/Hz. The QLN can be used in analyzing crosstalk.
`SNR(dB)`	This is the upstream and downstream Signal-to-Noise Ratio (in dB). A DMT sub-carrier's SNR is the ratio between the received signal power and the received noise power. The SNR can be used in analyzing time dependent changes in crosstalk levels and line attenuation (such as those caused by temperature variations and moisture).

48

MAC Table

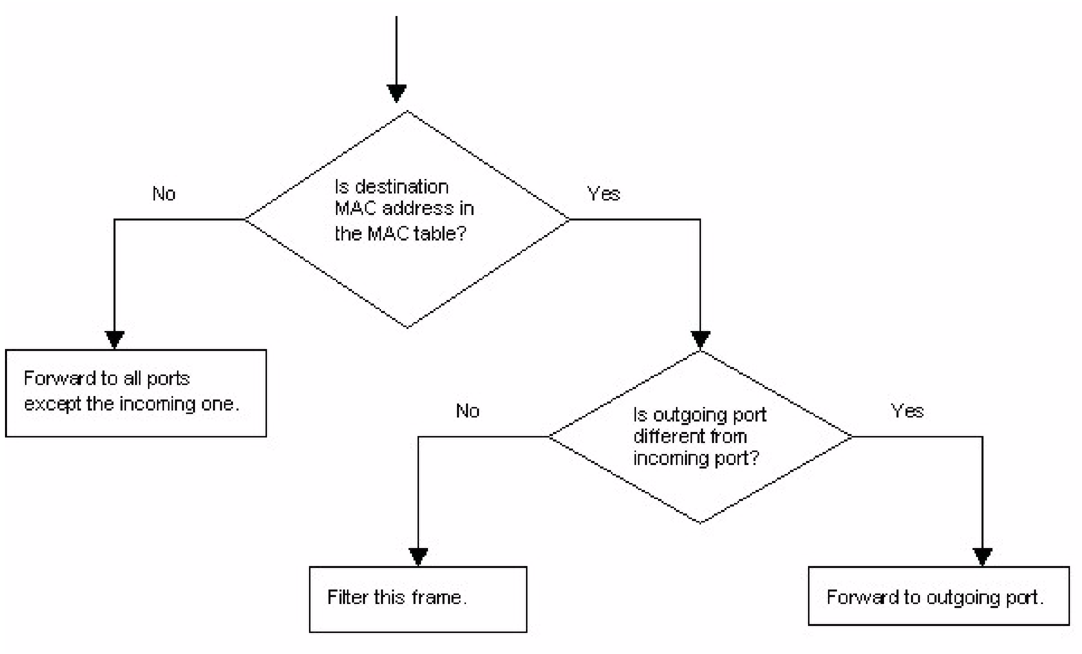
This chapter introduces the MAC Table.

48.1 Introduction to MAC Table

The MAC table lists device MAC addresses that are dynamically learned by the IES. The table shows the following for each MAC address: the port upon which Ethernet frames were received from the device, to which VLAN groups the device belongs (if any) and to which channel it is connected (for devices connected to DSL ports).

The device uses the MAC table to determine how to forward frames. See the following figure.

Figure 174 MAC Table Filtering Flowchart



1 The device examines a received frame and learns the port on which this source MAC address came.

2 The device checks to see if the frame's destination MAC address matches a source MAC address already learned in the MAC table.

- If the device has already learned the port for this MAC address, then it forwards the frame to that port.
- If the device has not already learned the port for this MAC address, then the frame is flooded to all ports. Too much port flooding leads to network congestion.
- If the device has already learned the port for this MAC address, but the destination port is the same as the port it came in on, then it filters the frame.

48.2 MAC Table Screen

To open this screen, click **Management > MAC Table**.

Figure 175 MAC Table

The following table describes the labels in this screen.

Table 131 MAC Table

LABEL	DESCRIPTION
Show port	Select a port for which to display learned MAC addresses (or display all of them).
Index	This is the number of the MAC table entry.
Port	This is the port to which the MAC address is associated.
MAC	This is the MAC address of the device from which this incoming frame originated.
VID	This is the VLAN ID of the device from this incoming frame originated. When one MAC address has two different VLAN IDs, it is listed in the MAC table as two separate entries.
Refresh	Click **Refresh** to update the list of dynamically learned MAC addresses.
Flush	Click **Flush** to remove all of the dynamically learned MAC address entries from the MAC table.

49

ARP Table

This chapter describes the ARP Table.

49.1 Introduction to ARP Table

Address Resolution Protocol (ARP) is a protocol for mapping an Internet Protocol address (IP address) to a physical machine address, also known as a Media Access Control or MAC address, on the local area network.

An IP (version 4) address is 32 bits long. In an Ethernet LAN, MAC addresses are 48 bits long. The ARP Table maintains an association between each MAC address and its corresponding IP address.

49.1.1 How ARP Works

When an incoming packet destined for a host device on a local area network arrives at the device, the device's ARP program looks in the ARP Table and, if it finds the address, sends it to the device.

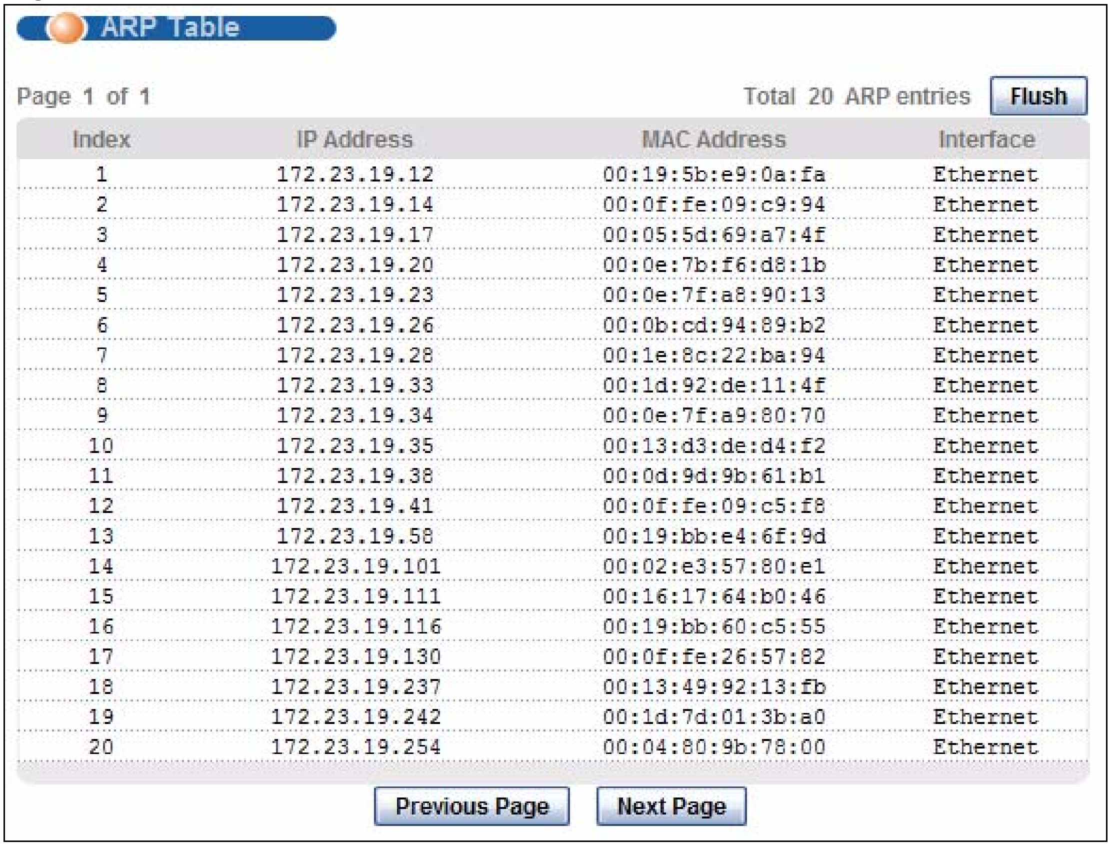
If no entry is found for the IP address, ARP broadcasts the request to all the devices on the LAN. The device fills in its own MAC and IP address in the sender address fields, and puts the known IP address of the target in the target IP address field. In addition, the device puts all ones in the target MAC field (FF.FF.FF.FF.FF.FF is the Ethernet broadcast address). The replying device (which is either the IP address of the device being sought or the router that knows the way) replaces the broadcast address with the target's MAC address, swaps the sender and target pairs, and unicasts the answer directly back to the requesting machine. ARP updates the ARP Table for future reference and then sends the packet to the MAC address that replied.

49.2 ARP Table Screen

The ARP table can hold up to 500 entries.

To open this screen, click **Management > ARP Table**.

Figure 176 ARP Table



The following table describes the labels in this screen.

Table 132 ARP Table

LABEL	DESCRIPTION
Flush	Click **Flush** to remove all of the entries from the ARP table.
Total X ARP Entries	This displays the number of entries in the ARP table.
Index	This is the ARP table entry number.
IP Address	This is the learned IP address of a device connected to a port.
MAC Address	This is the MAC address of the device with the listed IP address.
Interface	This is the type of interface used by the device, such Ethernet or VoIP.
Previous Page Next Page	Click one of these buttons to show the preceding or following screen if the information cannot be displayed in one screen.

PART V
Commands, Troubleshooting and Specifications

50

How to Access and Use the CLI

This chapter introduces the command line interface (CLI).

50.1 Accessing the CLI

Use any of the following methods to access the CLI.

50.1.1 Console Port

You can use this method if your IES has a console port.

1 Connect your computer to the console port on the IES using the appropriate cable.

2 Use terminal emulation software with the following settings:

SETTING	DEFAULT VALUE
Terminal Emulation	VT100
Baud Rate	9600 bps
Parity	None
Number of Data Bits	8
Number of Stop Bits	1
Flow Control	None

3 Press [ENTER] to open the login screen.

50.1.2 Telnet

1 Connect your computer to one of the Ethernet ports.

2 Open a Telnet session to the IES's IP address. If this is your first login, use the default values.

SETTING	DEFAULT VALUE
IP Address	192.168.1.1
Subnet Mask	255.255.255.0

Make sure your computer IP address is in the same subnet, unless you are accessing the IES through one or more routers. In the latter case, make sure remote management of the IES is allowed via Telnet.

50.1.3 SSH

You can use this method if your IES supports SSH connections.

1 Connect your computer to one of the Ethernet ports.

2 Use a SSH client program to access the IES. If this is your first login, use the default values in Table 134 on page 393 and Table 133 on page 392. Make sure your computer IP address is in the same subnet, unless you are accessing the IES through one or more routers.

50.2 Logging in

Use the administrator username and password. If this is your first login, use the default values. in some IES models you may not need to enter the user name.

Table 133 Default User Name and Password

SETTING	DEFAULT VALUE
User Name	admin
Password	1234

The IES automatically logs you out of the management interface after five minutes of inactivity. If this happens, simply log back in again. Use the `sys stdio set` command to extend the idle timeout. For example, the IES automatically logs you out of the management interface after 60 minutes of inactivity after you use the `sys stdio set 60` command. Use the `sys stdio show` command to display the current idle timeout setting.

50.3 Command Conventions

Command descriptions follow these conventions:

- Commands are in courier new font.
- Required input values are in angle brackets < >; for example, ping <*ip-address*> means that you must specify an IP address for this command.
- Optional fields are in square brackets []; for instance in the show logins [*name*]command, the *name* field is optional.

  The following is an example of a required field within an optional field: snmp-server [contact <*system contact*>], the contact field is optional. However, if you use contact, then you must provide the *system contact* information.
- The | (bar) symbol means "or".
- *italic* terms represent user-defined input values; for example, in sys datetime date [*year month date*], *year month date* can be replaced by the actual year month and date that you want to set, for example, 2007 08 15.
- A key stroke is denoted by square brackets and uppercase text, for example, [ENTER] means the "Enter" or "Return" key on your keyboard.
- <cr> means press the [ENTER] key.
- An arrow (-->) indicates that this line is a continuation of the previous line.

Command summary tables are organized as follows:

Table 134 Table Title

COMMAND	DESCRIPTION	P
switch dhcpsnoop show <*port-list*>	Use this command to display the current DHCP snooping settings of the specified port(s).	L/L
statistics dhcp counter [<*port-list*> [clear]]	Use this command to display or clear the summary of DHCP packets on the specified port(s).	L/L
statistics dhcp snoop <*port-list*>	Use this command to look at the DHCP snooping table on the specified port(s).	L/L

The **Table** title identifies commands or the specific feature that the commands configure.

The **COMMAND** column shows the syntax of the command.

The **DESCRIPTION** column explains what the command does. It may also identify legal input values.

The **P** column identifies the privilege level needed to run the command (see Section 50.5 on page 395). The first letter identifies the privilege level needed to use the command (**L** = low, **M** = medium or **H** = high) and the second letter indicates the privilege level need to perform the function in the web configurator (**L** = low or **H** = high).

A long list of pre-defined values may be replaced by a command input value ‘variable’ so as to avoid a very long command in the description table. Refer to the command input values table if you are unsure of what to enter.

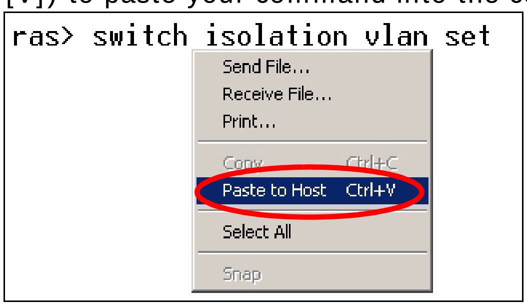
Table 135 Common Command Input Values

LABEL	DESCRIPTION
description	Used when a command has a description field in order to add more detail.
ip-address	An IP address in dotted decimal notation. For example, 192.168.1.3.
mask	The subnet mask in dotted decimal notation, for example, 255.255.255.0.
mask-bits	The number of bits in an address’s subnet mask. For example type /24 for a subnet mask of 255.255.255.0.
port	An xDSL port number.
hostname	The hostname can be an IP address or domain name.
name	Used for the name of a rule, policy, set, group and so on.
number	Used for a number, for example 10, that you have to enter.

Note: Commands are case sensitive! Enter commands exactly as seen in the command interface. Remember to also include underscores if required.

Copy and Paste Commands

You can copy and paste commands directly from this document into your terminal emulation console window (such as HyperTerminal). Use right-click (not [CTRL]-[V]) to paste your command into the console window as shown next.



50.4 Using Shortcuts and Getting Help

This table identifies some shortcuts in the CLI, as well as how to get help.

Table 136 CLI Shortcuts and Help

COMMAND / KEY(S)	DESCRIPTION
↑↓ (up/down arrow keys)	Scrolls through the list of recently-used commands. You can edit any command or press [ENTER] to run it again.
?	Displays the keywords and/or input values that are allowed in place of the ?.
help	Displays the (full) commands that are allowed in place of help.

Use the help command to view the executable commands on the IES. Follow these steps to create a list of supported commands:

1 Log into the CLI.

2 Type help and press [ENTER]. A list comes up which shows all the commands available for this device.

```
ras> help
adsl            alarm           config          exit
ip              statistics      switch          sys
voip
ras>
```

50.5 Command Privilege Levels

There is a high, middle or low privilege level for each command.

High privilege commands are only available to administrators with high privilege access. High privilege commands include things like creating administrator accounts, restarting the system and resetting the system to its factory defaults. Administrators with high privilege access can use all commands including the lower privilege commands.

Administrators with middle privilege access can use middle or low privilege commands.

Administrators with the low privilege level are restricted to using only low privilege commands. Low privilege commands are read only.

50.6 Saving Your Configuration

In the IES some commands are saved as you run them and others require you to run a save command. See the related section of this guide to see if a save command is required.

Note: Unsaved configuration changes are lost once you restart the IES

50.7 Logging Out

Use the `exit` command to log out of the CLI.

51

Common Commands

This chapter introduces some of the more commonly-used commands in the IES. For more detailed usage, see the corresponding feature chapter in this guide.

In the following examples, `ras` is the default command prompt. If you configure a system name, then the configured system name displays as the command prompt. For example, change the system name to `zyxel` using the `sys hostname zyxel` command; the command prompt will then display as `zyxel>`.

51.1 Port Selection

Subscriber xDSL ports are identified in a command by either a port number, or by a port list. Where a port list is specified, you can enter a single port number, a list of xDSL ports (for example `1,3,5`), a range of ports (for example `6~10`) a list and a range (for example `1,2,3,6~10`), or use an asterisk (`*`) to indicate all ports.

For example, the following command displays the ADSL status of ports 2, 8 and 15 to 19.

```
ras> adsl show 2,8,15~19
port enable mode     up/downstream profile
---- ------ -------- ------------- -------------------------
   2   V    auto        512/  9088 DEFVAL_MAX
   8   V    auto        512/  9088 DEFVAL_MAX
  15   V    auto        512/  9088 DEFVAL_MAX
  16   V    auto        512/  9088 DEFVAL_MAX
  17   V    auto        512/  9088 DEFVAL_MAX
  18   V    auto        512/  9088 DEFVAL_MAX
  19   V    auto        512/  9088 DEFVAL_MAX

Subscriber Info:
port name                             tel
---- ------------------------------- ----------------
   2 -                                -
   8 -                                -
  15 -                                -
  16 -                                -
  17 -                                -
  18 -                                -
  19 -                                -
ras>
```

51.2 IP Status

Use the following command to view IP statistics.

```
ras> ip show
interface ip              netmask         vid
--------- --------------- --------------- ----
Ethernet  192.168.3.206   255.255.255.0   1
VoIP      192.168.2.1     255.255.255.0   2
default management gateway: 192.168.3.254
default VoIP gateway: 192.168.2.254
ras>
```

51.3 Configuration Status

Use the `config show <sys|sw|adsl|ip|stat|all> [nopause]` command to view the IES’s current configuration.

`sys` - view system configuration information.

`sw` - view switch configuration information.

`adsl` - view ADSL port configuration information.

`ip` - view IP configuration information.

`stat` - view statistics.

`all` - view all the above information.

`nopause` - view the information without being prompted to continue after each section.

```
ras> config show adsl
================ adsl ====================================
================ adsl/show =================
port enable mode     up/downstream profile
---- ------ -------- ------------- -------------------------------
   1   V    auto        512/  9088 DEFVAL_MAX
   2   V    auto        512/  9088 DEFVAL_MAX
   3   V    auto        512/  9088 DEFVAL_MAX
   4   V    auto        512/  9088 DEFVAL_MAX
   5   V    auto        512/  9088 DEFVAL_MAX
   6   V    auto        512/  9088 DEFVAL_MAX
   7   V    auto        512/  9088 DEFVAL_MAX
   8   V    auto        512/  9088 DEFVAL_MAX
   9   V    auto        512/  9088 DEFVAL_MAX
  10   V    auto        512/  9088 DEFVAL_MAX
----------------------Snip------------------------
```

51.4 Reset to Defaults

Use the following command to reset the IES to the factory defaults. Make sure you back up your current configuration first (using the web configurator or SMT). The IES will restart and the console port speed will also reset to 9,600 bps.

```
ras> config restore

System will reboot automatically after restoring default configuration.
Do you want to proceed(y/n)? >
restoring configuration...
saving configuration to flash...
```

51.5 Port and VLAN Isolation

Turn on port isolation to block communications between subscriber ports. When you enable port isolation, you do not need to configure the VLAN to isolate subscribers.

Turn on VLAN isolation to block communications between subscribers in different VLAN if you do not block communications between subscriber ports. For example, you might want to isolate some VLAN (for example, high-speed Internet) and not isolate other VLAN (for example, VoIP).

51.5.1 Isolation Show Command

Use this command to display the current setting of the subscriber isolation feature.

```
ras> switch isolation show
system isolation: disabled
system switch mode : stand alone
isolated vlan list
----
  33
```

51.5.2 Port Isolation Enable Command

Use this command to turn on the port isolation feature.

```
ras> switch isolation enable
```

51.5.3 Port Isolation Disable Command

Use this command to turn off the port isolation feature.

```
ras> switch isolation disable
```

51.5.4 VLAN Isolation Set Command

Use this command to turn on VLAN isolation for the specified VLAN (100 in this example).

```
ras> switch isolation vlan set 100
ras> switch isolation show
system isolation: disabled
system switch mode : stand alone
isolated vlan list
----
  33
 100
```

51.5.5 VLAN Isolation Delete Command

Use this command to turn off VLAN isolation for the specified VLAN (100 in this example).

```
ras> switch isolation vlan delete 100
ras> switch isolation show
system isolation: disabled
system switch mode : stand alone
isolated vlan list
----
  33
```

51.6 Statistics Monitor Command

Use this command to show the current hardware status (voltage, temperature, fan speed and alarm status).

```
ras> statistics monitor show
Hardware monitor status: enabled
      nominal limit(hi) limit(lo)   current      min      max      avg status
      ------- --------- --------- --------- -------- -------- -------- -----
---
v1(v)   1.200     1.284     1.116     1.191    1.191    1.191    1.191 Normal
v2(v)   1.800     1.944     1.656     1.736    1.736    1.736    1.736 Normal
v3(v)   3.300     3.564     3.036     3.196    3.196    3.196    3.196 Normal
v4(v)  20.500    22.140    18.860    20.429   20.429   20.429   20.429 Normal
v5(v)   1.400     1.512     1.288     1.438    1.425    1.438    1.435 Normal
v6(v)   3.300     3.564     3.036     3.264    3.264    3.264    3.264 Normal
v7(v)   5.000     5.400     4.600     4.782    4.782    4.782    4.782 Normal

      limit(hi) limit(lo)   current       min       max       avg status
      --------- --------- --------- --------- --------- --------- --------
t1(c)    97.000   -55.000    36.000    32.000    37.000    34.000 Normal
t2(c)    97.000   -55.000    35.000    33.000    35.000    33.000 Normal
t3(c)    97.000   -55.000    33.000    32.000    33.000    32.000 Normal
t4(c)    97.000   -55.000    30.000    29.000    31.000    29.000 Normal
t5(c)    97.000   -55.000    33.000    31.000    33.000    31.000 Normal
t6(c)   120.000   -55.000    29.000    28.000    30.000    28.000 Normal

MAINBOARD: v1~v4, t1~t3
VOIPBOARD: v5~v7, t4~t6
          limit(hi) limit(lo)   current       min       max       avg status
          --------- --------- --------- --------- --------- --------- ------
--
fan1(rpm)      8000      2000      3708      3686      5373      3708 Normal
fan2(rpm)      8000      2000      3693      3675      5283      3694 Normal
fan3(rpm)      8000      2000      3765      3724      5378      3761 Normal

          status name
          ------ ------------------------------
ext alm1  Normal extalm1
ext alm2  Normal extalm2
ext alm3  Normal extalm3

             status
             ---------
ext relay    Normal
```

51.7 Statistics Port Command

Use this command to display or erase port statistics. The following example displays port statistics for ADSL port 1.

```
ras> statistics port 1
[adsl port 1]
tx packets        : 20
rx packets        : 0
tx uni-packets    : 1
rx uni-packets    : 0
tx nonuni-packets : 19
rx nonuni-packets : 0
tx discard packets: 0
rx discard packets: 0
errors            : 0
tx rate  (bytes/s): 0
rx rate  (bytes/s): 128
tx bytes          : 5904
rx bytes          : 0
```

See Chapter 9 on page 101 for details on the port statistics fields.

52

System Commands

This chapter describes the system commands. Use the system commands to view and change basic information about your IES.

52.1 System Commands

The following table describes the sys commands not described elsewhere in this guide (see Chapter 63 on page 487 for information on the sys snmp commands).

Table 137 System Commands

COMMAND	DESCRIPTION	P
`sys client disable` *<index>*	Turns off a secure client.	H/H
`sys client enable` *<index>*	Turns on a secure client.	H/H
`sys client set` *<index> <start-ip> <end-ip>* `[[telnet] [ftp] [web] [icmp] [snmp]]`	Sets a secured client set: a range of IP addresses from which you can manage the device and the protocols that can be used.	H/H
`sys client show`	Displays the device's secured client settings.	M/L
`sys date set` *<yyyy mm dd>*	Sets the system's date.	H/H
`sys date show`	Displays the system's current date.	L/L
`sys info contact` *<contact>*	Sets contact person information.	M/H
`sys info hostname` *<hostname>*	Sets the system name.	M/H
`sys info location` *<location>*	Sets location information.	M/H
`sys info show`	Displays general system information.	L/L
`sys log clear`	Clears the device's logs.	H/H
`sys log show`	Displays the device's logs.	M/L
`sys monitor disable`	Turns the hardware monitor off.	H/H
`sys monitor enable`	Turns the hardware monitor on.	H/H
`sys monitor extalm` *<index> <name>*	Set external alarm name.	H/H

Table 137 System Commands (continued)

COMMAND	DESCRIPTION	P
`sys monitor flimit <index> <high> <low>`	Sets the maximum (*high*) or minimum (*low*) fan revs per minute (RPM) at the specified fan (*index*). *index*: 1=Fan 1, 2=Fan 2, 3=Fan 3.	H/H
`sys monitor show`	Displays the hardware monitor’s statistics.	L/L
`sys monitor tlimit <index> <high> <low>`	Sets the maximum (*high*) or minimum (*low*) temperature at the specified temperature sensor. You can specify a temperature with up to three digits after a decimal point (-50.025 for example). Temperature sensor locations: *index*: 1=DSL, 2=CPU, 3=HW monitor	H/H
`sys monitor vlimit <index> <high> <low>`	Sets the maximum (<high>) or minimum (<low>) voltage at the specified voltage sensor. You can specify a voltage with up to three digits after a decimal point (0.941 for example). Normal voltage at each sensor: *index*: 1=1.2v, 2=1.8v, 3=3.3v, 4=24v	H/H
`sys monitor ftrapmode [normal\two]`	Display or configure FAN trap operation mode *normal*: FAN trap is issued if just one of the three FAN’s revolutions per minute (RPM) is lower than the FAN speed threshold. *two*: FAN trap is issued if two of the three FAN’s RPMs are lower than the FAN speed threshold	M/H
`sys reboot [show|sec|cancel]`	Sets the reboot timer or displays the timer and remaining time for reboot. If a reboot has been scheduled, use this command to prevent a reboot.	H/H
`sys server disable <telnet|ftp|web|icmp>`	Turns a service off.	H/H
`sys server enable <telnet|ftp|web|icmp>`	Turns a service on.	H/H
`sys server port <telnet|ftp|web> <port>`	Sets a port for a service.	H/H
`sys server show`	Displays the device’s service status and port numbers.	M/L
`sys stdio set <minute>`	Sets the current stdio timeout. Enter `0` to have no timeout.	H/H
`sys stdio show`	Displays the current stdio timeout.	L/L
`sys syslog disable`	Turns off the syslog logging.	H/H
`sys syslog enable`	Turns on the syslog logging.	H/H
`sys syslog server <ip-address>`	Sets the IP address of the syslog server.	H/H
`sys syslog show`	Displays the syslog settings.	M/L

Table 137 System Commands (continued)

COMMAND	DESCRIPTION	P
sys time set <*hh*> [<*mm*> [*ss*]]	Sets the system's time.	H/H
sys time show	Displays the system's current time.	L/L
sys timeserver set <daytime> <*ip-address*> [nosync]	Sets the time service protocol and the time server's IP address.	H/H
sys timeserver set <none>	Sets the system to not use a time server.	H/H
sys timeserver set <time|ntp> <ip> <utc[<+|->0100~1200]> [nosync]	Sets the time service protocol, time server's IP address and the device's time zone.	H/H
sys timeserver show	Displays the system's time server.	M/L
sys timeserver sync	Retrieves the date and time from the time server.	H/H
sys user auth <local|radius|landr>	Sets the authentication method.	H/H
sys user delete <*name*>	Removes the specified user name of multi-login.	H/H
sys user disable <*name*>	Turns off the specified user name of multi-login.	H/H
sys user enable <*name*>	Turns on the specified user name of multi-login.	H/H
sys user online	Displays online user info.	M/~
sys user server <*ip-address*> <*port*> <*secret*> [high|middle|low|deny]	Set remote authentication server's IP address and secret.	H/H
sys user set <*username*> <*password*> <high|middle|low>	Creates or edits the password and privilege level of the specified user name.	H/H
sys user show	Displays the authentication mode, RADIUS server settings and user info.	M/L
sys wdog set <*msec*>	Sets the watchdog count. 0 turns the watchdog off.	H/~
sys wdog show	Displays the current watchdog firmware protection feature status and timer.	H/~

52.1.1 Idle Timeout Set Command Example

By default, the IES automatically logs you out of the management interface after five minutes of inactivity. Use the `sys stdio set` command to extend the idle timeout. The following example extends the idle timeout to 120 minutes.

```
ras> sys stdio set 120
ras>
```

52.1.2 Basic System Information Command Examples

Use the following command to view the firmware and bootbase version.

```
ras> sys info show
         Hostname:
         Location:
          Contact:
            Model: IES-xxxx
    ZyNOS version: V3.53(ARY.0)b6 | 09/06/2007
         F/W size: 4519516
      MAC address: 00:00:00:00:00:00
   System up time:   0(days) :    2:25:03
 Bootbase version: VARY1.05 | 09/06/2007
   F/W build date: Aug 31 2007 13:09:26
 DSP code version:  6.05.0006
 Hardware version:
    Serial number:
 VOIP DSP version: 12.01.00.005 EGW
Codec F/W version: 1.98
ras>
```

Use the following commands to view the IES’s time and date.

```
ras> sys time show
current time is 16:46:45
ras> sys date show
current date is Tue 2007/09/04
ras>
```

Use the following command to restart your IES right away.

```
ras> sys reboot

Bootbase Version: VARY1.04 | 08/20/2007
RAM:Size = 32 Mbytes
FLASH: Intel 64M

ZyNOS Version: V3.53(ARY.0)b6 | 08/31/2007

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

52.1.3 Logs Command Examples

Use the following commands to display all logs or just error logs. Logs are very useful for troubleshooting. If you are having problems with your IES, customer support may request that you send them the logs.

```
ras> sys log show
   1 Tue Sep 04 16:17:19 2007 1_Tell_P  INFO  Session Begin!
   2 Tue Sep 04 14:22:39 2007 Console   INFO  Session End!
   3 Tue Sep 04 14:22:39 2007 Console   INFO  Last errorlog repeat 1 Times
   4 Tue Sep 04 14:17:37 2007 Console   INFO  Session Begin!
   5 Tue Sep 04 14:17:33 2007 Console   WARN  Incorrect Password!
   6 Tue Sep 04 14:17:10 2007 PSSV      INFO  System Cold Start!
   7 Tue Sep 04 14:17:02 2007 iw_app    INFO  Ether 1 Link Up(SN=2): 100/100!
   8 Tue Sep 04 14:16:59 2007 PINI      INFO  Change time server to none.
```

52.1.3.1 Log Format

The common format of the system logs is: <item no> <time> <process> <type> <log message>.

Table 138 Log Format

LABEL	DESCRIPTION
<item no>	This is the index number of the log entry.
<time>	This is the time and date when the log was created.
<process>	This is the process that created the log.
<type>	This identifies what kind of log it is. "INFO" identifies an information log. "WARN" identifies a warning log.
<log message>	This is the log's detailed information (see Table 139 on page 410)

52.1.3.2 Log Messages

The following table lists and describes the system log messages.

Table 139 Log Messages

LOG MESSAGE	TYPE	DESCRIPTION

`ADSL <port> Link Up(SN=<seq no>): <ds rate>/<us rate>!`
or
`ADSL Link Info: NM:<ds NM>/<us NM>!`
	INFO	An ADSL port established a connection.
		port - port number
		seq no - sequence number of the connection
		ds rate - downstream rate
		us rate - upstream rate
		us NM - upstream noise margin
		ds NM - downstream noise margin

`ADSL <port> Link Down(SN=<seq no>)!`	WARN	An ADSL port lost its connection. port - port number seq no - sequence number of the connection
`ADSL <port>  Link Loss of Power Dying-Gasp Event!`	WARN	The subscriber device connected to an ADSL port experienced a loss of power (Dying-Gasp). port - port number
`Change time server to none.`	INFO	The time server setting was changed to none.
`Change time server to TIME. IP:<ip> Timezone: <time zone>.`	INFO	The time server protocol setting was changed to TIME. The time server's IP address and time zone are displayed.
`Change time server to DAYTIME. IP: <ip>`	INFO	The time server protocol setting was changed to DAYTIME. The time server's IP address and time zone are displayed.
`Change time server to NTP. IP: <ip> Timezone: <time zone>`	INFO	The time server protocol setting was changed to NTP. The time server's IP address and time zone are displayed.
`External alarm is triggered!`	WARN	External alarm input was detected.
`Ether <port> Link Down(SN=N)!`	WARN	An Ethernet link is down. port - 1 is ENET1, 2 is ENET2 SN - an internal sequencer number
`Ether N Link Up(SN=N): <speed>!`	INFO	An Ethernet link is up. port - 1 is ENET1, 2 is ENET2 SN - an internal sequencer number speed - Ethernet connection speed, for example 1000M or 100M
`External alarm is released.`	INFO	An external alarm is over and the input has returned to a normal state.

Table 139 Log Messages (continued)

LOG MESSAGE	TYPE	DESCRIPTION
FAN RPM DOWN: dev: <id> Limit:N value:N!	WARN	A fan’s RPM went too low. id - 1=Fan 1, 2=Fan 2, 3=Fan Limit - minimum (low) fan (RPM) value - the measured fan RPM
FAN RPM OK: dev: <id> Limit:N value:N!	INFO	A fan’s RPM returned to the normal range. id - 1=Fan 1, 2=Fan 2, 3=Fan 3 Limit - maximum (high) or minimum fan (RPM) that had been breached value - the measured fan RPM
FAN RPM OVER: dev: <id> Limit:N value:N!	WARN	A fan’s RPM went too high. id - 1=Fan 1, 2=Fan 2, 3=Fan 3 Limit - maximum (high) fan (RPM) value - the measured fan RPM
Incorrect Password!	WARN	Someone attempted to use the wrong password to start a console, telnet or FTP session (see the <process> field for the type of session).
Session Begin!	INFO	A console, telnet or FTP session has begun (see the <process> field for the type of session).
Session End!	INFO	A console telnet or FTP session has terminated (see the <process> field for the type of session).
Sync with timeserver <ip> failed!	WARN	The device was not able to synchronize the time with the time server at the listed IP address.
Sync with timeserver <ip> successful!	INFO	The device synchronized the time with the time server at the listed IP address.
Received File <file>!	INFO	A file was uploaded to the IES by FTP. file - received file’s name
Received Firmware Checksum Error!	WARN	A checksum error was detected during an attempted FTP firmware upload.
Received Firmware Invalid!	WARN	Someone attempted to upload a firmware file with a wrong identity via FTP.
Received Firmware Size too large!	WARN	The file size was too large with an attempted FTP firmware upload.
THERMO LOW VOLTAGE: dev: <id> limit: <threshold> value: <voltage>!	WARN	The device’s voltage went above the accepted operating range. id - 1=1.2v, 2=1.8v, 3=3.3v, 4=24v threshold - voltage limit voltage - voltage of the DC power when logged

Table 139 Log Messages (continued)

LOG MESSAGE	TYPE	DESCRIPTION
`THERMO LOW TEMPERATURE: dev:<id> threshold:<threshold>(degree C) value:<temp>(degree C)!`	`WARN`	The temperature was too low at one of the temperature sensors. `id` - 0: sensor near the ADSL chipset, 1: sensor near the CPU, 2: thermal sensor chip `threshold` - temperature limit `temp` - temperature when the entry was logged
`THERMO OVER TEMPERATURE: dev:<id> threshold:<threshold>(degree C) value:<temp>(degree C)!`	`WARN`	The temperature was too high at one of the temperature sensors. `id` - 0: sensor near the ADSL chipset, 1: sensor near the CPU, 2: thermal sensor chip `threshold` - temperature limit `temp` - temperature when the entry was logged
`THERMO OVER TEMPERATURE released: dev:<id> threshold:<threshold>(degree C) value:<temp>(degree C)!`	`INFO`	The temperature at one of the temperature sensors has come back to normal. `id` - 0: sensor near the ADSL chipset, 1: sensor near the CPU, 2: thermal sensor chip `threshold` - temperature limit `temp` - temperature when the entry was logged
`THERMO OVER VOLTAGE: dev: <id> limit: <threshold> value: <voltage>!`	`WARN`	The voltage at one of the voltage sensors went above the accepted operating range. `id` - 1=1.2v, 2=1.8v, 3=3.3v, 4=24v `threshold` - voltage limit `voltage` - voltage of the DC power when logged
`THERMO OVER VOLTAGE released: nominal:<nominal>(mV) value:<voltage> (mV)!`	`INFO`	The device's voltage is back inside the accepted operating range. `nominal` - nominal voltage of the DC power `voltage` - voltage of the DC power when logged

52.1.4 Clearing the Log

Syntax:

```
ras> sys log clear
```

This command clears the system error log.

Note: If you clear a log (using the `sys log clear` command), you cannot view it again.

53

Alarm Commands

This chapter describes the alarm management commands. Use these commands to view, customize and clear alarms. You can also set the device to report alarms to an SNMP or syslog server that you specify.

53.1 General Alarm Command Parameters

The following table describes commonly used alarm command parameter notation.

Table 140 General Alarm Command Parameters

NOTATION	DESCRIPTION
alarm	Specify a category of alarms. `eqpt` represents equipment alarms. `dsl` represents Digital Subscriber Line (DSL) alarms. `enet` represents Ethernet alarms. `sys` represents system alarms. `all` specifies every alarm category.
severity	Specify an alarm severity level (`critical`, `major`, `minor`, `info` or `all`). Critical alarms are the most severe, major alarms are the second most severe, minor alarms are the third most severe and info alarms are the least severe.
condition	This is the text description for the condition under which the alarm applies. Use the alarm tablelist to find alarm conditions.

53.2 Alarm Commands

The following table describes the `alarm` commands.

Table 141 alarm Commands

COMMAND	DESCRIPTION	P
alarm show [<*severity*>|all] [<*alarm*>|all] [<*condition*>|all] [*detail*]	This command displays the current alarms by severity, alarm category or alarm condition. *detail*: Display in-depth alarm information.	L/L
alarm port show [<*severity*>|all]	This command displays port alarm severity level thresholds. The system reports an alarm on a port if the alarm has a severity equal to or higher than the port's threshold.	L/L
alarm port set <all|enet1|enet2|<*port*>> <*severity*>	This command sets the alarm severity threshold for recording alarms on an individual port(s). The system reports an alarm on a port if the alarm has a severity equal to or higher than the port's threshold. all|enet1|enet2|port: Ports on the IES.	M/H
alarm tablelist [<*alarm*>|all] [<*severity*>|all] [<*fac*>|all][<*target*>[,<*target*>] [<*condition*>|all]	This command lists alarm settings. *fac*: The log facility (local1~local7) that has the device log the syslog messages to different files in the syslog server. See your syslog program's documentation for details. *target*: snmp|syslog|all The type of alarm messages that the device is to send (SNMP, syslog or all).	L/L
alarm history show [<*severity*>|all] [<*alarm*>|all] [<*condition*>|all] [<*sdate*>|all] [<*edate*>|all] [for|rev] [detail]	This command displays historic alarms by severity, alarm category, alarm condition and/or dates. *sdate*: The start date, in yyyy/mm/dd format. *edate*: The end date, in yyyy/mm/dd format. for|rev: The displaying order. Use for to display in chronological order starting from the oldest alarm. Use rev to display in reverse chronological order starting from the most recent alarm. detail: Display in-depth alarm information.	L/~
alarm history clear [<*alarm*>|all <*condition*>|all] <*severity*>	This command removes historic alarm entries by alarm category, alarm condition or severity.	M/~

Table 141 alarm Commands (continued)

COMMAND	DESCRIPTION	P
`alarm xedit <<`*`alarm`*`>|all> <<`*`condition`*`>|<`*`condcode`*`>> <`*`severity`*`> <`*`fac`*`> <`*`target`*`>[,<`*`target`*`>] [clearable|unclearable]`	This command sets the severity level of an alarm(s) and where the system is to send the alarm(s). Use the `alarm tablelist` command to display alarm setting details. `cond: all|condition` This is the text description for the condition under which the alarm applies. Use the `alarm tablelist` to find alarm conditions. `condcode:` The condition code is the number of a specific alarm message. Use the `alarm tablelist` to find alarm condition codes. `severity:` Specify an alarm severity level (`critical`, `major`, `minor` or `info`) for this alarm. Critical alarms are the most severe, major alarms are the second most severe, minor alarms are the third most severe and info alarms are the least severe. `fac:` The log facility (`local1~local7`) has the device log the syslog messages to a particular file in the syslog server. Set this if this entry is for sending alarms to a syslog server. See your syslog program's documentation for details. `target: snmp|syslog|all` The type of alarm messages that the device is to send (SNMP, syslog or all). You can specify more than one, separated by commas. `clearable|unclearable` This sets whether or not the alarm clear command removes the alarm from the system.	M/ H
`alarm cutoff`	This command cancels an alarm. This stops the sending of the alarm signal current. This is useful in stopping an alarm if you have the alarm output connector pins connected to a visible or audible alarm. The alarm entry remains in the system.	M/ ~
`alarm clear`	This command erases the clearable alarm entries.	M/ H

53.2.1 Alarm Show Command Example

The following example shows the results of using this command.

The source is where the alarm originated. This is either a DSL port number, one of the Ethernet ports (enet 1 or 2), or “eqpt” for the system itself.

```
ras> alarm show

[current alarm list]
    no alarm   condition            severity timestamp      source
------ ------  -------------------- -------- -------------- -------
     1 eqpt   +fan_err              critical 09/19 12:49:10 eqpt 1
     2 eqpt   +fan_err              critical 09/19 12:49:10 eqpt 3
     3 eqpt   +fan_err              critical 09/19 12:49:10 eqpt 2
```

53.2.2 Alarm Port Show Command Example

This example shows the results of using this command.

```
ras> alarm port show

    Press any key to continue, 'e' to exit, 'n' for nopause

 no      ifindex       severity
-----   ----------    -----------
01       01          minor
02       02          minor
03       03          minor
04       04          minor
05       05          minor
06       06          minor
07       07          minor
08       08          minor
09       09          minor
10       10          minor
11       11          minor
12       12          minor
13       13          minor
14       14          minor
15       15          minor
16       16          minor
17       17          minor
18       18          minor
19       19          minor
20       20          minor

    Press any key to continue, 'e' to exit, 'n' for nopause
```

53.2.3 Alarm Port Set Command Example

The following example has the IES record only critical alarms on DSL port 7.

```
ras> alarm port set 7 critical
```

53.2.4 Alarm Tablelist Command Example

The following example displays the supported minor level alarms for all alarm categories, facilities, types of alarm messages and conditions.

```
ras> alarm tablelist
 no alarm         condition          facility snmp syslog severity clearable
--- -----  -------------------------   -------- ---- ------ -------- -------
--
  1   dsl  ( 5000)line_up              local1    V     V    info       -
  2   dsl  ( 5001)line_down            local1    V     V    minor      V
  3   dsl  ( 5002)ad_perf_lol_thresh   local1    V     V    minor      V
  4   dsl  ( 5003)ad_perf_lof_thresh   local1    V     V    minor      V
  5   dsl  ( 5004)ad_perf_los_thresh   local1    V     V    minor      V
  6   dsl  ( 5005)ad_perf_lop_thresh   local1    V     V    minor      V
  7   dsl  ( 5006)ad_perf_es_thresh    local1    V     V    minor      V
  8   dsl  ( 5007)ad_perf_ses_thresh   local1    V     V    minor      V
  9   dsl  ( 5008)ad_perf_uas_thresh   local1    V     V    minor      V
 10   dsl  ( 5009)ad_atuc_loftrap      local1    V     V    minor      -
 11   dsl  ( 5010)ad_atuc_lostrap      local1    V     V    minor      -
 12   dsl  ( 5011)ad_atur_loftrap      local1    V     V    minor      -
 13   dsl  ( 5012)ad_atur_lostrap      local1    V     V    minor      -
 14   dsl  ( 5013)ad_atur_lprtrap      local1    V     V    minor      -
 15  eqpt  (10000)vol_err              local1    V     V    critical   -
 16  eqpt  (10001)temp_err             local1    V     V    critical   -
 17  eqpt  (10002)fan_err              local1    V     V    critical   -
 18  eqpt  (10003)hw_rtc_fail          local1    V     V    critical   -
 19  eqpt  (10004)hw_mon_fail          local1    V     V    critical   -

    Press any key to continue, 'e' to exit, 'n' for nopause
```

53.2.5 Log Format

The following table describes the columns in the list.

Table 142 Log Format

LABEL	DESCRIPTION
no	This is the index number of the alarm entry in this list display.
alarm	This is the category of alarms. eqpt represents equipment alarms. dsl represents Digital Subscriber Line (DSL) alarms. enet represents Ethernet alarms. sys represents system alarms.
condition	There is a condition code number for the specific alarm message and a text description for the condition under which the alarm applies.
facility	This is the log facility (local1~local7) on the syslog server where the system is to log this alarm. This is for alarms that send alarms to a syslog server.
snmp	This displays “V” if the system is to send this alarm to an SNMP server. It displays a dash (-) if the system does not send this alarm to an SNMP server.

Table 142 Log Format (continued)

LABEL	DESCRIPTION
syslog	This displays “V” if the system is to send this alarm to a syslog server. It displays a dash (-) if the system does not send this alarm to a syslog server.
severity	This is the alarm severity level (critical, major, minor or info).
clearable	This displays “V” if the alarm clear command removes the alarm from the system. It displays a dash (-)if the alarm clear command does not remove the alarm from the system.

53.2.6 Alarm History Show Command Example

The following example displays the historic critical level alarms for all alarm categories, and all conditions.

```
ras> alarm history show critical all all all all rev detail
    no alarm   condition                severity timestamp      source
------ ------  ------------------------ -------- -------------- -------
     1 eqpt   +fan_err                  critical 07/28 15:23:35 eqpt
               * IES:Fan 2 speed 0, low 2000, high 8000
     2 eqpt   +fan_err                  critical 07/28 15:23:35 eqpt
               * IES:Fan 3 speed 0, low 2000, high 8000
     3 eqpt   +fan_err                  critical 07/28 15:23:33 eqpt
               * IES:Fan 1 speed 0, low 2000, high 8000
```

53.2.7 Alarm History Clear Command Example

The following example removes the historic minor level alarms for all alarm categories, and all conditions.

```
ras> alarm history clear minor
```

53.2.8 Alarm XEdit Command Example

The following example creates an alarm report entry that sets all system alarms to the major severity level and sends them to an SNMP server at the local 3 log facility.

```
ras> alarm xedit sys all major local3 syslog
```

54

DHCP Commands

This chapter describes how to use the DHCP Relay and DHCP Snoop commands. Use these commands to configure the DHCP relay feature. See Chapter 29 on page 233 for background information on DHCP relay.

54.1 General DHCP Command Parameters

The following table describes commonly used DHCP command parameter notation.

Table 143 General DHCP Command Parameters

NOTATION	DESCRIPTION
vid|all	The ID of the VLAN to which to apply the setting. Type `all` to apply the setting to all VLANs.
port-list	You can specify a single port (`1`), all ports (`*`) or a list of ports (`1,3`). You can also include a range of ports (`1,5,6~10`).

54.2 DHCP Relay Commands

Table 144 DHCP Relay Commands

COMMAND	DESCRIPTION	P
`switch dhcprelay show`	This command displays the DHCP relay settings for each VLAN. These settings include whether or not this feature is activated for each VLAN, the relay mode, the current list of DHCP servers, the status of the DHCP relay agent info option 82 feature and the information configured for it.	L/L
`switch dhcprelay enable` <*vid*|all>	This command turns on the DHCP relay for the specified VLAN or for all VLANs.	M/H
`switch dhcprelay disable` <*vid*|all>	This command turns off the DHCP relay for the specified VLAN or for all VLANs.	M/H

Table 144 DHCP Relay Commands (continued)

COMMAND	DESCRIPTION	P
`switch dhcprelay server set <vid> <primary-server> [secondary-server]`	This command specifies the DHCP server(s) that serve the specified VLAN. The primary server is required; the secondary server is optional. The IES routes DHCP requests to the specified DHCP server(s) according to the `relaymode`. Use VLAN ID 0 to set up the default DHCP server(s) for all non-listed VLAN. *vid*: The ID of the VLAN to which to apply the setting. *primary-server*: The IP address of one DHCP server. *secondary-server*: The IP address of a second DHCP server.	M/H
`switch dhcprelay server delete <vid|all> [primary-server]`	This command deletes all information about DHCP servers for the specified VLAN or for all VLANs. Afterwards, the specified VLAN can uses the default DHCP server(s) set up for VLAN ID 0, if any. *primary-server*: The IP address of one DHCP server.	M/H
`switch dhcprelay server active <vid> <active-server>`	If the `relaymode` is `auto`, this command specifies to which DHCP server (the primary one or the secondary one) the IES should relay DHCP requests for the selected VLAN. This command has no effect if the `relaymode` is `both`. *active-server*: 1: The primary DHCP server is active. 2: The secondary DHCP server is active.	M/H
`switch dhcprelay relaymode <vid|all> <mode>`	This command controls how the IES routes DHCP requests. The IES can route DHCP requests to the active DHCP server for the selected VLAN, or it can route DHCP requests to all DHCP servers set up for the selected VLAN. *mode*: Relay process mode; it controls to which DHCP server(s) the IES relays DHCP requests for the specified VLAN or for all VLANs. `auto` - the IES relays DHCP requests to the active server for the specified VLAN or for all VLANs. `both` - the IES relays DHCP requests to the primary and secondary server for the specified VLAN or for all VLANs, regardless of which server is active.	M/H

54.2.1 Show Command Example

This example shows the current DHCP configuration of the IES.

```
ras> switch dhcprelay show

 vid enable relay mode primary-server     secondary-server
---- ------ ---------- ----------------- ------------------
   0   -       both    0.0.0.0            0.0.0.0
  33   V       auto    (*)192.168.1.10    0.0.0.0

     option82                            option82
 vid sub-opt1 info (Circuit ID)       sub-opt2 info (Remote ID)
---- -------- ---------------------- -------- ----------------------
   0    -                                 -
  33    -     opt1                        -     opt2
```

54.3 DHCP Relay Option 82 Sub-option 1 Commands

Use the following commands to configure the DHCP relay Option 82 (agent information) feature, sub-option 1 (circuit ID). This feature applies regardless of whether or not the DHCP relay is on.

Table 145 DHCP Relay Option 82 Sub-option 1 Commands

COMMAND	DESCRIPTION	P
`switch dhcprelay option82 enable <vid|all>`	This command turns on the DHCP relay agent information (Option 82 Sub-option 1) for the specified VLAN or for all VLANs.	M/H
`switch dhcprelay option82 disable <vid|all>`	This command turns off the DHCP relay agent information (Option 82, Sub-option 1) for the specified VLAN or for all VLANs.	M/H
`switch dhcprelay option82 set <vid|all> <relay-info>`	This command adds the specified information for the relay agent for the specified VLAN or for all VLANs. *relay-info*: Up to 23 ASCII characters of additional information for the IES to add to the DHCP requests that it relays to a DHCP server. Examples of information you could add would be the name of the IES or the ISP. To clear this field, type a pair of double quotation marks with no space between them (“”).	M/H

54.4 DHCP Relay Option 82 Sub-option 2 Commands

Use the following commands to configure the DHCP relay Option 82 (agent information) feature, sub-option 2 (remote ID). This feature applies regardless of whether or not the DHCP relay is on.

Table 146 DHCP Relay Option 82 Sub-option 2 Commands

COMMAND	DESCRIPTION	P
`switch dhcprelay opt82sub2 enable <vid|all>`	This command turns on the DHCP relay agent information (Option 82, Sub-option 2) for the specified VLAN or for all VLANs.	M/H
`switch dhcprelay opt82sub2 disable <vid|all>`	This command turns off the DHCP relay agent information (Option 82, Sub-option 2) for the specified VLAN or for all VLANs.	M/H
`switch dhcprelay opt82sub2 set <vid|all> <relay-info>`	This command adds the specified information for the relay agent (Option 82, Sub-option 2) for the specified VLAN or for all VLANs. *relay-info*: Up to 23 ASCII characters of additional information for the IES to add to the DHCP requests that it relays to a DHCP server. Examples of information you could add would be the name of the IES or the ISP. To clear this field, type a pair of double quotation marks with no space between them (“”).	M/H

54.5 PPPoE Intermediate Agent Information Commands

Use these commands if you want the IES to add a vendor-specific tag to PADI (PPPoE Active Discovery Initiation) and PADR (PPPoE Active Discovery Request) packets from PPPoE clients. This tag gives a PPPoE termination server additional information (such as the port number, VLAN ID, and MAC address) that the server can use to identify and authenticate a PPPoE client. See Chapter 39 on page 305 for background information.

Table 147 PPPoE Intermediate Agent Commands

<table>
<tr><th>COMMAND</th><th>DESCRIPTION</th><th>P</th></tr>
<tr><td><code>switch poeagent clearinfo <<i>vid</i>|all></code></td><td>This command clears any extra information the IES adds to PADI and PADR packets in the specified VLAN or for all VLANs.</td><td>H/H</td></tr>
<tr><td><code>switch poeagent enable <<i>vid</i>|all></code></td><td>This command adds a vendor-specific tag to PADI and PADR packets for PPPoE clients in the selected VLAN(s) or for all VLANs. This tag contains information that a PPPoE termination server can use to identify and authenticate a PPPoE client.</td><td>H/H</td></tr>
<tr><td><code>switch poeagent optionmode <<vid>|all> <private|tr101></code></td><td>Sets the IES to use the TR-101 format for the PPPoE Sub-option 1 (Circuit ID) or private mode for the packets it transmits for the specified VLAN.</td><td>H/H</td></tr>
<tr><td><code>switch poeagent delete <<i>vid</i>|all></code></td><td>This command deletes the PPPoE intermediate agent settings for the specified VLAN or for all VLANs. You cannot delete the setting for VLAN 0.</td><td>H/H</td></tr>
<tr><td><code>switch poeagent disable <<i>vid</i>|all></code></td><td>This command removes the vendor-specific tag from PADI and PADR packets for PPPoE clients in the selected VLAN(s) or for all VLANs.</td><td>H/H</td></tr>
<tr><td><code>switch poeagent info <<i>vid</i>|all> <<i>description</i>></code></td><td>This command specifies the extra information the IES adds to PADI and PADR packets in the specified VLAN or in all VLANs, if the PPPoE intermediate agent is enabled.

Note: Before you can configure PPPoE intermediate agent information, you must first create a entry using the <code>poeagent set</code> command.

<i><code>description</code></i>: The PPPoE line information the switch is to add to PPPoE discover packets from the specified VLAN or from all VLANs. Enter a description (up to 23 alphanumerical characters).</td><td>H/H</td></tr>
</table>

Table 147 PPPoE Intermediate Agent Commands (continued)

COMMAND	DESCRIPTION	P
`switch poeagent set <vid>`	This command creates a PPPoE agent information entry for the VLAN. After you have created an entry for a VLAN, you can configure the line information settings. *vid*: VLAN ID.	H/H
`switch poeagent show [vlanlist]`	This command displays PPPoE intermediate agent settings for the specified VLAN or for all VLANs. *vlanlist*: You can specify a single VID (1), all VIDs (*), a list of VIDs (1,3), or you can also include a range of VIDs (1,5,6~10).	M/L

54.5.1 PPPoE Intermediate Agent Enable Command Example

The following example activates the PPPoE agent setting for VLAN 100.

```
ras> switch poeagent enable 100
ras> switch poeagent show
 vid enable  optionmode info
---- ------  ---------- -----------------------------
   0   V     private
 100   V     private
Note: vid 0 is the default agent.
```

54.5.2 PPPoE Intermediate Agent Info Command Example

The following example sets the switch to add “testing” to PADI and PADR packets on VLAN 100.

```
ras> switch poeagent info 100 testing
ras> switch poeagent show
 vid enable  optionmode info
---- ------  ---------- -----------------------------
   0   -     private
 100   V     private    testing
Note: vid 0 is the default agent.
```

54.5.3 PPPoE Intermediate Agent Set Command Example

The following example creates an entry for VLAN 10.

```
ras> switch poeagent set 10
ras> switch poeagent show
 vid enable  info
---- ------  ----------------------------
   0   -
  10   -
 100   V     testing
 101   -
 102   -
Note: vid 0 is the default agent.
```

54.5.4 PPPoE Intermediate Agent Show Command Example

The following example shows the PPPoE intermediate agent settings for all VLANs.

```
ras> switch poeagent show
 vid enable  info
---- ------  ----------------------------
   0   -
  10   -
 100   V     testing
 101   -
 102   -
Note: vid 0 is the default agent.
```

54.6 DHCP Snoop Commands

Use these commands to configure or show DHCP snooping settings on the subscriber ports. The system gets the client MAC-IP address information (in the reply from a DHCP server) and stores it in the DHCP snooping table. The system forwards packets from only the clients whose MAC-IP address is in the DHCP snooping table. Packets from unknown IP address(es) are not forwarded (dropped). This feature prevents clients from assigning their own static IP addresses.

In some cases, you might want to allow packets from an IP address not offered by the DHCP server. This might apply, for example, to static IP addresses. In this case, you can specify the IP address whose packets are allowed, and the IES forwards these packets as well.

Table 148 DHCP Snoop Commands

COMMAND	DESCRIPTION	P
switch dhcpsnoop enable <*port-list*>	This command activates the DHCP snooping feature on the specified port(s).	M/H
switch dhcpsnoop disable <*port-list*>	This command disables the DHCP snooping feature on the specified port(s).	M/H
switch dhcpsnoop flush <*port-list*>	This command clears the DHCP snooping binding table on the specified port(s). The system also automatically clears the binding table when you disable DHCP snooping.	M/H
switch dhcpsnoop lan2lan disable	This command disables LAN to LAN DHCP services.	M/L
switch dhcpsnoop lan2lan enable	This command enables LAN to LAN DHCP services.	M/L
switch dhcpsnoop lan2lan show	This command displays whether LAN to LAN DHCP services are currently enabled or disabled.	M/L
switch dhcpsnoop pool set <*port*> <*ip-address*>	This command adds the specified IP address to the static IP pool for the specified port. The IES forwards packets from IP addresses in this pool, as well as packets from IP addresses learned through DHCP snooping. You can set up to three IP addresses for each port, but you have to set each IP address for each port one at a time. You cannot add IP addresses to a static IP pool if the pool already has three IP addresses in it. You have to delete one of the existing IP addresses first. *port*: The selected ADSL port number(s).	M/H
switch dhcpsnoop pool delete <*port*> <*ip-address*>	This command removes the specified IP address from the static IP pool for the specified port. The IES forwards packets from IP addresses in this pool, as well as packets from IP addresses learned through DHCP snooping. You cannot delete an IP address that is not in the pool. *port*: The selected ADSL port number(s).	M/H
switch dhcpsnoop show <*port-list*>	Use this command to display the current DHCP snooping settings of the specified port(s).	L/L
statistics dhcp counter [<*port-list*> [clear]]	Use this command to display or clear the summary of DHCP packets on the specified port(s).	L/L
statistics dhcp snoop <*port-list*>	Use this command to look at the DHCP snooping table on the specified port(s).	L/L

54.6.1 DHCP Snoop Enable Command Example

The following example enables DHCP snooping on port 1.

```
ras> switch dhcpsnoop enable 1
```

54.6.2 DHCP Snoop Set Static IP Command Example

The following example adds 1.2.3.7 to the static IP pool for port 1.

```
ras> switch dhcpsnoop pool set 1 1.2.3.7
ras> switch dhcpsnoop show 1~5
port enable static IP pool
---- ------ ---------------------------------------------------
   1   -    1.2.3.7
   2   -
   3   -
   4   -
   5   -    1.2.3.4           1.2.3.5           1.2.3.6
```

54.6.3 DHCP Snoop Delete Static IP Command Example

The following example removes 1.2.3.7 from the static IP pool for port 1.

```
ras> switch dhcpsnoop pool delete 1 1.2.3.7
ras> switch dhcpsnoop show 1~5
port enable static IP pool
---- ------ ---------------------------------------------------
   1   -
   2   -
   3   -
   4   -
   5   -    1.2.3.4           1.2.3.5           1.2.3.6
```

54.6.4 DHCP Snoop Show Command Example

The following example displays the settings of ports 1-5.

```
ras> switch dhcpsnoop show 1~5
port enable static IP pool
---- ------ ---------------------------------------------------
   1   -
   2   -
   3   -
   4   -
   5   -    1.2.3.4           1.2.3.5           1.2.3.6
```

54.6.5 DHCP Counter Statistics Command Example

The following example displays the settings of port 1.

```
ras> statistics dhcp counter 1
 port discover  offer   request    ack    overflow
----- -------- -------- -------- -------- --------
   1         0        0        0        0        0
```

Each field is described in the following table.

`port`	=	The selected ADSL port number(s).
`discover`	=	The number of DHCP Discover packets on this port.
`offer`	=	The number of DHCP Offer packets on this port.
`request`	=	The number of DHCP Request packets on this port.
`ack`	=	The number of DHCP Ack packets on this port.
`overflow`	=	There is a limit to the number of IP addresses the DHCP server can assign at one time to each port. This field displays the number of requests from DHCP clients above this limit. Overflow requests are dropped by the IES.

54.6.6 DHCP Snoop Statistics Command Example

The following example displays the settings of port 1.

Figure 177 DHCP Snoop Statistics Command Example

```
ras> statistics dhcp snoop 1
port overflow       mac               ip
---- -------- ---------------- ---------------
```

Each field is described in the following table.

port	=	The selected ADSL port number(s).
overflow	=	There is a limit to the number of IP addresses the DHCP server can assign at one time to each port. This field displays the number of requests from DHCP clients above this limit. Overflow requests are dropped by the IES.
mac	=	The MAC address of a client on this port to which the DHCP server assigned an IP address.
ip	=	The IP address assigned to a client on this port.

55

OUI Filter

These commands let you configure an OUI (Organizationally Unique Identifier) filter to block or forward packets from other devices with the specified OUI in the MAC address. The OUI field is the first three octets in a MAC address. An OUI uniquely identifies the manufacturer of a network device and allows you to identify from which device brands the switch will accept traffic or send traffic to. The OUI value is assigned by the Internet Assign Numbers Authority (IANA).

These commands correspond to the Web Configurator's OUI Filter settings described in Chapter 42 on page 313.

Note: If you enable both MAC filtering and OUI filtering, MAC filtering takes priority.

55.1 OUI Filtering

Use these commands to configure the OUI filter settings.

Table 149 OUI Filter Commands

COMMAND	DESCRIPTION	P
`switch oui set <port> <oui-mac> [<oui-mac> <oui-mac> ...]`	Creates a filter for the specified OUI octets on an ADSL port(s). `port`: Enter a port number or series of port numbers, separated by commas, a range separated by a tilde (~), or a combination of the two separated by a comma. For example: 1,2 or 5~10 or 1,2,5~10. `oui-mac`: Enter the first three octets of the MAC address you want to filter.	H/H
`switch oui delete <port> <oui-mac> [<oui-mac> <oui-mac> ...]`	Removes a filter for the specified OUI octets on an ADSL port(s). `port`: Enter a port number or series of port numbers, separated by commas, a range separated by a tilde (~), or a combination of the two separated by a comma. For example: 1,2 or 5~10 or 1,2,5~10. `oui-mac`: Enter the first three octets of the MAC address for which you want to remove filter.	H/H

Table 149 OUI Filter Commands

COMMAND	DESCRIPTION	P
switch oui enable [*port-list*]	Turns on the OUI filter for the specified port(s). *port-list*: Enter a series of port numbers, separated by commas, a range separated by a tilde (~), or a combination of the two separated by a comma. For example: 1,2 or 5~10 or 1,2,5~10.	H/H
switch oui disable [*port-list*]	Turns off the OUI filter for the specified port(s). *port-list*: Enter a series of port numbers, separated by commas, a range separated by a tilde (~), or a combination of the two separated by a comma. For example: 1,2 or 5~10 or 1,2,5~10.	H/H
switch oui mode <*port*> <*accept*|*deny*>	Flags the OUI filter for the specified port to either accept or deny incoming connections based on the OUI octet. *port*: Enter a port number or series of port numbers, separated by commas, a range separated by a tilde (~), or a combination of the two separated by a comma. For example: 1,2 or 5~10 or 1,2,5~10.	H/H
switch oui show <*port-list*>	Displays the OUI filter settings for the specified port(s). *port-list*: Enter a series of port numbers, separated by commas, a range separated by a tilde (~), or a combination of the two separated by a comma. For example: 1,2 or 5~10 or 1,2,5~10.	M/L

55.1.1 OUI Set and Delete Command Examples

The following example creates a filter two separate MAC octects (01:23:45 and 67:89:ab) on port number 2.

Figure 178 OUI Set Command Example

```
ras> switch oui set 2 01:23:45 67:89:ab
```

The following shows you how to remove the two MAC octets from the filter list for port number 2.

Figure 179 OUI Delete Command Example

```
ras> switch oui delete 2 01:23:45 67:89:ab
```

55.1.2 OUI Enable and Disable Command Examples

The following is an example of enabling an OUI filter on port 7.

Figure 180 OUI Enable Command Example

```
ras> switch oui enable 7
```

The following is an example of disabling an OUI filter on port 1.

Figure 181 OUI Disable Command Example

```
ras> switch oui disable 1
```

55.1.3 OUI Mode Command Example

The following is an example of flagging port 3 to accept any devices with MAC address that match the octets in the OUI filter list.

Figure 182 OUI Mode Command Example

```
ras> switch oui mode 3 accept
```

The following is an example of flagging port 5 to deny any devices with MAC address that match the octets in the OUI filter list.

Figure 183 OUI Enable Command Example

```
ras> switch oui mode 5 deny
```

55.1.4 OUI Show Command Example

The following shows you how to display the OUI filtering for a specific port.

Figure 184 OUI Show Command Example

```
ras> switch oui show  1
     status:V, enable oui filter function.
     status:-, disable oui filter function.
port  mode  status oui
---- ------ ------ -----------------
   1 accept   -    00:11:00
```

Each field is described in the following table.

`port`	=	The selected ADSL port number(s).
`mode`	=	The port mode and whether it accepts connections from devices with the specified OUI octet or denies them.
`status`	=	The port status and whether the OUI function is enabled or disabled on the specified port. `V`: The OUI filter function is enabled for the port. `-`: The OUI filter function is disabled for the port.
`oui`	=	The three OUI octets used to filter the specified port.

56

IEEE 802.1Q Tagged VLAN and Isolation Commands

This chapter describes the IEEE 802.1Q Tagged VLAN commands as well as command used to configure the isolation feature on the IES.

56.1 IEEE 802.1Q Tagging Types

There are two kinds of tagging:

- Explicit Tagging

A VLAN identifier is added to the frame header that identifies the source VLAN.

- 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.

It is important for the IES 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).

56.2 Filtering Databases

A filtering database stores and organizes VLAN registration information useful for switching frames to and from the IES. A filtering database consists of static entries (Static VLAN or SVLAN table).

56.2.1 Static Entries (SVLAN Table)

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

56.3 IEEE VLAN1Q Tagged VLAN Configuration Commands

These switch commands allow you to configure and monitor the IEEE 802.1Q Tagged VLAN.

Table 150 IEEE VLAN1Q Tagged VLAN Configuration Command Summary

COMMAND	DESCRIPTION	P
`switch vlan portshow [`*portlist*`]`	Displays the port's IEEE 802.1Q VLAN tag settings.	M/L
`switch vlan pvid` <*portlist*> <*pvid*>	Sets a default VLAN ID for all untagged packets that come in through the specified port. *portlist*: You can specify a single port <1>, all ports <*> or a list of ports <1,3,enet1>. You can also include a range of ports <1,5,6~10,enet1,enet2>. *pvid*: The VLAN ID. Valid parameter range = [1 – 4094].	H/H
`switch vlan priority` <*portlist*> <*priority*>	Sets the priority of incoming frames with an IEEE 802.1Q VLAN tag. *priority*: This is the priority value (0 to 7) to use for incoming frames with an IEEE 802.1Q VLAN tag.	H/H

Table 150 IEEE VLAN1Q Tagged VLAN Configuration Command Summary

COMMAND	DESCRIPTION	P
`switch vlan set <vid> <portlist>:<F<T|U>|X|N> [<portlist>:<F<T|U>|X> ...][name]`	Adds or modifies an entry in the static VLAN table. *vid*: The VLAN ID [1 – 4094]. *portlist*: You can specify a single port: <1>, all ports: <*>, a list of ports: <1,3,enet1>, you can also include a range of ports: <1,5,6~10,enet1,enet2>. F<T|U>: The <F> stands for a fixed registrar administration control flag and registers a <*portlist*> to the static VLAN table with <*vid*>. For a fixed port, you also have to specify <T|U>, the tag control flag. T: has the device add an IEEE 802.1Q tag to frames going out through this port(s). U: has the device send frames out through this port(s) without an IEEE 802.1Q tag. X: This is the registrar administration control flag. X stands for forbidden and blocks a <*portlist*> from joining the static VLAN table with <*vid*>. N: stands for normal and confirms registration of the <*portlist*> to the static VLAN table with <vid>. This is used in GVRP applications. *name*: A name to identify the SVLAN entry.	H/H
`switch vlan frametype <portlist> <all|tag>`	Sets the specified xDSL ports to accept VLAN tagged Ethernet frames, or both tagged and untagged Ethernet frames.	H/H
`switch vlan cpu show`	Displays the management VLAN (CPU). You can only use ports that are members of this management VLAN in order to manage the IES.	M/~
`switch vlan cpu set <vid>`	Sets the management VLAN (CPU). You can only use ports that are members of this management VLAN in order to manage the IES.	H/~
`switch vlan delete <vlan-list>`	Deletes the specified VLAN ID entry from the static VLAN table. *vlan-list*: You can specify a single VID: <1>, all VIDs: <*>, a list of VIDs: <1,3>, you can also include a range of VIDs: <1,5,6~10>.	H/H

Table 150 IEEE VLAN1Q Tagged VLAN Configuration Command Summary

COMMAND	DESCRIPTION	P
`switch vlan enable <vid>`	This command enables the specified VLAN ID in the SVLAN (Static VLAN) table.	H/H
`switch vlan disable <vid>`	This command disables the specified VLAN ID in the SVLAN (Static VLAN) table.	H/H
`switch vlan show <vlanlist>`	This command shows information about the specified port's VLAN settings.	M/L
`switch vlan gvrp <portlist> <enable|disable>`	Set the port(s) to enable or disable GVRP.	H/H

56.3.1 VLAN Port Show Command Example

The following example shows the settings for xDSL port 1.

```
ras> switch vlan portshow 3
 port pvid priority frametype
----- ---- -------- ---------
    3    1        0       all
```

56.3.2 VLAN PVID Command Example

The following example sets the default VID of port 1 to 200.

```
ras> switch vlan pvid 1 200
```

56.3.3 VLAN Priority Command Example

The following example sets a priority of three for frames (with an IEEE 802.1Q VLAN tag) that come in on xDSL port 2.

```
ras> switch vlan priority 2 3
```

56.3.4 VLAN Set Command Examples

This command adds or modifies an entry in the static VLAN table. Use the `switch vlan show` command to display your configuration. An example of a configuration is shown next.

56.3.4.1 Modify a Static VLAN Table Example

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

```
ras> switch vlan set 2000 1:FU
ras> switch vlan set 2001 2:FU
```

56.3.4.2 Forwarding Process Example

Tagged Frames

1. First the IES checks the VLAN ID (VID) of tagged frames or assigns temporary VIDs to untagged frames (see Section 56.3.2 on page 438).
2. The IES checks the frame's source MAC address against the MAC filter.
3. The IES then checks the VID in a frame's tag against the SVLAN table.
4. The IES notes what the SVLAN table says (that is, the SVLAN tells the IES whether or not to forward a frame and if the forwarded frames should have a tag).
5. Frames might be dropped if they are sent to a CPE (customer premises equipment) xDSL device that does not accept tagged frames.

Untagged Frames

1. An untagged frame comes in from the LAN.
2. The IES checks the frame's source MAC address against the MAC filter.
3. The IES checks the PVID table and assigns a VID and IEEE 802.1Q priority.
4. The IES ignores the port from which the frame came, because the IES does not send a frame to the port from which it came. The IES also does not forward frames to "forbidden" ports.
5. If after looking at the SVLAN, the IES does not have any ports to which it will send the frame, it drops the frame.

56.3.5 VLAN Frame Type Command Example

The following example sets the IES to accept only VLAN tagged Ethernet frames on xDSL port 3.

```
ras> switch vlan frametype 3 tag
```

56.3.6 VLAN CPU Show Command Example

The following example sets VLAN ID 2 to be the CPU (management) VLAN.

```
ras> switch vlan cpu set 2
```

56.3.7 VLAN CPU Set Command Example

The following example sets VLAN ID 2 to be the CPU (management) VLAN.

```
ras> switch vlan cpu set 2
```

56.3.8 Configuring Management VLAN Example

Note: After the following example configuration, you must connect to the first Ethernet port through a VLAN aware device that is using the proper VLAN ID in order to perform management.

By default, the IES's xDSL ports are members of the management VLAN (VID 1). The following procedure shows you how to configure a tagged VLAN that limits management access to just one Ethernet port.

Note: Use the console port to configure the IES if you misconfigure the management VLAN and lock yourself out.

1 Use the `switch vlan set` command to configure a VLAN ID (VID 3 in this example) for managing the IES (the "management" or "CPU" VLAN).

```
ras> switch vlan set 3 enet1:FT
```

2 Use the `switch vlan1q vlan cpu` command to set VID 3 as the management VLAN.

```
ras> switch vlan cpu set 3
```

56.3.9 VLAN Delete Command Example

The following example deletes entry 2 in the static VLAN table.

```
ras> switch vlan delete 2
```

56.3.10 VLAN Show Command Example

The following example shows the settings for all VIDs.

```
ras> switch vlan show *
 vid name             F:fixed X:forbidden N:normal   U:untag T:tag
---- ---------------- ---------------------------------------------------
   1 -
     enabled          123456789012345678901234567890123456789012345678 12
                      FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF FF
                      UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU UU
   2 -
     disabled         123456789012345678901234567890123456789012345678 12
                      FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF FF
                      UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU UU
2000 -
     enabled          123456789012345678901234567890123456789012345678 12
                      FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF FF
                      UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU UU
```

56.4 VLAN Statistics Commands

VLAN statistics provide information about VLANs configured on the IES.

Table 151 Statistics VLAN Command Summary

COMMAND	DESCRIPTION	P
statistics vlan	Displays current VLAN settings.	M/L

56.5 GARP Timer Commands

These switch commands allow you to configure GARP (Generic Attribute Registration Protocol) Timer settings. GARP Timers set declaration (Join, Leave and Leave All) timeout values with respect to GVRP (GARP VLAN Registration Protocol).

Table 152 GARP Timer Command Summary

COMMAND	DESCRIPTION	P
`switch garptimer join <milliseconds>`	Sets the system's garp join time.	H/H
`switch garptimer leave <milliseconds>`	Sets the system's garp leave time.	H/H
`switch garptimer leaveall <milliseconds>`	Sets the system's garp leaveall time.	H/H
`switch garptimer show <milliseconds>`	Displays the system's garp settings.	M/L

56.6 Isolation Commands

Use the `switch isolation` commands to configure the subscriber isolation feature. Use subscriber isolation to block communications between subscriber ports. When you enable subscriber isolation you do not need to configure the VLAN to isolate subscribers.

Turn on VLAN isolation to block communications between subscribers in different VLANs if you do not block communications between subscriber ports. For example, you might want to isolate some VLANs (for example, high-speed Internet) and not isolate other VLANs (for example, VoIP). See Chapter 51 on page 397 for examples.

Table 153 Isolation Command Summary

COMMAND	DESCRIPTION	P
`switch isolation daisychain`	Sets switch mode to daisychain mode.	H/H
`switch isolation disable`	Turns the subscriber isolation feature off.	H/H
`switch isolation enable`	Turns the subscriber isolation feature on.	H/H
`switch isolation show`	Displays the subscriber isolation feature's current settings.	M/L
`switch isolation standalone`	Sets switch mode to standalone mode.	H/H
`switch isolation vlan delete <vlan-id>`	Deletes an isolated VLAN.	H/H
`switch isolation vlan set <vlan-id>`	Creates an isolated VLAN.	H/H

57

MAC Commands

This chapter describes how to configure the IES's MAC commands.

57.1 MAC Filter Commands

Use the MAC filter to control from which MAC (Media Access Control) addresses frames can (or cannot) come in through a port.

Table 154 MAC Filter Command Summary

COMMAND	DESCRIPTION	P
switch mac filter show [*portlist*]	Displays the MAC filtering status (V for enabled, - for disabled) and the fixed source MAC addresses on the specified xDSL port(s) or on all xDSL ports if no port is specified.	M/L
switch mac filter enable [*portlist*]	Turns on the MAC filtering feature on the specified xDSL port(s) or on all xDSL ports if no port is specified.	H/H
switch mac filter disable [*portlist*]	Turns off the MAC filtering feature on the specified xDSL port(s) or on all xDSL ports if no port is specified.	H/H
switch mac filter mode <*port*> <accept|deny>	Sets whether the IES allows or blocks access for the MAC addresses you specify.	H/H
switch mac filter set <*port*> <*mac*> [*mac*] [*mac*]...	Adds an allowed source MAC address on the specified xDSL port. *mac*: The source MAC address in "00:a0:c5:12:34:56" format.	H/H
switch mac filter delete <*port*> <*mac*> [*mac*] [*mac*] ...	Removes a configured source MAC address from the xDSL port that you specify. *mac*: The source MAC address in "00:a0:c5:12:34:56" format.	H/H
statistics mac	Displays current MAC address forwarding table.	M/L

57.1.1 MAC Filter Show Command Example

The following example displays the MAC filtering mode, status and the fixed source MAC addresses on xDSL port 5.

```
ras> sw mac filter show 5
     status:V, enable mac filter function.
     status:-, disable mac filter function.
port  mode  status mac
---- ------ ------ -----------------
   5 accept   -    00:a0:c5:12:34:56
```

57.1.2 MAC Filter Enable Command Example

The following example turns on the MAC filtering feature on xDSL port 5.

```
ras> switch mac filter enable 5
```

57.1.3 MAC Filter Disable Command Example

The following example turns off the MAC filtering feature on xDSL port 5.

```
ras> switch mac filter disable 5
```

57.1.4 MAC Filter Mode Command Example

The following example sets xDSL port 5 to allow frames from the MAC addresses specified for xDSL port 5.

```
ras> switch mac filter mode 5 accept
```

57.1.5 MAC Filter Set Command Example

The following example adds source MAC address 00:a0:c5:12:34:56 for xDSL port 5.

```
ras> switch mac filter set 5 00:a0:c5:12:34:56
```

57.1.6 MAC Filter Delete Command Example

The following example removes the source MAC address of 00:a0:c5:12:34:56 from the MAC filter for xDSL port 5.

```
ras> switch mac filter delete 5 00:a0:c5:12:34:56
```

57.2 MAC Count Commands

Use MAC count commands to limit how many MAC addresses may be dynamically learned. MAC count commands are listed next. When the MAC filter accept mode is enabled (see Section 57.1 on page 443), the IES ignores the MAC count setting and accepts all of the MAC addresses listed for the port in the MAC filter settings.

Table 155 MAC Count Command Summary

COMMAND	DESCRIPTION	P
`switch mac count show [`*`portlist`*`]`	Displays the MAC count settings on the specified xDSL port(s) or on all xDSL ports if no port is specified.	M/L
`switch mac count enable <`*`portlist`*`>`	Enables the MAC count filter on the specified xDSL port(s). When the MAC filter accept mode is enabled (see Section 57.1 on page 443), the IES ignores the MAC count setting and accepts all of the MAC addresses listed for the port in the MAC filter settings.	H/H
`switch mac count disable <`*`portlist`*`>`	Disables the MAC filtering feature on the specified xDSL port(s).	H/H
`switch mac count set <`*`portlist`*`> <`*`count`*`>`	Sets the limit for how many MAC addresses may be dynamically learned on the specified xDSL port(s). *count*: The valid range is from “1” to “128”.	H/H
`mac flush`	Clears learned MAC addresses from the forwarding table.	H/H
`switch mac agingtime set <10~10000|0:disabled>`	Sets the MAC aging out time period.	H/H
`switch mac agingtime show`	Displays the MAC aging out time period.	M/L

57.2.1 MAC Count Show Command Example

The following example displays the MAC count settings for xDSL port 4.

```
ras> switch mac count show 4
port status count
---- ------ -----
   4   V     128
```

57.2.2 MAC Count Enable Command Example

The following example turns on the MAC count filter on xDSL port 4.

```
ras> switch mac count enable 4
```

57.2.3 MAC Count Disable Command Example

The following example turns off the MAC count filter on xDSL port 4.

```
ras> switch mac count disable 4
```

57.2.4 MAC Count Set Command Example

The following example sets the MAC count filter to allow up to 50 MAC addresses to be dynamically learned on xDSL port 7.

```
ras> switch mac count set 7 50
```

57.3 MAC Anti-Spoofing Commands

Use MAC anti-spoofing commands to configure checking for authorized MAC to IP address bindings for incoming packets on the IES.

Table 156 MAC Anti-Spoofing Command Summary

COMMAND	DESCRIPTION	P
`switch mac antispoofing disable`	Turns off the MAC antispoofing.	H/H
`switch mac antispoofing enable`	Turns on the MAC antispoofing.	H/H
`switch mac antispoofing show`	Shows the MAC antispoofing status.	M/L

58

IGMP Commands

This chapter describes the IGMP snooping and filtering commands.

58.1 IGMP Snooping Commands

Use the IGMP snoop commands to enable or disable IGMP proxy or IGMP snooping.

Table 157 igmpsnoop Command Summary

COMMAND	DESCRIPTION	P
`switch igmpsnoop show`	Displays the IGMP mode (proxy, snooping or disabled).	M/L
`switch igmpsnoop enable <proxy|snooping> [v2|v3]`	Turns on IGMP proxy or snooping and, optionally, specifies the IGMP version. Use proxy to have the device use IGMP proxy. Use snooping to have the device passively learn multicast groups. If you select IGMPv2 (v2), the device discards IGMPv3 packets. This provides better security if none of the devices in the network use IGMPv3. If you select IGMPv3 (v3), the device recognizes both IGMPv2 and IGMPv3.	H/H
`switch igmpsnoop disable`	Turns off IGMP proxy or snooping.	H/H

58.1.1 IGMP Snoop Show Example

The following example displays the IGMP mode (proxy, snooping or disabled).

```
ras> switch igmpsnoop show
IGMP Snooping/Proxy is Disable
```

58.1.2 IGMP Snoop Enable Example

The following example sets the device to use IGMP proxy.

```
ras> switch igmpsnoop enable proxy
```

58.1.3 IGMP Snoop Disable Command Example

The following example sets the device to not use IGMP proxy or snooping.

```
ras> switch igmpsnoop disable
```

58.2 IGMP Filter Commands

Use the IGMP filter commands to define IGMP filter profiles and assign them to xDSL ports.

IGMP filter profiles allow you to control access to IGMP multicast groups. You can have a service available to a specific IGMP multicast group. You can configure an IGMP filter profile for an IGMP multicast group that has access to a service (like a SIP server for example). Then you can assign the IGMP filter profile to xDSL ports that are allowed to use the service.

Table 158 igmpfilter Command Summary

COMMAND	DESCRIPTION	P
switch igmpfilter show [*portlist*]	Displays which IGMP filter profile an xDSL port(s) is using. *portlist*: You can specify a single xDSL port <1>, all xDSL ports <*> or a list of xDSL ports <1,3,5>. You can also include a range of ports <1,5,6~10>.	M/L
switch igmpfilter set [<*port*>|*] <*name*>	Sets an xDSL port(s) to use an IGMP filter profile. *port*|*: You can specify a single xDSL port, for example **1** or all xDSL ports *****. *name*: The name of an IGMP filter profile.	H/H
switch igmpfilter profile set <*name*> <*index*> <*startip*> <*endip*>	Configures an IGMP filter profile. *name*: Specify a name to identify the IGMP filter profile (you cannot change the name of the DEFVAL profile). You can use up to 31 ASCII characters; spaces are not allowed. *index*: The number (1~16) to identify a multicast IP address range. *startip*: Type the starting multicast IP address for a range of multicast IP addresses that you want to belong to the IGMP filter profile. *endip*: Type the ending multicast IP address for a range of IP addresses that you want to belong to the IGMP filter profile. If you want to add a single multicast IP address, enter it in both the *startip* and *endip* fields.	H/H

Table 158 igmpfilter Command Summary (continued)

COMMAND	DESCRIPTION	P
`switch igmpfilter profile delete <name>`	Removes the specified IGMP filter profile.	H/H
`switch igmpfilter profile show [<name>|*]`	Displays an IGMP filter profile's settings.	M/L

58.2.1 IGMP Filter Show Command Example

The following example displays which IGMP filter profile xDSL port 9 is using.

```
ras> switch igmpfilter show 9
port                          profile
--------------------------------------
   9                            DEFVAL
```

58.2.2 IGMP Filter Set Command Example

The following example sets xDSL port 9 to use the voice IGMP filter profile.

```
ras> switch igmpfilter set 9 voice
```

58.2.3 IGMP Filter Profile Set Command Example

The following example configures an IGMP filter profile named **voice** with a range of multicast IP addresses (index 1) from 224.1.1.10 to 224.1.1.44.

```
ras> switch igmpfilter profile set voice 1 224.1.1.10 224.1.1.44
```

58.2.4 IGMP Filter Profile Delete Command Example

The following example removes the **voice** IGMP filter profile.

```
ras> switch igmpfilter profile delete voice
```

58.2.5 IGMP Filter Profile Show Command Example

The following example displays the **voice** IGMP filter profile's settings.

```
ras> switch igmpfilter profile show voice
                         profile  index          startip            endip
-------------------------------------------------------------------------
                           voice      1       224.1.1.10       224.1.1.44
                           voice      2          0.0.0.0          0.0.0.0
                           voice      3          0.0.0.0          0.0.0.0
                           voice      4          0.0.0.0          0.0.0.0
                           voice      5          0.0.0.0          0.0.0.0
                           voice      6          0.0.0.0          0.0.0.0
                           voice      7          0.0.0.0          0.0.0.0
                           voice      8          0.0.0.0          0.0.0.0
                           voice      9          0.0.0.0          0.0.0.0
                           voice     10          0.0.0.0          0.0.0.0
                           voice     11          0.0.0.0          0.0.0.0
                           voice     12          0.0.0.0          0.0.0.0
                           voice     13          0.0.0.0          0.0.0.0
                           voice     14          0.0.0.0          0.0.0.0
                           voice     15          0.0.0.0          0.0.0.0
                           voice     16          0.0.0.0          0.0.0.0
```

58.3 IGMP Bandwidth Commands

Use the IGMP bandwidth commands to set up bandwidth budgets for specific multicast channels.

Table 159 IGMP Bandwidth Command Summary

COMMAND	DESCRIPTION	P
`switch igmpsnoop bandwidth default <rate>`	Sets the default bandwidth for multicast channels for which you have not configured bandwidth requirements yet. Multicast bandwidth settings on channels (using the `switch igmpsnoop bandwidth set` command) have higher priority over this default setting. *rate*: Allowed bandwidth between 1 and 1000 000 kbps (kilo bits per second).	H/H

Table 159 IGMP Bandwidth Command Summary (continued)

COMMAND	DESCRIPTION	P
`switch igmpsnoop bandwidth set <index> <start-mcast-ip> <end-mcast-ip> <rate>`	Configures bandwidth allocation for the multicast channel(s). For multicast channel(s) for which you have not configured bandwidth settings, the default multicast bandwidth setting applies (see the `switch igmpsnoop bandwidth default` command). *index*: 1~96; a unique number for this setting. *start-mcast-ip*: 224.0.0.0~239.255.255.255; the beginning of the multicast range. *end-mcast-ip*: 224.0.0.0~239.255.255.255; the end of the multicast range. It must be greater than <start-mcast-ip>. *rate*: 1~100000, in units of kbps	H/H
`switch igmpsnoop bandwidth delete <index>`	Removes the specified multicast bandwidth configuration profile.	H/H
`switch igmpsnoop bandwidth show`	Displays bandwidth budget for multicast IP channels configured on the IES.	M/L

58.4 IGMP Bandwidth Port Commands

Use the IGMP bandwidth port commands to set up bandwidth budgets for multicast traffic on specific ports.

Table 160 IGMP Bandwidth Port Command Summary

COMMAND	DESCRIPTION	P
`switch igmpsnoop bandwidth port disable <portlist>`	Deactivates multicast bandwidth settings of the specified port. *portlist*: You can specify a single xDSL port <1>, all xDSL ports <*> or a list of xDSL ports <1,3,5>. You can also include a range of ports <1,5,6~10>.	H/H
`switch igmpsnoop bandwidth port enable <portlist>`	Activates multicast bandwidth setting on the specified port.	H/H
`switch igmpsnoop bandwidth port set <portlist> <rate>`	Sets the bandwidth allowed for multicast traffic on the specified port(s). It does not automatically enable it, however. *rate*: 1~100000, in units of kbps	H/H
`switch igmpsnoop bandwidth port show <portlist>`	Displays the multicast bandwidth setting on the specified port(s) and whether or not this setting is active. The following example displays the bandwidth budget for port 1.	M/L

58.4.1 IGMP Bandwidth Port Show Command Example

The following example displays the bandwidth budget for port 1.

```
ras> switch igmpsnoop bandwidth port show 1
 port  enable   bandwidth
------ ------ -----------
    1     -        4096
```

58.5 IGMP Count Limit Commands

Use these commands to limit the number of IGMP groups a subscriber on a port can join. This allows you to control the distribution of multicast services (such as content information distribution) based on service plans and types of subscription.

IGMP count is useful for ensuring the service quality of high bandwidth services like video or Internet Protocol television (IPTV). IGMP count can limit how many channels (IGMP groups) the subscriber connected to an xDSL port can use at a time. If each channel requires 4~5 Mbps of download bandwidth, and the subscriber's connection supports 11 Mbps, you can use IGMP count to limit the subscriber to using just 2 channels at a time. This also effectively limits the subscriber to using only two IPTVs with the xDSL connection.

Table 161 IGMP Count Limit Command Summary

COMMAND	DESCRIPTION	P
`switch igmpsnoop igmpcount disable <portlist>`	Turns off the IGMP count limit for the specified xDSL port(s).	H/H
`switch igmpsnoop igmpcount enable <portlist>`	Turns on the IGMP count limit for the specified xDSL port(s).	H/H
`switch igmpsnoop igmpcount set <portlist> <count>`	Sets the IGMP count limit for the specified xDSL port(s). *count*: 0~16; the maximum number of IGMP groups subscribers on the specified port(s) can join.	H/H
`switch igmpsnoop igmpcount show [portlist]`	Displays the IGMP count limit setting status for the specified xDSL port(s).	M/L

58.5.1 IGMP Count Disable Command Example

The following command turns off the IGMP count limit for port 4.

```
ras> switch igmpsnoop igmpcount disable 4
```

58.5.2 IGMP Count Enable Command Example

The following command turns on the IGMP count limit for port 4.

```
ras> switch igmpsnoop igmpcount enable 4
```

58.5.3 IGMP Count Set Command Example

The following command sets a IGMP count limit of 2 for port 4.

```
ras> switch igmpsnoop igmpcount set 4 2
```

58.5.4 IGMP Count Show Command Example

The following example displays the IGMP count limit settings for ports 1-5.

```
ras> switch igmpsnoop igmpcount show 1~5
port enable count
---- ------ -----
   1   -        5
   2   -        5
   3   -        5
   4   -        5
   5   -        5
```

58.6 IGMP Snoop Statistics Commands

Use the IGMP Snoop Statistics commands to display current IGMP settings and statistics.

Table 162 IGMP Snooping Statistics Command Summary

COMMAND	DESCRIPTION	P
`statistics igmpsnoop info [clear]`	Displays the current IGMP settings and the number of IGMP-related packets received. Optionally, clears the statistics.	L/L
statistics igmpsnoop group [<*vid*> [<*mcast_ip*>]]	Displays the information about IGMP groups learned on the system, specified VLAN, or specified multicast address on the specified VLAN(s). *vid*: The VLAN ID [1 – 4094]. *mcast-ip*: The multicast IP address.	L/L
statistics igmpsnoop port info <*portlist*>	Displays the number of IGMP-related packets received on the specified port(s).	L/L

Table 162 IGMP Snooping Statistics Command Summary (continued)

COMMAND	DESCRIPTION	P
`statistics igmpsnoop port group <portlist>`	Displays the IGMP groups a port joins.	M/L

58.6.1 IGMP Snoop Info Statistics Command Example

This command displays the current IGMP settings and the number of IGMP-related packets received.

```
ras> statistics igmpsnoop info
IGMP Snooping/Proxy is Disable
number of query    = 0
number of report   = 0
number of leave    = 0
number of groups   = 0
```

58.6.2 IGMP Group Statistics Command Example

This command displays the information about IGMP groups learned on the system, specified VLAN, or specified multicast address on the specified VLAN(s).

```
ras> statistics igmpsnoop group
[group info]
group            vid port
--------------- ---- ------------------------------------------------ --
```

58.6.3 IGMP Port Info Statistics Command Example

The following figure shows the number of IGMP packets for port 1.

```
ras> statistics igmpsnoop port info 1
port  group_cnt query_cnt  join_cnt leave_cnt
----- --------- --------- --------- ---------
    1         0         0         0         0
```

58.6.4 IGMP Port Group Statistics Command Example

The following figure shows an example for port 1.

```
ras> statistics igmpsnoop port group 1
port   vid mcast_ip        source ip
----- ---- --------------- ---------------
```

58.7 IGMP Query VLAN Commands

Use the IGMP query VLAN commands to configure the IES to query VLANs as multicast group members.

Table 163 igmpsnoop Command Summary

COMMAND	DESCRIPTION	P
`switch igmpsnoop qryvid delete <vid>`	Deletes the specified IGMP query VLAN ID while the IES is in IGMP proxy mode.	H/H
`switch igmpsnoop qryvid set <vid>`	Creates the specified IGMP query VLAN ID while the IES is in IGMP proxy mode.	H/H
`switch igmpsnoop qryvid show`	Displays the IGMP query VLAN ID settings of the IES.	M/L

58.8 Multicast VLAN Commands

Use these commands to configure VLAN multicast settings and set multicast port members.

Multicast VLAN allows one single multicast VLAN to be shared among different subscriber VLANs on the network. This improves bandwidth utilization by reducing multicast traffic in the subscriber VLANs and simplifies multicast group management.

Table 164 Multicast VLAN Command Summary

COMMAND	DESCRIPTION	P
`switch igmpsnoop mvlan set <vid> <portlist>:<F<T|U>|X> [<portlist>:<F<T|U>|X> ...] [name]`	Creates a multicast VLAN and sets the allowed/ blocked port member(s). This command is similar to the command to create a regular VLAN. See Section 56.3.4 on page 438 for examples and more information. *portlist*: You can specify a single port (“1”), all ports (“*”), a list of ports (“1,3,enet1”), you can also include a range of ports (“1,5,6~10,enet1,enet2”). F<T|U>: Stands for a fixed registrar administration control flag and registers a <*portlist*> to the static VLAN table with <*vid*>. For a fixed port, you also have to specify <T|U>, the tag control flag. T: has the device add an IEEE 802.1Q tag to frames going out through this port(s). U: has the device send frames out through this port(s) without an IEEE 802.1Q tag. X: This is the registrar administration control flag. It stands for forbidden and blocks a <*portlist*> from joining the static VLAN table with <*vid*>. *name*: A name to identify the SVLAN entry.	H/H
`switch igmpsnoop mvlan delete <vlan-list>`	Removes the specified multicast VLAN configuration(s). *vlan-list*: You can specify a single VLAN: <1>, all VLAN: <*>, a list of VLAN: <1,3>, you can also include a range of VLAN: <1,5,6~10>.	H/H
`switch igmpsnoop mvlan disable <vid>`	Deactivates the specified multicast VLAN.	H/H
`switch igmpsnoop mvlan enable <vid>`	Activates the specified multicast VLAN.	H/H
`switch igmpsnoop mvlan show <vlan-list>`	Displays the current multicast VLAN settings.	H/H

Table 164 Multicast VLAN Command Summary (continued)

COMMAND	DESCRIPTION	P
`switch igmpsnoop mvlan group set <vid> <index> <start-mcast-ip> <end-mcast-ip>`	Creates a multicast VLAN group. *index*: 1~16; a unique number for this setting. *start-mcast-ip*: Start of the multicast IP address range. *end-mcast-ip*: End of the multicast IP address range.	H/H
`switch igmpsnoop mvlan group delete <vid> <index>`	Removes the specified multicast VLAN group setting. *index*: 1~16; a unique number for this setting.	H/H
`switch igmpsnoop mvlan group show [<vid>]`	Displays a multicast to VLAN translation entry.	H/H

58.8.1 Multicast VLAN Disable Command Example

The following example disables multicast VLAN 12.

```
ras> switch igmpsnoop mvlan disable 12
```

58.8.2 Multicast VLAN Show Command Example

This command displays the current multicast VLAN settings for VLAN 1. In the state column, “-” indicates the multicast VLAN is not active while “V” indicates the multicast VLAN is active.

```
ras> switch igmpsnoop mvlan show 1
 vid name             F:fixed X:forbidden    U:untag T:tag
---- ---------------- ----------------------------------------
```

58.8.3 Multicast VLAN Group Set Command Example

The following example creates a multicast VLAN with VID 10 and group index 1. The multicast address range is 224.224.224.1 ~ 224.224.224.10.

```
ras> switch igmpsnoop mvlan group set 10 1 224.224.224.1
224.224.224.10
```

59

Packet Filter Commands

Use the following packet filter commands to filter out specific types of packets on specific ports.

59.1 Command Summary

The following section lists the commands for this feature.

Table 165 pktfilter Command Summary

COMMAND	DESCRIPTION	P
`switch pktfilter show [`*`portlist`*`]`	Displays the packet type filter settings on the specified xDSL port(s) or on all xDSL ports if no port is specified. *portlist*: You can specify a single xDSL port <1>, all xDSL ports <*> or a list of xDSL ports <1,3,5>. You can also include a range of ports <1,5,6~10>.	M/L

Table 165 pktfilter Command Summary (continued)

COMMAND	DESCRIPTION	P
switch pktfilter set <portlist> [*filter*]	Sets the packet type filter for the specified xDSL port(s). *filter*: Select the filter(s) separated by a space from the following choices: • pppoe: Reject PPPoE packets. (Point-to-Point Protocol over Ethernet) relies on PPP and Ethernet. PPPoE is a specification for connecting the users on an Ethernet to the Internet through a common broadband medium, such as a single xDSL line, wireless device or cable modem. • ip: Reject IP packets. Internet Protocol. The underlying protocol for routing packets on the Internet and other TCP/IP-based networks. • arp: Reject ARP packets. Address Resolution Protocol is a protocol for mapping an Internet Protocol address (IP address) to a physical computer address that is recognized in the local network. • netbios: Reject NetBIOS packets. (Network Basic Input/Output System) are TCP or UDP packets that enable a computer to connect to and communicate with a LAN. • dhcp: Reject DHCP packets. Dynamic Host Configuration Protocol automatically assigns IP addresses to clients when they log on. DHCP centralizes IP address management on central computers that run the DHCP server program. DHCP leases addresses, for a period of time, which means that past addresses are “recycled” and made available for future reassignment to other systems. • eapol: Reject EAPoL packets. EAP (Extensible Authentication Protocol, RFC 2486) over LAN. EAP is used with IEEE 802.1x to allow additional authentication methods (besides RADIUS) to be deployed with no changes to the access point or the wireless clients. • igmp: Reject IGMP packets. Internet Group Multicast Protocol is used when sending packets to a specific group of hosts. • none: Accept all packets.	H/H
switch pktfilter pppoeonly <*portlist*>	Sets the IES to allow only PPPoE traffic on the specified xDSL port(s). The system will drop any non-PPPoE packets.	H/H

59.1.1 Packet Filter Show Command Example

The following example displays the packet type filter settings for xDSL ports 1 and 2. “V” displays for the packet types that the IES is to accept on the port. “-” displays for packet types that the IES is to reject on the port (packet types that are not listed are accepted). When you use PPPoE only,”#” appears for all of the packet types. With PPPoE only, the IES rejects all packet types except for PPPoE (packet types that are not listed are also rejected).

```
ras> switch pktfilter show 9
V: pass through, -: filter out, #:Don't care
E: Enable, D: Disable
port pppoe ip arp netbios dhcp eapol igmp  | PPPoE-Only
   1   #   #   #     #     #     #    #    |    E
   2   -   V   V     -     V     V    V    |    D
```

59.1.2 Packet Filter Set Command Example

The following example sets xDSL port 9 to reject ARP, PPPoE and IGMP packets.

```
ras> switch pktfilter set 9 arp pppoe igmp
```

59.1.3 Packet Filter PPPoE Only Command Example

The following example sets xDSL port 1 to accept only PPPoE packets.

```
ras> switch pktfilter pppoeonly 1
```

60 Switch and Statistics Commands

This chapter describes the `switch` and `statistics` commands not discussed elsewhere in this guide.

60.1 IEEE 802.1x Commands

The following table describes the `dot1x` commands. Use these commands to configure port authentication on the IES.

Table 166 IEEE 802.1x Commands

<table>
<tr><th>COMMAND</th><th>DESCRIPTION</th><th>P</th></tr>
<tr><td>switch dot1x auth <profile|radius></td><td>Sets the authentication method to profile or radius.</td><td>H/H</td></tr>
<tr><td>switch dot1x disable</td><td>Turns IEEE 802.1x off.</td><td>H/H</td></tr>
<tr><td>switch dot1x enable</td><td>Turns IEEE 802.1x on.</td><td>H/H</td></tr>
<tr><td>switch dot1x port control <<i>portlist</i>> <auto|auth|unauth></td><td>Sets the port authentication status.</td><td>H/H</td></tr>
<tr><td>switch dot1x port disable <<i>portlist</i>></td><td>Turns IEEE 802.1x off on the specified port(s).</td><td>H/H</td></tr>
<tr><td>switch dot1x port enable <<i>portlist</i>></td><td>Turns on IEEE 802.1x on the specified port(s).</td><td>H/H</td></tr>
<tr><td>switch dot1x port period <<i>portlist</i>> <<i>period</i>></td><td>Set the reauthentication period of the specified port(s).</td><td>H/H</td></tr>
<tr><td>switch dot1x port reauth <<i>portlist</i>> <on|off></td><td>Turns reauthentication on or off on the specified port(s).</td><td>H/H</td></tr>
<tr><td>switch dot1x profile delete <<i>name</i>></td><td>Removes the specified account for profile mode.</td><td>H/H</td></tr>
<tr><td>switch dot1x profile set <<i>name</i>> <<i>password</i>></td><td>Sets the account and password for profile mode.</td><td>H/H</td></tr>
<tr><td>switch dot1x profile show</td><td>Displays the accounts for profile mode.</td><td>M/L</td></tr>
<tr><td>switch dot1x radius ip <<i>ip-address</i>></td><td>Sets the RADIUS server IP address.</td><td>H/H</td></tr>
</table>

Table 166 IEEE 802.1x Commands (continued)

COMMAND	DESCRIPTION	P
switch dot1x radius port <*port*>	Sets the RADIUS server port.	H/H
switch dot1x radius secret <*secret*>	Sets the RADIUS server secret.	H/H
switch dot1x radius show	Displays RADIUS server settings.	M/L
switch dot1x show [*portlist*]	Displays IEEE 802.1x settings.	M/L
statistics dot1x [*portlist*]	Displays the IEEE 802.1x information for the specified port(s).	M/L

60.2 DSCP Commands

The following table describes the dscp commands. Use these commands to configure the DiffServ Code Point settings of the IES’s ports.

Table 167 DSCP Commands

COMMAND	DESCRIPTION	P
switch dscp disable <portlist>	Disables DSCP mapping on the specified xDSL or Ethernet port(s).	M/H
switch dscp enable <*portlist*>	Enables DSCP mapping on the specified xDSL or Ethernet port(s).	M/H
switch dscp map set <*srccp*> <*mappri*>	Configures the DSCP-to-802.1p mapping table. *srccp*: source code point (0~63). For example, 1,3~5,10~15). *mappri*: mapping priority (0~7).	M/H
switch dscp map show	Displays the DSCP-to-802.1p mapping table.	L/L
switch dscp show [portlist]	Displays the DSCP setting for the specified port(s).	L/L

60.3 Ethernet Commands

The following table describes the enet commands. Use these commands to configure the settings of the IES’s Ethernet ports.

Table 168 Enet Commands

COMMAND	DESCRIPTION	P
switch enet disable <*portlist*>	Turns off the specified Ethernet port(s).	H/H
switch enet enable <*portlist*>	Turns on the specified Ethernet port(s).	H/H

Table 168 Enet Commands (continued)

COMMAND	DESCRIPTION	P
switch enet maxmtu set <*size*>	Sets the MTU (Maximum Transmission Unit) size for layer 2 frames. *size*: 1526 ~ 1532; the default value is 1526.	H/H
switch enet maxmtu show	Displays the current MTU size.	M/L
switch enet name <*portlist*> <*name*>	Sets the name of the specified Ethernet port(s).	H/H
switch enet reset <*portlist*>	Resets the Ethernet interface.	H/H
switch enet show	Displays the Ethernet port settings.	M/L
switch enet speed <*portlist*> <1000fiber|1000copper|100copper|auto>	Sets the connection speed of the specified Ethernet port(s).	H/H
statistics enet	Displays Ethernet port settings and statistics.	M/L

60.4 Queuemap Commands

The following table describes the queuemap commands. Use these commands to configure priority levels and physical queues on the IES.

Table 169 Queuemap Commands

COMMAND	DESCRIPTION	P
switch queuemap set <*priority*> <*queue level*>	Maps a priority level to a physical queue.	H/H
switch queuemap show	Displays the system’s priority level to physical queue mapping.	M/L

60.5 RSTP Commands

The following table describes the `rstp` commands. Use these commands to configure Rapid Spanning Tree Protocol on the IES.

Table 170 RSTP Commands

COMMAND	DESCRIPTION	P
switch rstp disable	Turns the IES’s RSTP off.	H/H
switch rstp enable	Turns the IES’s RSTP on.	H/H
switch rstp fwdelay <*seconds*>	Sets the IES’s RSTP forward delay time in seconds.	H/H
switch rstp hellotime <*seconds*>	Sets the IES’s RSTP hello time in seconds.	H/H

Table 170 RSTP Commands (continued)

COMMAND	DESCRIPTION	P
switch rstp maxage <*seconds*>	Sets the IES's RSTP max age in seconds.	H/H
switch rstp port disable <*portlist*>	Disables RSTP on the specified Ethernet port(s).	H/H
switch rstp port enable <*portlist*>	Enables RSTP on the specified Ethernet port(s).	H/H
switch rstp port pathcost <*portlist*> <*pathcost*>	Sets the RSTP pathcost of the specified Ethernet port(s).	H/H
switch rstp port priority <*portlist*> <*priority*>	Sets the RSTP priority of the specified Ethernet port(s).	H/H
switch rstp port show	Displays the RSTP status of the specified Ethernet port(s).	M/L
switch rstp priority <*priority*>	Sets the IES's RSTP priority.	H/H
switch rstp show	Display the system's rstp settings.	M/L
statistics rstp	Displays rstp information.	M/L

60.6 Static Multicast Commands

The following table describes the `smcast` commands. Use these commands to configure static multicasting on the IES.

Table 171 Static Multicast Commands

COMMAND	DESCRIPTION	P
switch smcast delete <*mac-address*>	Removes a static multicast filter entry by deleting the associated MAC address.	H/H
switch smcast set <*xdsl-port*> <*mac-address*> <join|leave>	Use join/leave to add/ remove multicast MAC addresses on specified ADSL ports, a range of ADSL ports or all ADSL ports.	H/H
switch smcast show	Displays all MAC addresses linked to ADSL ports.	M/L

60.7 RMON Command

Use this command to view details of remote monitoring on the IES's Ethernet ports.

Table 172 RMON Command

COMMAND	DESCRIPTION	P
statistics rmon Stats|history <*enet-port*>	Displays uplink/subtending link RMON information	M/L

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IP Commands

This chapter shows you how to use the IP commands to configure the IP (Internet Protocol) parameters.

61.1 General IP Commands

Use the IES's management IP addresses to manage it through the network.

The following table describes the values required for many `ip` commands. Other values are discussed with the corresponding commands.

Table 173 General IP Commands Input Values

LABEL	DESCRIPTION
ip-address	An IP address in dotted decimal notation. For example, 192.168.1.3.
mask-bits	The number of bits in an address's subnet mask. To find the bit number, convert the subnet mask to binary and add all of the 1's together. Take "255.255.255.0" for example. 255 converts to eight 1's in binary. There are three 255's, so add three eights together and you get the bit number (24).
dest-ip	The destination IP address of packets that this static route is to route.
gateway-ip	The IP address of the gateway that you want to send the packets through.
metric	The metric (hop count) of a static route.
name	A name to identify this static route. Up to 31 ASCII characters. Spaces and tabs are not allowed.

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

Table 174 General IP Commands

COMMAND	DESCRIPTION	P
ip set *<ip-address>* [*</mask-bits>*]	Changes the IP settings for the IES’s uplink, downlink and IES DSL ports. If you don’t enter the subnet mask, the system automatically computes one.	H/H
ip gateway *<ip-address>*	Changes the default gateway (next hop). This tells the IES where to send packets that have a destination IP address that is not on the same subnet as the IES’s IP address.	H/H
ip show	Displays the current management IP settings.	M/L
ip showall	Displays the current management IP settings, the IES’s routing table, and the IP Address Resolution Protocol (ARP) table.	M/L
ip ping *<ip-address>* [*count*] [voip]	Checks for network functionality by sending an echo request to another IP host and waiting for the reply. voip: use the VoIP interface.	M/L
ip route set *<dest-ip>*[*/mask-bits*] *<gateway-ip>* [*metric*] *<name>*	Defines a new, static IP forwarding route or edits an existing one.	H/H
ip route set default *<gateway-ip>* *<metric>* [voip]	Configures the default static IP forwarding route.	H/H
ip route delete *<dest-ip>*[*/mask-bits*]	Removes a static IP forwarding route.	H/H
ip route show	Displays the IES’s routing table.	M/L
ip route flush	Clears the routing table.	H/~
ip arp show	Displays the IES’s IP Address Resolution Protocol (ARP) table. This is the list of IP addresses and matching MAC addresses that the IES has resolved.	M/L
ip arp flush	Clears the IES’s IP Address Resolution Protocol table.	H/H
statistics ip	Shows the statistics for the CPU IP traffic.	M/~

61.1.1 IP Settings and Default Gateway Example

The following command sequence sets the IES to have 192.168.1.3 as the IP address, 255.255.255.0 for the subnet mask and 192.168.1.233 for the default gateway.

```
ras> ip set 192.168.1.3/24
ras> ip gateway 192.168.1.233
ras> config save
```

The IES leaves the factory with a default management IP address of 192.168.1.1 and a subnet mask of 255.255.255.0, (ff:ff:ff:00 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 a IES to the network, otherwise, you may interrupt services already running.

61.1.2 Route Show Command Example

This example displays the IES's routing table.

```
ras> ip route show
index dest               interface gateway         metric name
----- ------------------ --------- --------------- ------ ------------------
---
1     192.168.1.0/24     Ethernet  192.168.1.1          1
2     default voip       VoIP      192.168.2.254        1
3     192.168.2.0/24     VoIP      192.168.2.1          1
4     default management Ethernet  192.168.1.254        1
```

61.1.3 ARP Show Command Example

Here is an example of the IES's IP ARP table.

```
ras> ip arp show
ip              mac address
---------------  -----------------
192.168.2.254  00:0c:db:30:ac:00
192.168.15.254  00:0c:db:30:ac:00
```

61.2 Statistics IP Command Example

This example shows the statistics for the CPU IP traffic.

```
ras> statistics ip
[Ethernet]
inet     : 192.168.2.253      netmask: 0.0.0.0
broadcast: 192.168.255.255     mtu: 1500
in octet   :   10728504  in unicast :       738  in multicast    :     232488
in discard :          0  in error   :         0  in unknown proto:          0
out octet  :      41361  out unicast:       861  out multicast   :          0
out discard:          0  out error  :         0
```

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IP Bridge Commands

The IP bridge function is designed for large-scale, flat, access networks, and it is ideal when the network is based on Ethernet. When the IP bridge is enabled, the IES forwards frames based on the destination IP address, instead of the destination MAC address, and it replaces the source MAC address with its own MAC address.

You can follow these steps to set up a simple IP bridge.

1 Create a domain. (Each domain is an ISP.)

2 Create one or more VLANs in the domain. (For example, one VLAN is for high-speed Internet, and another VLAN is for VoIP.)

3 Specify one or more edge routers for the domain.

4 Create routing table entries, so the IES forwards frames to the appropriate edge router.

5 Create downlink interfaces, so the IES forwards frames to the appropriate subscribers.

6 Create PVCs for the subscribers.

62.1 IP Bridge Command Input Values

The following table describes the values required in IP bridge commands. Other values are discussed with the corresponding commands.

Table 175 IP Bridge Command Input Values

LABEL	DESCRIPTION
domain-name	The name of the domain. You can use 1-31 printable ASCII characters. Spaces are allowed, but you must use double quotation marks (") to enclose the name. (You must use a back slash (\) before double quotation marks in the name itself.)
vlan-id	The ID (<1~4094>) of the VLAN.

Table 175 IP Bridge Command Input Values (continued)

LABEL	DESCRIPTION
`join|leave`	Specifies whether you want to add the specified VLAN to (join) or remove the specified VLAN from (leave) the domain.
ip-address	IP address, in dotted decimal notation.
mask-bits	Number of bits <1~32> in the subnet mask.
nexthop	IP address, in dotted decimal notation.
metric	The metric <1~15> represents the “cost” of transmission for routing purposes. IP routing uses hop count as the measurement of cost, with a minimum of 1 for directly-connected networks. Select the number that approximates the cost for this link The number need not be precise, but it must be between 1 and 15. In practice, 2 or 3 is usually a good number. If two entries have the same metric, the IES uses the one with the lower IP address.
priority	The IEEE 802.1p priority value <0~7>.
port	The port number of the PVC.
vpi	The VPI of the PVC.
vci	The VCI of the PVC.
port-list	You can specify a single ADSL port <1>, all ADSL ports <*> or a list of ADSL ports <1,3,5>. You can also include a range of ports <1,5,6~10>.
DS vcprofile	Assign a VC profile to use for this channel’s downstream traffic shaping.
[,US vcprofile]	Assign a VC profile to use for policing this channel’s upstream traffic. The IES does not perform upstream traffic policing if you do not specify an upstream VC profile.
super|<*vlan-id*>	Enable the super channel option to allow a channel forward frames belonging to multiple VLAN groups (that are not assigned to other channels). The IES forwards frames belonging to VLAN groups that are not assigned to specific channels to the super channel. The super channel functions in the same way as the channel in a single channel environment. One port can have only one super channel. The default VID (1 to 4094). Each PVC must have a unique VID since the IES forwards traffic back to the subscribers based on the VLAN ID. You must assign a default VID (1 to 4094) and IEEE 802.1p default priority (0 to 7) to normal channels. Each PVC must have a unique VID (since the IES forwards traffic back to the subscribers based on the VLAN ID).
ipoa|ipoe	Specifies whether the PVC is running on Ethernet (ipoe) or on ATM (ipoa).

62.2 IP Bridge Domain Commands

Use these commands to set up and maintain domains in IP bridges.

A domain represents an ISP. Each domain is defined by (and dominates) the VLAN that are in it and has its own routing table and ARP table. As a result, two or more VLANs in different domains can use the same IP subnet, and one network can support multiple ISPs.

VLANs in IP bridges are exclusive. They can be in at most one domain. In addition, VLANs in IP bridges share the same VLAN space as regular VLANs, so VLANs in IP bridges must have different VLAN IDs than regular VLANs.

Table 176 IP Bridge Domain Commands

COMMAND	DESCRIPTION	P
`adsl ipbpvc domain set <domain-name>`	Creates the domain with the specified name.	H/H
`adsl ipbpvc domain show [<domain-name>]`	Displays the settings for the specified domain and the VLAN that are in the domain.	M/L
`adsl ipbpvc domain delete <domain-name>`	Deletes the specified domain. You have to remove the VLAN that are in the domain first.	H/H
`adsl ipbpvc domain dhcpvlan enable <domain-name> <vlan-id>`	This setting has no effect on DHCP packets that come from VLANs where the IES's DHCP relay settings are active. (See Chapter 54 on page 419. The DHCP relay settings take precedence over the IP bridge DHCP VLAN setting.) This command specifies the VLAN where the domain's DHCP server is located. The VLAN must already be in the domain. The IES forwards subscribers' DHCP packets to the selected VLAN and changes the source MAC address to the IES's MAC address. The IES still adds whatever Option 82 information is specified for the VLAN in the DHCP relay settings. (See Chapter 54 on page 419.)	H/H

Table 176 IP Bridge Domain Commands

COMMAND	DESCRIPTION	P
`adsl ipbpvc domain dhcpvlan disable <domain-name>`	This setting has no effect on DHCP packets that come from VLANs where the IES's DHCP relay settings are active. (See Chapter 54 on page 419. The DHCP relay settings take precedence over the IP bridge DHCP VLAN setting.) This command specifies that there is no DHCP server for the domain, in which case the IES does not change the source MAC address in DHCP packets. The IES still adds whatever Option 82 information is specified for the VLAN in the DHCP relay settings. (See Chapter 54 on page 419.)	H/H
`adsl ipbpvc domain vlan <domain-name> <vlan-id> join|leave`	This command adds the specified VLAN to (join) or removes the specified VLAN (leave) from the specified domain. VLANs in IP bridges share the same VLAN space as regular VLANs, so VLANs in IP bridges must have different VLAN IDs than regular VLANs. Use the regular VLAN commands to configure the VLAN (see Chapter 54 on page 429). You have to delete every IP bridge setting (including DHCP VLAN) that uses the selected VLAN before you can remove it from the domain.	H/H

62.2.1 IP Bridge Domain Show Command Example

An example is shown next.

```
ras> adsl ipbpvc domain show example1
Domain Name:example1
DHCP VLAN: 200
VLAN
----+----+----+----+----+----+----+----+
 200  210  220  240  502
```

The output values correspond to the input values of other IP bridge domain commands.

62.2.2 IP Bridge Domain DHCP VLAN Enable Command Example

In the following example, domain “example3” has its DHCP server in VLAN 401.

```
ras> adsl ipbpvc domain dhcpvlan enable example3 401
```

62.2.3 IP Bridge Domain VLAN Registration Command Example

In the following example, VLAN 402 is added to domain “example3”.

```
ras> adsl ipbpvc domain vlan example3 402 join
```

62.3 IP Bridge Edge Router Commands

Use these commands to set up and maintain edge routers in an IP bridge.

Edge routers are usually the gateways that are provided to the subscribers. They can also be gateways that are specified in static routing table entries. Each edge router, in addition to its IP address, has an associated VLAN ID. When the IES forwards a frame to an edge router, it uses this VLAN ID to replace whatever VLAN ID the subscriber specified.

Table 177 IP Bridge Edge Router Commands

COMMAND	DESCRIPTION	P
adsl ipbpvc edgerouter set <*ip-address*>/<*mask-bits*> <*vlan-id*>	This command creates an edge router with the specified IP address, subnet mask, and VID. The IES uses the VLAN ID when it forwards frames to the edge router. It also uses the VLAN ID to identify the domain the edge router is in.	H/H
adsl ipbpvc edgerouter show [<*vlan-id*>]	Displays the edge routers for the specified VLAN or for all VLAN.	M/L
adsl ipbpvc edgerouter delete <*ip-address*> <*vlan-id*>	Deletes the edge router with the specified IP address and VLAN ID.	H/H

62.3.1 IP Bridge Edge Router Set Command Example

The following example creates edge router 192.168.1.244 with subnet mask 255.255.255.0 and VID 401.

```
ras> adsl ipbpvc edgerouter set 192.168.1.244/24 401
```

62.3.2 IP Bridge Edge Router Show Command Example

This example displays the edge routers for VLAN 401.

```
ras> adsl ipbpvc edgerouter show 401
ip/netmask          vid
------------------ ----
192.168.1.244/24    401
```

The output values correspond to the input values of other IP bridge edge router commands.

62.3.3 IP Bridge Edge Router Delete Command Example

The following example deletes edge router 192.168.1.244 with VID 401.

```
ras> adsl ipbpvc edgerouter delete 192.168.1.244 401
```

62.4 IP Bridge Routing Table Commands

Use these commands to set up and maintain the routing table for each domain.

Each domain has its own routing table. Each routing table contains entries that, based on the destination IP address, control where the IES forwards packets (for upstream and downstream traffic). The IES automatically creates routing table entries for each downlink interface and for each edge router in the domain. You can create additional entries by specifying the edge router to which the IES should forward traffic for a particular destination IP address or IP subnet.

Table 178 IP Bridge Routing Table Commands

COMMAND	DESCRIPTION	P
`adsl ipbpvc route set` *<domain-name> <ip-address>/ <mask-bits> <nexthop> <metric>* [*<priority>*]	This command creates the specified entry in the routing table of the specified domain. The *<ip-address>/<mask-bits>* specifies the range of IP addresses to which this entry applies. If the destination IP address of a packet is in this range, the IES forwards the frame to the specified IP address <nexthop>. If <nexthop> corresponds to an edge router configured using the edge router commands (see Section 62.3 on page 475), the IES uses the associated VLAN ID. In addition, If the edge router is in the same domain as the entry, the entry is used for upstream traffic. If the edge router is in a different domain than the entry, the entry is used for downstream traffic. If <nexthop> is not set up in the edge router screen, the IES uses the entry for downstream traffic and does not change the VLAN ID. If the <priority> is not specified, the default value is zero. This is applied to incoming frames without a <priority> tag.	H/H
`adsl ipbpvc route show` [<domain name> | *<ip-address>/<mask-bits>* | *<domain-name> <ip-address>/ <mask-bits>*]	This command displays routing table entries created manually for the specified domain and/or range of IP addresses. It does not show entries added automatically by the IES.	M/L
`adsl ipbpvc route runtime` [*<domain-name>* | *<ip-address>/<mask-bits>* | *<domain-name> <ip-address>/ <mask-bits>*]	This command displays the (run-time) routing table(s) for the selected domain or range of IP addresses. This table includes all the entries, whether added automatically by the IES or provided manually.	M/L
`adsl ipbpvc route delete` *<domain-name> <ip-address>/ <mask-bits> <nexthop>*	This command deletes the specified entry from the routing table of the specified domain. You can only remove entries that were added manually.	H/H

62.4.1 IP Bridge Route Set Command Example

The following example creates an entry in the routing table for domain “example3”. This entry forwards traffic for IP addresses 192.168.4.0~192.168.4.255 to edge router 192.168.1.244.

```
ras> adsl ipbpvc route set example3 192.168.4.0/24 192.168.1.244 1
```

62.4.2 IP Bridge Route Show Command Example

Here is an example of manually created routing table entries.

```
ras> adsl ipbpvc route show example1
domain name          ip/netmask          gateway ip      metric pri
-------------------- ------------------- --------------- ------ ---
example1             0.0.0.0/0           192.168.1.250        1   0
example1             4.4.4.0/24          5.6.7.8              2   1
example1             7.7.7.0/24          192.168.1.253        1   0
example1             192.168.37.0/24      192.168.1.251        1   0
```

The output values correspond to the input values of other IP bridge routing table commands.

62.4.3 IP Bridge Route Runtime Command Example

This example displays the (run-time) routing table(s) for the “example2” domain.

```
ras> adsl ipbpvc route runtime example2
domain name          ip/netmask          gateway ip      metric pri type
-------------------- ------------------- --------------- ------ --- -----
example2             192.168.1.253/32    -                    -   -   U
example2             192.168.1.35/32     -                    -   -   D
example2             2.2.2.0/24          -                    -   -   D
example2             192.168.37.0/24      192.168.1.250        1   0   D
example2             192.168.2.0/24      192.168.1.249        1   0   D
example2             0.0.0.0/0           192.168.1.252        1   0   D
```

The type field indicates whether this entry is used for upstream traffic (**U**, or uplink interface) or downstream traffic (**D**, or downlink interface). By default, all entries are for downstream traffic, unless the **Edge Router IP** is configured in the edge router commands (see Section 62.3 on page 475).

The other output values correspond to the input values of other IP bridge routing table commands.

62.4.4 IP Bridge Route Delete Command Example

This example removes the entry for 172.32.37.0~172.32.37.255 for domain "example2".

```
ras> adsl ipbpvc route show example2
domain name          ip/netmask          gateway ip      metric pri
-------------------- ------------------- --------------- ------ ---
example2             0.0.0.0/0           192.168.1.252        1   0
example2             192.168.37.0/24      192.168.1.250        1   0
example2             192.168.2.0/24      192.168.1.249        1   0
ras> adsl ipbpvc route delete example2 192.168.37.0/24 192.168.1.250
ras> adsl ipbpvc route show example2
domain name          ip/netmask          gateway ip      metric pri
-------------------- ------------------- --------------- ------ ---
example2             0.0.0.0/0           192.168.1.252        1   0
example2             192.168.2.0/24      192.168.1.249        1   0
```

62.5 IP Bridge Downlink Interface Commands

Use these commands to set up and maintain forwarding information for downstream traffic.

Downlink interfaces provide forwarding information for downstream traffic. The IES learns some of this information by snooping DHCP packets. For static IP addresses, you should provide this information manually. In this case, specify the VLAN ID and, optionally, the PVC for a range of IP addresses. The IES uses the

VLAN ID to identify the domain the downlink interface is in. Downlink interfaces in the same domain cannot have overlapping IP addresses.

Table 179 IP Bridge Downlink Interface Commands

COMMAND	DESCRIPTION	P
adsl ipbpvc interface set *<ip-address>/<mask-bits> <vlan-id>* [*<port> <vpi> <vci>*]	Creates the specified downlink interface. The *<ip-address>/<mask-bits>* specifies the IP address and subnet mask of the VLAN or subscriber. If the destination IP address of a packet is in this range, the IES forwards the frame to the specified VLAN and PVC, if any. The IES uses the specified VLAN ID when it forwards frames to the VLAN or subscriber. It also uses the VLAN ID to identify the domain the downlink interface is in. Make sure you specify a valid IP bridge PVC. Do not specify PVCs that are not defined in the IPB PVC screen in Section 62.6 on page 482.	H/H
adsl ipbpvc interface show [*<ip-address>/<mask-bits>* | *<vlan-id>* | *<ip-address>/<mask-bits> <vlan-id>*]	This command displays downlink interfaces created manually. It does not show forwarding information learned by snooping DHCP packets.	M/L
adsl ipbpvc interface runtime [*<ip-address>/<mask-bits>* | *<vlan-id>* | *<ip-address>/<mask-bits> <vlan-id>*]	Displays the (run-time) downlink interfaces for the selected range of IP addresses and/or VLAN. This table includes all the forwarding information for downstream traffic, whether learned by snooping DHCP packets or provided manually.	M/L
adsl ipbpvc interface delete *<ip-address>/<mask-bits> <vlan-id>*	Deletes the specified downlink interface. You can only remove downlink interfaces that were added manually.	H/H

62.5.1 IP Bridge Downlink Interface Set Command Example

The following example creates a downlink interface that forwards frames for IP addresses 192.168.3.0~192.168.3.255 to VLAN 402.

```
ras> adsl ipbpvc interface set 192.168.3.0/24 402
```

62.5.2 IP Bridge Downlink Interface Show Command Example

This example displays the downlink interfaces created manually.

```
ras> adsl ipbpvc interface show 200
ip/netmask          vid port vpi   vci
------------------ ---- ---- --- -----
1.2.3.0/24          200   20 200   200
3.3.3.3/32          200    1   6     6
192.168.1.33/32     200    -   -     -
192.168.1.64/28     200    2   0    35
```

The output values correspond to the input values of other IP bridge downlink interface commands.

62.5.3 IP Bridge Downlink Interface Runtime Command Example

This example displays the (run-time) downlink interfaces for VID 210.

```
ras> adsl ipbpvc interface runtime 210
ip/netmask          vid port vpi   vci type
------------------ ---- ---- --- ----- ----
192.168.1.34/32     210    1  31    64 ipoa
192.168.1.37/32     210    1  20    53 ipoe
```

The type field specifies whether the downlink interface is running on Ethernet (**IPoE**) or on ATM (**IPoA**). The other output values correspond to the input values of other IP bridge downlink interface commands.

62.5.4 IP Bridge Downlink Interface Delete Command Example

This example removes the downlink interface for 192.168.1.33 in VLAN 200.

```
ras> adsl ipbpvc interface show 200
ip/netmask          vid port vpi   vci
------------------ ---- ---- --- -----
1.2.3.0/24          200   20 200   200
3.3.3.3/32          200    1   6     6
192.168.1.33/32     200    -   -     -
192.168.1.64/28     200    2   0    35
ras> adsl ipbpvc interface delete 192.168.1.33/32 200
ras> adsl ipbpvc interface show 200
ip/netmask          vid port vpi   vci
------------------ ---- ---- --- -----
1.2.3.0/24          200   20 200   200
3.3.3.3/32          200    1   6     6
192.168.1.64/28     200    2   0    35
```

62.6 IP Bridge PVC Commands

Use these commands to set up and maintain PVCs for subscribers in an IP bridge.

IP bridge PVCs are similar to regular PVCs and are endpoints of the IP bridge. In addition, IP bridge PVCs are one of two types, IP over Ethernet or IP over ATM, depending on the underlying network.

The PVID is used to identify the domain the PVC is in, so the PVID must be in a domain.

Table 180 IP Bridge PVC Commands

COMMAND	DESCRIPTION	P
`adsl ipbpvc show [<port-list> [<vpi> <vci>]]`	Displays the PVCs for subscribers in an IP bridge.	M/L
`adsl ipbpvc set <port-list> <vpi> <vci> <DS vcprofile[,US vcprofile]> super|<vlan-id> <priority> ipoa|ipoe`	Allows the configuration of a PVC (permanent virtual circuit) for one or a range of ADSL ports in an IP bridge.	H/H
`adsl ipbpvc delete <port-list> <vpi> <vci>`	Deletes the specified PVC channel in an IP bridge.	H/H

62.6.1 IP Bridge PVC Show Command Example

This example displays the PVCs for subscribers in an IP bridge.

Figure 185 IP Bridge PVC Show Command Example

```
ras> adsl ipbpvc show
port vpi   vci  pvid pri Type  DS/US vcprofile
---- --- ----- ----- --- ----- --------------------------------
   1  30    63   200   0 ipoe  DEFVAL/-
   1  31    64   210   0 ipoa  DEFVAL/-
   2  10    43   200   0 ipoe  DEFVAL/-
  20 200   200   230   1 ipoe  DEFVAL/-
  48   8    35     2   0 ipoe  DEFVAL/-
```

The output values correspond to the input values of other IP bridge PVC commands.

62.6.2 IP Bridge PVC Set Command Example

The following example sets a PVC on ADSL port 10 with VPI 40, VCI 73, default VID 402 priority 2. It sets the DEFVAL profile for downstream traffic shaping and runs on Ethernet.

```
ras> adsl ipbpvc show
port vpi   vci  pvid pri Type  DS/US vcprofile
---- --- ----- ----- --- ----- --------------------------------
   1  30    63   200   0 ipoe  DEFVAL/-
   1  31    64   210   0 ipoa  DEFVAL/-
   2  10    43   200   0 ipoe  DEFVAL/-
  20 200   200   230   1 ipoe  DEFVAL/-
  48   8    35     2   0 ipoe  DEFVAL/-
ras> adsl ipbpvc set 10 40 73 DEFVAL 402 2 ipoe
ras> adsl ipbpvc show
port vpi   vci  pvid pri Type  DS/US vcprofile
---- --- ----- ----- --- ----- --------------------------------
   1  30    63   200   0 ipoe  DEFVAL/-
   1  31    64   210   0 ipoa  DEFVAL/-
   2  10    43   200   0 ipoe  DEFVAL/-
  10  40    73   402   2 ipoe  DEFVAL/-
  20 200   200   230   1 ipoe  DEFVAL/-
  48   8    35     2   0 ipoe  DEFVAL/-
```

62.6.3 IP Bridge PVC Delete Command Example

The following example deletes the IP bridge PVC on ADSL port 10 with VPI 40, VCI 73.

```
ras> adsl ipbpvc show
port vpi   vci  pvid pri Type  DS/US vcprofile
---- --- ----- ----- --- ----- --------------------------------
   1  30    63   200   0 ipoe  DEFVAL/-
   1  31    64   210   0 ipoa  DEFVAL/-
   2  10    43   200   0 ipoe  DEFVAL/-
  10  40    73   402   2 ipoe  DEFVAL/-
  20 200   200   230   1 ipoe  DEFVAL/-
  48   8    35     2   0 ipoe  DEFVAL/-
ras> adsl ipbpvc delete 10 40 73
ras> adsl ipbpvc show
port vpi   vci  pvid pri Type  DS/US vcprofile
---- --- ----- ----- --- ----- --------------------------------
   1  30    63   200   0 ipoe  DEFVAL/-
   1  31    64   210   0 ipoa  DEFVAL/-
   2  10    43   200   0 ipoe  DEFVAL/-
  20 200   200   230   1 ipoe  DEFVAL/-
  48   8    35     2   0 ipoe  DEFVAL/-
```

62.7 IP Bridge ARP Proxy Commands

Use these commands to look at and flush the Address Resolution Protocol (ARP) table for each domain. You can also configure how long the IES keeps entries in the ARP table.

The IES is an ARP proxy for edge routers and subscribers in an IP bridge. You can configure basic settings for this, and you can look at (and flush, in some cases) the (PVC, MAC, IP, VLAN ID) information the IES has learned using DHCP snooping and ARP.

Table 181 IP Bridge ARP Commands

COMMAND	DESCRIPTION	P
`adsl ipbpvc arpproxy agingtime set <seconds>`	Configures how long the device stores the IP addresses of CPE devices in IP bridges in the Address Resolution Protocol (ARP) table.	H/H
`adsl ipbpvc arpproxy agingtime show`	Displays how long the device stores the IP addresses of IP bridge devices in the Address Resolution Protocol table.	M/L
`adsl ipbpvc arpproxy show [domain <domain-name> [edgerouter <ip-address> <vlan-id>|interface <ip-address>/<mask-bits> <vlan-id>]]`	Displays the specified ARP table entries.	M/L
`adsl ipbpvc arpproxy flush <all|edgerouter> [<ip-address> <vlan-id>] |interface [<ip-address>/<mask-bits> <vlan-id>]`	Clears the specified entries in the ARP table(s).	H/H

62.7.1 IP Bridge ARP Proxy Agingtime Show Command Example

This example displays how long the IES stores the IP addresses of IP bridge devices in the ARP table.

```
ras> adsl ipbpvc arpproxy agingtime show
ipbpvc aging time (sec): 300
```

62.7.2 IP Bridge ARP Proxy Show Command Example

This example displays the ARP table entries.

```
ras> adsl ipbpvc arpproxy show
Domain Name: d01
ip              mac               port vpi   vci interface          vid type
--------------- ----------------- ---- --- ----- ----------------- ---- ---
192.168.2.2     00:05:5d:03:99:3a   22   0    33 192.168.2.0/24       3   D
192.168.2.254   00:13:49:95:03:07   50   -     - 192.168.2.254        2   U
*: the ARP is learned from DHCP and can't be flushed.
```

The following table describes the labels in this screen.

Table 182 IPB ARP Proxy Show Command Output

LABEL	DESCRIPTION
Domain Name	This field displays the name of the domain which has this ARP table.
ip	This field displays the IP address assigned to the specific device.
mac	This field displays the MAC (Media Access Control) address of the device.
port	This field displays the port number to which the device is connected.
vpi/vci	This field displays the Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI) the device is using. The VPI and VCI identify a channel on this port.
interface	This field displays the name of the interface the device is using.
vid	This field displays the VLAN ID the device is using.
type	This field indicates whether this entry is used for upstream traffic (**U**, or uplink interface) or downstream traffic (**D**, or downlink interface). By default, all entries are for downstream traffic, unless the edge router is configured using the edge router commands (see Section 62.3 on page 475).

63

SNMP Commands

This chapter covers commands for configuring the IES's Simple Network Management Protocol (SNMP) settings.

63.1 SNMP Commands

The following table describes common required values in SNMP commands. Other values are discussed with the corresponding commands.

Table 183 SNMP Commands Input Values

LABEL	DESCRIPTION
community	A password.

The following is a list of the SNMP commands.

Table 184 SNMP Commands

COMMAND	DESCRIPTION	P
`sys snmp getcommunity <community>`	Sets the password for the incoming Get- and GetNext- requests from the management station.	H/H
`sys snmp setcommunity <community>`	Sets the password for the incoming Set- requests from the management station.	H/H
`sys snmp trusthost <ip-address>`	Specifies the IP address a trusted host. If you enter a specific IP address, the IES will only respond to SNMP messages from this address. You can use the `sys client set` command to specify additional IP addresses, if necessary. See Table 137 on page 405 for more information about this command. If you specify 0.0.0.0, the IES responds to all SNMP messages it receives, regardless of the settings for the `sys client set` command.	H/H
`sys snmp trapcommunity <community>`	Sets the password sent with each trap to the SNMP manager.	H/H

Table 184 SNMP Commands

COMMAND	DESCRIPTION	P
`sys snmp trapdst set <index> <ip-address> [<port>]`	Specifies the IP address (and port number) of a trap server to which the IES sends SNMP traps. If you leave the trap destination set to 0.0.0.0 (default), the IES will not send any SNMP traps. *index*: The number of the trap server (1~4). *port*: The port number upon which the trap server listens for SNMP traps. The IES uses the default of 162 if you do not specify a trap port.	H/H
`sys snmp trapdst del <index>`	Removes the specified SNMP trap server setting.	H/H
`sys snmp show`	Displays the current SNMP get community, set community, trap community, trusted hosts and trap destination settings.	M/L

64

ADSL Commands

This chapter describes some of the ADSL commands that allow you to configure and monitor the ADSL ports.

64.1 ADSL Command Input Values

The following table describes the values required in ADSL commands. Other values are discussed with the corresponding commands.

Table 185 ADSL Command Input Values

LABEL	DESCRIPTION
down-downshift-margin	The downstream down shift noise margin (0~31 dB).
down-max-margin	The maximum acceptable ADSL downstream signal/noise margin (0~31db).
down-max-rate	The maximum ADSL downstream transmission rate (32~25000 Kbps).
down-min-margin	The minimum acceptable ADSL downstream signal/noise margin (0~31db).
down-min-rate	The minimum ADSL downstream transmission rate (32~25000 Kbps).
down-target-margin	The target ADSL downstream signal/noise margin (0~31db).
fast|interleave[=<*up-delay*>,<*down-delay*>]	The latency mode. With interleave, you must also define the upstream and downstream delay (1~255 ms). It is recommended that you configure the same delay for both upstream and downstream.
max-nominal-psd	Maximum nominal transmit PSD (Power Spectral Density) measured in 0.1dBm/Hz.
mx	The downstream carrier tones to be masked (disabled). Each <mx> can use up to 8 hexadecimal digits (00000000~ffffffff). Each <mx> represents 32 carrier tones (each hexadecimal digit represents 4 tones). The hexadecimal digit is converted to binary and a '1' disables the corresponding tone. Disabling a carrier tone turns it off so the system does not send data on it.

Table 185 ADSL Command Input Values

LABEL	DESCRIPTION
portlist	You can specify a single ADSL port <1>, all ADSL ports <*> or a list of ADSL ports <1,3,5>. You can also include a range of ports <1,5,6~10>.
profile	A descriptive name for the profile that will define the settings of this port.
up-downshift-margin	The upstream down shift noise margin (0~31 dB).
up-max-rate	The maximum ADSL upstream transmission rate (32~3000 Kbps).
up-min-margin	The minimum acceptable ADSL upstream signal/noise margin (0~31db). *up-max-margin*: The maximum acceptable ADSL upstream signal/noise margin (0~31db).
up-min-rate	The minimum ADSL upstream transmission rate (32~3000 Kbps).
up-target-margin	The target ADSL upstream signal/noise margin (0~31db).
up-upshift-margin	The upstream up shift noise margin (0~31 dB).
vlanlist	You can specify a single VLAN <1>, all VLANs <*> or a list of VLANs <1,3,5>. You can also include a range of VLANs <1,5,6~10>.

64.2 ADSL Commands

Use these commands to configure the ADSL ports. See Chapter 16 on page 131 for background information on ADSL..

Table 186 ADSL Commands

COMMAND	DESCRIPTION	P
adsl show <*portlist*>	Shows the activation status, ADSL mode, maximum upstream and downstream rate settings, profile and name of each ADSL port.	L/L
adsl enable <*portlist*>	Enables the specified ADSL port(s).	M/H
adsl disable <*portlist*>	Disables the specified ADSL port(s).	M/H
adsl name <*portlist*><*name*>	Sets the name of an ADSL port(s). *name*: A descriptive name for the port. You can use up to 31 printable ASCII characters (including spaces and hyphens).	M/H
adsl reset <*portlist*>	Resets the specified xDSL ports to their defaults.	H/H

Table 186 ADSL Commands (continued)

COMMAND	DESCRIPTION	P
adsl tel <*portlist*><*tel*>	Records the telephone number of an ADSL subscriber telephone number. *tel*: An ADSL subscriber's telephone number. You can use up to 15 ASCII characters (including spaces and hyphens).	M/H
adsl loopback <*portlist*><f5><*vpi*><*vci*>	Performs an OAMF5 loopback test on the specified ADSL port(s). f5: Use f5 to perform an OAMF5 loopback test on the specified DSL port. An Operational, Administration and Maintenance Function 5 test is used to test the connection between two DSL devices. First, the DSL devices establish a virtual circuit. Then the local device sends an ATM F5 cell to be returned by the remote DSL device (both DSL devices must support ATM F5 in order to use this test). *vpi*, *vci*: The Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI) identify a channel on this port. Possible values for the VPI are 0~255. Possible values for the VCI are 32~65535 if the VPI is 0. If the VPI is not 0, possible values for the VCI are 1~65535.	H/H
adsl usnompsd <*port*>[<*max-nominal-psd*>]	Displays or sets the upstream maximum nominal transmit PSD (Power Spectral Density). *max-nominal-psd*: -400 ~ 40 (unit of measure is 0.1dBm/Hz)	H/H
adsl dsnompsd <*port*>[<*max-nominal-psd*>]	Displays or sets the downstream maximum nominal transmit PSD (Power Spectral Density).	H/H
adsl uscarrier <*port*>[<*m0*><*m1*>]	Displays or sets masks for upstream carrier tones from 0 to 63. Masking a carrier tone disables the use of that tone on the specified ADSL port. Use this command to have the system not use an ADSL line's tones that are known to have a high noise level. The most significant bit defines the lowest tone number in a mask. The hexadecimal digit is converted to binary and a '1' masks (disables) the corresponding tone. Disabling a carrier tone turns it off so the system does not send data on it. The most significant bit defines the first tone sequentially. For example, in <m0>, 0x00000001 means tone 31. For example, you could use 0xffff0000 for <m0> to disable upstream carrier tones 0~15 and leave tones 16 ~ 31 enabled. *m0*:tones 0~31 *m1*:tones 32~63	H/H

Table 186 ADSL Commands (continued)

COMMAND	DESCRIPTION	P
`adsl dscarrier0 <port>[<m1> <m2><m3><m4><m5><m6><m7>]`	Displays or sets masks for downstream carrier tones from 33 to 255. Masking a carrier tone disables the use of that tone on the specified ADSL port. The most significant bit defines the lowest tone number in a mask. *m1*:tones 32~63 *m2*:tones 64~95 *m3*:tones 96~127 *m4*:tones 128~159 *m5*:tones 160~191 *m6*:tones 192~223 *m7*:tones 224~255	H/H
`adsl dscarrier1 <port>[<m0><m1> <m2><m3><m4><m5><m6><m7>`	Displays or sets masks for downstream carrier tones from 256 to 511 on the specified ADSL2+ port(s). Use this command to have the system not use an ADSL line's tones that are known to have a high noise level. *m0*: tones 256~287 *m1*:tones 288~319 *m2*:tones 320~351 *m3*:tones 352~383 *m4*:tones 384~415 *m5*:tones 416~447 *m6*:tones 448~479 *m7*:tones 480~511	H/H
`adsl pmm enable <portlist> <L2|L3>`	Enables Power ManageMent (PMM) to reduce the amount of power used overall and reduce the instances of the connection going down. PMM increases or decreases the transmission power based on line conditions. PMM also reduces the number of service interruptions. L2: Low Power. Sets the power management feature to scale back line usage to the minimum level sufficient to maintain an active connection when there is low level of traffic. L3: Idle. Sets the power management feature to reduce the power consumption when there is no traffic. Ports may be disabled or go into monitor mode in this state.The power level comes back up when there is traffic.	H/H

Table 186 ADSL Commands (continued)

COMMAND	DESCRIPTION	P
adsl pmm set *<portlist>* <L0|L2>	Sets the power management mode. L0: Turns off power management on a port. L2: Low Power. Sets the power management feature to scale back line usage to the minimum level sufficient to maintain an active connection when there is low level of traffic.	H/H
adsl pmm param *<portlist>*[*<l0time><l2time><l2atpr><l2atprt>*][*<max-l2rate><min-l2rate><l0tol2-rate>*]	Displays or sets PMM parameters for the specified ADSL port(s). *l0time*: Set the minimum time in seconds (10~65535) that the ADSL line must stay in L0 power mode before changing to the L2 power mode. *l2time*: Set minimum time in seconds (10~65535) that the ADSL line must stay in the L2 power mode before reducing the power again in the L2 power mode. *l2atpr*: Set the maximum Aggregate Transmit Power Reduction (ATPR) in decibels (dB) that is permitted in a L2 power reduction. The system can gradually decrease the ADSL line transmission power while it is in the L2 power mode. This is the largest individual power reduction allowed in the L2 power mode. The range is 0~15(dB). *max-l2rate*: Set the maximum transfer rate (in Kilobits per second) that is permitted while the port is in the L2 power mode. The supported range is 32~4096 Kbps in 4 Kbps increments. If you enter a number that is not a multiple of 4, the system uses the next lower multiple of 4. If you enter 39 for example, the system will use 36. *min-l2rate*: Set the minimum transfer rate (in Kilobits per second) that is permitted while the port is in the L2 power mode. The supported range is 32~4096 Kbps in 4 Kbps increments. If you enter a number that is not a multiple of 4, the system uses the next lower multiple of 4. If you enter 39 for example, the system will use 36. *l0tol2-rate*: Set the down stream transfer rate (in Kilobits per second) that serves as the threshold for whether the port is to use the L0 or the L2 power mode. The system changes from L0 mode to L2 mode when the downstream transfer rate stays below this threshold for L0 Time. The system changes back from L2 mode to L0 mode when the downstream transfer rate goes above this threshold. This rate must be less than or equal to one half of the Min L2 Rate and at least 16 Kbps.	H/H
adsl pmm show *<portlist>*	Displays the PMM settings for the specified port(s).	M/L
adsl pmm disable *<portlist>*	Turns off PMM on the specified port(s).	H/H

Table 186 ADSL Commands (continued)

COMMAND	DESCRIPTION	P
adsl inp *<portlist>*[*<usinp>*[,*<dsinp>*]]	Sets the upstream (us) and downstream (ds) impulse noise protection minimum setting on the specified ADSL port(s). Sudden spikes in the line's noise level (impulse noise) can cause errors and result in lost packets. Set the impulse noise protection minimum to have a buffer to protect the ADSL physical layer connection against impulse noise. This buffering causes a delay that reduces transfer speeds. It is recommended that you use a non-zero setting for real time traffic that has no error correction (like videoconferencing). *usinp*: Sets the minimum upstream (us) impulse noise protection setting. Use 0~3 to define a number of DMT symbols. 0 = 0 DMT symbols, 1 = 0.5 DMT symbols, 2 = 1 DMT symbols, 3 = 2 DMT symbols. *dsinp:* Sets the minimum downstream (ds) impulse noise protection setting. Use 0~3 to define a number of DMT symbols. 0 = 0 DMT symbols, 1 = 0.5 DMT symbols, 2 = 1 DMT symbols, 3 = 2 DMT symbols.	H/H
adsl annexm show *<portlist>*	Displays the Annex M feature setting for the specified port(s).	M/L
adsl annexm enable *<portlist>*	This command turns on the Annex M double upstream feature on the specified ADSL2/2+ port(s). This has the upstream connection use tones 6 to 63.	H/H
adsl annexm disable *<portlist>*	This command turns off the Annex M double upstream feature on the specified ADSL2/2+ port(s).	H/H
adsl queuemap set *<priority>* *<queue-level>*	IEEE 802.1p defines up to 8 separate traffic types by inserting a tag into a MAC-layer frame that contains bits to define class of service. Frames without an explicit priority tag are given the default priority of the ingress port. Use this command to configure the priority level-to-physical queue mapping. *queue-level*: The device has 4 physical queues that you can map to the 8 priority levels for outgoing Ethernet traffic. The device has 8 physical queues that you can map to the 8 priority levels for outgoing DSL traffic. Traffic assigned to higher index queues gets through the device faster while traffic in lower index queues is dropped if the network is congested.	H/H
adsl queuemap show	Displays the xDSL priority level to physical queue mapping.	M/L
adsl dsbcast enable *<portlist>* *<vlanlist>*	Enables downstream broadcast packets sent to specified VLANs on specified ports.	M/H
adsl dsbcast show *<portlist>*	Shows downstream broadcast settings on specified xDSL port(s).	L/L
adsl dsbcast disable *<portlist>* *<vlanlist>*	Disables downstream broadcast packets sent to specified VLANs on specified ports.	M/H
adsl sra enable *<portlist>*	Turns on Seamless Rate Adaptation (SRA) ADSL2+ on the specified port(s).	H/H

Table 186 ADSL Commands (continued)

COMMAND	DESCRIPTION	P
adsl sra show <*portlist*>	Displays the SRA ADSL2+ setting for the specified port(s).	M/L
adsl sra disable <*portlist*>	Turns off SRA ADSL2+ on the specified port(s)	H/H
adsl ipbpvc arpproxy agingtime set <*sec*>	Sets the valid time interval of a learned MAC address (10~10000 seconds).	H/H
adsl ipbpvc arpproxy agingtime show	Display the current time interval of a learned MAC address.	M/L
adsl ipbpvc arpproxy flush all | edgerouter [<*ip*><*vid*>]|*interface* [<*ip*>/<*mask*><*vid*>]	Flush the learned MAC addresses manually.	H/H
adsl ipbpvc arpproxy show [domain <domain> [edgerouter [<*ip*><*vid*>]]|[interface[<*ip*>/<*mask*><*vid*>]]]	Displays learnt MAC table for a domain Displays learnt MAC table for all/an edge router in a domain Displays learnt MAC table for all/an interface in a domain.	M/L
adsl ipbpvc delete <*portlist*> <*vpi*><*vci*>	Remove IP aware Bridge PVC.	H/H
adsl ipbpvc domain delete <*domain-name*>	Delete a domain, have to delete all VLANs belonging to this domain first.	H/H
adsl ipbpvc domain dhcpvlan disable <*domain-name*>	Disable DHCP VLAN in a domain.	H/H
adsl ipbpvc domain dhcpvlan enable <*domain-name*> <*vid*>	Enable DHCP VLAN in a domain.	H/H
adsl ipbpvc domain set <*domain-name*>	Create domain, maximum 8 domains in the system.	H/H
adsl ipbpvc domain show [<*domain-name*>]	Display domain setting.	M/L
adsl ipbpvc domain vlan <*domain-name*><*vid*><*registration*>	Set vlan to join or leave specified domain, maximum 8 VLANs in one domain.	H/H
adsl ipbpvc edgerouter delete <*ip*><*vid*>	Delete specified edge router setting.	H/H
adsl ipbpvc edgerouter set <*ip*>/<*mask*><*vid*>	Sets the edge router.	H/H
adsl ipbpvc edgerouter show [<*vid*>]	Displays the edge router setting.	M/L
adsl ipbpvc interface delete <*ip*>/<*mask*><*vid*>	Delete an IP interface.	H/H
adsl ipbpvc interface runtime [<*ip*>/<*mask*>|<*vid*>|<*ip*>/<*mask*><*vid*>]	Display runtime interfaces by optional <ip>/<mask> and vlan id parameter.	M/L
adsl ipbpvc interface set <*ip*>/<*mask*><*vid*>[<*port*><*vpi*><*vci*>]	Sets the interface.	H/H
adsl ipbpvc interface show [<*ip*>/<*mask*>|<*vid*>|<*ip*>/<*mask*><*vid*>]	Displays the interface setting by optional <ip>/<mask> and vlan id parameter.	M/L

Table 186 ADSL Commands (continued)

COMMAND	DESCRIPTION	P
adsl ipbpvc route delete *<domain-name><ip>/<mask> <nexthop>*	Deletes route entry from specified domain. *nexthop*:	H/H
adsl ipbpvc route runtime [*<domain-name>*|*<ip>/<mask>*|*<domain><ip>/<mask>*]	Displays the runtime route information.	M/L
adsl ipbpvc route set *<domain-name><ip>/<mask><nexthop> <metric>* [*<priority>*]	Sets a new route to specified edgerouter for a given domain. Maximum 16 routes in a domain. *metric:* *priority:*	H/H
adsl ipbpvc route show [*<domain-name>*|*<ip>/<mask>*|*<domain><ip>/<mask>*]	Displays current routing table for specific domain.	M/L
adsl ipbpvc set *<portlist><vpi> <vci><ds-vcprofile*[*,us-vcprofile*]*> <pvid> <priority> <ipab_type>*	Sets IP aware Bridge PVC. *pvid*: *ipab_type*:	H/H
adsl ipbpvc show [*<portlist>* [*<vpi><vci>*]]	Displays IP aware Bridge PVC setting.	M/L

64.2.1 ADSL Show Command Example

The following example displays information on ADSL port 5.

Figure 186 ADSL Show Command Example

```
ras> adsl show 5
port enable mode     up/downstream profile          name
---- ------ -------- ------------- ---------------- ----------------
   5   -    auto        512/  2048 DEFVAL           -
```

64.2.2 ADSL Name Command Example

The following example sets ADSL port 5 to have the name super.

Figure 187 ADSL Name Command Example

```
ras> adsl name 5 super
```

64.2.3 ADSL Tel Command Example

The following example records the telephone number 12345678 for ADSL port 5.

Figure 188 ADSL Tel Command Example

```
ras> adsl tel 5 12345678
```

64.2.4 ADSL Loopback Command Example

The following example has the IES perform an OAMF5 loopback test on ADSL port 1’s PVC at VPI 0 and VCI 33.

Figure 189 ADSL Loopback Command Example

```
ras> adsl loopback 1 f5 0 33
port[1] OAM F5 loopback test: failed
```

64.2.5 ADSL Upstream PSD Command Example

The following example sets the upstream maximum nominal transmit PSD for port 7 to -10 dBm/Hz.

Figure 190 ADSL Upstream PSD Command Example

```
ras> adsl usnompsd 7 -100
```

64.2.6 ADSL Downstream PSD Command Example

The following example sets the downstream maximum nominal transmit PSD for port 7 to -10 dBm/Hz.

Figure 191 ADSL Downstream PSD Command Example

```
ras> adsl dsnompsd 7 -10
```

64.2.7 ADSL Upstream Carrier Command Example

The following example disables upstream carrier tones 0~15 for ADSL port 5.

Figure 192 ADSL Upstream Carrier Command Example

```
ras> adsl uscarrier 5 ffff0000 00000000
```

The following example displays the results.

Figure 193 ADSL Upstream Carrier Command Display Example

```
ras> adsl uscarrier 5

          us carrier
port      m0       m1
----  |--------|--------|
   5   FFFF0000 00000000
Tone:
m0:0-31, m1:32-63
```

64.2.8 ADSL Downstream Carrier0 Command Example

The following example disables downstream carrier tone 71 for ADSL port 5.

Figure 194 ADSL Downstream Carrier0 Command Example 1

```
ras> adsl dscarrier0 5 0 01000000 0 0 0 0 0
```

The following example displays the results.

Figure 195 ADSL Downstream Carrier0 Command Display Example

```
ras> adsl dscarrier0 5
                                 ds carrier
port      m1       m2       m3       m4       m5       m6       m7
----  |--------|--------|--------|--------|--------|--------|--------|
   5   00000000 01000000 00000000 00000000 00000000 00000000 00000000
Tone:
m1:32-63, m2:64-95, m3:96-127, m4:128-159
m5:160-191, m6:192-223, m7:224-255
```

This example disables downstream carrier tones 70 and 71 for ADSL port 5.

Figure 196 ADSL Downstream Carrier0 Command Example 2

```
ras> adsl dscarrier0 5 0 03000000 0 0 0 0 0
```

64.2.9 ADSL Downstream Carrier1 Command Example

The following example disables downstream carrier tone 307 for ADSL2+ port 5.

Figure 197 ADSL Downstream Carrier1 Command Example 1

```
ras> adsl dscarrier1 5 0 00001000 0 0 0 0 0 0
```

The following example disables downstream carrier tones 304 to 307 for ADSL2+ port 5.

Figure 198 ADSL Downstream Carrier1 Command Example 2

```
ras> adsl dscarrier1 5 0 0000f000 0 0 0 0 0 0
```

The following example displays the results.

Figure 199 ADSL Downstream Carrier1 Command Display Example

```
ras> adsl dscarrier1 5
                                 ds carrier
port      m0       m1       m2       m3       m4       m5       m6       m7
----  |--------|--------|--------|--------|--------|--------|--------|-----
---|
   5   00000000 000F0000 00000000 00000000 00000000 00000000 00000000
00000000
Tone:
m0:256-287, m1:288-319, m2:320-351, m3:352-383
m4:384-415, m5:416-447, m6:448-479, m7:480-511
```

64.2.10 PMM Parameters Command Example

The following example sets ADSL port 5 to use the following PMM settings.

- Stay in the L0 power mode for 180 seconds before a change to the L2 power mode is permitted.
- Once in L2 power mode, wait for 90 seconds before further reducing the transmission power.
- Each L2 power mode power reduction can only be 2 dB or less.
- The total power reduction allowed in the L2 power mode is 15 dB.

Figure 200 PMM Parameters Command Example

```
ras> adsl pmm param 5 180 90 2 15
```

64.2.11 Impulse Noise Protection Command Example

The following example sets the impulse noise protection minimum to 1 DMT symbols for upstream and 0.5 DMT symbols for downstream for ADSL port 5.

Figure 201 Impulse Noise Protection Command Example

```
ras> adsl inp 5 2 1
```

64.3 ADSL Profile Commands

Table 187 ADSL Profile Commands

COMMAND	DESCRIPTION	P
adsl profile show [*profile*]	Displays the specified ADSL profile or all ADSL profiles if you do not specify one.	L/L
adsl profile set <*profile*> <fast|interleave[=<*up-delay*>,<*down-delay*>]><*up-max-rate*><*down-max-rate*>[<*up-target-margin*><*up-min-margin*><*up-max-margin*><*up-min-rate*><*down-target-margin*><*down-min-margin*><*down-max-margin*><*down-min-rate*><*up-downshift-margin*><*up-up-shift-margin*><*down-downshift-margin*><*down-upshift-margin*>]	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 profile set 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 32 Kbps. 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 64 Kbps. The ADSL up/down shift noise margins define the threshold that triggers rate adaptation. For example: The target SNR is 6, and the up/down shift noise margins are 9/3. If the signal becomes better and the SNR is higher than 9, rate adaptation is triggered and the line rate becomes higher If the signal becomes bad and the SNR is lower than 3, rate adaptation is triggered and the line rate becomes lower. After you create an ADSL profile, you can assign it to any of the ADSL ports on any of the ADSL IES in the IES.	H/H
adsl profile delete <*profile*>	Allows you to delete an individual ADSL profile by its name. You cannot delete a profile that is assigned to any of the DSL ports in the IES. Assign a different profile to any DSL ports that are using the profile that you want to delete, and then you can delete the profile.	H/H

Table 187 ADSL Profile Commands (continued)

COMMAND	DESCRIPTION	P
`adsl profile map` *<portlist>* *<profile>* <glite|gdmt|t1413|auto|adsl2|adsl2+>	Assigns a specific profile to an individual port and sets the port's ADSL 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 to which you assign the profile. glite|gdmt|t1413|auto|adsl2|adsl2+: The ADSL operational mode. When set to auto, the port follows whatever mode is set on the other end of the line. Note: When the mode is set to `auto`, the connection rates are governed by the negotiated ADSL mode regardless of the rates configured in the profile. For example, if the profile is set to use a rate of 18000 Kbps, that speed is only supported if the negotiated ADSL mode is ADSL 2+. Any other ADSL mode will limit the rate to what is supported by the specific ADSL standard.	H/H
adsl ipbpvc arpproxy agingtime set *<sec>*	Sets the valid time interval of a learned MAC address (10~10000 seconds).	H/H
adsl ipbpvc arpproxy agingtime show	Display the current time interval of a learned MAC address.	M/L
adsl ipbpvc arpproxy flush all | edgerouter [*<ip><vid>*]|*interface* [*<ip>/<mask><vid>*]	Flush the learned MAC addresses manually.	H/H
adsl ipbpvc arpproxy show [domain <domain> [edgerouter [*<ip><vid>*]]|[interface[*<ip>/<mask><vid>*]]]	Displays learnt MAC table for a domain Displays learnt MAC table for all/an edge router in a domain Displays learnt MAC table for all/an interface in a domain.	M/L
adsl ipbpvc delete *<portlist>* *<vpi><vci>*	Remove IP aware Bridge PVC.	H/H
adsl ipbpvc domain delete *<domain-name>*	Delete a domain, have to delete all VLANs belonging to this domain first.	H/H
adsl ipbpvc domain dhcpvlan disable *<domain-name>*	Disable DHCP VLAN in a domain.	H/H
adsl ipbpvc domain dhcpvlan enable *<domain-name>* *<vid>*	Enable DHCP VLAN in a domain.	H/H
adsl ipbpvc domain set *<domain-name>*	Create domain, maximum 8 domains in the system.	H/H
adsl ipbpvc domain show [*<domain-name>*]	Display domain setting.	M/L
adsl ipbpvc domain vlan *<domain-name><vid><registration>*	Set vlan to join or leave specified domain, maximum 8 VLANs in one domain.	H/H

Table 187 ADSL Profile Commands (continued)

COMMAND	DESCRIPTION	P
adsl ipbpvc edgerouter delete <ip><vid>	Delete specified edge router setting.	H/H
adsl ipbpvc edgerouter set <ip>/ <mask><vid>	Sets the edge router.	H/H
adsl ipbpvc edgerouter show [<vid>]	Displays the edge router setting.	M/L
adsl ipbpvc interface delete <ip>/<mask><vid>	Delete an IP interface.	H/H
adsl ipbpvc interface runtime [<ip>/<mask>|<vid>|<ip>/<mask> <vid>]	Display runtime interfaces by optional <ip>/<mask> and vlan id parameter.	M/L
adsl ipbpvc interface set <ip>/ <mask><vid>[<port><vpi><vci>]	Sets the interface.	H/H
adsl ipbpvc interface show [<ip>/<mask>|<vid>|<ip>/<mask> <vid>]	Displays the interface setting by optional <ip>/ <mask> and vlan id parameter.	M/L
adsl ipbpvc route delete <domain-name><ip>/<mask> <nexthop>	Deletes route entry from specified domain. *nexthop*:	H/H
adsl ipbpvc route runtime [<domain-name>|<ip>/ <mask>|<domain><ip>/<mask>]	Displays the runtime route information.	M/L
adsl ipbpvc route set <domain-name><ip>/<mask><nexthop> <metric> [<priority>]	Sets a new route to specified edgerouter for a given domain. Maximum 16 routes in a domain. *metric:* *priority:*	H/H
adsl ipbpvc route show [<domain-name>|<ip>/<mask>|<domain><ip>/ <mask>]	Displays current routing table for specific domain.	M/L
adsl ipbpvc set <portlist><vpi> <vci><ds-vcprofile[,us-vcprofile]> <pvid> <priority> <ipab_type>	Sets IP aware Bridge PVC. *pvid*: *ipab_type*:	H/H
adsl ipbpvc show [<portlist> [<vpi><vci>]]	Displays IP aware Bridge PVC setting.	M/L

64.3.1 ADSL Profile Show Command Example

The following example displays the ADSL DEFVAL profile.

Figure 202 ADSL Profile Show Command Example

```
ras> adsl profile show DEFVAL
01. DEFVAL    latency mode: interleave
                    up stream down stream
                    --------- -----------
max rate    (kbps):       512        2048
min rate    (kbps):        32          32
latency delay (ms):         4           4
max margin    (db):        31          31
min margin    (db):         0           0
target margin (db):         6           6
up shift margin(db):        9           9
down shift margin(db):      3           3
```

64.3.2 ADSL Profile Set Command Example

The following example creates a premium profile (named “gold”) for providing subscribers with very high connection speeds and no interleave delay. It also sets the upstream target signal/noise margin to 5 db, the upstream minimum acceptable signal/noise margin to 0 db, the upstream maximum acceptable signal/noise margin to 30 db, the upstream minimum ADSL transmission rate to 128 Kbps, the downstream target signal/noise margin to 5 db, the downstream minimum acceptable signal/noise margin to 0 db, the downstream maximum acceptable signal/noise margin to 30 db and the downstream minimum ADSL transmission rate to 256Kbps.

The upstream down shift noise margin is 0 dB. The upstream up shift noise margin is 6 dB. The downstream down shift noise margin is 0 dB. The downstream up shift noise margin is 6 dB.

Figure 203 ADSL Profile Set Command Example 1

```
ras> adsl profile set gold fast 1200 24000 5 0 30 128 5 0 30 256 0 6 0 6
```

This next example creates a similar premium profile (named `goldi`), except it sets an interleave delay of 16 ms for both upstream and downstream traffic.

Figure 204 ADSL Profile Set Command Example 2

```
ras> adsl profile set goldi interleave=16,16 1200 24000 5 0 30 128 5 0 30 256
0 6 0 6
```

After you create an ADSL profile, you can assign it to any of the ADSL ports in the IES.

64.3.3 ADSL Profile Delete Command Example

The following example deletes the gold ADSL profile.

Figure 205 ADSL Profile Delete Command Example

```
ras> adsl profile delete gold
```

64.3.4 ADSL Profile Map Command Example

The following example sets ADSL port 1 to have the gold profile in G.dmt mode.

Figure 206 ADSL Profile Delete Command Example

```
ras> adsl profile map 1 gold gdmt
```

64.4 Statistics ADSL Commands

Use these commands to display ADSL port statistics.

Table 188 ADSL Statistics Commands

COMMAND	DESCRIPTION	P
statistics adsl show [*portlist*]	Displays ADSL port connection statistics including the status (V for enabled, - for disabled), ADSL operational mode, upstream and downstream maximum rates, up time and the number of errored seconds.	M/L
statistics adsl linedata <*portlist*>	Shows the line bit allocation of an ADSL port. Discrete Multi-Tone (DMT) modulation divides up a line's bandwidth into tones. This command displays the number of bits transmitted for each tone. This can be used to determine the quality of the connection, 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. See the ITU-T G.992.1 recommendation for more information on DMT. The better (or shorter) the line, the higher the number of bits transmitted for a DMT tone. The maximum number of bits that can be transmitted per DMT tone is 15. "upstream carrier load" displays the number of bits transmitted per DMT tone for the upstream channel (from the subscriber's DSL modem or router to the IES). "downstream carrier load" displays the number of bits received per DMT tone for the downstream channel (from the IES to the subscriber's DSL modem or router). The bit allocation contents are only valid when the link is up.	M/L
statistics adsl lineinfo <*portlist*>	Shows the line operating values of an ADSL port.	M/L
statistics adsl lineperf <*portlist*>	Shows the line performance counters of an ADSL port.	M/L
statistics adsl linerate <*portlist*>	Displays the line rate for the specified port(s).	M/L
statistics adsl 15mperf <*portlist*>[count <0~96>]	Displays line performance statistics for the current and previous 15-minute periods. count <0~96>: Specify for which 15-minute interval (0~96) you want to display performance statistics. 0 is the current 15 minutes.	M/L
statistics adsl 1dayperf <*portlist*>	Displays line performance statistics for the current and previous 24 hours.	M/L

Table 188 ADSL Statistics Commands (continued)

COMMAND	DESCRIPTION	P
adsl linediag setld *<port>*	Performs line diagnostics on the specified port. The ADSL port must be set to ADSL2 or ADSL2+ ADSL operational mode and have a connection. It takes about one minute for the line diagnostics to finish.	H/H
adsl linediag getld *<port>*	Displays the line diagnostics results after using the line diagnostics set command on an ADSL port. Use the line diagnostics results to analyze problems with the physical ADSL line. Note: Wait at least one minute after using the line diagnostic set command before using this command.	L/L
adsl linediag getld992-3 *<port>*	Displays the line diagnostics results in the format defined in the ITU-T G.992.3 standard after using the line diagnostics set command on an ADSL port. Use the line diagnostics results to analyze problems with the physical ADSL line. Note: Wait at least one minute after using the line diagnostic set command before using this command.	L/L
adsl linediag setselt *<port>*	Performs a single end line test on the specified port. This test checks the distance to the subscriber's location. Note: The port must have an open loop. There cannot be a DSL device, phone, fax machine or other device connected to the subscriber's end of the telephone line.	H/H
adsl linediag getselt *<port>*	Displays the status and the results of the SELT test on the specified port. The report tells you what gauge of telephone wire is connected to the port and the approximate length of the line measured both in meters and thousands of feet.	L/L
adsl linediag toneDiag *<port>*	Displays the tone diagnostics for a port in the format defined in the ITU-T G.992.3 standard. You do not need to use the line diagnostics set command first. Use the tone diagnostics to analyze problems with the physical ADSL line.	L/L
adsl ipbpvc arpproxy agingtime set *<sec>*	Sets the valid time interval of a learned MAC address. 10~10000 seconds.	H/H
adsl ipbpvc arpproxy agingtime show	Display the current time interval of a learned MAC address.	M/L
adsl ipbpvc arpproxy flush all | edgerouter [*<ip><vid>*]|*interface* [*<ip>/<mask><vid>*]	Flush the learned MAC addresses manually.	H/H

Table 188 ADSL Statistics Commands (continued)

<table>
<tr><th>COMMAND</th><th>DESCRIPTION</th><th>P</th></tr>
<tr><td>adsl ipbpvc arpproxy show [domain <domain> [edgerouter [<ip><vid>]]|[interface[<ip>/<mask><vid>]]]</td><td>Displays learnt MAC table for a domain Displays learnt MAC table for all/an edge router in a domain Displays learnt MAC table for all/an interface in a domain.</td><td>M/L</td></tr>
<tr><td>adsl ipbpvc delete <portlist> <vpi><vci></td><td>Remove IP aware Bridge PVC.</td><td>H/H</td></tr>
<tr><td>adsl ipbpvc domain delete <domain-name></td><td>Delete a domain, have to delete all VLANs belonging to this domain first.</td><td>H/H</td></tr>
<tr><td>adsl ipbpvc domain dhcpvlan disable <domain-name></td><td>Disable DHCP VLAN in a domain.</td><td>H/H</td></tr>
<tr><td>adsl ipbpvc domain dhcpvlan enable <domain-name> <vid></td><td>Enable DHCP VLAN in a domain.</td><td>H/H</td></tr>
<tr><td>adsl ipbpvc domain set <domain-name></td><td>Create domain, maximum 8 domains in the system.</td><td>H/H</td></tr>
<tr><td>adsl ipbpvc domain show [<domain-name>]</td><td>Display domain setting.</td><td>M/L</td></tr>
<tr><td>adsl ipbpvc domain vlan <domain-name><vid><registration></td><td>Set vlan to join or leave specified domain, maximum 8 VLANs in one domain.</td><td>H/H</td></tr>
<tr><td>adsl ipbpvc edgerouter delete <ip><vid></td><td>Delete specified edge router setting.</td><td>H/H</td></tr>
<tr><td>adsl ipbpvc edgerouter set <ip>/<mask><vid></td><td>Sets the edge router.</td><td>H/H</td></tr>
<tr><td>adsl ipbpvc edgerouter show [<vid>]</td><td>Displays the edge router setting.</td><td>M/L</td></tr>
<tr><td>adsl ipbpvc interface delete <ip>/<mask><vid></td><td>Delete an IP interface.</td><td>H/H</td></tr>
<tr><td>adsl ipbpvc interface runtime [<ip>/<mask>|<vid>|<ip>/<mask><vid>]</td><td>Display runtime interfaces by optional <ip>/<mask> and vlan id parameter.</td><td>M/L</td></tr>
<tr><td>adsl ipbpvc interface set <ip>/<mask><vid>[<port><vpi><vci>]</td><td>Sets the interface.</td><td>H/H</td></tr>
<tr><td>adsl ipbpvc interface show [<ip>/<mask>|<vid>|<ip>/<mask><vid>]</td><td>Displays the interface setting by optional <ip>/<mask> and vlan id parameter.</td><td>M/L</td></tr>
<tr><td>adsl ipbpvc route delete <domain-name><ip>/<mask><nexthop></td><td>Deletes route entry from specified domain.

nexthop:</td><td>H/H</td></tr>
<tr><td>adsl ipbpvc route runtime [<domain-name>|<ip>/<mask>|<domain><ip>/<mask>]</td><td>Displays the runtime route information.</td><td>M/L</td></tr>
<tr><td>adsl ipbpvc route set <domain-name><ip>/<mask><nexthop><metric> [<priority>]</td><td>Sets a new route to specified edgerouter for a given domain. Maximum 16 routes in a domain.

metric:

priority:</td><td>H/H</td></tr>
</table>

Table 188 ADSL Statistics Commands (continued)

COMMAND	DESCRIPTION	P
adsl ipbpvc route show [<*domain-name*>|<*ip*>/<*mask*>|<*domain*><*ip*>/<*mask*>]	Displays current routing table for specific domain.	M/L
adsl ipbpvc set <*portlist*><*vpi*><*vci*><*ds-vcprofile*[,*us-vcprofile*]> <*pvid*> <*priority*> <*ipab_type*>	Sets IP aware Bridge PVC. *pvid*: *ipab_type*:	H/H
adsl ipbpvc show [<*portlist*> [<*vpi*><*vci*>]]	Displays IP aware Bridge PVC setting.	M/L

64.4.1 ADSL Show Command Example

The following example displays connection statistics for ADSL port 1.

Figure 207 ADSL Show Command Example

```
ras> statistics adsl show 1
port status mode     up/downstream        up time error second(15M/24H)
---- ------ -------- ------------- -------------- ---------------------
   1   V    adsl2       512/  9089 00000:00:04:59       15/15
```

64.4.2 Linedata Command Example

In the following example, the upstream channel is carried on tones 7 to 39 and the downstream channel is carried on tones 53 to 259 (space is left between the channels to avoid interference).

Figure 208 Linedata Command Example

```
ras> statistics adsl linedata 1
[port 1]
up stream carrier load: number of bits per symbol(tone):
tone    0-  19: 00 00 00 00 00 00 02 03 04 05 - 06 07 07 07 07 07 07 07 08 08
tone   20-  39: 08 08 07 08 08 07 07 06 06 05 - 04 03

down stream carrier load: number of bits per symbol(tone):
tone    0-  19: 00 00 00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00 00 00
tone   20-  39: 00 00 00 00 00 00 00 00 00 00 - 00 00 00 00 00 00 00 00 00 00
tone   40-  59: 00 00 00 00 00 00 00 00 00 00 - 00 00 00 01 01 01 01 01 01 02
tone   60-  79: 02 02 02 02 00 02 02 02 02 02 - 02 02 02 02 02 02 02 02 02 02
tone   80-  99: 02 02 02 02 02 02 02 02 02 02 - 02 02 02 02 02 02 02 02 02 02
tone  100- 119: 02 02 02 02 02 02 02 02 02 02 - 02 02 02 02 02 02 02 02 02 02
tone  120- 139: 02 02 02 02 02 02 02 02 02 02 - 02 02 02 02 02 02 02 02 02 02
tone  140- 159: 02 02 02 02 02 02 02 02 02 02 - 02 02 02 02 02 02 02 02 02 02
tone  160- 179: 02 02 02 02 02 02 02 02 02 02 - 02 02 02 02 02 02 02 02 02 02
tone  180- 199: 02 02 02 02 02 02 02 02 02 02 - 02 02 02 02 02 02 02 02 02 02
tone  200- 219: 02 02 02 02 02 02 02 02 02 02 - 02 02 02 02 02 02 02 02 02 02
tone  220- 239: 02 02 02 02 02 02 02 02 02 02 - 02 02 02 02 02 02 02 02 02 02
tone  240- 259: 02 02 02 02 02 02 02 02 02 02 - 02 02 02 02 02 02
```

64.4.3 ADSL Lineinfo Command Example

An example is shown next.

Figure 209 ADSL Lineinfo Command Example

```
ras> statistics adsl lineinfo 8
[port 8]
operating modes:
- service type in operation: adsl2+
- TRELLIS operation mode   : on
connection detail:
- down/up stream interleaved delay (ms):  3/ 2
- total transceiver DS output power  (dbm): -2.5
- total transceiver US output power  (dbm): 11.5

atuc information:
- vendor id:      30304235303035300000000000000000
- version number: 66323330323030300000000000000000
- serial number :
30323030306530336539303030370000000000000000000000000000000000
00
atur information:
- vendor id:      b5004244434d00000000000000000000
- version number: 41327042303139610000000000000000
- serial number :
0000000000000000000000000000000000000000000000000000000000000000
```

The service type in operation is the ADSL standard that the port is using: G.dmt or ANSI T1.413 issue 2.

Trellis coding helps to reduce the noise in ADSL transmissions. Trellis may reduce throughput but it makes the connection more stable.[5]

The numbers of milliseconds of interleave delay for downstream and upstream transmissions are listed. The total output power of the transceiver varies with the length and line quality. The farther away the subscriber's ADSL modem or router is or the more interference there is on the line, the higher the power will be. "DS" refers to the power output of the IES "US" refers to the power output of the subscriber's ADSL modem or router.

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

The `atuc information` fields show data acquired from the ATUC (ADSL Termination Unit – Central), in this case IES, during negotiation/provisioning message interchanges.

5. At the time of writing, the IES always uses Trellis coding.

The `atur information` fields show data acquired from the ATUR (ADSL Termination Unit – Remote), in this case the subscriber's ADSL modem or router, during negotiation/provisioning message interchanges. This information can help in identifying the subscriber's ADSL modem or router.

The vendor ID, vendor version number and product serial number are obtained from vendor ID fields (see ITU-T G.994.1) or R-MSGS1 (see T1.413).

64.4.4 Lineperf Command Example

An example is shown next.

Figure 210 Lineperf Command Example

```
ras> statistics adsl lineperf 1
[port 1] Perf since boot up
nfebe-I/nfebe-ni   :         46/         0 (Far End CRC)
ncrc-I/ncrc-ni     :          5/         0 (Near End CRC)
nfecc-I/nfecc-ni   :          0/         0 (Far End Corrected FEC)
nfec-I/nfec-ni     :         28/         0 (Near End Corrected FEC)
init-atuc/init-atur:         23/         -
es-atuc /es-atur   :         27/        92
ses-atuc /ses-atur :         26/        60
uas-atuc /uas-atur :       1515/      1515
lpr-atuc /lpr-atur :          -/         2
```

These counters display 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. "I" stands for interleaved and "ni" stands for non-interleaved (fast mode).

A block is a set of consecutive bits associated with the path; each bit belongs to one and only one block. Consecutive bits may not be contiguous in time.

Table 189 Line Performance Counters

LABEL	DESCRIPTION
nfebe	The Number of Far End Block Errors (Cyclic Redundancy Check).
ncrc	Near end Cyclic Redundancy Check errors.
nfecc	The Far End blocks repaired by Forward Error Correction.
nfec	The Near End blocks repaired by Forward Error Correction.
init	The number of link ups and link downs.
es	The Number of Errored Seconds. This is how many seconds contained at least one errored block or at least one defect.
ses	The Number of Severely Errored Seconds. This is how many seconds contained 30% or more errored blocks. This is a subset of n-es.

Table 189 Line Performance Counters (continued)

LABEL	DESCRIPTION
uas	The Number of Unavailable Seconds.
lpr	The Number of Loss of Power Seconds (on the ATUR) that have occurred.

64.4.5 15 Minute Performance Command Example

An example is shown next.

Figure 211 15 Minute Performance Command Example

```
ras> statistics adsl 15mperf 10
Port 10 Current 15 Min elapsed time:833 sec (Link UP)
   Current 15 Min PM:      ATUC      ATUR
                lofs:         0         0
                loss:         0         0
                lols:         0         -
                lprs:         -         0
                 eSs:         0         0
               inits:         0         -
                sesl:         0         0
                uasl:         0         0
  History 15 Min PM-1:      ATUC      ATUR
                lofs:         0         0
                loss:         0         0
                lols:         0         -
                lprs:         -         0
                 eSs:         0         0
               inits:         1         -
                sesl:         0         0
                uasl:         0         0
  History 15 Min PM-2:      ATUC      ATUR
                lofs:         0         0
                loss:         0         0
                lols:         0         -
                lprs:         -         0
                 eSs:         0         0
               inits:         0         -
                sesl:         0         0
                uasl:         0         0
```

The following table explains these counters.

Table 190 15 Minute Performance Counters

LABEL	DESCRIPTION
atuc	Upstream. These statistics are for the connection (or traffic) coming from the subscriber’s device to the IES.
atur	Downstream. These statistics are for the connection (or traffic) going from the IES to the subscriber’s device.

Table 190 15 Minute Performance Counters (continued)

LABEL	DESCRIPTION
lofs	The number of Loss Of Frame seconds that have occurred within the 15-minute period.
loss	The number of Loss Of Signal seconds that have occurred within the 15-minute period.
lols	The number of Loss Of Link seconds that have occurred within the 15-minute period.
lprs	The number of Loss of Power seconds (on the ATUR) that have occurred within the 15-minute period.
eSs	The number of Errored Seconds that have occurred within the 15-minute period.
inits	The number of link ups and link downs that have occurred within the 15-minute period.
sesl	The number of Severely Errored Seconds that have occurred within the 15-minute period.
uasl	The number of UnAvailable Seconds that have occurred within the 15-minute period.

These counters are also used in the alarm profiles (see Section 53.1 on page 413).

64.4.6 1 Day Performance Command Example

An example is shown next.

Figure 212 1Day Performance Command Example

```
ras> statistics adsl 1dayperf 10
 Port 10 current 1 day elapsed time:7827 sec (Link UP)
 Current 1 Day Perf       ATUC      ATUR
               lofs          0         0
               loss          0         0
               lols          0         -
               lprs          -         0
                eSs          0         0
              inits          1         -
               sesl          1         0
               uasl          0         0

 Port 10 previous 1 day elapsed time:0 sec
 Previous 1 Day Perf      ATUC      ATUR
               lofs          0         0
               loss          0         0
               lols          0         -
               lprs          -         0
                eSs          0         0
              inits          0         -
               sesl          0         0
               uasl          0         0
```

See Table 190 on page 513 for details about these counters.

64.4.7 Line Diagnostics Set Command Example

The following example performs line diagnostics on ADSL port 1. The screen displays a message confirming upon which ADSL port line diagnostics will be performed.

Figure 213 Line Diagnostics Set Command Example

```
ras> adsl linediag setld 1
Line- 1 set to Line Diagnostic Mode
```

64.4.8 Line Diagnostics Get Command Example

The following example displays the line diagnostics results for ADSL port 1.

Figure 214 Line Diagnostics Get Command Example

```
ras> adsl linediag getld 1
Line_Diagnostics_Parameter,_channel: 0

number_of_subcarries: 256       32
hlinScale: 19625        32767
latn: 54        0
satn: 52        8
snrm: 60        60
attndr: 12140000        1120000
farEndActatp: 75        125
i       li.rl   li.im   log     QLN     SNR
0       32768   32768   1023    255     255
1       32768   32768   1023    255     255
2       32768   32768   1023    255     255
3       32768   32768   1023    255     255
4       32768   32768   1023    255     255
5       32768   32768   1023    255     255
6       11604   4752    83      191     132
7       17794   5598    48      190     139
8       22385   5567    30      184     147
9       24903   5163    21      163     152
10      26768   5013    15      185     159
11      29179   5494    8       175     165
12      31605   6574    1       172     168
13      32766   8020    1023    186     170
14      32159   9597    1023    183     173
15      30990   11350   1023    182     173
16      30432   13730   1023    186     172
17      30259   16694   1023    182     170
18      29137   19570   1023    171     170
19      26499   21554   1023    186     172
20      23288   22973   0       173     174
```

The following table lists the line diagnostics test parameters that display, see the ITU-T's G.992.3 for more information.

Table 191 Line Diagnostics Get Command

LABEL	DESCRIPTION
`number_of_ subcarries`	Discrete Multi-Tone (DMT) modulation divides up a line's bandwidth into sub-carriers (sub-channels) of 4.3125 kHz each. The first number is the total number of DMT sub-carriers the ADSL connection is using. The second number indicates how many upstream DMT sub-carriers the ADSL connection is using.
`hlinScale:`	The channel characteristics function is represented in linear format by a scale factor and a complex number. These are the maximum upstream and downstream scale factors used in producing the channel characteristics function.
`latn:`	This is the upstream and downstream Line Attenuation (in .1 dB).
`satn:`	This is the upstream and downstream Signal Attenuation (in .1 dB).
`snrm:`	This is the upstream and downstream Signal-to-Noise Ratio Margin (in .1 dB). A DMT sub-carrier's SNR is the ratio between the received signal power and the received noise power. The signal-to-noise ratio margin is the maximum that the received noise power could increase with the IES still being able to meet its transmission targets.
`attndr:`	This is the upstream and downstream Attainable Net Data Rate (in bit/ s).
`farEndActatp:`	This is the upstream and downstream Far End Actual Aggregate Transmit Power (in .1 dBm)
`i`	This is the index number of the DMT sub-carrier.
`li.rl`	The channel characteristics function is represented in linear format by a scale factor and a complex number. This is the real part of the complex number used in producing the channel characteristics function for this sub-carrier.
`li.im`	The channel characteristics function is represented in linear format by a scale factor and a complex number. This is the imaginary part of the complex number used in producing the channel characteristics function for this sub-carrier
`log`	This is a format for providing channel characteristics. It provides magnitude values in a logarithmic scale. This can be used in analyzing the physical condition of the ADSL line.
`QLN`	The Quiet Line Noise for a DMT sub-carrier is the rms (root mean square) level of the noise present on the line, when no ADSL signals are present. It is measured in dBm/Hz. The QLN can be used in analyzing crosstalk.
`SNR`	This is the upstream and downstream Signal-to-Noise Ratio (in .1 dB). A DMT sub-carrier's SNR is the ratio between the received signal power and the received noise power. The SNR can be used in analyzing time dependent changes in crosstalk levels and line attenuation (such as those caused by temperature variations and moisture).

64.4.9 Line Diagnostics Get 992.3 Command Example

The following example displays the line diagnostics results for ADSL port 1.

Figure 215 Line Diagnostics Get 992.3 Command Example

```
ras> adsl linediag getld992_3 1
port: 1

number_of_subcarries:       256        32
hlinScale:                17024     32767
latn:                       2.0       0.2
satn:                       2.0       0.0
snrm:                      -0.0       6.0
attndr:                10398468   1152000
farEndActatp:              20.4      12.4
  i     li.rl     li.im   log(dB)  QLN(dBm)   SNR(dB)
  0       N/A       N/A       N/A       N/A       N/A
  1       N/A       N/A       N/A       N/A       N/A
  2       N/A       N/A       N/A       N/A       N/A
  3       N/A       N/A       N/A       N/A       N/A
  4       N/A       N/A       N/A       N/A       N/A
  5       N/A       N/A       N/A       N/A       N/A
  6   0.31557   0.00796      -9.9    -120.5       8.5
  7   0.43477  -0.31599      -5.3    -120.0      42.0
  8   0.28313  -0.67576      -2.6    -119.5      44.5
  9  -0.01016  -0.86645      -1.1    -119.0      46.5
 10  -0.28423  -0.89969      -0.4    -118.5      51.5
 11  -0.48750  -0.85403      -0.1    -118.0      52.0
 12  -0.63495  -0.79630       0.2    -118.0      54.5
 13  -0.75373  -0.75644       0.6    -117.5      56.5
 14  -0.84457  -0.72510       1.0    -117.0      56.5
 15  -0.89389  -0.68549       1.1    -116.5      56.5
 16  -0.90713  -0.64631       1.0    -114.5      56.5
 17  -0.91955  -0.63196       1.0    -116.0      57.0
 18  -0.95053  -0.64860       1.3    -116.0      57.0
 19  -0.97781  -0.67563       1.6    -115.5      57.0
 20  -0.97161  -0.69211       1.6    -115.5      57.5
```

The following table lists the line diagnostics test parameters that display, see the ITU-T's G.992.3 for more information.

Table 192 Line Diagnostics Get 992.3 Command

LABEL	DESCRIPTION
`number_of_ subcarries`	Discrete Multi-Tone (DMT) modulation divides up a line's bandwidth into sub-carriers (sub-channels) of 4.3125 KHz each. The first number is the total number of DMT sub-carriers the ADSL connection is using. The second number indicates how many upstream DMT sub-carriers the ADSL connection is using.
`hlinScale:`	The channel characteristics function is represented in linear format by a scale factor and a complex number. These are the maximum upstream and downstream scale factors used in producing the channel characteristics function.
`latn:`	This is the upstream and downstream Line Attenuation (in dB).
`satn:`	This is the upstream and downstream Signal Attenuation (in dB).
`snrm:`	This is the upstream and downstream Signal-to-Noise Ratio Margin (in dB). A DMT sub-carrier's SNR is the ratio between the received signal power and the received noise power. The signal-to-noise ratio margin is the maximum that the received noise power could increase with the IES still being able to meet its transmission targets.
`attndr:`	This is the upstream and downstream Attainable Net Data Rate (in bit/s).
`farEndActatp:`	This is the upstream and downstream Far End Actual Aggregate Transmit Power (in dBm)
`i`	This is the index number of the DMT sub-carrier.
`li.rl`	The channel characteristics function is represented in linear format by a scale factor and a complex number. This is the real part of the complex number used in producing the channel characteristics function for this sub-carrier.
`li.im`	The channel characteristics function is represented in linear format by a scale factor and a complex number. This is the imaginary part of the complex number used in producing the channel characteristics function for this sub-carrier
`log`	This is a format for providing channel characteristics. It provides magnitude values in a logarithmic scale. It is measured in dB. This can be used in analyzing the physical condition of the ADSL line.
`QLN`	The Quiet Line Noise for a DMT sub-carrier is the rms (root mean square) level of the noise present on the line, when no ADSL signals are present. It is measured in dBm. The QLN can be used in analyzing crosstalk.
`SNR`	This is the upstream and downstream Signal-to-Noise Ratio (in dB). A DMT sub-carrier's SNR is the ratio between the received signal power and the received noise power. The SNR can be used in analyzing time dependent changes in crosstalk levels and line attenuation (such as those caused by temperature variations and moisture).

64.4.10 SELT Diagnostic Set Command Example

The following example starts a SELT test on ADSL port 1.

Figure 216 SELT Diagnostic Set Command Example

```
ras> adsl linediag setselt 1
```

64.4.11 SELT Diagnostic Get Command Example

The following example displays the status and results SELT diagnostic results for ADSL port 1.

Figure 217 Line Diagnostics Get Command Example

```
ras> adsl linediag getselt 1
port     inprogress       cableType loopEstimateLength
---- -------------------- --------- ------------------
   1           INPROGRESS     24AWG    0 m(0.00 kFt)
ras> adsl linediag getselt 1
port     inprogress       cableType loopEstimateLength
---- -------------------- --------- ------------------
   1                 DONE     24AWG    0 m(0.00 kFt)
```

64.4.12 Tone Diagnostics 992.3 Command Example

The following example displays the tone diagnostics results for ADSL port 8.

Figure 218 Tone Diagnostics Command Example

```
ras> ad lined toneD 1
port: 1

number_of_subcarries:       512        32
latn:                      24.1       2.7
satn:                      24.1      61.3
snrm:                      30.2      25.0
attndr:                28008000   1248000
farEndActatp:             -31.0      11.9
  i   log(dB)  QLN(dBm)   SNR(dB)
  0       N/A       N/A       N/A
  1       N/A       N/A       N/A
  2       N/A       N/A       N/A
  3       N/A       N/A       N/A
  4       N/A       N/A       N/A
  5       N/A       N/A       N/A
  6     -21.1    -125.5      17.5
  7     -15.3    -124.0      26.0
  8      -9.9    -123.0      31.0
  9      -5.7    -120.5      38.0
----------------------Snip------------------------

509       6.0    -124.0      29.0
510       6.0    -124.0      29.0
511       6.0    -123.0      26.5
```

The following table lists the tone diagnostic parameters. See the ITU-T's G.992.3 for more information.

Table 193 ToneDiag Command

LABEL	DESCRIPTION
number_of_ subcarries	Discrete Multi-Tone (DMT) modulation divides up a line's bandwidth into sub-carriers (sub-channels) of 4.3125 KHz each. This number indicates how many upstream and downstream DMT sub-carriers the ADSL connection is using.
hlinScale:	The channel characteristics function is represented in linear format by a scale factor and a complex number. This is the maximum upstream and downstream scale factor used in producing the channel characteristics function.
latn:	This is the upstream and downstream Line Attenuation (in dB).
satn:	This is the upstream and downstream Signal Attenuation (in dB).

Table 193 ToneDiag Command (continued)

LABEL	DESCRIPTION
`snrm:`	This is the upstream and downstream Signal-to-Noise Ratio Margin (in dB). A DMT sub-carrier's SNR is the ratio between the received signal power and the received noise power. The signal-to-noise ratio margin is the maximum that the received noise power could increase with the IES still being able to meet its transmission targets.
`attndr:`	This is the upstream and downstream Attainable Net Data Rate (in bit/s).
`farEndActatp:`	This is the upstream and downstream Far End Actual Aggregate Transmit Power (in dBm)
`i`	This is the index number of the DMT sub-carrier.
`log(dB)`	This is a format for providing channel characteristics. It provides magnitude values in a logarithmic scale. This can be used in analyzing the physical condition of the ADSL line.
`QLN(dBm)`	The Quiet Line Noise for a DMT sub-carrier is the rms (root mean square) level of the noise present on the line, when no ADSL signals are present. It is measured in dBm/Hz. The QLN can be used in analyzing crosstalk.
`SNR(dB)`	This is the upstream and downstream Signal-to-Noise Ratio (in dB). A DMT sub-carrier's SNR is the ratio between the received signal power and the received noise power. The SNR can be used in analyzing time dependent changes in crosstalk levels and line attenuation (such as those caused by temperature variations and moisture).

64.5 Alarm Profile Commands

Configure alarm profiles to set alarm settings and thresholds for the ADSL ports.

Table 194 Alarm Profile Commands

COMMAND	DESCRIPTION	P
adsl alarmprofile show [*profile*]	Displays the settings of the specified alarm profile (or all of them if you do not specify one).	L/L
adsl alarmprofile set <*profile*> [<*atuc lofs*><*atur lofs*><*atuc loss*><*atur loss*><*atuc lols*><*atuc lprs*><*atur lprs*><*atuc ess*><*atur ess*><*atuc fast rateup*><*atur fast rateup*><*atuc interleave rateup*><*atur interleave rateup*><*atuc fast ratedown*><*atur fast ratedown*><*atuc interleave ratedown*><*atur interleave ratedown*><*init fail enable*><*atuc fail fast*><*atuc ses*><*atur ses*><*atuc uas*><*atur uas*>]	This command configures settings and thresholds that define when the IES is to send an alarm trap and generate a syslog entry. Configure alarm profiles first and then use the alarmprofile map command to set the IES to use them with specific ADSL ports. *atuc*: Upstream. These parameters are for the connection (or traffic) coming from the subscriber's device to the IES. *atur*: Downstream. These parameters are for the connection (or traffic) going from the IES to the subscriber's device. *atuc lofs, atur lofs*: The number of Loss Of Frame seconds that are permitted to occur within 15 minutes. *atuc loss, atur loss*: The number of Loss Of Signal seconds that are permitted to occur within 15 minutes. *atuc lols*: The number of Loss Of Link seconds that are permitted to occur within 15 minutes. *atuc lprs, atur lprs*: The number of Loss of Power seconds that are permitted to occur (on the ATUR) within 15 minutes. *atuc ses*, *atur ses*: The number of Severely Errored Seconds that are permitted to occur within 15 minutes. *atuc uas, atur uas*: The number of UnAvailable Seconds that are permitted to occur within 15 minutes.	H/H

Table 194 Alarm Profile Commands (continued)

COMMAND	DESCRIPTION	P
	atuc ess, atur ess: The number of Errored Seconds that are permitted to occur within 15 minutes. *atuc fast rateup, atur fast rateup*: A rate in kilobits per second (kbps). If a fast mode connection's upstream transmission rate increases by more than this number, then a trap is sent. *atuc interleave rateup, atur interleave rateup*: A rate in kilobits per second (kbps). If an interleave mode connection's upstream transmission rate increases by more than this number, then a trap is sent. *atuc fast ratedown, atur fast ratedown*: A rate in kilobits per second (kbps). If a fast mode connection's downstream transmission rate decreases by more than this number, then a trap is sent. *atuc interleave ratedown, atur interleave ratedown*: A rate in kilobits per second (kbps). If an interleave mode connection's upstream transmission rate decreases by more than this number, then a trap is sent. *init fail enable*: "1" sets the profile to trigger an alarm for an initialization failures trap. "2" sets the profile to not trigger an alarm for an initialization failures trap. *atuc fail fast*: The number of failed fast retrains that are permitted to occur within 15 minutes.	
adsl alarmprofile delete <*profile*>	This command allows you to delete an individual ADSL alarm profile by its name. You cannot delete the DEFVAL alarm profile.	
adsl alarmprofile map <*portlist*> <*profile*>	Sets the IES to use an (already-configured) alarm profile with the specified ADSL ports.	H/H
adsl alarmprofile showmap [*port*]	Displays the alarm profile(s) mapped to the specified port(s).	L/L
adsl alarmprofile showport <*port*>	Displays the alarm profile settings for the specified port.	L/~
adsl ipbpvc arpproxy agingtime set <*sec*>	Sets the valid time interval of a learned MAC address. 10~10000 seconds.	H/H
adsl ipbpvc arpproxy agingtime show	Display the current time interval of a learned MAC address.	M/L
adsl ipbpvc arpproxy flush all | edgerouter [<*ip*><*vid*>]|*interface* [<*ip*>/<*mask*><*vid*>]	Flush the learned MAC addresses manually.	H/H
adsl ipbpvc arpproxy show [domain <domain> [edgerouter [<*ip*><*vid*>]]|[interface[<*ip*>/<*mask*><*vid*>]]]	Displays learnt MAC table for a domain Displays learnt MAC table for all/an edge router in a domain Displays learnt MAC table for all/an interface in a domain.	M/L

Table 194 Alarm Profile Commands (continued)

COMMAND	DESCRIPTION	P
adsl ipbpvc delete *<portlist>* *<vpi><vci>*	Remove IP aware Bridge PVC.	H/H
adsl ipbpvc domain delete *<domain-name>*	Delete a domain, have to delete all VLANs belonging to this domain first.	H/H
adsl ipbpvc domain dhcpvlan disable *<domain-name>*	Disable DHCP VLAN in a domain.	H/H
adsl ipbpvc domain dhcpvlan enable *<domain-name>* *<vid>*	Enable DHCP VLAN in a domain.	H/H
adsl ipbpvc domain set *<domain-name>*	Create domain, maximum 8 domains in the system.	H/H
adsl ipbpvc domain show [*<domain-name>*]	Display domain setting.	M/L
adsl ipbpvc domain vlan *<domain-name><vid><registration>*	Set vlan to join or leave specified domain, maximum 8 VLANs in one domain.	H/H
adsl ipbpvc edgerouter delete *<ip><vid>*	Delete specified edge router setting.	H/H
adsl ipbpvc edgerouter set *<ip>/<mask><vid>*	Sets the edge router.	H/H
adsl ipbpvc edgerouter show [*<vid>*]	Displays the edge router setting.	M/L
adsl ipbpvc interface delete *<ip>/<mask><vid>*	Delete an IP interface.	H/H
adsl ipbpvc interface runtime [*<ip>/<mask>*|*<vid>*|*<ip>/<mask>* *<vid>*]	Display runtime interfaces by optional <ip>/<mask> and vlan id parameter.	M/L
adsl ipbpvc interface set *<ip>/<mask><vid>*[*<port><vpi><vci>*]	Sets the interface.	H/H
adsl ipbpvc interface show [*<ip>/<mask>*|*<vid>*|*<ip>/<mask>* *<vid>*]	Displays the interface setting by optional <ip>/<mask> and vlan id parameter.	M/L
adsl ipbpvc route delete *<domain-name><ip>/<mask>* *<nexthop>*	Deletes route entry from specified domain. *nexthop*:	H/H
adsl ipbpvc route runtime [*<domain-name>*|*<ip>/<mask>*|*<domain><ip>/<mask>*]	Displays the runtime route information.	M/L
adsl ipbpvc route set *<domain-name><ip>/<mask><nexthop>* *<metric>* [*<priority>*]	Sets a new route to specified edgerouter for a given domain. Maximum 16 routes in a domain. *metric:* *priority:*	H/H
adsl ipbpvc route show [*<domain-name>*|*<ip>/<mask>*|*<domain><ip>/<mask>*]	Displays current routing table for specific domain.	M/L

Table 194 Alarm Profile Commands (continued)

COMMAND	DESCRIPTION	P
adsl ipbpvc set *<portlist><vpi><vci><ds-vcprofile*[*,us-vcprofile*]*> <pvid> <priority> <ipab_type>*	Sets IP aware Bridge PVC. *pvid*: *ipab_type*:	H/H
adsl ipbpvc show [*<portlist>* [*<vpi><vci>*]]	Displays IP aware Bridge PVC setting.	M/L

64.5.1 Alarm Profile Show Command Example

The following example displays the default alarm profile (DEFVAL).

Figure 219 Alarm Profile Show Command Example

```
ras> adsl alarmprofile show DEFVAL
01. DEFVAL
                                            ATU-C      ATU-R
                                       ---------- ----------
Thresh15MinLofs                (sec):          0          0
Thresh15MinLoss                (sec):          0          0
Thresh15MinLols                (sec):          0        ---
Thresh15MinLprs                       :          0          0
Thresh15MinESs                 (sec):          0          0
ThreshFastRateUp               (bps):          0          0
ThreshInterleaveRateUp         (bps):          0          0
ThreshFastRateDown             (bps):          0          0
ThreshInterleaveRateDown       (bps):          0          0
InitFailureTrap(1-enable, 2-disable):          2        ---
Thresh15MinFailedFast             :          0        ---
Thresh15MinSes                 (sec):          0          0
Thresh15MinUas                 (sec):          0          0
```

64.5.2 Alarm Profile Set Command Example

The following example sets an alarm profile named `SESalarm` that has the IES send an alarm trap and generate a syslog whenever the upstream connection's number of severely errored seconds exceeds three within a 15 minute period.

Figure 220 Alarm Profile Set Command Example

```
ras> adsl alarmprofile set SESalarm 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 3
0 0 0
```

64.5.3 Alarm Profile Delete Command Example

The following example deletes the `SESalarm` alarm profile.

Figure 221 Alarm Profile Delete Command Example

```
ras> adsl alarm profile delete SESalarm
```

64.5.4 Alarm Profile Map Command Example

The following example sets the IES to use the `SESalarm` alarm profile with ADSL port 5.

Figure 222 Alarm Profile Map Command Example

```
ras> adsl alarmprofile map SESalarm 5
```

64.5.5 Alarm Profile Showmap Command Example

The following example displays which alarm profile the IES is set to use for ADSL port 5.

Figure 223 Alarm Profile Showmap Command Example

```
ras> adsl alarmprofile showmap 5
ADSL alarm profile mapping:
Port  5: Alarm Profile = DEFVAL
```

65

G.Bond

G.bond allows subscribers to connect to an ISP using data streams spread over multiple DSL lines. The total available bandwidth for the subscriber then becomes the sum of the bandwidth available for each of the subscriber's line connections. As well as extra bandwidth, additional DSL lines provide backup support.

The system only supports ADSL port bonding using ZyXEL's P-663H-51. See the User's Guide of this CPE device for information on its port bonding specifications.

These commands correspond to the Web Configurator's G.bond settings described in Section 18.4 on page 170.

65.1 ADSL Port Bonding

Use these commands to configure ADSL port bonding settings.

Table 195 G.Bond Commands

COMMAND	DESCRIPTION	P
`adsl gbond set` <*bond_name*> <*port-list*>	Creates a pair bond using the specified name and ports. *bond_name*: Enter a descriptive name for this pair bond. You can use up to 31 characters. *port-list*: Enter the two port numbers to be bonded, separated by commas, a range separated by a tilde (~), or a combination of the two separated by a comma. For example: 1,2 or 5~10 or 1,2,5~10.	H/H
`adsl gbond delete` <*bond_name*>	Removes the specified pair bonding.	H/H
`adsl gbond show` [*bond_name*]	Displays the settings for the specified pair bond.	L/L
`statistics adsl gbond` [*bond_name*]	Displays the upstream and downstream link statistics for the specified pair bond.	M/L

Note: G.Bond only works with two adjacent ports, such as ports 1 and 2.

65.1.1 G.Bond Set and Delete Command Examples

The following example creates a pair bond between ports and 2 and 3 using the descriptive name 'gbond1'.

Figure 224 OUI Set Command Example

```
ras> adsl gbond set gbond1 2,3
```

The following example deletes the pair bond with the descriptive name 'Westlake'.

Figure 225 OUI Set Command Example

```
ras> adsl gbond delete gbond1
```

65.1.2 G.Bond Show Example

The following shows you how to display information for a specified pair bond.

Figure 226 G.Bond Show Command Example

```
ras> adsl gbond show gbond1
name                            port list
------------------------------- ---------
gbond1                                1,2
```

Each field is described in the following table.

name	=	The name of the specified pair bond.
port list	=	The two ADSL ports that are bonded.

65.1.3 Statistics ADSL G.Bond Command Example

The following shows you how to display statistics for a specified pair bond.

Figure 227 Statistics ADSL G.Bond Command Example

```
ras> statistics adsl gbond
name                        port list us rate(kbps) ds rate(kbps)
--------------------------- --------- ------------- -------------
gbond1                            1,2             0             0
```

Each field is described in the following table.

`name`	=	The name(s) of the current pair bond(s).
`port list`	=	The two ports associated with the pair bond.
`us rate (kbps)`	=	The pair bond's upstream data rate.
`ds rate (kbps)`	=	The pair bond's downstream data rate.

66

Virtual Channel Commands

This chapter shows you how to use commands to configure virtual channels.

See Chapter 16 on page 131 for background information on virtual channels and ATM QoS.

66.1 Virtual Channel Command Input Values

The following table describes the values required in Virtual Channel commands. Other values are discussed with the corresponding commands.

Table 196 Virtual Channel Command Input Values

LABEL	DESCRIPTION
cdvt	Cell Delay Variation Tolerance (CDVT) is the accepted tolerance of the difference between a cell's transfer delay and the expected transfer delay (measured in number of cells). Possible values are 0~255 or * (means 0).
member-vci	The VCI of the individual PVC that you are adding to a Permanent Virtual Circuit (PVC). The subscriber's device must create this PVC.
member-vpi	The VPI of the individual PVC that you are adding to a PPVC. The subscriber's device must create this PVC.
pcr	The Peak Cell Rate (150~300 000) is the maximum rate (measured in cells per second) at which the sender can send cells.
portlist	You can specify a single ADSL port <1>, all ADSL ports <*> or a list of ADSL ports <1,3,5>. You can also include a range of ports <1,5,6~10>.
priority	The priority level (0~7) assigned to PVC traffic. 7 is the highest priority.
vc|llc	The type of encapsulation. VC Mux is a type of encapsulation where, by prior agreement, each protocol is assigned to a specific virtual circuit, for example, VC1 carries IP and VC2 carries IPX. LLC is a type of encapsulation where one VC carries multiple protocols with each packet header containing protocol identifying information.
vcprofile, ds-vcprofile, us-vcprofile	The name of the virtual channel profile (up to 31 ASCII characters). You can assign profiles for downstream and upstream virtual channels. You cannot change the DEFVAL or DEFVAL_VC profiles.

Table 196 Virtual Channel Command Input Values

LABEL	DESCRIPTION
vlan-id	This is the VLAN Identifier (1 – 4094) added to routed Ethernet frames. Each PVC must have a unique *vlan-id* since the IES forwards traffic back to the subscribers based on the VLAN ID.
vpi, vci	The Virtual Path Identifier (VPI) and Virtual Circuit Identifier (VCI) identify a channel on this port. Possible values for the VPI are 0~255. This PVC channel is for internal use. The subscriber does not need to create this PVC. Possible values for the VCI are 32~65535 if the VPI is 0. If the VPI is not 0, possible values for the VCI are 1~65535. This PVC channel is for internal use. The subscriber does not need to create this PVC.

66.2 Virtual Channel Profile Commands

Use the following commands to configure virtual channel profiles.

Table 197 Virtual Channel Profile Commands

COMMAND	DESCRIPTION	P
adsl vcprofile show [*vcprofile*]	Displays the settings of the specified virtual channel profile (or all of them if you do not specify one).	L/L
adsl vcprofile set <*vcprofile*> <vc|llc><ubr|cbr><pcr> <cdvt>	Creates a virtual channel profile. ubr|cbr: Specify either a unspecified bit rate (UBR) or constant bit rate (CBR).	H/H

Table 197 Virtual Channel Profile Commands

COMMAND	DESCRIPTION	P
`adsl vcprofile set <vcprofile> <vc|llc><vbr(rt-vbr)|nrt-vbr> <pcr><cdvt><scr><bt>`	Creates a virtual channel profile. After you create a virtual channel profile, you can assign it to any of the ADSL ports on any of the ADSL IES in the IES. `vbr(rt-vbr)|nrt-vbr`: The Real-Time Variable Bit Rate (RT-VBR) or Non Real-Time (NRT-VBR) Variable Bit Rate ATM traffic class. `pcr`: Peak Cell Rate (PCR) is the maximum rate (150 to 300000 cells per second) at which the sender can send cells. `cdvt`: Cell Delay Variation Tolerance (CDVT) is the accepted tolerance of the difference between a cell's transfer delay and the expected transfer delay measured in number of cells. Enter from 0 to 255 or * (means 0). `scr`: The Sustained Cell Rate (SCR) sets the average cell rate (long-term) that can be transmitted (measured in cells per second). SCR applies to the VBR traffic class. `bt`: Burst Tolerance (BT) is the maximum number of cells that the port is guaranteed to handle without any discards (number of cells). BT applies to the VBR traffic class.	H/H
`adsl vcprofile delete <vcprofile>`	You cannot delete a virtual channel profile that is assigned to any of the ADSL ports. Assign a different profile to any ADSL ports that are using the profile that you want to delete, and then you can delete the profile.	H/H

66.2.1 Set Virtual Channel Profile Command

The following example creates a virtual channel profile named gold that uses LLC encapsulation. It uses constant bit rate and has the maximum rate (peak cell rate) set to 300,000 cells per second. The acceptable tolerance of the difference between a cell's transfer delay and the expected transfer delay (CDVT) is set to 5 cells.

Figure 228 Set Virtual Channel Profile Command Example 1

```
ras> adsl vcprofile set gold llc cbr 300000 5
```

The following example creates a virtual channel profile named silver that uses VC encapsulation. It uses real-time variable bit rate and has the maximum rate (peak cell rate) set to 250,000 cells per second. The acceptable tolerance of the difference between a cell's transfer delay and the expected transfer delay (CDVT) is set to 5 cells. The average cell rate that can be transmitted (SCR) is set to

100,000 cells per second. The maximum number of cells that the port is guaranteed to handle without any discards (BT) is set to 200.

Figure 229 Set Virtual Channel Profile Command Example 2

```
ras> adsl vcprofile set silver vc vbr 250000 5 100000 200
```

The following example creates a virtual channel profile named economy that uses LLC encapsulation. It uses unspecified bit rate and has the maximum rate (peak cell rate) set to 50,000 cells per second. The acceptable tolerance of the difference between a cell's transfer delay and the expected transfer delay (CDVT) is set to 100 cells.

Figure 230 Set Virtual Channel Profile Command Example 3

```
ras> adsl vcprofile set gold llc cbr 50000 100
```

66.2.2 Delete Virtual Channel Profile Command

The following example deletes the silver virtual channel profile.

Figure 231 Delete Virtual Channel Profile Command Example

```
ras> adsl vcprofile delete silver
```

66.3 PVC Channels

Channels (also called Permanent Virtual Circuits or PVCs) let you set priorities for different services or subscribers. You can define up to eight channels on each DSL port and use them for different services or levels of service. You set the PVID that is assigned to untagged frames received on each channel. You also set an IEEE 802.1p priority for each of the PVIDs. In this way you can assign different priorities to different channels (and consequently the services that get carried on them or the subscribers that use them). Use the following commands to define channels.

Table 198 PVC Commands

COMMAND	DESCRIPTION	P
`adsl pvc show [<portlist>[<vpi><vci>]]`	Displays the Permanent Virtual Circuit (PVC) parameters of the specified ADSL port(s) or all of the ADSL ports if you do not specify any.	M/L
`adsl pvc set <portlist><vpi><vci><super|vlanid<priority>><ds-vcprofile[,us-vcprofile]>`	Allows the configuration of a PVC (permanent virtual circuit) for one or a range of ADSL ports. *super*: Enable the super channel option to allow a channel to forward frames belonging to multiple VLAN groups (that are not assigned to other channels). The IES forwards frames belonging to VLAN groups that are not assigned to specific channels to the super channel. The super channel functions in the same way as the channel in a single channel environment. One port can have only one super channel.	H/H
`adsl pvc delete [<portlist>[<vpi><vci>]]`	Deletes the specified PVC channel.	H/H

66.3.1 PVC Set Command

The following example sets a PVC on ADSL port 1 with VPI 1, VCI 34, default VID 100 and priority 3. It sets the “platinum” profile for downstream traffic shaping and a VC profile named “plus” for upstream traffic policing.

Figure 232 PVC Set Command Example

```
ras> adsl pvc set 1 1 34 100 3 platinum,plus
```

66.4 Priority-based PVCs

A PPVC (Priority-based PVC) allows you to give different priorities to PVCs that are members of the same VLAN.

The IES uses eight priority queues (also called levels) for the member PVCs. The system maps frames with certain IEEE 802.1p priorities to a PVC with a particular priority queue. See Chapter 16 on page 131 for the factory default mapping.

Use these commands to configure PPVCs and add and remove member PVCs..

Table 199 PPVC Commands

COMMAND	DESCRIPTION	P
adsl ppvc set <*portlist*><*vpi*><*vci*><*llc*|*vc*><*pvid*><*priority*>	Creates a Priority PVC (PPVC). This allows you to give different priorities to PVCs that are members of the same VLAN.	H/H
adsl ppvc member set <*portlist*><*vpi*><*vci*><*member-vpi*><*member-vci*><*ds-vcprofile*[,*us-vcprofile*]><*priority*>	Adds a member PVC to a PPVC. You must create the PPVC before you use this command to add a member. Note: Only the member PVCs need to be created on the subscriber's device.	H/H
adsl ppvc member delete <*portlist*><*vpi*><*vci*><*member-vpi*><*member-vci*>	Removes a PVC from a PPVC.	H/H
adsl ppvc member show [*portlist*][<*vpi*><*vci*>]	Displays the PVCs that are members of a PPVC.	M/L
adsl ppvc show [<*portlist*>[<*vpi*><*vci*>]]	Displays the runtime configured PPVCs.	M/L
adsl ppvc delete <*portlist*><*vpi*><*vci*>	Removes a PPVC. Removing a PPVC also deletes all of the member PVCs.	H/H

66.4.1 PPVC Set Command Example

The following example creates a PPVC with VPI 8 and VCI 35 for port 5. The PPVC uses llc encapsulation and default VID 25. Any frames received without an IEEE 802.1p priority tag will be assigned a priority of 3. The IES uses this PVC channel internally. This PVC is not needed on the subscriber's device.

Figure 233 PPVC Set Command Example

```
ras> adsl ppvc set 5 8 35 llc 25 3
```

66.4.2 PPVC Member Set Command Example

The following example adds a PVC to a PPVC with VPI 8 and VCI 35 for port 5. The PVC uses VPI 8 and VCI 36. It sets the DEFVAL profile for downstream traffic shaping and for upstream traffic policing. It uses priority queue 2.

Figure 234 PPVC Member Set Command Example

```
ras> adsl ppvc member set 5 8 35 8 36 DEFVAL,DEFVAL 2
```

66.4.3 PPVC Member Delete Command Example

The following example removes a PVC that uses VPI 8 and VCI 36 from a PPVC with VPI 8 and VCI 35 for port 5.

Figure 235 PPVC Member Delete Command Example

```
ras> adsl ppvc member delete 5 8 35 8 36
```

66.4.4 PPVC Member Show Command Example

The following example displays the PVCs that are members of a PPVC for port 5.

Figure 236 PPVC Member Show Command Example

```
ras> adsl ppvc member show 5
port vpi   vci mvpi  mvci  level DS/US vcprofile
---- --- ----- ---- ----- ------ --------------------
   5   8    35    8    36      2 DEFVAL/DEFVAL
```

66.4.5 PPVC Show Command Example

The following example displays the PPVCs configured on DSL port 5.

Figure 237 PPVC Show Command Example

```
ras> adsl ppvc show 5
port  vpi    vci  encap pvid pri
================================
  5     8     35   llc    25  6
```

66.4.6 PPVC Delete Command Example

The following example removes a PPVC with VPI 8 and VCI 35 for port 5.

Figure 238 PPVC Delete Command Example

```
ras> adsl ppvc delete 5 8 35
```

66.5 2684 Routed Mode Commands

Use the 2684 routed mode to have the IES add MAC address headers to 2684 routed mode traffic from a PVC that connects to a subscriber device that uses 2684 routed mode. You can also specify the gateway to which the IES sends the traffic and the VLAN ID tag to add. See RFC-2684 for details on routed mode traffic carried over AAL type 5 over ATM.

Use the commands in the following order to set up a 2684 routed mode PVC.

1. Use the `adsl rpvc gateway` commands to configure gateway settings.
2. Use the `adsl rpvc set` command to configure RPVCs (2684 routed mode PVCs) for 2684 routed mode traffic.
3. Use the `adsl rpvc route set` command to configure domains for 2684 routed mode traffic. The domain is the range of IP addresses behind the subscriber's device (the CPE or Customer Premises Equipment). This includes the CPE device's LAN IP addresses and the IP addresses of the LAN computers.
4. Use the `adsl rpvc arp` commands to view the Address Resolution Protocol table of IP addresses of CPE devices using 2684 routed mode and configure how long the device is to store them.
5. For upstream traffic: Since the subscriber's device will not send out a MAC address, after the IES reassembles the Ethernet packets from the AAL5 ATM cells, the IES will append the routed mode gateway's MAC address and the IES's MAC address as the destination/source MAC address.

   For downstream traffic: When the IES sees the destination IP address is specified in the RPVC (or RPVC domain), the IES will strip out the MAC header and send them to the corresponding RPVC.

Table 200 RPVC Commands

COMMAND	DESCRIPTION	P
`adsl rpvc gateway set <gateway-ip><vlan-id>[<priority>]`	Adds a gateway IP address to use for 2684 routed mode traffic.	H/H
`adsl rpvc gateway show`	Displays the gateway IP addresses that are configured for use with 2684 routed mode traffic.	M/L
`adsl rpvc gateway delete <gateway-ip>`	Removes the gateway IP address that the device was set to use for 2684 routed mode traffic.	H/H

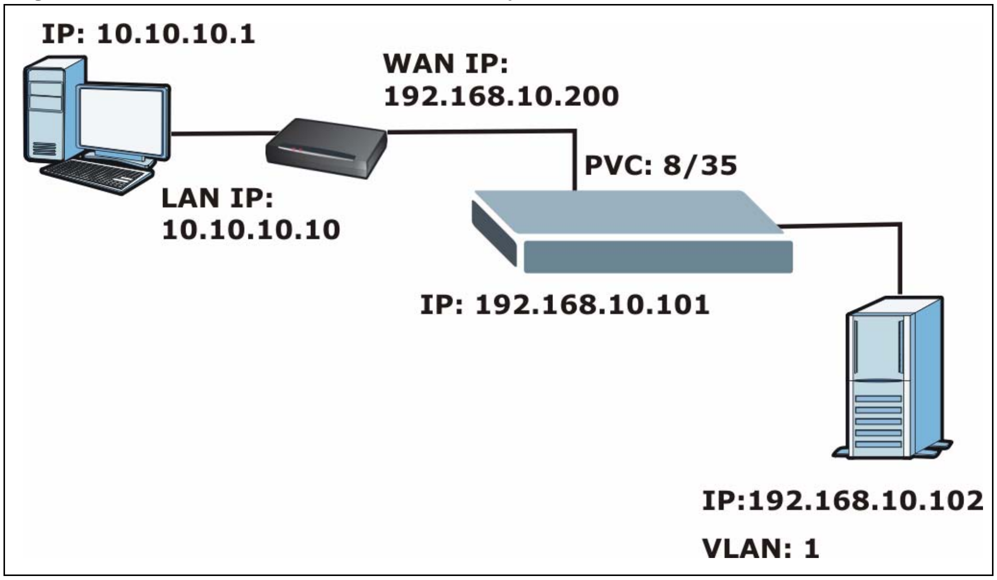
Table 200 RPVC Commands

COMMAND	DESCRIPTION	P
adsl rpvc set *<portlist><vpi> <vci><ds-vcprofile[,us-vcprofile]> <ip>/<mask> <gateway-ip>*	This command adds a PVC to handle 2684 routed mode traffic. Make sure that the routed PVC's subnet does not include the IES's IP address. Note: You must use the `rpvc gateway set` command to configure the gateway's settings before you use the `rpvc set` command.	H/H
adsl rpvc show *<portlist>*	This command lists the PVCs for handling 2684 routed mode traffic (RPVCs).	M/L
adsl rpvc delete *<portlist><vpi><vci>*	Removes the specified PVC for 2684 routed mode traffic.	H/H
adsl rpvc route set *<port><vpi> <vci><ip>/<mask>*	Sets RPVC route on a port.	H/H
adsl rpvc route show *<portlist>*	This command lists the domains for 2684 routed mode traffic.	M/L
adsl rpvc route delete *<port> <vpi><vci><ip>/<mask>*	Removes the specified domain for 2684 routed mode traffic. The domain includes the subscriber's LAN IP addresses.	H/H
adsl rpvc arp agingtime set *<sec>*	Configures how long the device stores the IP addresses of CPE devices using 2684 routed mode in the Address Resolution Protocol table. *sec:* The number of seconds (10~10000) the device is to keep the Address Resolution Protocol table's entries of IP addresses of 2684 routed mode gateways. Use 0 to disable the aging time.	H/H
adsl rpvc arp agingtime show	Displays how long the device stores the IP addresses of 2684 routed mode gateways in the Address Resolution Protocol table.	M/L
adsl rpvc arp show	Displays how long the device stores the IP addresses of 2684 routed mode gateways in the Address Resolution Protocol table.	M/L
adsl rpvc arp flush	Clears the IP addresses of 2684 routed mode gateways from the Address Resolution Protocol table.	H/H

66.5.1 2684 Routed Mode Example

The following figure shows an example RFC 2684 (formerly RFC 1483) routed mode set up. The gateway server uses IP address 192.168.10.102 and is in VLAN 1. The IES uses IP address 192.168.20.101. The subscriber's device (the CPE) is connected to DSL port 1 on the IES and the 2684 routed mode traffic is to use the PVC identified by VPI 8 and VCI 35. The CPE device's WAN IP address is 192.168.10.200. The routed domain is the LAN IP addresses behind the CPE device. The CPE device's LAN IP address is 10.10.10.10 and the LAN computer's IP address is 10.10.10.1. This includes the CPE device's LAN IP addresses and the IP addresses of the LAN computers.

Figure 239 2684 Routed Mode Example



Note the following.

- The CPE device's WAN IP (192.168.10.200 in this example) must be in the same subnet as the gateway's IP address (192.168.10.102 in this example).
- The IES's management IP address can be any IP address, it doesn't have any relationship to the WAN IP address or routed gateway IP address.
- The IES's management IP address should not be in the same subnet as the one defined by the WAN IP address and netmask of the subscriber's device. It is suggested that you set the netmask of the subscriber's WAN IP address to 32 to avoid this problem.
- The IES's management IP address should not be in the same subnet range of any RPVC and RPVC domain. It will make the IES confused if the IES receives a packet with this IP as destination IP.
- The IES's management IP address also should not be in the same subnet as the one defined by the LAN IP address and netmask of the subscriber's device. Make sure you assign the IP addresses properly.
- In general deployment, the computer must set the CPE device's LAN IP address (10.10.10.10 in this example) as its default gateway.
- The subnet range of any RPVC and RPVC domain must be unique.

Use the following command sequence to configure the IES for this example set up.

Figure 240 2684 Routed Mode Commands Example

```
ras> adsl rpvc gateway set 192.168.10.102 1
ras> adsl rpvc set 1 8 35 DEFVAL 192.168.10.200/32 192.168.10.102
ras> adsl rpvc route set 1 8 35 10.10.10.1/24
```

66.5.2 RPVC Gateway Set Command Example

The following example has the device use a VLAN ID of 1 and IEEE 802.1p priority of 3 when sending 2684 routed mode traffic to a gateway at IP address 192.168.10.102.

Figure 241 RPVC Gateway Set Command Example

```
ras> adsl rpvc gateway set 192.168.10.102 1 3
```

66.5.3 RPVC Gateway Show Command Example

The following is an example.

Figure 242 RPVC Gateway Show Command Example

```
ras> adsl rpvc gateway show
gateway ip      vid
--------------- ----
192.168.10.102  1
```

66.5.4 RPVC Gateway Delete Command Example

The following example has the device remove a 2684 routed mode traffic gateway entry for IP address 192.168.10.102.

Figure 243 RPVC Gateway Delete Command Example

```
ras> adsl rpvc gateway delete 192.168.10.102
```

66.5.5 RPVC Set Command Example

The following example adds a PVC for 2684 routed mode traffic. It is for DSL port 1, VPI 8, VCI 35. It sets the DEFVAL profile for downstream traffic shaping and for upstream traffic policing. The CPE device's WAN IP address is 192.168.10.200 with a netmask of 32 and the gateway's IP address is 192.168.10.102.

Figure 244 RPVC Set Command Example

```
ras> adsl rpvc set 1 8 35 DEFVAL,DEFVAL 192.168.10.200/32 192.168.10.102
```

66.5.6 RPVC Show Command Example

The following example displays the RPVCs for DSL port 1.

Figure 245 RPVC Show Command Example

```
ras> adsl rpvc show 1
port vpi  vci ip/netmask         gateway ip      DS/US vcprofile
---- --- ---- ------------------ --------------- ---------------------------
---
   1   8    35 192.168.10.200/32  192.168.10.102  DEFVAL/DEFVAL
```

66.5.7 RPVC Delete Command Example

The following example removes a PVC for 2684 routed mode traffic. It is for DSL port 1, VPI 8, VCI 35.

Figure 246 RPVC Delete Command Example

```
ras> adsl rpvc delete 1 8 35
```

66.5.8 RPVC Route Set Command Example

The following example adds a domain for a CPE device is connected to DSL port 1 on the IES and the 2684 routed mode traffic is to use the PVC identified by VPI 8 and VCI 35. The CPE device's LAN IP address is 10.10.10.10 and uses a subnet mask of 255.255.255.0. This includes the CPE device's LAN IP addresses and the IP addresses of the LAN computers.

Figure 247 RPVC Route Set Command Example

```
ras> adsl rpvc route set 1 8 35 10.10.10.1/24
```

66.5.9 RPVC Route Show Command Example

The following example displays the domains for 2684 routed mode traffic for devices connected to DSL ports 1 and 2.

Figure 248 RPVC Route Show Command Example

```
ras> adsl rpvc route show 1,2
port vpi vci ip/netmask
---- --- --- ------------------
   1   8  35 10.10.10.0/24
   2   8  35 10.10.11.0/24
```

66.5.10 RPVC Route Delete Command Example

The following example removes a domain for a CPE device is connected to DSL port 1 on the IES and the 2684 routed mode traffic is to use the PVC identified by VPI 8 and VCI 35. The CPE device's LAN IP address is 10.10.10.10 and uses a subnet mask of 255.255.255.0. This includes the CPE device's LAN IP addresses and the IP addresses of the LAN computers.

Figure 249 RPVC Route Delete Command Example

```
ras> adsl rpvc route delete 1 8 35 10.10.10.1/24
```

66.5.11 RPVC ARP Agingtime Set Command Example

The following example sets the device to store the IP addresses 2684 routed mode gateways in the Address Resolution Protocol table for 500 seconds.

Figure 250 RPVC ARP Agingtime Command Example

```
ras> adsl rpvc arp agingtime set 500
```

66.5.12 RPVC ARP Agingtime Show Command Example

The following is an example.

Figure 251 RPVC ARP Agingtime Show Command Example

```
ras> adsl rpvc arp agingtime show
rpvc aging time (sec): 500
```

66.5.13 RPVC ARP Show Command Example

The following is an example.

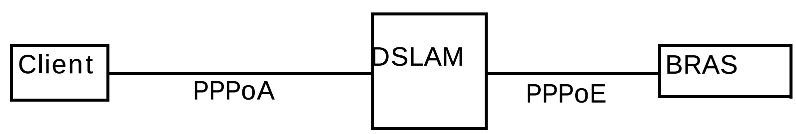
Figure 252 RPVC ARP Agingtime Show Command Example

```
ras> adsl rpvc arp show
gateway ip       vid  mac
---------------  ---- -----------------
192.168.10.102      1 00:0d:9d:d9:43:3b
```

66.6 PPPoA to PPPoE (PAE) Translation

Before migrating to an Ethernet infrastructure, a broadband network might consist of PPPoA connections between the CPE devices and the DSLAM and PPPoE connections from the DSLAM to the BRAS (Broadband Remote Access Server). The following figure shows a network example.

Figure 253 Mixed PPPoA-to-PPPoE Broadband Network Example



In order to allow communication between the end points (the CPE clients and the BRAS), you need to configure the DSLAM (the IES) to translate PPPoA frames to PPPoE packets and vice versa.

When PPPoA packets are received from the CPE, the ATM headers are removed and the IES adds PPPoE and Ethernet headers before sending the packets to the BRAS. When the IES receives PPPoE packets from the BRAS, PPPoE and Ethernet headers are stripped and necessary PVC information (such as encapsulation type) is added before forwarding to the designated CPE.

You can use these commands to create PVCs for PAE translation.

Table 201 PAEPVC Commands

COMMAND	DESCRIPTION	P
adsl paepvc delete <*portlist*> <*vpi*><*vci*>	This command removes a PPPoA-to-PPPoE (PAE) PVC.	M/H
adsl paepvc set <*portlist*><*vpi*> <*vci*><*ds-vcprofile*[,*us-vcprofile*]><*pvid*><*priority*> [*acname*][*srvcname*][*hellotime*]	Creates a PAE PVC to allow communication between the ATM (CPE) and Ethernet network (BRAS) segments. The PVC is mapped to a PPPoE session that connects to the specified BRAS (Broadband Remote Access Server). *acname:* Specifies the hostname of a remote access concentrator if there are two access concentrators (or BRAS) on the network or that you want to allow PAE translation to the specified access concentrator. *srvcname:* Specifies the name of the service that uses this PVC. This must be a service name that you configure on the remote access concentrator. *hellotime*: Specifies the timeout, (0~600 seconds) for the PPPoE session. Enter 0 if there is no timeout.	M/H
adsl paepvc show [<*portlist*>[<*vpi*><*vci*>]]	Displays the PAE PVC settings for the specified port(s) or PVCs.	L/L
adsl paepvc session <*portlist*> [<*vpi*><*vci*>]	This command displays the status of PAE PVC sessions on the specified port(s) or PVCs.	L/L
adsl paepvc counter <*portlist*> [<*vpi*><*vci*>]	This command displays statistics about PAE PVC activity.	L/L

66.6.1 PAE PVC Set Command Example

The following example creates a PPPoA-to-PPPoE PVC (1/33) for port 1. The VLAN ID is 1, and the IEEE 802.1p priority is 0. This configuration is for the video service on the vom access concentrator. The switch waits 10 seconds before terminating the PPPoE session.

Figure 254 PAE PVC Set Command Example

```
ras> adsl paepvc set 1 1 33 DEFVAL 1 0 acname vom srvcname video hellotime 10
```

66.6.2 PAE PVC Show Command Example

The following example displays the settings for port 1.

Figure 255 PAE PVC Show Command Example

```
ras> adsl paepvc show 1
port vpi   vci pvid pri htime US/DS vcprofile/acname/srvcname
---- --- ----- ---- --- ----- ----------------------------------
   1   1    33    1   0    10 dsprofile: DEFVAL
                              usprofile:
                              acname   : vom
                              srvcname : video
```

66.6.3 PAE PVC Session Command Example

The following example displays the settings for port 1.

Figure 256 PAE PVC Session Command Example

```
ras> adsl paepvc session 1
pvc 1-1/33
session state : down
session id    : 0
session uptime: 0 secs
acname        :
srvcname      :
```

66.6.4 PAE PVC Counter Command Example

The following example displays the statistics for port 1.

Figure 257 PAE PVC Counter Command Example

```
ras> adsl paepvc counter 1
pvc 1-1/33
                                 tx                rx
                          ---------------- ----------------
 ppp lcp config-request :                -                0
 ppp lcp echo-request   :                -                0
 ppp lcp echo-reply     :                -                0
 pppoe padi             :                0                -
 pppoe pado             :                -                0
 pppoe padr             :                0                -
 pppoe pads             :                -                0
 pppoe padt             :                0                0
 pppoe srvcname error   :                -                0
 pppoe ac system error  :                -                0
 pppoe generic error    :                0                0
```

Each value is described below.

`tx/rx`	=	The values in these columns are for packets transmitted (`tx`) or received (`rx`) by the IES.
`ppp lcp config-request`	=	The number of config-request PDUs received by the IES from the CPE (client) device.
`ppp lcp echo-request`	=	The number of echo-request PDUs received by the IES from the CPE (client) device.
`ppp lcp echo-reply`	=	The number of echo-reply PDUs received by the IES from the CPE (client) device.
`pppoe padi`	=	The number of padi PDUs sent by the IES to the BRAS.
`pppoe pado`	=	The number of pado PDUs sent by the BRAS to the IES.
`pppoe padr`	=	The number of padr PDUs sent by the IES to the BRAS.
`pppoe pads`	=	The number of pads PDUs sent by the BRAS to the IES.
`pppoe padt`	=	The number of padt PDUs sent and received by the IES.
`pppoe srvcname error`	=	The number of service name errors; for example, the IES's specified service is different than the BRAS's setting.

`pppoe ac system error`	=	The number of times the access concentrator experienced an error while performing the Host request; for example, when resources are exhausted in the access concentrator. This value does not include the number of times the IES checks the AC name field in the BRAS's reply PDU and finds a mismatch, however.
`pppoe generic error`	=	The number of other types of errors that occur in the PPPoE session between the IES and the BRAS.

66.7 Transparent LAN Service (TLS)

Transparent LAN Services (also known as VLAN stacking or Q-in-Q) allows a service provider to distinguish multiple customers VLANs, even those with the same (customer-assigned) VLAN ID, within its network.

Use TLS to add an outer VLAN tag to the inner IEEE 802.1Q tagged frames that enter the network. By tagging the tagged frames (“double-tagged” frames), the service provider can manage up to 4,094 VLAN groups with each group containing up to 4,094 customer VLANs. This allows a service provider to provide different services, based on specific VLANs, for many different customers.

A service provider’s customers may require a range of VLANs to handle multiple applications. A service provider’s customers can assign their own inner VLAN tags to traffic. The service provider can assign an outer VLAN tag for each customer. Therefore, there is no VLAN tag overlap among customers, so traffic from different customers is kept separate.

Before the IES sends the frames from the customers, the VLAN ID is added to the frames. When packets intended for specific customers are received on the IES, the outer VLAN tag is removed before the traffic is sent.

See Section 33.1.1 on page 258 for an example.

Note: You can NOT configure PPPoA-to-PPPoE and TLS settings on the same PVC.

Table 202 TLS Commands

COMMAND	DESCRIPTION	P
adsl tlspvc delete *<portlist><vpi><vci>*	Clears Transparent LAN Services (TLS) settings for the PVC.	M/H
adsl tlspvc set *<portlist><vpi><vci><ds-vcprofile*[*,us-vcprofile*]*><pvid><priority>*	Uses TLS to add an outer VLAN tag to the inner IEEE 802.1Q tagged frames that enter the network. By tagging the tagged frames ("double-tagged" frames) the service provider can manage up to 4094 VLANs groups with each group containing up to 4094 customer VLANs. This allows a service provider to provide different services, based on specific VLANs, for many different customers. Sets untagged traffic with a tag including the specified VLAN ID and priority. It traffic is already tagged, this command adds a tag with the specified VLAN ID and the original priority setting for the traffic, not the priority setting specified in the command.	M/H
adsl tlspvc show [*<portlist>*[*<vpi><vci>*]]	Displays the TLS settings for the specified port(s) or PVC(s).	L/L

66.7.1 TLS PVC Set Command Example

The following example adds VLAN tag 100 to traffic using the DEFVAL ATM profile on PVC (1/33) on port 2.

Figure 258 TLS PVC Set Command Example

```
ras> adsl tlspvc set 2 1 33 DEFVAL 100 0
```

66.7.2 TLS PVC Show Command Example

Figure 259 TLS PVC Show Command Example

```
ras> adsl tlspvc show 2
port vpi   vci  pvid pri DS/US vcprofile
---- --- ----- ----- --- ----------------------------------
   2   1    33   100   0 DEFVAL
```

66.8 IP Bridge PVC Commands

Use the commands in Section 62.6 on page 482 to set up and maintain PVCs for subscribers in an IP bridge.

66.9 PVC Upstream Limit Commands

Use these commands to limit the transmission rate for upstream traffic by PVC.

Table 203 PVC Upstream Limit Commands

COMMAND	DESCRIPTION	P
adsl uslimit enable [<*portlist*>[<*vpi*><*vci*>]]	Turns on the limit on the transmission rate for upstream traffic for the specified PVC.	H/H
adsl uslimit set <*portlist*><*vpi*><*vci*><*rate*>	Sets the limit on the transmission rate for upstream traffic for the specified PVC. (A PVC could be PVC, PPVC, IPBPVC or TLSPVC). Enable the upstream limit before using this command. *rate*: The limit on the transmission rate (1~65535 kbps) for upstream traffic.	H/H
adsl uslimit show [<*portlist*>[<*vpi*><*vci*>]]	Displays the limit(s) on the transmission rate for upstream traffic for the specified port(s) or PVC(s).	M/L
adsl uslimit disable [<*portlist*>[<*vpi*><*vci*>]]	Turns off the limit on the transmission rate for upstream traffic for the specified PVC.	H/H

Note: You can set this limit for regular PVCs, priority PVCs, TLS PVCs, and IP bridge PVCs.

66.9.1 Show PVC Upstream Limit Command Example

The following example shows the limits for port 1.

Figure 260 Show PVC Upstream Limit Command Example

```
ras> adsl uslimit show 1
port vpi   vci    rate enable type
---- --- ----- ------- ------ -------
   1   0    33   65535    -   pvc
   1  30    63   65535    -   ipbpvc
   1  31    64   65535    -   ipbpvc
```

66.9.2 Enable PVC Upstream Limit Command Example

The following example turns on the limit for the default PVC on port 1 (VPI 0, VCI 33).

Figure 261 Enable PVC Upstream Limit Command Example

```
ras> adsl uslimit enable 1 0 33
ras> adsl uslimit show 1
port vpi   vci    rate enable type
---- --- ----- ------- ------ -------
   1   0    33   65535    V   pvc
   1  30    63   65535    -   ipbpvc
   1  31    64   65535    -   ipbpvc
```

66.9.3 Disable PVC Upstream Limit Command Example

The following example turns off the limit for the default PVC on port 1 (VPI 0, VCI 33).

Figure 262 Disable PVC Upstream Limit Command Example

```
ras> adsl uslimit disable 1 0 33
ras> adsl uslimit show 1
port vpi   vci    rate enable type
---- --- ----- ------- ------ -------
   1   0    33   65535    -   pvc
   1  30    63   65535    -   ipbpvc
   1  31    64   65535    -   ipbpvc
```

66.9.4 Set PVC Upstream Limit Command Example

The following example sets the limit for the default PVC on port 1 (VPI 0, VCI 33).

Figure 263 Set PVC Upstream Limit Command Example

```
ras> adsl uslimit set 1 0 33 10000
ras> adsl uslimit show 1
port vpi   vci    rate enable type
---- --- ----- ------- ------ -------
   1   0    33   10000    -   pvc
   1  30    63   65535    -   ipbpvc
   1  31    64   65535    -   ipbpvc
```

67

ACL Commands

An ACL (Access Control Logic) profile allows the system to classify and perform actions on the upstream traffic. Use the ACL Profile commands to set up ACL profiles and the ACL Assignment commands to apply them to PVCs.

67.1 ACL Profile Commands

Use these commands to set up ACL profiles.

The following table describes common required values in ACL commands. Other values are discussed with the corresponding commands.

Table 204 ACL Command Input Values

LABEL	DESCRIPTION
name	The name of the ACL profile.
rule	The rule that classifies traffic flows.
action	One or more actions to perform on the classified packets. You can select one or more of the following actions. `rate` <*rate*> = Sets the transmission rate (1~65535 in kbps) for the matched traffic. `rvlan` <*rvlan*> = Replaces the VLAN ID with this VLAN ID (1~4094). `rpri` <*rpri*> = Replaces the priority with this priority (0 ~7) of the matched packets. `deny` = Drops the packets.

Table 205 ACL Commands

COMMAND	DESCRIPTION	P
switch acl profile set <*name*> <*rule*> <*action*>	Configures an ACL rule to classify the upstream traffic and perform action(s) on the classified traffic. Here are the criteria you can configure for rules in ACL profiles. The rules are listed in sequence from highest priority to lowest priority. The criteria within a rule are position-independent. etype <*etype*> vlan <*vlan-id*> etype <*etype*> smac <*mac-address*> etype <*etype*> dmac <*mac-address*> vlan <*vlan-id*> smac <*mac-address*> vlan <*vlan-id*> dmac <*mac-address*> smac <*mac-address*> dmac <*mac-address*> vlan <*vlan-id*> priority <*priority*> etype <*etype*> vlan <*vlan-id*> smac <*mac-address*> dmac <*mac-address*> priority <*priority*> protocol <*protocol*> srcip <*ip-address*>/<*mask-bits*> [dstip <*ip-address*>/<*mask-bits*> [tos <tos> [srcport <sport> <eport> [dstport <sport> <eport>]]]] where etype <*etype*> = Ethernet type (0~65535). vlan <*vlan-id*> = VLAN ID (1~4094). smac <*mac-address*> = Source MAC address. dmac <*mac-address*> = Destination MAC address. priority <*priority*> = Priority (0 ~ 7)	M/H

Table 205 ACL Commands

COMMAND	DESCRIPTION	P
	`protocol <protocol>` = Protocol type: tcp, udp, ospf, igmp, ip, gre, icmp or user specified IP protocol number <0 ~ 255>. `srcip <ip-address>/<mask-bits>` = Source IP address and subnet mask (0~32). `dstip <ip-address>/<mask-bits>` = Destination IP address and subnet mask (0~32). `tos <stos> <etos>` = Sets the ToS (Type of Service) range between 0 and 255. `srcport <sport> <eport>` = Source port range (0~65535). `dstport <sport> <eport>` = Destination port range (0~65535). The following guidelines apply to classifiers. You can apply one classifier for a protocol on a port's PVC. You cannot create a classifier that contains matching criteria for layer 2 and layer 3 fields. For example `switch acl profile set test protocol tcp vlan 15 deny` is not allowed as protocol type and VLAN do not belong to the same network layer. Each type of criteria can only be used once in a classifier. For example, `profile acl set test protocol tcp protocol udp deny` is not allowed. For this example, you need to create a separate classifier for each protocol and apply them to the same PVC(s).	
`switch acl profile delete <name>`	This command removes the specified ACL profile. You cannot remove an ACL profile that is currently in use.	M/H
`switch acl profile showmap <name>`	Displays the DSL port(s) to which the specified ACL profile is applied.	L/L
`switch acl profile show [<name>]`	Lists the names of every ACL profile or displays the detailed settings of the specified ACL profile.	L/L

67.1.1 ACL Profile Set Command Example

This example creates an ACL rule example named test for traffic from VLAN 10 with a priority level of 2. This rule limits the rate on the classified traffic to 1000 kbps and changes the priority level to 7.

```
ras> switch acl profile set test vlan 10 priority 2 rate 1000 rpri 7
```

67.1.2 ACL Profile Show Map Command Example

This example displays the port mapping table for the “test” ACL profile.

```
ras> switch acl profile showmap test
profile: test
port type   vpi   vci
---- ------ --- -----
```

67.1.3 ACL Profile Show Command Example

This example displays the detailed settings of the “test” ACL profile.

```
ras> switch acl profile show test
profile test:
rule:
  vlan   :10
  priority:2

action:
  rpri    :7
  rate    :1000
```

67.2 ACL Assignment Commands

Use these commands to apply ACL profiles to PVCs.

The following table describes common required values in ACL assignment commands. Other values are discussed with the corresponding commands.

Table 206 ACL Assignment Command Input Values

LABEL	DESCRIPTION
<port-list>	The port number of the PVC. You can specify a single ADSL port <1>, all ADSL ports <*> or a list of ADSL ports <1,3,5>. You can also include a range of ports <1,5,6~10>.
<vpi>	The VPI of the PVC.
<vci>	The VCI of the PVC.
<profile>	The name of the ACL profile.

The following is a list of the ACL assignment commands.

Table 207 ACL Assignment Commands

COMMAND	DESCRIPTION	P
switch acl set *<port-list>* *<vpi>* *<vci>* *<profile>*	Applies an ACL profile to the specified port(s). You can apply up to eight profiles to a subscriber port.	M/H
switch acl delete *<port-list>* *<vpi>* *<vci>* *<profile>*	Removes an ACL profile from the specified PVC.	M/H
switch acl show [*<port-list>*] [*<vpi>* *<vci>*]	Displays the ACL profiles currently applied to the specified PVC(s).	L/L

67.2.1 ACL Assignment Set Command Example

This example applies the ACL profile “test” to a PVC.

```
ras> switch acl set 1 0 33 test
```

67.2.2 ACL Assignment Show Command Example

This example displays the ACL profiles applied to the ACL profile “test”.

```
ras> switch acl show
port vpi   vci type profile
---- --- ----- ---- --------------------------------
   1   0    33 PVC  test
```

68

VoIP Commands

This chapter describes the Voice over IP management commands.

68.1 General VoIP Command Parameters

The following table describes commonly used VoIP command parameter notation.

Table 208 General VoIP Command Parameters

NOTATION	DESCRIPTION
sip-profile	The name of the SIP profile (up to 31 characters).
svc-profile	The name of the call service profile (up to 31 characters).
dsp-profile	The name of the DSP profile (up to 31 characters).
num-table	The name of the SIP numbering plan table (up to 31 characters).
port-list	You can specify a single port (1), all ports (*) or a list of ports (1,3). You can also include a range of ports (1,5,6~10).

68.2 VoIP Show Commands

The following table describes the voip show commands.

Table 209 General VoIP Commands

COMMAND	DESCRIPTION	P
voip show lineinfo <*port-range*>	Displays VoIP line information about the specified range of ports.	L/L

Table 209 General VoIP Commands (continued)

COMMAND	DESCRIPTION	P
`voip show linestat <port-range>`	Displays the service state and phone state of the specified range of ports.	L/L
`voip show voip sip serverstate [<proxysvr-ip>|<proxysvr-dn>]`	Displays the specified SIP server status. *proxysvr-ip*: The SIP server's IP address. ***proxysvr-dn***: The SIP sever's domain name. Possible response values are: • Disabled • Out-of-service • Idle • Waiting-for-dialing • Dialing-out • Ringing • Conversation-caller • Conversation-callee • Fax/Modem-caller • Fax/Modem-callee • Waiting-for-on-hook • Alerting-off-hook • Power-cut-down	L/L

68.3 voip countrycode Commands

Use these commands to set the country of operation, or the country with the same configuration as the country of operation. The following lists the variables affected by the selected countrycode.

- AC impedance
- PCM companding law
- Cadence ring
- Flash time
- Pulse dial interval
- Pay-signal type

The following table lists the accepted `country` and `countrycode` values.

```
country            countrycode
USA                0
Japan              1
Taiwan             2
```

```
Austria          3
Belgium          4
Czech            5
Denmark          7
Finland          8
Italy            12
Netherlands      14
Norway           15
Spain            19
Sweden           20
Switzerland      21
UK               22
Germany          23
Australia        25
New_zealand      26
Ireland          30
Russia           32
China            36
Vietnam          43
Brazil           44
```

The following table lists the `countrycode` commands.

Table 210 voip countrycode Commands

COMMAND	DESCRIPTION	P
`voip countrycode set` <*country*>|<*countrycode*>	Use this command to configure regional settings for VoIP parameters. By default the IES is configured for use in the USA (countrycode `0`).	M/H
`voip countrycode show`	This command displays the region for which the IES is currently configured, and provides details of the specific settings.	L/L
`voip sip dialplan delete` <*name*>	Use this command to delete a dialplan table	
`voip sip dialplan map` [<*name*>]	Use this command to display a specified dialplan table's mappings.	
`voip sip dialplan set` <*name*> <*pattern*> <*num-of-prefix-cut*> <*sip-server*> [<*prefix-add-digits*> <*number-of-digits*> <*interdigit-timeout*>]	Use this command to create a dialplan table.	
`voip sip dialplan show` [<*name*>]	Use this command to display a specified dialplan table.	

Table 210 voip countrycode Commands (continued)

COMMAND	DESCRIPTION	P
voip sip keypattern delete <*name*>	Use this command to delete a specified keypattern table.	L/L
sip keypattern map *[<name>]*	Use this command to display a specified keypattern table's mappings.	L/L
voip sip keypattern set <*name*> <*service-type*> <*pattern*>	Use this command to create a keypattern table.	L/L
voip sip keypattern show [<*name*>]	Use this command to display a specified keypattern table.	L/L
voip sip localcall show	Use this command to display the IES localcall timing settings. The local call time feature allows subscribers to call other subscribers if the IES cannot connect to a SIP server.	L/L
voip sip localcall time <*enter-time*> <*exit-time*>	Use this command to set up the IES's localcall timing parameters. *enter-time*: Sets how long (in minutes) that the system should wait after losing the connection to the SIP server before using the local call feature. Range is **1~60**. *exit-time*: Sets how long (in minutes) that the system should wait after regaining the connection to the SIP server before it stops using the local call feature. Range is **1~60**.	L/L
voip sip localhelp delete <*name*>	Use this command to delete a specified localhelp table.	L/L
voip sip localhelp map [<*name*>]	Use this command to show a specified localhelp table's mappings.	L/L
voip sip localhelp set <*name*> <*index*> [<*tel-number*>]	Use this command to create a localhelp table.	L/L
voip sip localhelp show [<*name*>]	Use this command to display the specified localhelp table.	L/L

68.3.1 voip countrycode set Command Example

The following example configures the IES for use in the Czech Republic.

```
ras> voip countrycode set 5
```

68.3.2 voip countrycode show Command Example

An example of using this command is shown next.

```
ras> voip countrycode show
Country Code        : 25,Australia
law                 : alaw
impedance           : 220ohm_820ohm_120nf
loop current        : 25 mA
tax type            : metering

Ring parameters:
frequency           : 25.0 Hz
amplitude           : 53.0 Vrms
onTime1             : 0.40 seconds
offTime1            : 0.20 seconds
onTime2             : 0.40 seconds
offTime2            : 2.00 seconds

Pulse parameters:
flashMin            : 90 ms
flashMax            : 500 ms
breakMin            : 47 ms
breakMax            : 80 ms
makeMin             : 30 ms
makeMax             : 55 ms
interDigitMin       : 250 ms

Meter parameters:
frequency           : 12 kHz
onTime              : 200 ms
offTime             : 200 ms

Caller ID parameters:
CID type            : prior ring
payload type        : ETSI-MDMF
first TAS type      : DT-AS
second TAS type     : NULL
first TAS interval  : 300 ms
second TAS interval : 0 ms
start to ring       : 400 ms (prior ring only)

Tones parameters:
dial tone                : 425Hz -18.0dB continuous
ring back tone           : 400+450Hz -18.0dB on 0.400s off 0.200s
busy tone                : 425Hz -18.0dB on 0.380s off 0.380s
reorder tone             : 480+620Hz -24.0dB on 0.250s off 0.250s
congestion tone          : 425Hz -18.0dB on 0.380s off 0.380s
special dial tone        : 350+440Hz -13.0dB continuous
call waiting tone #1     : 425Hz -18.0dB on 0.200s off 0.200s
call waiting tone #2     : 425Hz -18.0dB on 0.200s off 4.400s
MWI tone                 : 350+440Hz -13.0dB on 0.100s off 0.100s
ROH tone                 : 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s
warning tone             : 480+620Hz -24.0dB on 0.250s off 0.250s
                           480+620Hz -24.0dB on 0.250s
confirmation tone        : 600Hz -24.0dB on 0.125s off 0.125s
                           600Hz -24.0dB on 0.125s
```

68.4 voip diagnostic Commands

Use these commands to perform a variety of standard Metallic Line Tests on the subscriber ports.

Table 211 voip diagnostic Commands

COMMAND	DESCRIPTION	P
`voip diagnostic mlt test <port> <option> [user] [force]`	This command performs a variety of standard Metallic Line Tests on the specified connection. *port*: Port number 1~48 *option*: The type or types of tests to be run. Allowed values are: *all*: Perform all test on the line connected to the specified port. *vac*: Test the line's AC voltage only. *vdc*: Test the line's DC voltage only. *rload*: Test the line's load resistance only. *riso*: Test the line's isolation resistance only. *cap*: Test the line's capacitance only. *ren*: Test the line's ringer equivalent number only. *ring*: Test the line's ring voltage only. *metering*: Test the line's metering voltage only. *dialtone*: Test the line's dialtone only. *digit*: Test the line's DTMF response only. If this variable is used without the *user* variable, then it reflects the test tones back at itself and checks for the expected correctness of said response; if used with the *user* variable, then the test tones are sent to the device at the end of the line and the user must input DTMF response. *roh*: Test the line's receive on-hook (roh) text only. *user*: User inputs DTMF tone when testing the *digit* variable. *force*: Perform the test(s) immediately, even if the specified port is in use.	M/H
`voip diagnostic mlt show <port>`	This command displays the results of the last Metallic Line Test that was run on the specified port.	L/L
`voip diagnostic mlt relay set <port> off [force]`	Perform specified MLT relay function, or turn off MLT relay function in specified subscriber. *port*: Port number, 1~48 *off*: Turn off relays *force*: Force to set relays even the port is in use. By default, the relay function is turned off.	M/H

Table 211 voip diagnostic Commands (continued)

COMMAND	DESCRIPTION	P
`voip diagnostic mlt relay set <port> in|out|both [<timeout> [force]]`	Perform specified MLT relay function, or turn off MLT relay function in specified subscriber. *port*: Port number, 1~48 *in*: Turn on test-in relay. *out*: Turn on test-out relay. *both*: Turn on test-in and test-out relay. *timeout*: Relays will be turned off automatically while the specified timer is timeout, 1~65535 minutes. *force*: Force to set relays even the port is in use. By default, the relay function is turned off.	M/H
`voip diagnostic mlt relay show`	This command shows the test relay condition of the IES. Test relay functions are off by default.	L/L

68.4.1 voip diagnostic mlt test Command Example

The following example tests the REN of the line connected to port 8.

```
ras> voip diagnostic mlt test 8 ren
```

68.4.2 diagnostic mlt show Command Example

The following example shows the result of the last test conducted on the line connected to port 8.

```
ras> voip diagnostic mlt show 8
Port 8: testing
Foreign AC Voltage Test Results
vTip      = 0.0 Vrms
vRing     = 0.0 Vrms
vDiff     = 0.0 Vrms
Foreign DC Voltage Test Results
vTip      = 0.0 Volts
vRing     = 0.0 Volts
vDiff     = 0.0 Volts
DC Loop Resistance Test Results
rLoop     = 4390.2 Ohms
Three-Element Resistance Test Results
rTG       = OPEN
rRG       = OPEN
rTR       = OPEN
No Three-Element Capacitance Test Results
Ringer Equivalence Numer Test Results
REN       = 2147483647.2147483647
No Ringing Voltage Test Results
No Metering Voltage Test Results
ras>
```

68.4.3 voip diagnostic mlt relay set Command Example

The following example allows diagnostic testing (both directions) on port 8.

```
ras> voip diagnostic mlt relay set 8 both
```

68.5 voip ip Commands

Use these commands to manage the IP address, VLAN and DNS details for VoIP services.

Table 212 voip ip Commands

COMMAND	DESCRIPTION	P
`voip ip set <ip-address>[/<mask-bits>] <vid>`	Use this command to configure the IP address, subnet mask (*mask-bits*) and VLAN ID (*vid*) of the IES used for VoIP communications.	M/H
`voip ip dns [ip-address]`	This command sets the DNS (Domain Name Service) server IP address for VoIP communications. *ip-address*: The IP address of the DNS server. When you do not specify a DNS server IP address, the IES displays the IP address of the currently-configured DNS server.	M/H
`voip ip gateway <ip-address>`	This command sets the IP address of the default outbound gateway for VoIP communications.	M/H

68.5.1 voip ip set Command Example

The following example sets the IES to use the IP address 111.11.11.1 with a 24-bit subnet mask (255.255.255.0) and VLAN ID 22 for VoIP communications.

```
ras> voip ip set 111.11.11.1/24 22
```

68.5.2 voip ip dns Command Example

The following example sets the IES to use the DNS server at 123.44.55.66.

```
ras> voip ip dns 123.44.55.66
```

68.6 voip port Commands

Use these commands to manage which of the IES’s ports are used for VoIP services, and specify which SIP, SVC and DSP profiles each port uses.

Table 213 voip port Commands

COMMAND	DESCRIPTION	P
`voip port disable <port-list>`	Use this command to turn the specified subscriber port(s) off. The subscriber port(s) cannot be used for VoIP services. Subscriber ports are disabled by default.	M/H
`voip port enable <port-list>`	Use this command to turn the specified subscriber port(s) on. The subscriber port(s) can be used for VoIP services.	M/H
`voip port show <port-list>`	Use this command to see whether or not the specified port(s) are active, and the SIP, call service (SVC) and DSP profiles each uses.	L/L
`voip port sip set <port-list> <sip-profile> <svc-profile> [<dsp-profile>]`	Configure related profiles to specified subscriber(s). <portlist>: Port number, for example *, 3~5, 10~15. <profile>: SIP or dial plan profile name. Enter up to 31 characters. <svc-profile>: Service profile name. Enter up to 31 characters. <dsp-profile>: DSP profile name. Enter up to 31 characters. By default, all ports refer to the profile "DEFVAL" for all three kinds of profiles.	M/H
`voip port sip opmode <port-list> <DEFVAL|v5sip>`	Use this command to set the default sip mode or v5 sip mode for each port. *DEFVAL* means SIP is being used to connect to a server. **v5sip** means V5.2 is being used to connect to a traditional class 5 POTS switch.	M/H
`voip port name <port-list> <name>`	Use this command to set a port name.	M/H
`voip port pots gain <port-list> <tx-gain> <rx-gain>`	Use this command to set a port’s power gain level for outgoing (TX) and incoming (RX). *tx-gain*: Enter a unit of -20~20 in units of 1 dB to adjust the outgoing gain. *rx-gain*: Enter a unit of -20~20 in units of 1 dB to adjust the incoming gain. A negative value indicates a decreased volume.	M/H

Table 213 voip port Commands (continued)

COMMAND	DESCRIPTION	P
`voip port pots impedance <port-list> <impedance>`	Use this command to set a port's impedance level. *impedence*: Indicates the default VoIP port AC impedance. The default impedance value depends on the country code. For more information on impedance and country code, see Section 68.3 on page 560.	M/H
`voip port tel <port> [<phone number>]`	Enter the telephone number for the specified port. *port*: Port number, 1~48 *phone number*: Enter up to 15 alphanumeric characters, or use two quotation marks ("") to clear the field. Note: The telephone number must be unique. By default, there is no telephone number.	M/H

68.6.1 voip port show command Example

The following example shows the current VoIP status of ports 6, 7 and 8.

```
ras> voip port show 6~8

port enable SIP profile                     VoIP Tel
            DSP profile                     CallService Profile
---- ------ ------------------------------- ------------------------------
   6   V    SIP_PROFILE_1                   5551234
            DSP_PROFILE_1                   DEFVAL
   7   V    SIP_PROFILE_2                   5555678
            DSP_PROFILE_2                   DEFVAL
   8   -    DEFVAL
            DEFVAL                          DEFVAL
ras>
```

68.6.2 voip port sip set Command

The following example sets port 14 to use the SIP_PROFILE_1, SVC_PROFILE_1 and DSP_PROFILE_1 profiles.

```
ras> voip port sip set 14 SIP_PROFILE_1 SVC_PROFILE_1 DSP_PROFILE_1
```

68.7 voip profile dsp Commands

Use these commands to set up and manage Digital Signal Processing for the IES’s VoIP functions. Each DSP profile specifies VoIP-related attributes, such as the voice codecs to use in a given session.

Table 214 voip dsp Commands

COMMAND	DESCRIPTION	P
`voip profile dsp delete` <*dsp-profile*>	This command removes the specified DSP profile.	M/H
`voip profile dsp map` <*dsp-profile*>	This command displays which subscribers use the specified DSP profile.	L/L

Table 214 voip dsp Commands (continued)

COMMAND	DESCRIPTION	P
voip profile dsp set <*name*> *[codec <codec>[,<codec> ...]] [echotail <echo-tail>] [playbuffer <min-delay> <max-delay>] [echocancel off|on] [vad off|on] [g711vpi <g711-vpi>] [g723vpi <g723-vpi>] [g726vpi <g726-vpi>] [g729vpi <g729-vpi>]*	This command creates and configures a DSP (Digital Signal Processing) profile. *name*: Enter up to 31 characters. *codec*: Enter one of the following codecs: G.711a: *g711a* G.711mu: *g711mu* G.723: *g723* 16 kbps: *g726-16* 24 kbps: *g726-24* 32 kbps: *g726-32* 40 kbps: *g726-40* G.729 a & b: *g729ab* *echo-tail*: The echo cancellation echo tail period in milliseconds (8, 16, 32 or 128). *min-delay*: The play buffer minimum delay in milliseconds (10~500). This value should be less than or equal to *max-delay*. *max-delay*: The play buffer maximum delay in milliseconds. This value should be greater or equal to the *min-delay*. *g711-vpi*: The G.711 voice package interval in milliseconds (10, 20, 30 or 40 only). *g723-vpi*: The G.723 voice package interval in milliseconds (either 30 or 60 only). *g726-vpi*: The G.726 voice package interval in milliseconds (10, 20, 30 or 40 only). *g729-vpi*: The G.729 voice package interval in milliseconds (10, 20, 30, 40, 50 or 60 only). The default profile "DEVAL" has the following settings: Codec: G.711a, G711mu Min-delay: 30ms Max-delay: 120ms Echo tail: 32ms	M/H
voip profile dsp show [*name*]	This command displays the settings of the specified DSP profile, or displays the names of all DSP profiles if none is specified.	L/L

68.7.1 voip profile dsp delete Command Example

An example is shown to delete a DSP profile named "digsig1".

```
ras> voip profile dsp delete digsig1
```

68.7.2 voip profile dsp map Command Example

The following example displays the subscribers that use a DSP profile named "digsig3".

```
ras> voip profile dsp map digsig3
         1         2         3         4
123456789012345678901234567890123456789012345678
------------------------------------------------
VVVVVVVVVVVVVVVVVVVVVVVVVVVV

ras>
```

68.7.3 voip profile dsp show Command Example

The following example shows the use of this command.

```
ras> voip profile dsp show
dsp profile(s)
-------------------------
1. DEFVAL
2. digsig4

ras> voip profile dsp show digsig4
dsp profile       : digsig4
codec             : g726-40  g726-32  g726-16
playbuff min-delay: 30
playbuff max-delay: 90
echotail          : 16
```

68.7.4 voip profile dsp set Command Example

The following example shows a command configuring a DSP profile named "digsig4" with the following settings:

- Codec: G.726 (40 bits), G.726 (32 bits), G.726 (16 bits).
- Min-delay: 30ms
- Max-delay: 90ms
- Echo tail: 64ms

```
ras> voip profile dsp set digsig4 codec g726-40,g726-32,g726-16 playbuffer
30 90 echotail 64
```

68.8 voip profile sip Commands

Use these commands to set up and manage SIP profiles. SIP profiles map to ports on the IES, and contain the SIP server connection details.

Table 215 voip profile sip Commands

COMMAND	DESCRIPTION	P
`voip profile sip delete` <*sip-profile*>	This command removes the specified SIP profile.	M/H
`voip profile sip map` <*sip-profile*>	This command displays which subscribers use the specified SIP profile.	L/L

Table 215 voip profile sip Commands (continued)

COMMAND	DESCRIPTION	P
`voip profile sip set` <*sip-profile*> <*sip-ip*>|<*sip-dn*> <*regsvr-ip*>|<*regsvr-dn*> [sipport <*sip-port*>] [regsvrport <*regsvr-port*>] [proxysvrport <*proxysvr-port*>] [uritype <sip|tel>] [pbit <*pbit*>] [dscp <*dscp*>] [keepalive <off|on> <*se*>] [prack <on|off>]	This command creates and configures a SIP profile. *sip-ip*: The SIP server IP address. *sip-dn*: The SIP server domain name (maximum 256 characters). *regsvr-ip*: The SIP registrar server IP address. *regsvr-dn*: The SIP registrar server domain name (maximum 256 characters). *proxysvr-ip*: The SIP proxy server IP address. *proxysvr-dn*: The SIP proxy server domain name (maximum 256 characters). *sip-port*: The SIP server port number (1025 ~ 65535). *regsvr-port*: The registrar server port number (1025 ~ 65535). *proxysvr-port*: The SIP proxy server port number (1025 ~ 65535). `uritype SIP`: The profile uses SIP URI. `uritype TEL`: The profile uses TEL URI. *pbit*: The IEEE 802.1p priority tag for SIP and RTP packets (0 ~ 7). *dscp*: The DiffServ Code Point for SIP and RTP packets (0 ~ 63). *keepalive*: Turn SIP session keepalive off or on. When this is on, the SIP UA periodically sends SIP session refresh requests. *se*: The session expiration time in seconds (90 ~ 65535) *prack*: The PRovisional ACKnowledgement response sent in reply to a SIP INVITE request. PRACK support can be activated (`prack on`) or deactivated (`prack off`). The values of the default SIP profile "DEFVAL" are as follows: SIP server domain name: 0.0.0.0 SIP registrar server domain name: 0.0.0.0 SIP proxy server domain name: 0.0.0.0 SIP server port number: 5060 SIP registrar server port number: 5060 SIP proxy server port number: 5060 URI type: SIP IEEE 802.1p tag: 7 DSCP tag: 48 Keep alive: off PRACK: off	M/H

Table 215 voip profile sip Commands (continued)

COMMAND	DESCRIPTION	P
voip profile sip show [*sip-profile*]	This command displays the settings of the specified SIP profile, or displays the settings of all SIP profiles if none is specified.	L/L

68.8.1 voip profile sip delete Command Example

An example is shown to delete the SIP profile named “bar”.

```
ras> voip profile sip delete bar
```

68.8.2 voip profile sip map Command Example

The following example displays the ports that map to a SIP profile named “SIP12”.

```
ras> voip profile sip map SIP12
         1         2         3         4
123456789012345678901234567890123456789012345678
------------------------------------------------
VVVVVVVVVVVVVVVVVVVVVVVVVVVV

ras>
```

68.8.3 voip profile sip set Command Example

The following example shows a command configuring a SIP profile named “sip10” with the following settings:

- SIP server domain name: host1.domain1
- SIP registrar server domain name: host2.domain2
- SIP proxy server domain name: host3.domain3
- SIP server port number: 5061
- SIP registrar server port number: 5062
- SIP proxy server port number: 5063
- URI type: SIP
- IEEE 802.1p tag: 5
- DSCP tag: 36
- Keep alive: on
- SE: 1000

• PRACK: on

```
ras> voip profile sip set sip10 host1.domain1 host2.domain2 host3.domain3
sipport 5061 regsvrport 5062 proxysvrport 5063 uritype sip pbit 5 dscp 36
keepalive on 1000 prack on
```

68.8.4 voip profile sip show Command

An example of using this command is shown next.

```
ras> voip profile sip show
sip profile    : DEFVAL
sip-dn         : 0.0.0.0
sip-port       : 5060
regsvr-ip/dn   : 0.0.0.0
regsvr-port    : 5060
proxysvr-ip/dn : 0.0.0.0
proxysvr-port  : 5060
uritype        : sip
pbit           : 7
dscp           : 48
keepalive      : off
prack          : off

sip profile    : sip10
sip-dn         : host1.domain1
sip-port       : 5061
regsvr-ip/dn   : host2.domain2
regsvr-port    : 5062
proxysvr-ip/dn : host3.domain3
proxysvr-port  : 5063
uritype        : sip
pbit           : 5
dscp           : 36
keepalive      : 1000 seconds
prack          : on

ras>
```

68.9 voip profile sip callsvc Commands

Use these commands to set up and manage the VoIP call service profiles. The call service profiles contain details about individual SIP accounts, as well as controlling the call services the subscribers can use.

Table 216 voip profile sip callsvc Commands

<table>
<tr><th>COMMAND</th><th>DESCRIPTION</th><th>P</th></tr>
<tr><td>voip profile sip callsvc delete *<svc-profile>*</td><td>This command removes the specified SIP call service profile.</td><td>M/H</td></tr>
<tr><td>voip profile sip callsvc map *<svc-profile>*</td><td>This command displays which subscribers use the specified SIP call service profile.</td><td>L/L</td></tr>
<tr><td>voip profile sip callsvc set *<name>*
[callhold on|off]
[callreturn on|off]
[calltransfer on|off]
[callwait on|off]
[cidcw on|off]
[clip on|off]
[clir on|off]
[dnd on|off]
[dtmf bypass|rfc2833|sipinfo|rfc2833like|plaintext]
[fax t38|g711]
[flash invite|rfc2833|rfc2833like|sipinfo1|sipinfo2|sipinfo3|sipinfo4|{sipinfo5 [<rc>]}||{sipinfo6 [<si>]}]
[keypattern <pattern-table>]
[localcall on|off]
[localhelp off|{on <tel-number> <localhelp-table> [<tel-number> <localhelp-table> ...]}]
[mwi on|off]
[numberplan off|{on <cc> <ndc> <numberplan-table>}]
[nopassword|{password <password>}]
[reanswer <ra>]
[registration off|{on [<re>]}]</td><td>This command creates and configures a SIP call service profile.

cc: E.164 country code, enter up to 7 characters.

localhelp-table: Local help table name (maximum 31 characters).

name: Enter up to 31 characters.

ndc: E.164 national destination code (maximum 7 characters).

numberplan-table: Numbering plan table name (maximum 31 characters).

password: Password for SIP registration (maximum 31 characters).

pattern-table: Key pattern table name (maximum 31 characters).

ra: Re-answer time, 0~30 seconds.

rc: Replace characters (maximum 7 characters).

re: Registration expiration time, 120~65535 seconds.

si: Specified information (maximum 31 characters).</td><td>M/H</td></tr>
</table>

Table 216 voip profile sip callsvc Commands (continued)

COMMAND	DESCRIPTION	P
	sipinfo1: Relays flash in SIP INFO packets (a signal=16 message). This field describes how the system processes the flash signal from a user. *sipinfo2*: Relays flash in SIP INFO packets (a signal=hf message). This field describes how the system processes the flash signal from a user. *sipinfo3*: Relays flash in SIP INFO packets (a signal=hook-flash message). This field describes how the system processes the flash signal from a user. *sipinfo4*: Relays flash in SIP INFO packets (a plain text "FLASH" message). This field describes how the system processes the flash signal from a user. *sipinfo5*: Relays flash in SIP INFO packets (multiple SIP messages). The message content is determined by the characters you enter in the field that appears to the right of the list. A separate SIP INFO message is sent for each character you enter. This field describes how the system processes the flash signal from a user. *sipinfo6*: Relays flash in SIP INFO packets (where the content of the message is determined by the text you enter in the field that appears to the right of the list). This field describes how the system processes the flash signal from a user. *tel-number*: Local help telephone number (maximum of 15 numberical digits). Note: There are at most 8 local help telephone number and table sets.	
voip profile sip callsvc show [*svc-profile*]	This command displays the settings of the specified SIP call service profile, or displays the settings of all call service profiles if none is specified.	L/L
voip profile sip dialplan delete <*name*>	Use this command to delete a specified dialplan profile. The IES uses dial plans to identify specific types of phone numbers dialed by a user, and to process the number before transmission by deleting or adding digits according to the relevant rule.	L/L
voip profile sip dialplan map *[<name>]*	Use this command to show a specified dialplan profile's mapping status.	L/L

Table 216 voip profile sip callsvc Commands (continued)

COMMAND	DESCRIPTION	P
voip profile sip dialplan set *<name> <index> [<dialplan-table>]*	Use this command to associate a specified dialplan profile with a dialplan table.	L/L
voip profile sip dialplan show *[<name>]*	Use this command to display details about a specified dialplan profile.	L/L

68.9.1 voip profile sip callsvc delete Command Example

An example is shown to delete the call service profile named “sp16”.

```
ras> voip profile sip callsvc delete sp16
```

68.9.2 voip profile sip callsvc map Command Example

An example is shown, displaying the ports that use a SIP call service profile named “sip-cs001”.

```
ras> voip profile sip callsvc map sip-cs001
         1         2         3         4
123456789012345678901234567890123456789012345678
------------------------------------------------
VVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVV

ras>
```

68.9.3 voip profile sip callsvc set Command Example

The following example shows a command configuring a SIP call service profile named “csp1” with the following settings:

- Password: “1959”
- Numbering plan: on
- DND: on
- Country code: 49
- National destination code: 40
- Numbering plan table: “plan9”
- call holding: off
- call waiting: off
- CLIP: off
- CLIR: on
- call transferring: on

- Fax: T-38
- DTMF: SIP INFO

```
ras> voip profile sip callsvc set csp1 password 1959 numberplan on 49 40
plan9 callhold off callwait off clip off clir on calltransfer on dtmf sipinfo
fax t38
```

68.9.4 voip profile sip callsvc show Command Example

An example of using this command is shown next.

```
ras> voip profile sip callsvc show
callsvc profile : DEFVAL
password        : none
dnd             : on
callhold        : on
callwait        : on
clip            : on
clir            : on
calltransfer    : on
fax             : g711
dtmf            : bypass
numberplan      : off
    cc          :
    ndc         :
    name        : DEFVAL

callsvc profile : csp1
password        : 1959
dnd             : on
callhold        : off
callwait        : off
clip            : off
clir            : on
calltransfer    : on
fax             : t38
dtmf            : sipinfo
numberplan      : off
    cc          : 49
    ndc         : 40
    name        : plan9

ras>
```

68.10 voip sip numberplan Commands

Use these commands to manage the VoIP numbering plans used by the IES. The numbering plans translate dialed numbers according to the rules you set.

Table 217 voip sip numberplan Commands

COMMAND	DESCRIPTION	P
voip sip numberplan delete <*num-table*>	This command removes the specified SIP numbering plan table.	M/H
voip sip numberplan map [*num-table*]	This command displays which SIP call service profiles refer to the specified SIP numbering plan table.	L/L
voip sip numberplan set <*num-table*> <*index*> [<*pattern*> <*rule*>]	This command replaces the *pattern* (the dialed number) with the specified *rule*. The IES applies the rules in numerical order, from 1 ~ 16, so ordering is important. *index*: The entry number (1 ~ 16) in the numberplan table. *pattern*: The dialed number for which this rule applies. Allowed characters are: the numerals “0” ~ “9”, asterisks “*”, and a maximum of one pair of parentheses “(” and “)”. For example: “002(1*)” *rule*: The value with which the pattern is to be replaced: “\c”: Countrycode. “\d”: National destination (region) code/ “\1”: The numbers enclosed by the parentheses in the *pattern*. “deny”: The *pattern* is not allowed.	M/H
voip sip numberplan show [*name*]	Display the entries in the specified numbering plan table.	L/L

68.10.1 voip sip numberplan delete Command Example

An example is shown to delete the numbering plan table named “foo”.

```
ras> voip sip numberplan delete foo
```

68.10.2 voip sip numberplan map Command Example

An example of using this command is shown, displaying the SIP call service profiles that map to a numbering plan table named “b2”.

```
ras> voip sip numberplan map b2
index name
----- --------------------------------
    1 grilp
    2 sw
```

68.10.3 voip sip numberplan set Command Example

The following example shows a command defining a rule (number 1 in the numberplan “cx”) that replaces the dialed number “002(*)” with the numbers enclosed by the parentheses. In this example, a dialed number “0024401473123456” would be translated to “4401473123456”.

```
ras> voip sip numberplan set cx 1 002(*) \1
```

69

Firmware and Configuration File Maintenance

This chapter tells you how to upload a new firmware and/or configuration file for the IES.

69.1 Firmware and Configuration File Maintenance Overview

The IES's built-in FTP server allows you to use any FTP client (for example, ftp.exe in Windows) to upgrade IES firmware or configuration files. The firmware or configuration file upgrade is done during operation (run-time).

Note: Do not turn off the power to the IES during the file transfer process, as it may permanently damage your IES.

Note: The IES automatically restarts when the upgrade process is complete.

69.2 Filename Conventions

The configuration file (called config-0) contains the factory default settings in the menus such as password, IP address, VLANs and so on. The configuration file arrives with a "rom" filename extension.

The OS (Operating System) firmware (sometimes referred to as the "ras" file) has a "bin" filename extension. With many FTP and clients, the filenames are similar to those shown next.

Figure 264 FTP Put Configuration File Example

```
ftp> put firmware.bin ras
```

This is a sample from a FTP session to transfer the computer file `firmware.bin` to the IES.

Figure 265 FTP Get Configuration File Example

```
ftp> get config-0 config.txt
```

This is a sample from a FTP session to transfer the IES's current configuration file (including the configuration files of all the IES) to the computer file `config.txt`.

If your FTP client does not allow you to have a destination filename different than the source, you will need to rename them as the IES only recognizes "config-0" and "ras". Be sure you keep unaltered copies of the files for later use.

The following table is a summary. Please note that the internal filename refers to the filename on the IES and the external filename refers to the filename not on the IES, that is, on your computer, local network or FTP site and so the name (but not the extension) may vary. After uploading new firmware, use the sys version command on the IES to confirm that you have uploaded the correct firmware version.

Table 218 Filename Conventions

FILE TYPE	INTERNAL NAME	EXTERNAL NAME	DESCRIPTION
Configuration File	`config-0`	`*.dat`	This is the configuration filename for the IES.
Firmware	`ras`	`*.bin`	This is the Operating System firmware on the IES.

69.3 Editable Configuration File

The configuration file can be downloaded as a plain-text (ASCII) file. Edits to the configuration can be made to this file before it is uploaded again to the IES.

Note: You can change the ".dat" file to a ".txt" file and still upload it back to the IES.

Note: Do not upload any invalid files to the IES's configuration file, as it may permanently damage your IES.

69.3.1 Editable Configuration File Backup

Configure your system, and then use FTP to backup the plain-text configuration file onto your computer. Do the following to backup the configuration file:

Use an FTP client to connect to the IES.

Figure 266 Example: Use an FTP Client to Connect to the IES

```
C:\> ftp <IES IP address>
Type your user name and press [ENTER].
User (172.23.15.86:(none)): admin
```

Enter the management password (1234 by default).

Figure 267 Example: Enter the Management Password

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

Use `get` to transfer the configuration file to the computer. The configuration file on the system (that you want to backup to the computer) is named `config-0`.

Figure 268 Example: Get the Configuration File config-0

```
ftp> get config-0
```

Quit FTP.

Figure 269 Example: Close FTP Client

```
ftp> quit
```

69.3.2 Edit Configuration File

Open the `config-0` file via Notepad (see the following example) and edit to a desired configuration.

Note: Ensure that any changes you make to the commands in the configuration file correspond to the commands documented in this User's Guide. The wrong configuration file or an incorrectly configured configuration file can render the device inoperable.

Figure 270 Configuration File Example

```
#### sysinfo
sys info hostname ""
sys info location ""
sys info contact ""
#### snmp
sys snmp getcommunity public
sys snmp setcommunity public
sys snmp trapcommunity public
sys snmp trustedhost 0.0.0.0
sys snmp trapdst set 1 0.0.0.0 162
sys snmp trapdst set 2 0.0.0.0 162
sys snmp trapdst set 3 0.0.0.0 162
sys snmp trapdst set 4 0.0.0.0 162
#### server
sys server enable telnet
sys server enable ftp
sys server enable web
sys server enable icmp
sys server port telnet 23
sys server port ftp 21
--------------- Snip ------------------------------------------------------
```

Note: The `sys user set admin` command is encrypted and you cannot edit it in a text editor. Attempting to edit it and upload it to the IES will lock you out after the system restarts. If this happens you will have to use the console port to restore the default configuration file, and all of your configuration changes will be lost.

69.3.3 Editable Configuration File Upload

You can upload the configuration file by following the steps below.

Use an FTP client to connect to the IES.

Figure 271 Example: Use an FTP Client to Connect to the IES

```
C:\> ftp <IES IP address>
Type your user name and press [ENTER].
User (172.23.15.86:(none)): admin
```

Enter the management password (1234 by default).

Figure 272 Example: Enter the Management Password

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

Use put to transfer the configuration file from the computer. The configuration file on the system is named config-0.

Figure 273 Example: Upload the Configuration File config-0

```
ftp> put xxx.dat config-0
```

Quit FTP.

Figure 274 Example: Close FTP Client

```
ftp> quit
```

Wait for the update to finish. The system restarts automatically.

69.4 Firmware File Upgrade

Use the following procedure to upload firmware to the IES.

Use an FTP client to connect to the IES.

Figure 275 Example: Use an FTP Client to Connect to the IES

```
C:\> ftp <IES IP address>
Type your user name and press [ENTER].
User (172.23.15.86:(none)): admin
```

Enter the management password (1234 by default).

Figure 276 Example: Enter the Management Password

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

Transfer the firmware file to the IES. The firmware file on your computer (that you want to put onto the IES is named `firmware.bin`. The internal firmware file on the IES is named `ras`.

Figure 277 Example: Transfer the Firmware File

```
ftp> put firmware.bin ras
```

Quit FTP.

Figure 278 Example: Close FTP Client

```
ftp> quit
```

Wait for the update to finish. The IES restarts automatically.

70

Troubleshooting

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

70.1 The SYS or PWR LED Does Not Turn On

The SYS/PWR LED does not turn on.

Table 219 SYS LED Troubleshooting

STEP	CORRECTIVE ACTION
1	Make sure the power wires are properly connected to the power supply and the power supply is operating normally. Make sure you are using the correct power source (see Chapter 71 on page 599).
2	Make sure the power wires are connected properly.
3	Make sure a fuse is not burnt-out. Replace a fuse if it is burnt-out. See Appendix A on page 613 for instructions.
4	The LED itself or the unit may be faulty; contact your vendor.

70.2 The ALM LED Is On

The **ALM** (alarm) LED lights when the IES is overheated, the fans are not working properly, the voltage readings are outside the tolerance levels or an alarm has been detected on the ALARM input pins.

Table 220 ALM LED Troubleshooting

STEP	CORRECTIVE ACTION
1	Use the statistics monitor command to verify the cause of the alarm. See step 2 if the unit is overheated, step 3 if the problem is with the fans and step 4 if the voltages are out of the allowed ranges.
2	Ensure that the IES is installed in a well-ventilated area and that normal operation of the fans is not inhibited. Keep the bottom, top and all sides clear of obstructions and away from the exhaust of other equipment.

Table 220 ALM LED Troubleshooting (continued)

STEP	CORRECTIVE ACTION
3	Make sure you can feel and/or hear the fans working - working fans emit a low buzz and blow air.
4	If the voltage levels are outside the allowed range, take a screen shot of the statistics monitor command display and contact your vendor.

70.3 SFP LNK LEDs Do Not Turn On

The LEDs for one of the SFP slots do not turn on.

Table 221 SFP LNK LED Troubleshooting

STEPS	CORRECTIVE ACTION
1	Make sure that the Ethernet port's mode is set to match that of the peer Ethernet device.
2	Check the cable and connections between the SFP slot and the peer Ethernet device.
3	Check the mini GBIC transceiver.
4	Make sure that the peer Ethernet device is functioning properly. If the cable, transceiver and peer Ethernet device are all OK and the LEDs stay off, there may be a problem with the SFP slot. Contact the distributor.

70.4 100/1000 LEDs Do Not Turn On

A 100/1000 Ethernet port's LEDs do not turn on.

Table 222 100/1000 LED Troubleshooting

STEPS	CORRECTIVE ACTION
1	Each 100/1000M RJ-45 Ethernet port is paired with a mini GBIC slot. The IES uses one connection per pair.
2	Check the **Speed Mode** settings in the **ENET Port Setup** screen. Make sure that the 100/1000 Ethernet port's connection speed is set to match that of the port on the peer Ethernet device. When an Ethernet port is set to **Auto**, the IES tries to make a fiber connection first and does not attempt to use the RJ-45 port if the fiber connection is successful.
3	Check the Ethernet cable and connections between the 100/1000 Ethernet port and the peer Ethernet device. Use 1000Base-T 4-pair (8 wire) UTP Cat. 5 Ethernet cables with the RJ-45 interface.
4	Make sure that the peer Ethernet device is functioning properly. If the Ethernet cable and peer Ethernet device are both OK and the LEDs still stay off, there may be a problem with the port. Contact the distributor.

70.5 100/1000 Ethernet Port Data Transmission

The Ethernet port's LED is on, but data cannot be transmitted.

Table 223 Troubleshooting Data Transmission

STEPS	CORRECTIVE ACTION
1	Make sure that the Ethernet port has the appropriate mode setting.
2	Make sure that the IES's IP settings are properly configured.
3	Check the VLAN configuration.
4	Ping the IES from a computer behind the peer Ethernet device.
5	If you cannot ping, check the Ethernet cable and connections between the Ethernet port and the Ethernet switch or router.
6	Check the switch mode. In daisychain mode, if you have a loop topology and enable RSTP, it is possible for RSTP to disable Ethernet port 1 (the uplink port). Note: It is not recommended to use daisychain mode in a loop topology.

70.6 DSL Data Transmission

The DSL link is up, but data cannot be transmitted.

Table 224 DSL Data Transmission Troubleshooting

STEPS	CORRECTIVE ACTION
1	Check the switch mode and port isolation settings. Check to see that the VPI/VCI and multiplexing mode (LLC/VC) settings in the subscriber's ADSL modem or router match those of the ADSL port. If the subscriber is having problems with a video or other high-bandwidth services, make sure the IES's ADSL port's data rates are set high enough.
2	Check the VLAN configuration.
3	Ping the IES from the computer behind the ADSL modem or router.
4	If you cannot ping, connect a DSL modem to an ADSL port (that is known to work). If the ADSL modem or router works with a different ADSL port, there may be a problem with the original port. Contact the distributor.
5	If using a different port does not work, try a different ADSL modem or router with the original port.

70.7 There Is No Voice on an ADSL Connection

The IES has internal POTS (Plain Old Telephone Service) splitters and VoIP capabilities that allow the telephone wiring used for ADSL connections to also simultaneously carry normal voice conversations.

Table 225 ADSL Voice Troubleshooting

STEP	CORRECTIVE ACTION
1	Ensure that the subscriber's ADSL is working normally.
2	Make sure the subscriber has a POTS splitter properly installed.
3	Check the ADSL line pin assignments shown in Chapter 71 on page 599.
4	Check the telephone wire connections between the subscriber and the MDF(s).
5	Check the telephone wire and connections between the MDF(s) and **ADSL** port(s).
6	Check the telephone wire mapping on the MDF(s).
7	Make sure the in-house wiring works and is connected properly.
8	Repeat the steps above using a different ADSL port.

70.8 I cannot make or receive phone calls.

ADSL is working, but VoIP calls cannot be made.

Table 226 Phonecall Troubleshooting

STEPS	CORRECTIVE ACTION
1	Ensure that the hardware is correctly installed. Ping the SIP server from the IES to ensure that it is reachable.
2	The port may be disabled. Use the `adsl show <port>` command to check the port status, and the `adsl enable <port>` command to activate a port.
3	The port may be set to use the wrong SIP profile, call service profile or DSP profile. Use the `voip port sip set <sip-profile> <svc-profile> <dsp-profile>` command to set the port to use the correct profiles.
4	The SIP profile, call service profile, DSP profile or numbering plan may be misconfigured. Use the `voip profile sip show [<name>]` command to check the SIP profile. Use the `voip profile sip callsvc show [<name>]` command to check the call service profile. Use the `voip profile dsp show [<name>]` command to check the DSP profile. Use the `voip sip numberplan show [<name>]` command to check the numbering plan.

Table 226 Phonecall Troubleshooting

STEPS	CORRECTIVE ACTION
5	The phone line may have problems. Use the `voip show linestat` command to check the current status of the phone line.
6	Check any hardware between the phone and the IES. Try using another telephone, another port on the IES, or both. Run the MLT (Metallic Line Test) on the relevant port (use the `diagnostic mlt test` commands).

70.9 Local Server

The computer behind a DSL modem or router cannot access a local server connected to the IES.

Table 227 Troubleshooting a Local Server

STEPS	CORRECTIVE ACTION
1	See Section 70.6 on page 591 to make sure that the subscriber is able to transmit to the IES.
2	Make sure the computer behind the DSL device has the correct gateway IP address configured.
3	Check the VLAN configuration (see Chapter 19 on page 175).
4	Check the cable and connections between the IES and the local server.
5	Try to access another local server. If data can be transmitted to a different local server, the local server that could not be accessed may have a problem.

70.10 Data Rate

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

Table 228 Troubleshooting the SYNC-rate

STEPS	CORRECTIVE ACTION
1	Connect the ADSL modem or router directly to the ADSL port using a different telephone wire.
2	If the rates match, the quality of the telephone wiring that connects the subscriber to the ADSL port may be limiting the speed to a certain rate. If they do not match when a good wire is used, contact the distributor.

70.11 Configured Settings

The configured settings do not take effect.

Table 229 Troubleshooting the IES's Configured Settings

CORRECTIVE ACTION
Use the "config save" command after you finish configuring to save the IES's settings.

70.12 Password

If you forget your password, you will need to use the console port to reload the factory-default configuration file (see Section 70.16 on page 595).

70.13 System Lockout

Any of the following could also lock you and others out from using in-band management (managing through the data ports).

1. Deleting the management VLAN (default is VLAN 1).
2. Incorrectly configuring the CPU VLAN.
3. Incorrectly configuring the access control settings.
4. Disabling all ports.

Note: Be careful not to lock yourself and others out of the system.

If you lock yourself (and others) out of the system, you can try using the console port to reconfigure the system. See Section 70.16 on page 595.

70.14 SNMP

The SNMP manager server cannot get information from the IES.

Table 230 Troubleshooting the SNMP Server

STEPS	CORRECTIVE ACTION
1	Ping the IES from the SNMP server. If you cannot, check the cable, connections and IP configuration.
2	Check to see that the community (or trusted host) in the IES matches the SNMP server's community.
3	Make sure that your computer's IP address matches a configured trusted host IP address (if configured).

70.15 Telnet

I cannot telnet into the IES.

Table 231 Troubleshooting Telnet

STEPS	CORRECTIVE ACTION
1	Make sure that the number maximum allowed number of telnet sessions has not already reached. The IES only accepts up to five telnet sessions at a time. Make sure that a telnet session is not already operating. The IES only accepts one telnet session at a time.
2	Make sure that your computer's IP address matches a configured secured client IP address (if configured). The IES immediately disconnects the telnet session if secured host IP addresses are configured and your computer's IP address does not match one of them.
3	Make sure that you have not disabled the Telnet service or changed the server port number that the IES uses for Telnet.
5	Ping the IES from your computer. If you are able to ping the IES but are still unable to telnet, contact the distributor. If you cannot ping the IES, check the cable, connections and IP configuration.

70.16 Resetting the Defaults

If you lock yourself (and others) from the IES, you will need to reload the factory-default configuration file. Uploading the factory-default configuration file replaces the current configuration file with the factory-default configuration file. This means that you will lose all previous configurations and the speed of the console port will be reset to the default of 9600bps with 8 data bit, no parity, one stop bit and flow control set to none. The user name will be reset to “admin” and the password will be reset to “1234” and the IP address to 192.168.1.1.

70.16.1 Resetting the Defaults Via Command

If you know the password, you can reload the factory-default configuration file via Command Line Interface (CLI) command. Use the following procedure.

1 Connect to the console port using a computer with terminal emulation software. See chapters 2-6 for details.

2 Enter your password.

3 Type `config restore`.

4 Type y at the question “Do you want to restore default ROM file(y/n)?”

5 The IES restarts.

Figure 279 Resetting the Switch Via Command

```
ras> config restore

System will reboot automatically after restoring default configuration.
Do you want to proceed(y/n)? >
restoring configuration...
saving configuration to flash...
```

The IES is now reinitialized with a default configuration file including the default user name of “admin” and the default password of “1234”.

70.16.2 Uploading the Default Configuration File

If you forget your password or cannot access the IES, you will need to reload the factory-default configuration file. Uploading the factory-default configuration file replaces the current configuration file with the factory-default configuration file. This means that you will lose all previous configurations and the speed of the console port will be reset to the default of 9600bps with 8 data bit, no parity, one stop bit and flow control set to none. The password will also be reset to “1234” and the IP address to 192.168.1.1.

Note: Uploading the factory default configuration file erases the IES’s entire configuration.

Obtain the default configuration file, unzip it and save it in a folder. Use a console cable to connect a computer with terminal emulation software to the IES’s console port. Turn the IES off and then on to begin a session. When you turn on the IES again you will see the initial screen. When you see the message `Press any key to enter Debug Mode within 3 seconds` press any key to enter debug mode.

To upload the configuration file, do the following:

1 Type `atlc` after the `Enter Debug Mode` message.

2 Wait for the `Starting XMODEM upload` message before activating XMODEM upload on your terminal.

3 This is an example Xmodem configuration upload using HyperTerminal. Click **Transfer**, then **Send File** to display the following screen.

Figure 280 Example Xmodem Upload

Type the configuration file's location, or click **Browse** to search for it. Choose the **1K Xmodem** protocol. Then click **Send**.

4 After a successful configuration file upload, type `atgo` to restart the IES.

The IES is now reinitialized with a default configuration file including the default password of “`1234`”.

70.17 Recovering the Firmware

Usually you should use FTP or the web configurator to upload the IES’s firmware. If the IES will not start up, the firmware may be lost or corrupted. Use the following procedure to upload firmware to the IES only when you are unable to upload firmware through FTP.

Note: This procedure is for emergency situations only.

1 Obtain the firmware file, unzip it and save it in a folder on your computer.

2 Connect your computer to the console port and use terminal emulation software configured to the following parameters:

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

3 Turn off the IES and turn it back on to restart it and begin a session.

4 When you see the message `Press any key to enter Debug Mode within 3 seconds`, press a key to enter debug mode.

5 Type `atba5` after the `Enter Debug Mode` message (this changes the console port speed to 115200 bps).

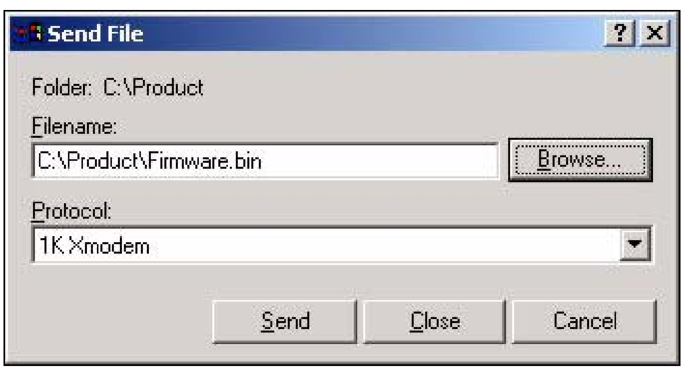
6 Change the configuration of your terminal emulation software to use 115200 bps and reconnect to the IES.

7 Type `atur` after the `Enter Debug Mode` message.

8 Wait for the `Starting XMODEM upload` message before activating XMODEM upload on your terminal.

9 This is an example Xmodem configuration upload using HyperTerminal. Click **Transfer**, then **Send File** to display the following screen.

Figure 281 Example Xmodem Upload



Type the firmware file's location, or click **Browse** to search for it. Choose the **1K Xmodem** protocol. Then click **Send**.

10 After a successful firmware upload, type atgo to restart the IES. The console port speed automatically changes back to 9600 bps when the IES restarts.

71

Product Specifications

This chapter provides the specifications for the IES.

71.1 Physical Specifications

The IES is 19 inch (482.6mm) rack-mountable.

Telco-50 Connectors

The IES has 2 Telco-50 connectors. Connect the two **ADSL** Telco-50 connectors to the subscribers.

Dimensions

1.5U 439.8 mm (W) x 251 mm (D) x 66 mm (H)

Weight

7.2 kg

Wire Gauge Specifications

The following table shows the specifications for wire gauge.

Table 232 Wire Gauge Specifications

WIRE TYPE	REQUIRED AWG NO. (DIAMETER)
Ground Wire	18 or larger
Telephone Wire	26 or larger
IES Power Wire	12 to 16

AWG (American Wire Gauge) is a measurement system for wire that specifies its thickness. As the thickness of the wire increases, the AWG number decreases.

Power Input

-36 ~ -72 VDC, 5 A maximum, no tolerance.

Power Consumption

180 W maximum

Fuse Rating

Changing the IES's fuses requires partial disassembly of the device. Only a qualified technician should perform this process.

The following table describes the location and specification of the IES's fuses.

Table 233 Fuse Specifications

FUSE LOCATION	FUSE RATING
On the DC Power board (near the IES's main power connection)	250VAC T6.3 A
On the VoIP Board (near the VoIP board's power connection)	250VAC T8.0A

ALARM Port Power

The maximum power rating for the **ALARM** port is as follows:

- Input: 20 V, 500 mA
- Output: 20 V, 500 mA

Operating Environment

- Temperature: -40 - 65°C
- Humidity: 10% - 95% (non-condensing)

Storage Environment

- Temperature: -40 - 70°C
- Humidity: 5% - 95% (non-condensing)

MAC Table

The MAC address table can hold up to 14K entries (128 per ADSL port, 4K per Ethernet port)

71.2 VoIP Features

This section lists the IES's additional VoIP features.

Table 234 VoIP Features

Other Features	• SIP keep alive • Numbering plan • CLIP and CLIR • Country code • Metallic Line Test (MLT) • External testing device support • SIP and RTP statistics generation
Ringer Output Amplitude	Adjustable (35 / 45 / 55 / 65 / 75 / 85 / 95 Vrms)
Output Ringing Frequency	Adjustable (16.7 / 20 / 25 / 50 Hz)
Ringer Output Power	Maximum 15W
Digital signal processing features	• RTP encapsulation • Supported voice codecs: G.711 A-law G.711 µ-law G.723.1 G.726 (16, 24, 32, 40 kbps) G.729 (G.729A and G.729B) • T.38 fax / modem passthrough (G.711 only) • V.21 fax tone detection • FSK Caller ID generation • DTMF detection and relay • DTMF Caller ID generation • G.168 echo cancellation • Silence detection and suppression • Comfort noise generation • Voice activity detection • Billing signal generation (12 / 16 kHz metering tone) • Tone generation: Dial tone Busy tone Congestion tone Ringback tone Waiting tone Howler tone • Packet loss concealment

Table 234 VoIP Features

Loop diagnostics	• Metallic Loop Test (MLT) for subscriber lines: Foreign AC/DC voltage test Three-element capacitance test Three-element resistance test Ringing equivalency number test (REN measurement) Loop resistance test Ring voltage test Metering voltage test • Test in/out ports.
Standards Compliance	• RFC 2327 (SDP: Session Description Protocol) • RFC 2976 (The SIP INFO Method) • RFC 3261 (SIP: Session Initiation Protocol) • RFC 3262 (Reliability of Provisional Responses in Session Initiation Protocol (SIP)) • RFC 3265 (Session Initiation Protocol (SIP)-Specific Event Notification) • RFC 3550 (RTP: A Transport Protocol for Real-Time Applications) • RFC 4028 (Session Timers in the Session Initiation Protocol (SIP)) • IEEE 802.1Q (Virtual LANs)

71.3 Default Settings

This section lists the default configuration of the IES.

Table 235 Default Settings

VLAN Default Settings	One VLAN is created (this is also the management VLAN).	
VID:	1	
Registration:	Fixed for the Ethernet and ADSL ports	
Tagging:	Untagged for all ports	
ADSL Default Settings		
Enable/Disable State:	Enabled	
Operational Mode:	auto	
(ADSL) Port Profile Default Settings		
Name:	DEFVAL	
Profile Status:	Active	
Latency Mode:	Interleave	
	Upstream ADSL Settings:	Downstream ADSL Settings:
Max Rate	512 Kbps	2048 Kbps
Min Rate	64 Kbps	64 Kbps
Latency Delay	4 ms	4 ms

Table 235 Default Settings (continued)

Max SNR	31 db	31 db
Min SNR	0 db	0 db
Target SNR	6 db	6 db
Up Shift Margin	9 db	9 db
Down Shift Margin	3 db	3 db
Name:	DEFVAL_MAX (Factory Default)	
Profile Status:	Active	
Latency Mode:	Interleave	
	Upstream ADSL Settings:	Downstream ADSL Settings:
Max Rate	512 Kbps	9088 Kbps
Min Rate	64 Kbps	64 Kbps
Latency Delay	4 ms	4 ms
Max Margin	31 db	31 db
Min Margin	0 db	0 db
Target Margin	6 db	6 db
Up Shift Margin	9 db	9 db
Down Shift Margin	3 db	3 db
Virtual Channel Default Settings[A].		
Super channel:	Enabled	
VPI:	0	
VCI:	33	
VC Profile:	DEFVAL (factory default)	
Default VC Profile Settings		
DEFVAL Profile Settings		
Encapsulation:	RFC 1483, RFC 2684	
Traffic Class:	UBR	
PCR:	300000 cells/second	
CDVT:	0	
DEFVAL_VC Profile Settings		
Encapsulation:	RFC 1483, RFC 2684	
Multiplexing:	VC-based	
Traffic Class:	UBR	
PCR:	300000 cells/second	
CDVT:	0	

Table 235 Default Settings (continued)

Default IGMP Filter Profile Settings	The **DEFVAL** IGMP filter profile is assigned to all of the ADSL ports by default. It allows a port to join all multicast IP addresses (224.0.0.0~239.255.255.255).	
Multiplexing:	LLC-based	
VoIP SIP Profile Default Settings		
Name	DEFVAL	
SIP server domain name	0.0.0.0	
SIP registrar server domain name	0.0.0.0	
SIP proxy server domain name	0.0.0.0	
SIP server port number:	5060	
SIP registrar server port number	5060	
SIP proxy server port number	5060	
URI type	SIP	
IEEE 802.1p tag	7	
DSCP tag	48	
Keep alive	off	
PRACK	off	
VoIP DSP Profile Default Settings		
Name	DEFVAL	
Codec	G.711a, G.711µ	
Min-delay	30ms	
Max-delay	120ms	
Echo tail	32ms	
VoIP SIP Call Service Profile		
Name	DEFVAL	
Password	none	
Numbering plan	off	
Call holding	on	
Call waiting	on	
Call transferring	on	
CLIP	on	
CLIR	on	
DND	on	
DTMF	bypass	

Table 235 Default Settings (continued)

Fax	G.711
VoIP Default Regional Settings	
Countrycode	USA (0)

A. The IES ADSL ports' PVCs use ATM Adaptation Layer (AAL) 5.

71.4 Pin Assignments

71.4.1 Hardware Telco-50 Connector Pin Assignments

The following diagram shows the pin assignments of the **ADSL** Telco-50 connectors.

Figure 282 ADSL 1~24 Port Telco-50 Pin Assignments

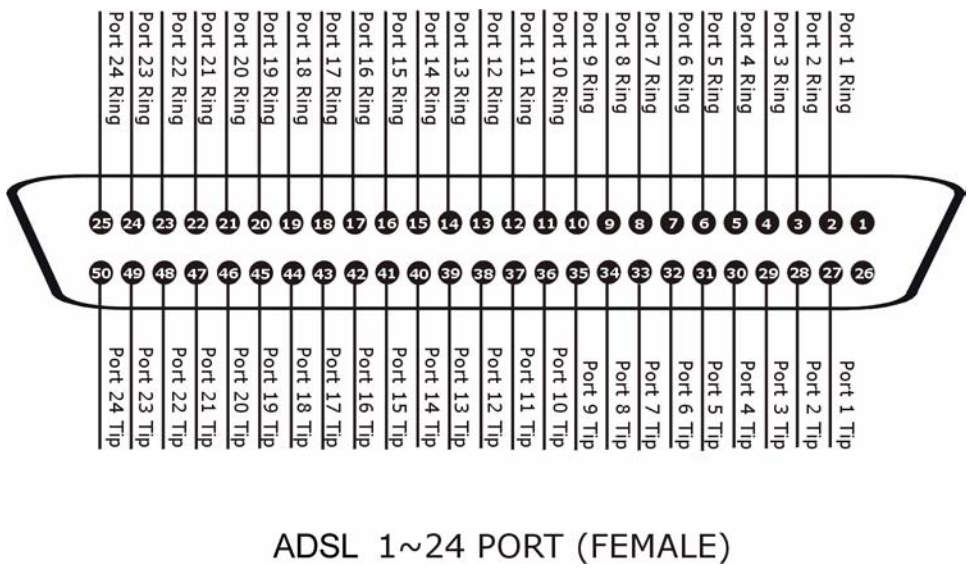
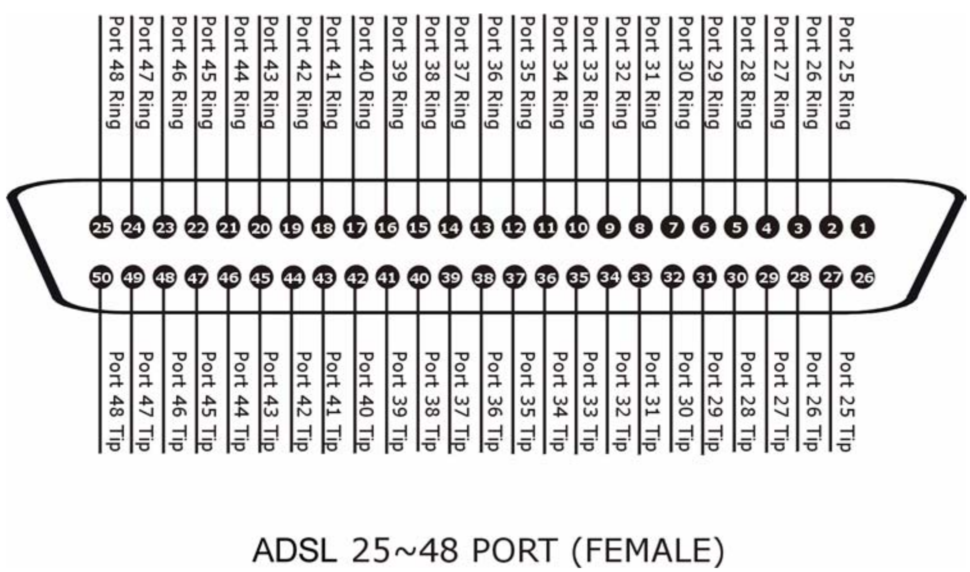


Figure 283 ADSL 25~48 Telco-50 Pin Assignments



This table lists the ports and matching pin numbers for the hardware Telco-50 connectors.

Table 236 Hardware Telco-50 Connector Port and Pin Numbers

PORT NUMBER	PIN NUMBER
1	2, 27
2	3, 28
3	4, 29
4	5, 30
5	6, 31
6	7, 32
7	8, 33
8	9, 34
9	10, 35
10	11, 36
11	12, 37
12	13, 38
13	14, 39
14	15, 40
15	16, 41
16	17, 42
17	18, 43
18	19, 44
19	20, 45
20	21, 46
21	22, 47
22	23, 48
23	24, 49
24	25, 50
25	2, 27
26	3, 28
27	4, 29
28	5, 30
29	6, 31
30	7, 32
31	8, 33
32	9, 34
33	10, 35
34	11, 36
35	12, 37
36	13, 38

Table 236 Hardware Telco-50 Connector Port and Pin Numbers (continued)

PORT NUMBER	PIN NUMBER
37	14, 39
38	15, 40
39	16, 41
40	17, 42
41	18, 43
42	19, 44
43	20, 45
44	21, 46
45	22, 47
46	23, 48
47	24, 49
48	25, 50

71.4.2 Telco-50 Cables

Connect to the IES's **ADSL 1 ~ 24** and **25 ~ 48** ports using cables that have Telco-50 connectors with the following pin assignments. The diagrams show the Telco-50 connector as seen when looking at the face that couples with the VOP.

Figure 284 1 ~ 24 Cable Telco-50 Pin Assignments

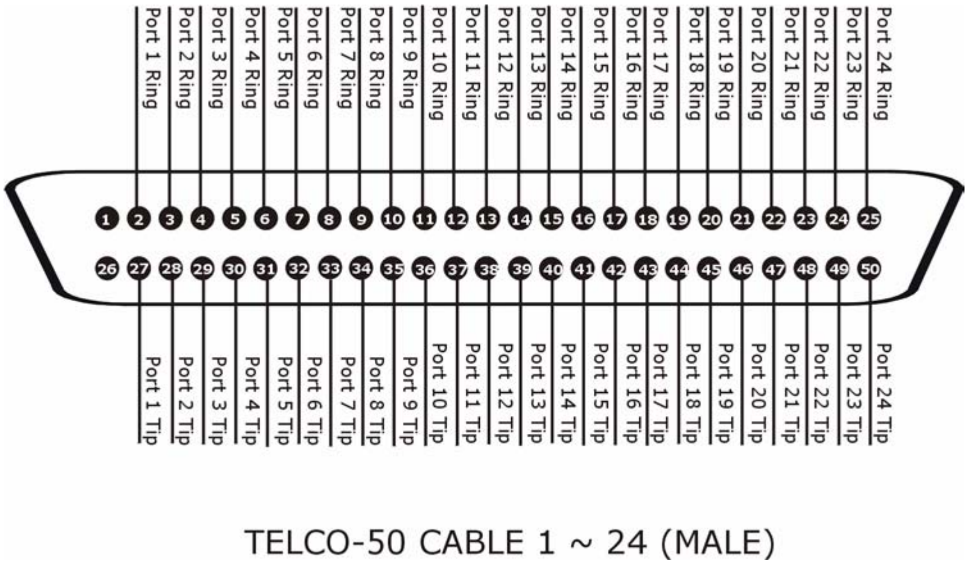
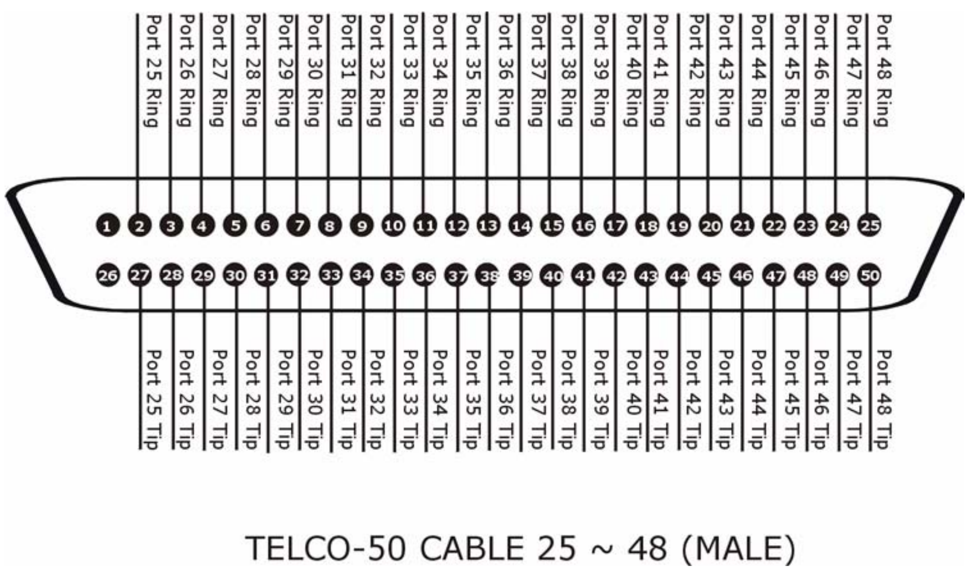


Figure 285 25 ~ 48 Cable Telco-50 Pin Assignments



71.4.3 Console Cable Pin Assignments

The following diagrams and chart show the pin assignments of the console cable.

Figure 286 Console Cable RJ-11 Male Connector

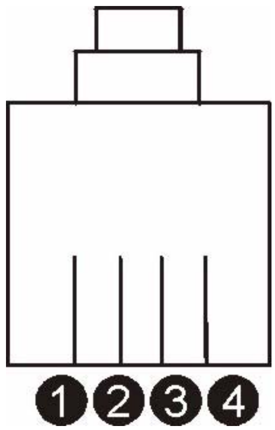


Figure 287 Console Cable DB-9 Female Connector

Table 237 Console Cable Connector Pin Assignments

RJ-11 MALE	DB-9 FEMALE
Pin 2: TXD	Pin 2
Pin 3: RXD	Pin 3
Pin 4: GND	Pin 5

PART VI
Appendices and Index

A

Changing a Fuse

This appendix shows you how to remove and install fuses for the IES.

If you use a fuse other than an included fuse, make sure it matches the fuse specifications in the chapter on product specifications.

Removing a Fuse

Disconnect all power from the IES before you begin this procedure.

This process requires partial disassembly of the IES. Only a qualified technician should perform this process.

1 Remove the power wires from the IES.

2 Remove the IES's top cover.

3 See the product specifications for the location of the fuse. A burnt-out fuse is blackened, darkened or cloudy inside its glass casing. A working fuse has a completely clear glass casing.

Use a small flat-head screwdriver to carefully pry out the fuse from the fuse clip.

4 Dispose of the burnt-out fuse properly.

Installing a Fuse

1 Gently press the replacement fuse into the fuse clip until you hear a click.

2 Replace the IES's cover.

3 Reconnect the power wires to the unit.

B

PSTN Parameters by Country

USA

country code: 0,USA

law: ulaw

impedance: 600ohm

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 20.0 Hz

amplitude: 53.0 Vrms

onTime1: 2.00 seconds

offTime1: 4.00 seconds

onTime2: 2.00 seconds

offTime2: 4.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: during ring

payload type: SDMF

first TAS type: NULL

second TAS type: NULL

first TAS interval: 0 ms

second TAS interval: 0 ms

start to ring: 500 ms (prior ring only)

Tones parameters:

dial tone: 350+440Hz -18.0dB continuous

ring back tone: 440+480Hz -18.0dB on 2.000s off 4.000s

busy tone: 480+620Hz -18.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -18.0dB on 0.300s off 0.200s

congestion tone: 440+620Hz -18.0dB on 0.200s off 0.300s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 440Hz -18.0dB on 0.300s off 10.000s

call waiting tone #2: 440Hz -13.0dB on 0.300s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Japan

country code: 1, Japan

law: ulaw

impedance: 600ohm_1000nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 20.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 2.00 seconds

onTime2: 1.00 seconds

offTime2: 2.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 620 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: during ring

payload type: SDMF

first TAS type: NULL

second TAS type: NULL

first TAS interval: 0 ms

second TAS interval: 0 ms

start to ring: 500 ms (prior ring only)

Tones parameters:

dial tone: 400+435Hz -18.0dB continuous

ring back tone: 400Hz -18.0dB on 1.000s off 2.000s

busy tone: 400Hz -18.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 400Hz -18.0dB on 0.250s off 0.250s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.200s off 0.200s

call waiting tone #2: 425Hz -18.0dB on 0.200s off 4.000s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Taiwan

country code: 2, Taiwan

law: ulaw

impedance: 600ohm

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 20.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 2.00 seconds

onTime2: 1.00 seconds

offTime2: 2.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: during ring

payload type: SDMF

first TAS type: NULL

second TAS type: NULL

first TAS interval: 0 ms

second TAS interval: 0 ms

start to ring: 500 ms (prior ring only)

Tones parameters:

dial tone: 350+440Hz -13.0dB continuous

ring back tone: 440+480Hz -19.0dB on 1.000s off 2.000s

busy tone: 440+620Hz -24.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 440+480Hz -18.0dB on 0.250s off 0.250s

special dial tone: 350+440Hz -13.0dB on 0.100s off 0.100s

350+440Hz -13.0dB on 0.100s off 0.100s

350+440Hz -13.0dB on 0.100s off 0.100s

350+440Hz -13.0dB continuous

call waiting tone #1: 440+480Hz -13.0dB on 1.500s

call waiting tone #2: 350Hz -13.0dB on 0.250s off 5.250s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 480Hz -3.0dB on 60.000s

warning tone: 392Hz -17.0dB on 0.500s

494Hz -17.0dB on 0.500s

587Hz -17.0dB on 1.500s

confirmation tone: 350+440Hz -13.0dB on 0.100s off 0.100s

350+440Hz -13.0dB on 0.300s

Austria

country code: 3, Austria

law: alaw

impedance: 220ohm_820ohm_120nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 50.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 5.00 seconds

onTime2: 1.00 seconds

offTime2: 5.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 420Hz -18.0dB continuous

ring back tone: 420Hz -18.0dB on 1.000s off 5.000s

busy tone: 420Hz -18.0dB on 0.400s off 0.400s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 420Hz -18.0dB on 0.200s off 0.200s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 420Hz -18.0dB on 0.040s off 1.950s

call waiting tone #2: 425Hz -18.0dB on 0.200s off 4.000s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Belgium

country code: 4, Belgium

law: alaw

impedance: 270ohm_750ohm_150nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 3.00 seconds

onTime2: 1.00 seconds

offTime2: 3.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 1.000s off 3.000s

busy tone: 425Hz -18.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.170s off 0.170s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 1400Hz -18.0dB on 0.180s off 0.180s

call waiting tone #2: 1400Hz -18.0dB on 0.180s off 3.500s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Czech Republic

country code: 6, Czech

law: alaw

impedance: 270ohm_750ohm_150nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 4.00 seconds

onTime2: 1.00 seconds

offTime2: 4.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB on 0.330s off 0.330s

ring back tone: 425Hz -18.0dB on 1.000s off 4.000s

busy tone: 425Hz -18.0dB on 0.330s off 0.330s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.165s off 0.165s

special dial tone: 425Hz -18.0dB on 0.660s off 0.660s

call waiting tone #1: 425Hz -18.0dB on 1.000s off 0.170s

call waiting tone #2: 425Hz -18.0dB on 0.330s off 3.500s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Denmark

country code: 7, Denmark

law: alaw

impedance: 300ohm_1000ohm_220nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 0.75 seconds

offTime1: 7.50 seconds

onTime2: 0.75 seconds

offTime2: 7.50 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: DTMF

first TAS type: line reversal

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 1.000s off 4.000s

busy tone: 425Hz -18.0dB on 0.250s off 0.250s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.250s off 0.250s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.200s off 0.200s

call waiting tone #2: 425Hz -18.0dB on 0.200s off 3.600s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Finland

country code: 8, Finland

law: alaw

impedance: 270ohm_750ohm_150nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 4.00 seconds

onTime2: 1.00 seconds

offTime2: 4.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 1.000s off 4.000s

busy tone: 425Hz -18.0dB on 0.300s off 0.300s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.200s off 0.200s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.150s off 0.150s

call waiting tone #2: 425Hz -18.0dB on 0.150s off 8.000s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Italy

country code: 12, Italy

law: alaw

impedance: 270ohm_750ohm_150nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 4.00 seconds

onTime2: 1.00 seconds

offTime2: 4.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB on 0.200s off 0.200s

ring back tone: 425Hz -18.0dB on 1.000s off 4.000s

busy tone: 425Hz -18.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.200s off 0.200s

special dial tone: 425Hz -18.0dB on 0.600s off 1.000s

call waiting tone #1: 425Hz -18.0dB on 0.400s off 0.100s

call waiting tone #2: 425Hz -18.0dB on 0.250s off 0.100s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

The Netherlands

country code: 14, Netherlands

law: alaw

impedance: 270ohm_750ohm_150nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 4.00 seconds

onTime2: 1.00 seconds

offTime2: 4.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 1.000s off 4.000s

busy tone: 425Hz -18.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.250s off 0.250s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.500s off 9.500s

call waiting tone #2: 425Hz -18.0dB on 0.500s off 0.500s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Norway

country code: 15, Norway

law: alaw

impedance: 270ohm_750ohm_150nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 35.0 Vrms

onTime1: 0.20 seconds

offTime1: 0.20 seconds

onTime2: 0.40 seconds

offTime2: 0.20 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 1.000s off 4.000s

busy tone: 425Hz -18.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.200s off 0.200s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.200s off 0.600s

call waiting tone #2: 425Hz -18.0dB on 0.200s off 0.600s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Spain

country code: 19, Spain

law: alaw

impedance: 270ohm_750ohm_150nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 57.0 Vrms

onTime1: 1.50 seconds

offTime1: 3.00 seconds

onTime2: 1.50 seconds

offTime2: 3.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 1.500s off 3.000s

busy tone: 425Hz -18.0dB on 0.200s off 0.200s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.200s off 0.200s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.175s off 0.175s

call waiting tone #2: 425Hz -18.0dB on 0.175s off 3.500s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Sweden

country code: 20, Sweden

law: alaw

impedance: 270ohm_750ohm_150nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 5.00 seconds

onTime2: 1.00 seconds

offTime2: 5.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 200 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: DTMF

first TAS type: line reversal

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 1.000s off 5.000s

busy tone: 425Hz -18.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.250s off 0.750s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.200s off 0.500s

call waiting tone #2: 425Hz -18.0dB on 0.200s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Switzerland

country code: 21, Switzerland

law: alaw

impedance: 220ohm_820ohm_115nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 4.00 seconds

onTime2: 1.00 seconds

offTime2: 4.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 1.000s off 4.000s

busy tone: 425Hz -18.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.200s off 0.200s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.200s off 0.200s

call waiting tone #2: 425Hz -18.0dB on 0.200s off 4.000s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

United Kingdom

country code: 22,UK

law: alaw

impedance: 300ohm_1000ohm_220nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 0.40 seconds

offTime1: 0.20 seconds

onTime2: 0.40 seconds

offTime2: 2.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: UK

first TAS type: line reversal

second TAS type: DT-AS

first TAS interval: 300 ms

second TAS interval: 150 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 350Hz -22.0dB + 440Hz -18.0dB continuous

ring back tone: 400+450Hz -18.0dB on 0.400s off 0.200s

busy tone: 400Hz -18.0dB on 0.375s off 0.375s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 400Hz -25.0dB on 0.400s off 0.350s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 400Hz -18.0dB on 0.100s off 3.000s

call waiting tone #2: 400Hz -18.0dB on 0.200s off 4.000s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Germany

country code: 23,Germany

law: alaw

impedance: 220ohm_820ohm_120nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 4.00 seconds

onTime2: 1.00 seconds

offTime2: 4.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 1.000s off 4.000s

busy tone: 425Hz -18.0dB on 0.480s off 0.480s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.240s off 0.240s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.200s off 0.200s

call waiting tone #2: 425Hz -18.0dB on 0.200s off 5.000s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Australia

country code: 25, Australia

law: alaw

impedance: 220ohm_820ohm_120nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 0.40 seconds

offTime1: 0.20 seconds

onTime2: 0.40 seconds

offTime2: 2.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 400+450Hz -18.0dB on 0.400s off 0.200s

busy tone: 425Hz -18.0dB on 0.380s off 0.380s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.380s off 0.380s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.200s off 0.200s

call waiting tone #2: 425Hz -18.0dB on 0.200s off 4.400s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

New Zealand

country code: 26,New_zealand

law: alaw

impedance: 370ohm_620ohm_310nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 0.40 seconds

offTime1: 0.20 seconds

onTime2: 0.40 seconds

offTime2: 2.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 400Hz -18.0dB continuous

ring back tone: 400+450Hz -18.0dB on 0.400s off 0.200s

busy tone: 400Hz -18.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 400Hz -18.0dB on 0.250s off 0.250s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 400Hz -18.0dB on 0.200s off 3.000s

call waiting tone #2: 400Hz -18.0dB on 0.200s off 3.000s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Ireland

country code: 30, Ireland

law: alaw

impedance: 270ohm_750ohm_150nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 0.40 seconds

offTime1: 0.20 seconds

onTime2: 0.40 seconds

offTime2: 2.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: RP-AS

second TAS type: NULL

first TAS interval: 600 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 0.400s off 0.200s

busy tone: 425Hz -18.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 480+620Hz -18.0dB on 0.500s off 0.500s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.180s off 0.200s

call waiting tone #2: 425Hz -18.0dB on 0.200s off 4.500s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Russia

country code: 32, Russia

law: alaw

impedance: 600ohm

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 20.0 Hz

amplitude: 53.0 Vrms

onTime1: 2.00 seconds

offTime1: 4.00 seconds

onTime2: 2.00 seconds

offTime2: 4.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 0.800s off 3.200s

busy tone: 425Hz -18.0dB on 0.400s off 0.400s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 425Hz -18.0dB on 0.500s off 0.250s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 350Hz -13.0dB on 0.250s off 0.250s

440Hz -13.0dB on 0.250s

call waiting tone #2: 440Hz -13.0dB on 0.300s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

China

country code: 36, China

law: alaw

impedance: 220ohm_680ohm_100nf

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 20.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 4.00 seconds

onTime2: 1.00 seconds

offTime2: 4.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 450Hz -18.0dB continuous

ring back tone: 450Hz -18.0dB on 1.000s off 4.000s

busy tone: 450Hz -18.0dB on 0.350s off 0.350s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 400Hz -18.0dB on 0.700s off 0.700s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 400Hz -18.0dB on 0.500s off 10.000s

call waiting tone #2: 400Hz -18.0dB continuous

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Vietnam

country code: 43, Vietnam

law: alaw

impedance: 600ohm

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 20.0 Hz

amplitude: 53.0 Vrms

onTime1: 2.00 seconds

offTime1: 4.00 seconds

onTime2: 2.00 seconds

offTime2: 4.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 350+440Hz -18.0dB continuous

ring back tone: 440+480Hz -18.0dB on 2.000s off 4.000s

busy tone: 480+620Hz -18.0dB on 0.500s off 0.500s

reorder tone: 480+620Hz -18.0dB on 0.300s off 0.200s

congestion tone: 440+620Hz -18.0dB on 0.200s off 0.300s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 440Hz -18.0dB on 0.300s off 10.000s

call waiting tone #2: 440Hz -13.0dB on 0.300s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

Brazil

country code: 44, Brazil

law: alaw

impedance: 900ohm

loop current: 25 mA

tax type: metering

Ring parameters:

frequency: 25.0 Hz

amplitude: 53.0 Vrms

onTime1: 1.00 seconds

offTime1: 4.00 seconds

onTime2: 1.00 seconds

offTime2: 4.00 seconds

Pulse parameters:

flashMin: 90 ms

flashMax: 500 ms

breakMin: 47 ms

breakMax: 80 ms

makeMin: 30 ms

makeMax: 55 ms

interDigitMin: 250 ms

Meter parameters:

frequency: 12 kHz

onTime: 200 ms

offTime: 200 ms

Caller ID parameters:

CID type: prior ring

payload type: ETSI-MDMF

first TAS type: DT-AS

second TAS type: NULL

first TAS interval: 300 ms

second TAS interval: 0 ms

start to ring: 400 ms (prior ring only)

Tones parameters:

dial tone: 425Hz -18.0dB continuous

ring back tone: 425Hz -18.0dB on 1.000s off 4.000s

busy tone: 425Hz -18.0dB on 0.250s off 0.250s

reorder tone: 480+620Hz -24.0dB on 0.250s off 0.250s

congestion tone: 480+620Hz -24.0dB on 0.250s off 0.250s

special dial tone: 350+440Hz -13.0dB continuous

call waiting tone #1: 425Hz -18.0dB on 0.050s off 1.000s

call waiting tone #2: 440Hz -13.0dB on 0.300s

MWI tone: 350+440Hz -13.0dB on 0.100s off 0.100s

ROH tone: 1400+2060+2450+2600Hz 3.0dB on 0.100s off 0.100s

warning tone: 480+620Hz -24.0dB on 0.250s off 0.250s

480+620Hz -24.0dB on 0.250s

confirmation tone: 600Hz -24.0dB on 0.125s off 0.125s

600Hz -24.0dB on 0.125s

C

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- This device may not cause harmful interference.

- This device must accept any interference received, including interference that may cause undesired operations.

FCC Warning

This device has been tested and found to comply with the limits for a Class A digital switch, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This device generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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這是甲類的資訊產品，在居住的環境使用時，
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使用者會被要求採取某些適當的對策。

Notices

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This Class A digital apparatus complies with Canadian ICES-003.

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CLASS 1 LASER PRODUCT

APPAREIL A LASER DE CLASS 1

PRODUCT COMPLIES WITH 21 CFR 1040.10 AND 1040.11.

PRODUIT CONFORME SELON 21 CFR 1040.10 ET 1040.11.

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1 Go to http://www.zyxel.com.

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Registration

Register your product online to receive e-mail notices of firmware upgrades and information at www.zyxel.com for global products, or at www.us.zyxel.com for North American products.

D

Customer Support

Please have the following information ready when you contact customer support.

Required Information

- Product model and serial number.
- Warranty Information.
- Date that you received your device.
- Brief description of the problem and the steps you took to solve it.

"+" is the (prefix) number you dial to make an international telephone call.

Corporate Headquarters (Worldwide)

- Support E-mail: support@zyxel.com.tw
- Sales E-mail: sales@zyxel.com.tw
- Telephone: +886-3-578-3942
- Fax: +886-3-578-2439
- Web: www.zyxel.com, www.europe.zyxel.com
- FTP: ftp.zyxel.com, ftp.europe.zyxel.com
- Regular Mail: ZyXEL Communications Corp., 6 Innovation Road II, Science Park, Hsinchu 300, Taiwan

Costa Rica

- Support E-mail: soporte@zyxel.co.cr
- Sales E-mail: sales@zyxel.co.cr
- Telephone: +506-2017878
- Fax: +506-2015098
- Web: www.zyxel.co.cr
- FTP: ftp.zyxel.co.cr
- Regular Mail: ZyXEL Costa Rica, Plaza Roble Escazú, Etapa El Patio, Tercer Piso, San José, Costa Rica

Czech Republic

- E-mail: info@cz.zyxel.com
- Telephone: +420-241-091-350
- Fax: +420-241-091-359
- Web: www.zyxel.cz
- Regular Mail: ZyXEL Communications, Czech s.r.o., Modranská 621, 143 01 Praha 4 - Modrany, Ceská Republika

Denmark

- Support E-mail: support@zyxel.dk
- Sales E-mail: sales@zyxel.dk
- Telephone: +45-39-55-07-00
- Fax: +45-39-55-07-07
- Web: www.zyxel.dk
- Regular Mail: ZyXEL Communications A/S, Columbusvej, 2860 Soeborg, Denmark

Finland

- Support E-mail: support@zyxel.fi
- Sales E-mail: sales@zyxel.fi
- Telephone: +358-9-4780-8411
- Fax: +358-9-4780-8448
- Web: www.zyxel.fi
- Regular Mail: ZyXEL Communications Oy, Malminkaari 10, 00700 Helsinki, Finland

France

- E-mail: info@zyxel.fr
- Telephone: +33-4-72-52-97-97
- Fax: +33-4-72-52-19-20
- Web: www.zyxel.fr
- Regular Mail: ZyXEL France, 1 rue des Vergers, Bat. 1 / C, 69760 Limonest, France

Germany

- Support E-mail: support@zyxel.de
- Sales E-mail: sales@zyxel.de
- Telephone: +49-2405-6909-69
- Fax: +49-2405-6909-99

- Web: www.zyxel.de
- Regular Mail: ZyXEL Deutschland GmbH., Adenauerstr. 20/A2 D-52146, Wuerselen, Germany

Hungary

- Support E-mail: support@zyxel.hu
- Sales E-mail: info@zyxel.hu
- Telephone: +36-1-3361649
- Fax: +36-1-3259100
- Web: www.zyxel.hu
- Regular Mail: ZyXEL Hungary, 48, Zoldlomb Str., H-1025, Budapest, Hungary

India

- Support E-mail: support@zyxel.in
- Sales E-mail: sales@zyxel.in
- Telephone: +91-11-30888144 to +91-11-30888153
- Fax: +91-11-30888149, +91-11-26810715
- Web: http://www.zyxel.in
- Regular Mail: India - ZyXEL Technology India Pvt Ltd., II-Floor, F2/9 Okhla Phase -1, New Delhi 110020, India

Japan

- Support E-mail: support@zyxel.co.jp
- Sales E-mail: zyp@zyxel.co.jp
- Telephone: +81-3-6847-3700
- Fax: +81-3-6847-3705
- Web: www.zyxel.co.jp
- Regular Mail: ZyXEL Japan, 3F, Office T&U, 1-10-10 Higashi-Gotanda, Shinagawa-ku, Tokyo 141-0022, Japan

Kazakhstan

- Support: http://zyxel.kz/support
- Sales E-mail: sales@zyxel.kz
- Telephone: +7-3272-590-698
- Fax: +7-3272-590-689
- Web: www.zyxel.kz
- Regular Mail: ZyXEL Kazakhstan, 43 Dostyk Ave., Office 414, Dostyk Business Centre, 050010 Almaty, Republic of Kazakhstan

Malaysia

- Support E-mail: support@zyxel.com.my
- Sales E-mail: sales@zyxel.com.my
- Telephone: +603-8076-9933
- Fax: +603-8076-9833
- Web: http://www.zyxel.com.my
- Regular Mail: ZyXEL Malaysia Sdn Bhd., 1-02 & 1-03, Jalan Kenari 17F, Bandar Puchong Jaya, 47100 Puchong, Selangor Darul Ehsan, Malaysia

North America

- Support E-mail: support@zyxel.com
- Support Telephone: +1-800-978-7222
- Sales E-mail: sales@zyxel.com
- Sales Telephone: +1-714-632-0882
- Fax: +1-714-632-0858
- Web: www.zyxel.com
- Regular Mail: ZyXEL Communications Inc., 1130 N. Miller St., Anaheim, CA 92806-2001, U.S.A.

Norway

- Support E-mail: support@zyxel.no
- Sales E-mail: sales@zyxel.no
- Telephone: +47-22-80-61-80
- Fax: +47-22-80-61-81
- Web: www.zyxel.no
- Regular Mail: ZyXEL Communications A/S, Nils Hansens vei 13, 0667 Oslo, Norway

Poland

- E-mail: info@pl.zyxel.com
- Telephone: +48-22-333 8250
- Fax: +48-22-333 8251
- Web: www.pl.zyxel.com
- Regular Mail: ZyXEL Communications, ul. Okrzei 1A, 03-715 Warszawa, Poland

Russia

- Support: http://zyxel.ru/support
- Sales E-mail: sales@zyxel.ru

- Telephone: +7-095-542-89-29
- Fax: +7-095-542-89-25
- Web: www.zyxel.ru
- Regular Mail: ZyXEL Russia, Ostrovityanova 37a Str., Moscow 117279, Russia

Singapore

- Support E-mail: support@zyxel.com.sg
- Sales E-mail: sales@zyxel.com.sg
- Telephone: +65-6899-6678
- Fax: +65-6899-8887
- Web: http://www.zyxel.com.sg
- Regular Mail: ZyXEL Singapore Pte Ltd., No. 2 International Business Park, The Strategy #03-28, Singapore 609930

Spain

- Support E-mail: support@zyxel.es
- Sales E-mail: sales@zyxel.es
- Telephone: +34-902-195-420
- Fax: +34-913-005-345
- Web: www.zyxel.es
- Regular Mail: ZyXEL Communications, Arte, 21 5ª planta, 28033 Madrid, Spain

Sweden

- Support E-mail: support@zyxel.se
- Sales E-mail: sales@zyxel.se
- Telephone: +46-31-744-7700
- Fax: +46-31-744-7701
- Web: www.zyxel.se
- Regular Mail: ZyXEL Communications A/S, Sjöporten 4, 41764 Göteborg, Sweden

Thailand

- Support E-mail: support@zyxel.co.th
- Sales E-mail: sales@zyxel.co.th
- Telephone: +662-831-5315
- Fax: +662-831-5395
- Web: http://www.zyxel.co.th

- Regular Mail: ZyXEL Thailand Co., Ltd., 1/1 Moo 2, Ratchaphruk Road, Bangrak-Noi, Muang, Nonthaburi 11000, Thailand.

Ukraine

- Support E-mail: support@ua.zyxel.com
- Sales E-mail: sales@ua.zyxel.com
- Telephone: +380-44-247-69-78
- Fax: +380-44-494-49-32
- Web: www.ua.zyxel.com
- Regular Mail: ZyXEL Ukraine, 13, Pimonenko Str., Kiev 04050, Ukraine

United Kingdom

- Support E-mail: support@zyxel.co.uk
- Sales E-mail: sales@zyxel.co.uk
- Telephone: +44-1344-303044, 08707-555779 (UK only)
- Fax: +44-1344-303034
- Web: www.zyxel.co.uk
- FTP: ftp.zyxel.co.uk
- Regular Mail: ZyXEL Communications UK Ltd., 11 The Courtyard, Eastern Road, Bracknell, Berkshire RG12 2XB, United Kingdom (UK)

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