4929 DSLAM Installation and User's Guide

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⚠ Important Safety Instructions

1. Read and follow all warning notices and instructions marked on the product or included in the manual.
2. This product is to be connected to a nominal –48 to –60 VDC supply source that is electrically isolated from the AC source using minimum 18 AWG (0.75mm²) leads . Two inputs are provided for redundancy. The positive terminal of the DC source is to be reliably connected to earth. Connect a minimum 18 AWG (0.75mm²) green/yellow earthing (grounding) wire to the protective earthing (grounding) screw, identified by the protective earth symbol on the back of the chassis.
3. This product may only be used in a Restricted Access Location in accordance with the requirements of the National Electric Code, ANSI/NFPA 70, and the Canadian Electrical Code, or in accordance with the standards and regulatory requirements of the country in which it is installed. A Restricted Access Location is a secure area (dedicated equipment rooms, equipment closets, or the like) for equipment where access can only be gained by service personnel or by users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that must be taken. In addition, access into this designated secured area is possible only through the use of a tool or lock and key, or other means of security, and is controlled by the authority responsible for the location.
4. A readily accessible disconnect device as part of the building installation shall be incorporated in fixed wiring. The DC disconnect device must be rated at a minimum 60 VDC, minimum 2A. The disconnect device shall be readily accessible to the operator. The disconnect device must be included with an adequately rated fuse or circuit breaker in the ungrounded conductor. Use a minimum 18 AWG (0.75 mm²) fixed power source wires with strain retention.
5. Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.
6. Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these slots and openings must not be blocked or covered.
7. Do not attempt to service this product yourself, as it will void the warranty. Opening or removing covers may expose you to dangerous high voltage points or other risks. Refer all servicing to qualified service personnel.
8. A rare phenomenon can create a voltage potential between the earth grounds of two or more buildings. If products installed in separate buildings are interconnected, the voltage potential may cause a hazardous condition. Consult a qualified electrical consultant to determine whether or not this phenomenon exists and, if necessary, implement corrective action prior to interconnecting the products.
9. **CLASS 1 LASER PRODUCT:** This product has provisions for the customer to install a Class 1 laser transceiver, which provides optical coupling to the telecommunication network. Once a Class 1 laser product is installed, the equipment is to be considered to be a Class 1 Laser Product (Appareil à Laser de Classe 1). The customer is responsible for selecting and installing the laser transceiver and for insuring that the Class 1 AEL (Allowable Emission Limit) per EN/IEC 60825 is not exceeded after the laser

transponders have been installed. Do not install laser products whose class rating is greater than 1. Refer to all important safety instructions that accompanied the transceiver prior to installation. Only laser Class 1 devices certified for use in the country of installation by the cognizant agency are to be utilized in this product. Also, laser warnings are to be provided in accordance with IEC 60825-1 and its Amendments 1 and 2, as well as 21 CFR 1010 and 1040.10(g).

10. General purpose cables are described for use with this product. Special cables, which may be required by the regulatory inspection authority for the installation site, are the responsibility of the customer. To reduce the risk of fire, use a UL Listed or CSA Certified, minimum No. 26 AWG (0.128 mm^2) telecommunication cable, or comparable cables certified for use in the country of installation.

11. The equipment is intended for installation in a maximum 149° F (65° C) ambient temperature, in an environment that is free of dust and dirt.

12. Do not physically stack more than eight (8) units high. Physical stability has not been evaluated for stacking higher than eight units, and any configuration greater than eight may result in an unstable (tip-over) condition. Ensure that the four (4) rubber feet supplied with the product have been installed on the bottom of each unit prior to stacking any 4929 units on top of one another.

13. In addition, if the equipment is to be used with telecommunications circuits, take the following precautions:
    - Never install telephone wiring during a lightning storm.
    - Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
    - Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
    - Use caution when installing or modifying telephone lines.
    - Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
    - Do not use the telephone to report a gas leak in the vicinity of the leak.

14. When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.

EMI Notices

⚠ UNITED STATES – EMI NOTICE:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment 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 equipment 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.

The authority to operate this equipment is conditioned by the requirements that no modifications will be made to the equipment unless the changes or modifications are expressly approved by the manufacturer.

If the equipment includes a ferrite choke or chokes, they must be installed per the installation instructions.

⚠ CANADA – EMI NOTICE:

This Class A digital apparatus meets all requirements of the Canadian interference-causing equipment regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du réglement sur le matérial brouilleur du Canada.

Notices to Users of the Canadian Telephone Network

NOTICE: This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation IC before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

NOTICE: The Ringer Equivalence Number (REN) for this terminal equipment is labeled on the equipment and includes the effect of the POTS splitter. The REN assigned to each terminal equipment provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed five.

CE Marking

When the product is marked with the CE mark on the equipment label, a supporting Declaration of Conformity may be downloaded from **www.zhone.com**.

Japan

Class A ITE

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

This is a Class A product based on the standard of the Voluntary Control Council for interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

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ABOUT THIS GUIDE

Document Purpose and Intended Audience

This document is written for technicians who install the 4929 DSLAM.

Document Summary

Section	Description
Chapter 1, *Introduction*	Describes the 4929 DSLAM.
Chapter 2, *Installation*	Describes the physical installation of the 4929 DSLAM into a rack.
Chapter 3, *Cabling*	Describes how to install all cables for the 4929 DSLAM.
Chapter 4, *LEDs*	Explains the meaning and usage of the front panel LEDs.
Chapter 5, *Configuration Using the NMS*	Describes the configuration of the 4929 DSLAM using the web interface.
Chapter 6, *Command Line Interface*	Describes the configuration of the 4929 DSLAM using the command line interface.
Appendix A, *Connectors and Pin Assignments*	Provides pinouts for all connectors on the 4929 DSLAM.
Appendix B, *Equipment List*	Provides part numbers for the 4929 DSLAM and related products.
Appendix C, *Technical Specifications*	Lists the technical characteristics of the 4929 DSLAM.
Index	Lists key terms, acronyms, concepts, and sections in alphabetical order.

A master glossary of terms and acronyms used in these documents is available on the World Wide Web at **www.zhone.com**.

Related Product Documents

Documentation for this product is available on the World Wide Web at **www.zhone.com**.

Document Title
MIM-10/100 Installation Instructions Describes how to install the MIM-10/100 Micro Interface Module.
MIM-2E1 Installation Instructions Describes how to install the MIM-2E1 Micro Interface Module.
MIM-2T1 Installation Instructions Describes how to install the MIM-2T1 Micro Interface Module.
MIM-2000F Installation Instructions Describes how to install the MIM-2000F Micro Interface Module.
MIM-4E1 Installation Instructions Describes how to install the MIM-4E1 Micro Interface Module.
MIM-4T1 Installation Instructions Describes how to install the MIM-4T1 Micro Interface Module.
GrandVIEW® EMS User's Guide Contains instructions for maintaining network services and resources using the GrandVIEW Element Management System (EMS).

Contacting Global Service and Support

Contact Global Service and Support (GSS) if you have any questions about this or other Zhone products. Before contacting GSS, make sure you have the following information:

- Zhone product you are using
- System configuration
- Software version running on the system
- Description of the issue

Technical Support

If you require assistance with the installation or operation of your product, or if you want to return a product for repair under warranty, contact GSS. The contact information is as follows:

E-mail	support@zhone.com
Telephone (North America)	877-ZHONE20
Telephone (International)	510-777-7133
Internet	www.zhone.com/support

If you purchased the product from an authorized dealer, distributor, Value Added Reseller (VAR), or third party, contact that supplier for technical assistance and warranty support.

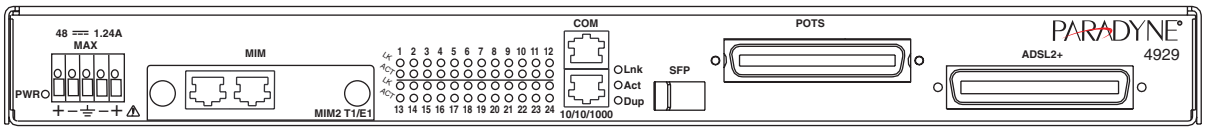
Service Requirements

If the product malfunctions, all repairs must be performed by the manufacturer or a Zhone-authorized agent. It is the responsibility of users requiring service to report the need for service to GSS.

1 INTRODUCTION

Overview

The 4900 Series DSLAMs are ADSL ITU G.992.5-compliant IP DSLAMs. They are available with or without internal POTS splitters.



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The 4900 Series DSLAMs are Ethernet based, environmentally hardened, and small enough to fit in even crowded Remote Terminal cabinets.

The 4900 Series DSLAMs support IGMP snooping for IP Video support, SNMP Management, Multimedia Traffic Management (MTM), enhanced security features, and up to 24 Mbps downstream bandwidth available on every one of its 24 DSL ports. Front loading, hot-swappable uplink module options called Micro Interface Modules (MIMs) are available for installation into the DSLAM. MIMs include T1/E1, 100BaseFX, 10/100BaseT, and gigabit Ethernet for easy integration with other network elements and easy migration as bandwidth requirements increase.

The 4900 Series DSLAMs interoperate with industry standard ADSL modems over the local loop while preserving the benefits of a packet-based architecture.

Features

Each 4900 Series DSLAM has the following features:

- Utilizes DSL The Easy Way™ Ethernet-based Architecture for optimum throughput and plug and play operation without the need to configure PVCs
- Small enough to fit in any remote terminal; ETSI standard form factor for 19” and 23” racks
- 24 ports of ADSL/ADSL2/ADSL2+ (ITU G.992.5), Annex A
- Modular, hot-swappable media independent backhaul using the following Micro Interface Modules: MIM-10/100, MIM-100FX, MIM-2E1, MIM-4E1, MIM-2T1, MIM-4T1, or MIM-2000F

- Compliant to ETSI 300-119-1-3 Environmental Requirements
- MTM for enhanced security and prioritization
- Embedded web-based management system for easy, platform-independent remote management, and SNMP for remote monitoring
- IGMP snooping for multicast video support
- Available with integral 600 Ohm POTS splitters, 900 Ohm POTS, or ISDN splitters

2 INSTALLATION

Preparation

Consider the following before installing the DSLAM:

- Installation Site – Your installation site should be well ventilated, clean, and free of environmental extremes.
- Installation Options – The DSLAM may be:
  - — Mounted with the included mounting brackets in a standard 19-inch (483 mm) or 23-inch (584 mm) rack (including both Bay Networks and Nortel 23-inch racks), or, with separately purchased mounting brackets, in a 21-inch (535 mm) ETSI rack. ETSI brackets are available. See Appendix B, *Equipment List*.

    As many 4900 Series DSLAMs may be mounted in a standard rack as there are 1.75-inch (44.45 mm) spaces in the rack, so long as adequate cooling is provided.
  - — Mounted on a wall.
  - — Set on a shelf or desktop.

    Up to eight 4900 Series DSLAMs may be stacked on a shelf or desktop. Different models can be mixed in a stack.
- **Power** – The DSLAM operates from a –48 VDC power supply to allow for standard power connections available in a CO. For AC voltage environments, an external AC-to-DC power converter is required.

Cables Required

No cables are provided with the DSLAM. See Table 1, Cable Descriptions, to determine what cables you need to obtain before installation. See Appendix A, *Connectors and Pin Assignments* and Appendix B, *Equipment List* for more information.

Table 1: Cable Descriptions

Connector Name or MIM	Connector and Cable	For Connecting . . .
ADSL2+ POTS	50-pin RJ21X Telco-type straight connector and 50-wire cable. Up to two cables required: one for DSL and one for POTS (if POTS splitters are installed).	Up to 24 DSL ports to a Main Distribution Frame, punchdown block, or splitters. Up to 24 POTS splitter ports to Main Distribution Frame or punchdown block.
SFP	GigE SFP transceiver and cable.	A 4900 Series DSLAM to an upstream 4900 or network.
10/100/1000	8-position modular plug and 8-wire Category 5 or better unshielded twisted pair (UTP) cable.	
MIM10/100	8-position modular plug and 8-wire Category 5 or better unshielded twisted pair (UTP) cable.	
MIM-100FX	100 Mbps SFP transceiver and fiber optic cable.	
MIM-2000F	Up to two GigE SFP transceivers and cables.	
MIM-2E1 MIM-2T1	8-position modular plug and 8-wire Category 5 or better unshielded twisted pair (UTP) cable. Up to two required.	
MIM-4E1 MIM-4T1	8-position modular plug and 8-wire Category 5 or better unshielded twisted pair (UTP) cable. Up to four required.	
COM	DB9 to RJ45 adapter cable.	The 4900 Series DSLAM to a terminal or a PC with a terminal emulation program.

Unpacking the Hardware

⚠ HANDLING PRECAUTIONS FOR STATIC-SENSITIVE DEVICES

This product is designed to protect sensitive components from damage due to electrostatic discharge (ESD) during normal operation. When performing installation procedures, however, take proper static control precautions to prevent damage to equipment. If you are not sure of the proper static control precautions, contact your nearest sales or service representative.

The DSLAM is shipped in a cardboard shipping container. Carefully remove the unit from its shipping container and check for physical damage. If the unit shows signs of shipping damage, notify your sales representative.

Package Contents

In addition to this installation guide, the shipping carton should contain:

- 4900 Series DSLAM
- Two sets of mounting brackets: one set suitable for a 19-inch (483 mm) rack and one set suitable for a 23-inch (584 mm) rack (including Bay Networks and Nortel)
- Other hardware (including cable ties, rubber feet)
- Installation guide

If anything is missing, notify your sales representative.

Before installing the DSLAM, read the *Important Safety Instructions* in the beginning of this document.

Mounting Configurations

Three basic installation configurations are available:

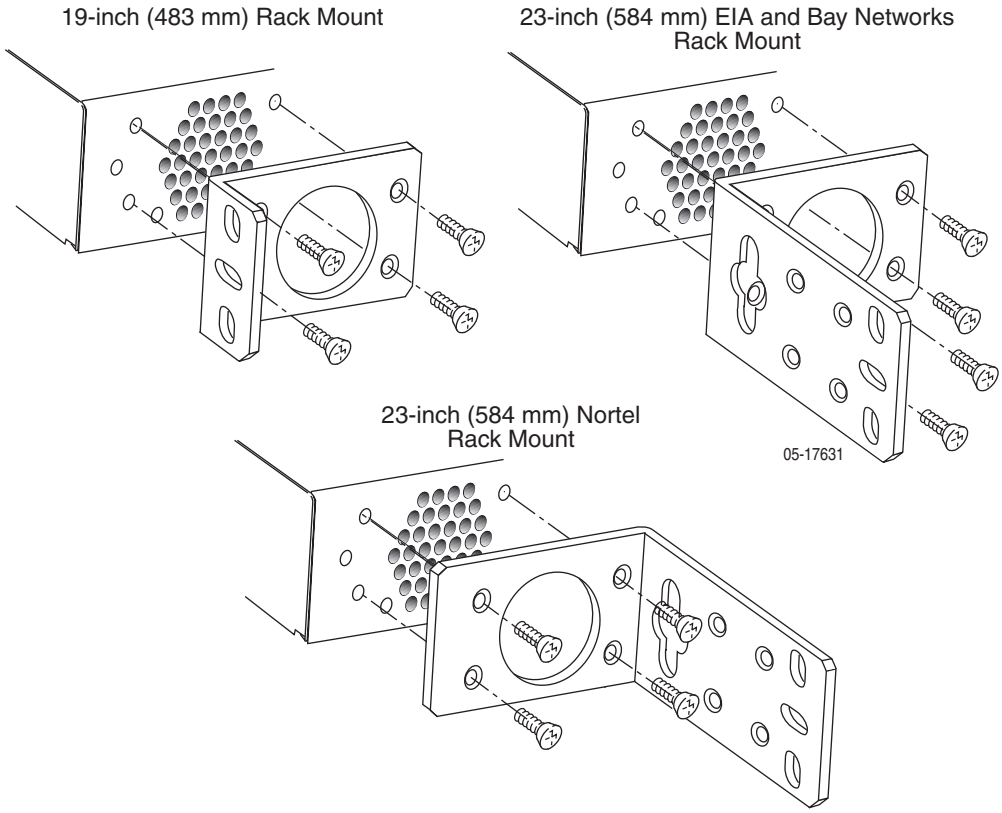
- Rack mount – see *Installing the Brackets for Rack Mounting on page 20* and *Installing the DSLAM Into a Rack on page 21*. In this guide, the term *rack* refers to any rack, cabinet, frame, or bay suitable for mounting telecommunications equipment.
- Wall mount – see *Installing the DSLAM on a Wall on page 22*.
- Shelf or desktop – see *Installing the DSLAM on a Shelf or Desktop on page 24*.

Installing the Brackets for Rack Mounting

The 4900 DSLAM can be installed in a rack using mounting brackets. Two brackets suitable for a 19-inch (483 mm) rack and two brackets suitable for a 23-inch (584 mm) Bay Networks or Nortel rack are shipped with the unit.

To install the mounting brackets for rack mounting:

1. Identify eight flat-head screws provided with the mounting brackets.
2. Attach the brackets appropriate to your rack size. Tighten all screws firmly.



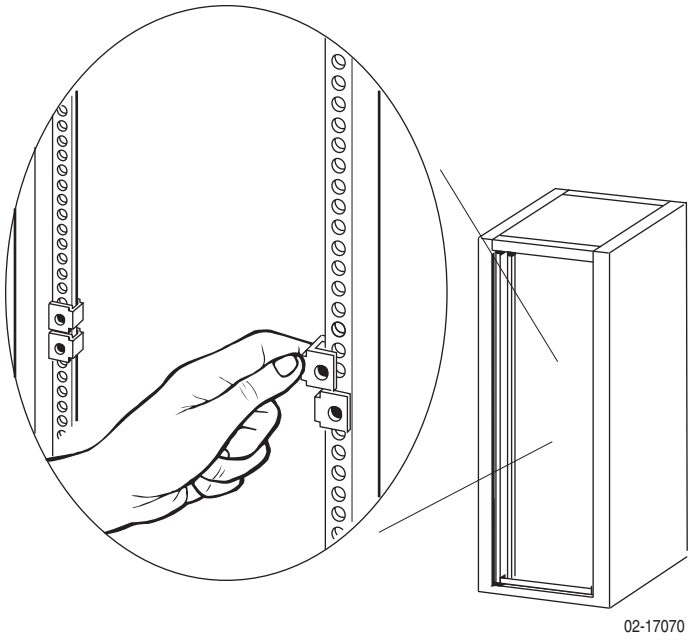
Installing the DSLAM Into a Rack

Use:

- #10-32 mounting screws for rails with threaded screw holes
- #12-24 mounting screws and self-retaining nuts for rails with unthreaded screw holes

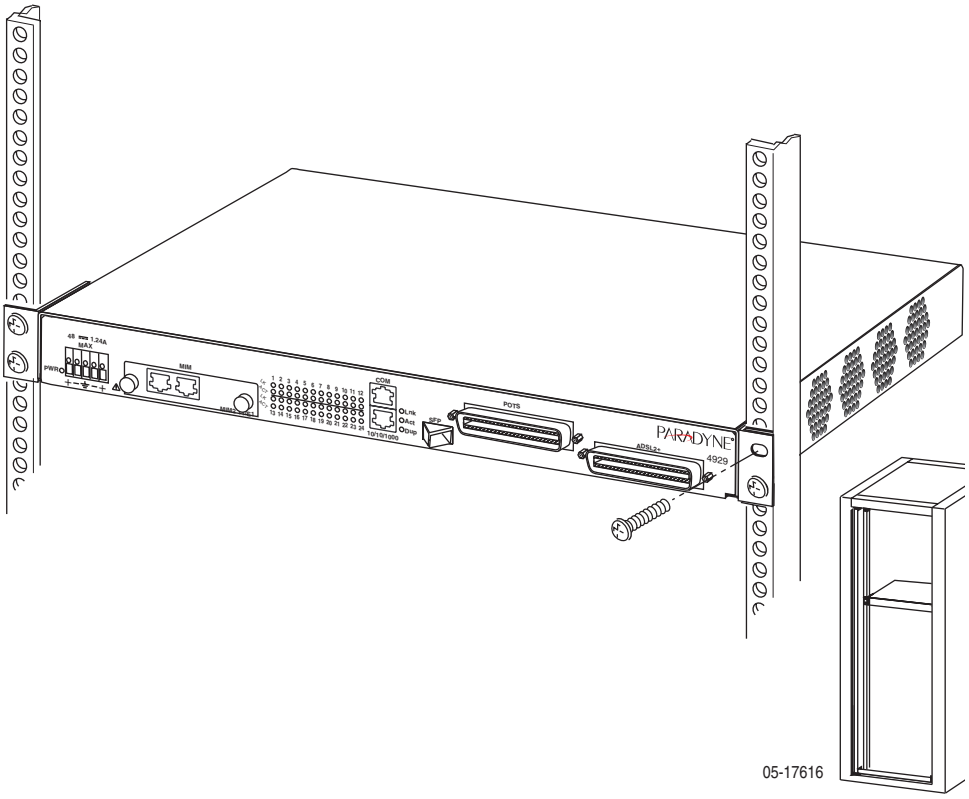
To install the DSLAM into a rack:

1 Determine where in the rack you will mount the DSLAM. If your rack does not have threaded screw holes, slip self-retaining nuts onto the rails where the DSLAM will be fastened.



2 Place the unit so that the brackets rest against the front of the rails. Insert screws in the bottom screw positions and hand-tighten them.

3 Insert and tighten the screws in the top screw positions, then tighten the bottom screws.



Installing the DSLAM on a Wall

Wall mounting requires two wood screws suitable for the weight of the fully cabled unit. These are not included. Use at a minimum 1/4-inch (6 mm) diameter screws in 3/4-inch (19 mm) plywood (not drywall).

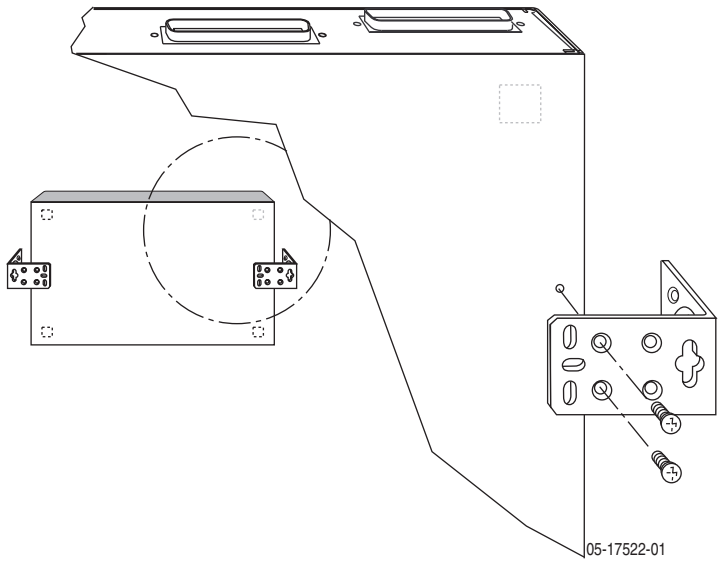
To install the DSLAM on a wall:

1 Identify the flat-head screws provided in the hardware kit and the brackets suitable for a 23-inch rack. Two screws are required for each bracket.

2 Lay the unit upside down on a flat surface.

3 Locate the pair of threaded holes on the right side of the unit. Attach a bracket using the flat-head screws.

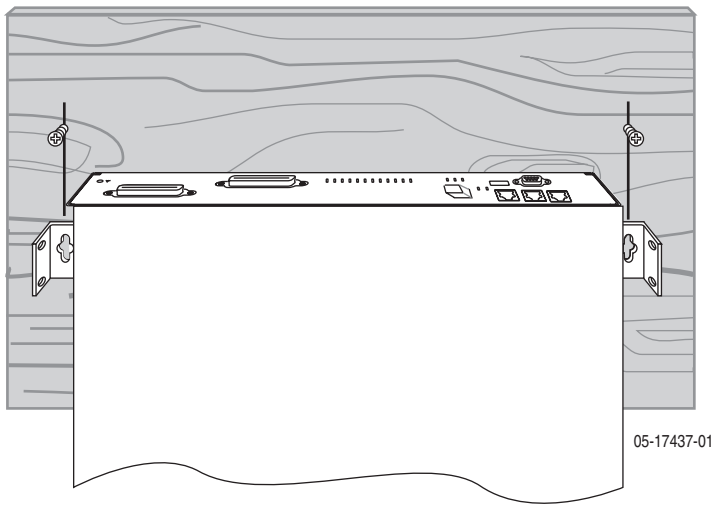
4 Locate the pair of threaded holes on the left side of the unit. Attach a bracket using the flat-head screws.



5 Tighten all screws firmly.

6 Lift the unit into the position it will occupy on the wall and mark the positions of the key slots in the brackets. Set the unit aside.

7 Install two wood screws (not provided) at the points you have marked. Do not completely tighten the screws. Leave them so their heads are about 1/4 inch (6 mm) from the wall.



8 Hang the unit from the wood screws to verify that the screws are properly placed. The screws should freely slide into the top of the key slots in the brackets.

Do not fasten the unit to the wall until after it is completely cabled and tested.

Installing the DSLAM on a Shelf or Desktop

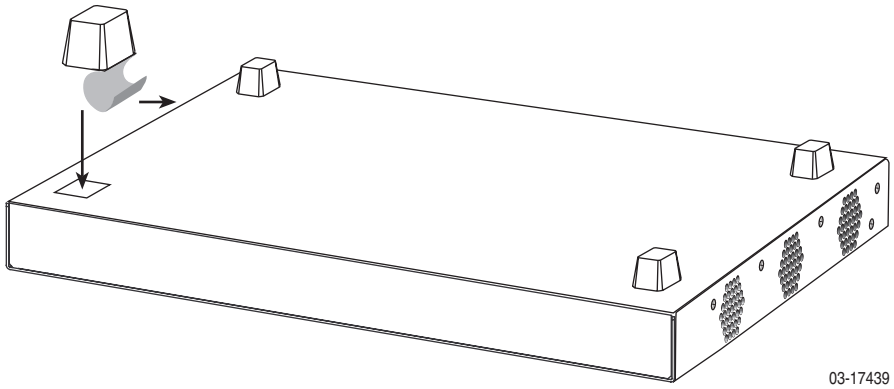
If the DSLAM will be placed on a shelf or desktop, install the provided rubber feet before putting the unit in position.

To install the DSLAM on a shelf or desktop, as a standalone unit or in a stack:

1 Locate the rubber feet in the hardware kit provided with the unit.

2 Turn the unit upside down on a flat surface. Squares stamped into the bottom of the unit show the proper positions for the feet.

3 Remove the protective sheet from the bottom of each foot, then press the foot onto a corner of the bottom of the unit.



4 Turn the unit right side up and place it in position on a shelf or desktop.

5 If the installation includes more than one unit, one can be stacked atop another. Up to eight units can be stacked together.

3 CABLING

Cabling Overview

The 4900 Series DSLAM has a large variety of possible cabling configurations. This chapter describes all possible connections, not all of which are required:

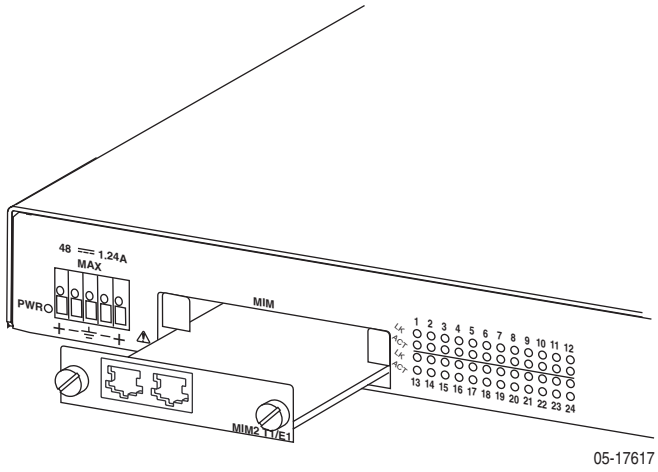
- *Installing the Micro Interface Module on page 26*
- *Connecting the ADSL2+ and POTS Connectors on page 27*
- *Connecting the SFP Connector or the 10/100/1000 Connector on page 28*
- *Connecting the COM Port on page 30*
- *Connecting to Power on page 31*

Installing the Micro Interface Module

A Micro Interface Module (MIM) is not required for operation. It provides additional Ethernet, T1, or E1 uplink ports for the DSLAM, depending upon the MIM model installed.

To install a MIM:

1. Using a flat-head screwdriver to loosen the fastening screws, remove the blanking plate covering the MIM port on the front of the DSLAM.
2. Align the MIM with the module guides inside the DSLAM's MIM port.



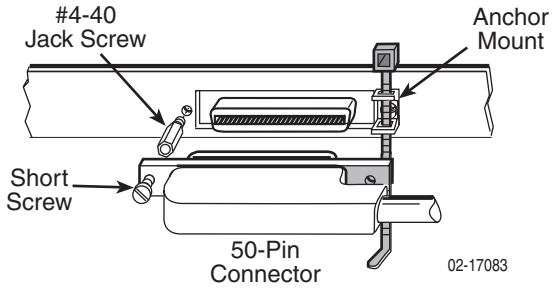
3. Slide the MIM into the chassis until it is fully seated.
4. Secure the MIM by tightening the fastening screws on the MIM faceplate with a flat-head screwdriver.
5. Cable the MIM as described in the MIM installation instructions.

Connecting the ADSL2+ and POTS Connectors

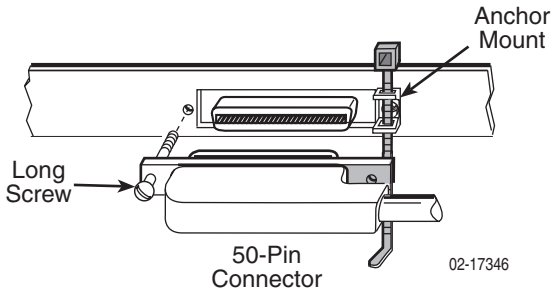
DSL connector supports the tip and ring connections of up to 24 DSL ports over a 50-position cable. A POTS (plain old telephone service) splitter connector is also provided in certain models. If your model does not contain an integrated POTS splitter, you must connect the unit to a separate POTS splitter.

To cable the DSL Ports:

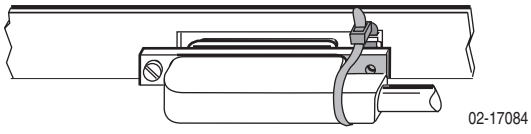
1. Insert a cable tie (provided) through the top of the anchor mount next to the ADSL2+ connector.
2. If the connector for your cable has a short captive screw, attach the cable to the ADSL2+ connector and fasten it to the jack screw with its short captive screw.



3. If the connector for your cable has a long captive screw, remove the provided jack screw from the threaded hole next to the ADSL2+ connector. Attach the cable connector to the unit using the long captive screw.



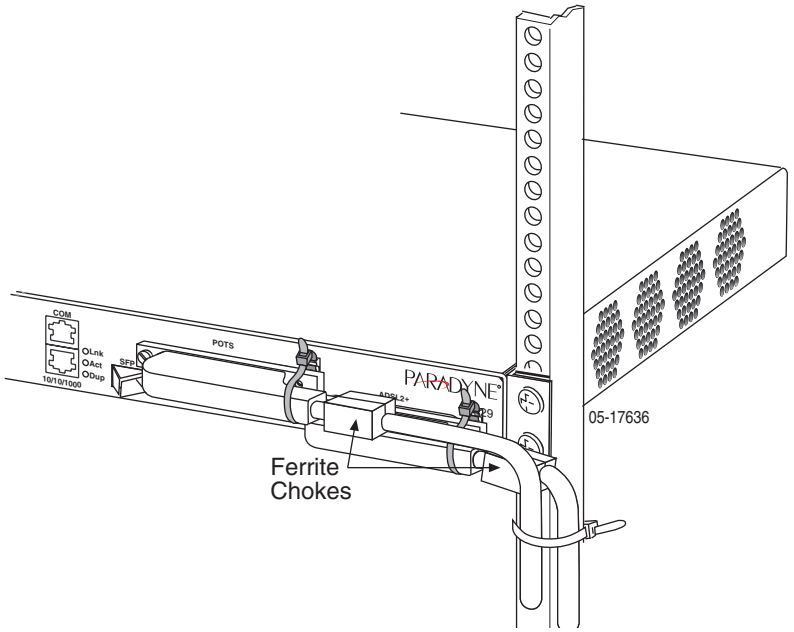
4. Tighten the cable tie around the connector and trim the excess.



5. If you are using an integrated POTS splitter, repeat Step 1 through Step 4, substituting POTS for ADSL2+.

6 Install the supplied large ferrite chokes on the DSL and POTS cables as close as possible to the connectors. If necessary, use cables ties to hold the chokes in place.

7 Secure the cables as required for strain relief.



Connecting the SFP Connector or the 10/100/1000 Connector

There are two Ethernet interfaces on the faceplate of the DSLAM, only one of which may be used at a time:

- An 8-position modular jack providing support for 1000BaseT
- A Small Form-Factor Pluggable (SFP) socket providing, with the appropriate transceiver installed, support for 1000BaseX and 1000BaseT. See Appendix B, *Equipment List*.

Either interface can be used as the uplink for a single DSLAM, or for the terminating unit in a stack of DSLAMs.

To use the SFP connector or 10/100/1000 connector:

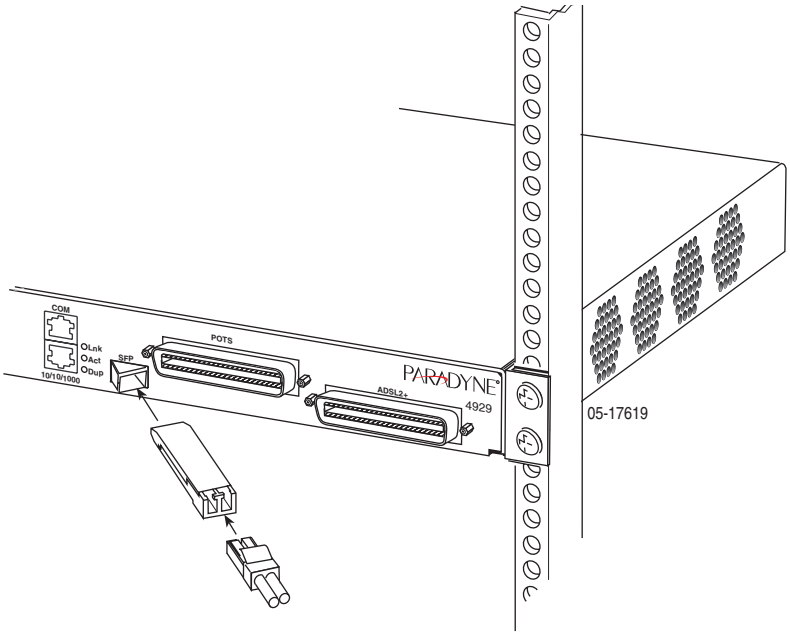
1 Connect the uplink cable to the DSLAM:

— **For a wire connection**, plug the 8-position modular plug of your uplink cable into the 10/100/1000 modular jack. A straight-through cable can be used regardless of the destination interface, since the port automatically distinguishes between a Medium-Dependent Interface (MDI) and an MDI Crossover (MDIX).

Install the supplied small ferrite choke on the cable as close as possible to the jack. Use a cable tie to hold the choke in place.

— **For an SFP copper connection**, plug your transceiver into the SFP socket. Plug the 8-position modular plug of your uplink cable into the SFP transceiver's modular jack.

— **For an SFP fiber connection**, plug your transceiver into the SFP socket. Plug the LC connector of your fiber optic uplink cable into the cable socket of the transceiver. Observing the minimum bend radius for your cable, fasten it with cable ties in such a way that it will not be kinked or snagged in the course of other cabling. If you do not know the specifications for your cable, maintain a radius of at least ten times the cable diameter.



2 Connect the other end of the uplink cable to the uplink interface, such as an Ethernet switch.

Connecting DSLAMs to Each Other

Two or more DSLAMs can be daisy-chained together. All DSLAMs in this configuration must have a MIM installed; the MIM2000F, with two GigE ports, is recommended for performance reasons.

When daisy-chaining, one Ethernet port must be connected to the LAN, normally to a router. A second Ethernet port is connected to an Ethernet port of another 4900 DSLAM, or to the uplink interface.

The connection to the downstream DSLAM must be specified. This is done using the web interface. See *DSLAM Interconnect Configuration* in Chapter 5, *Configuration Using the NMS*.

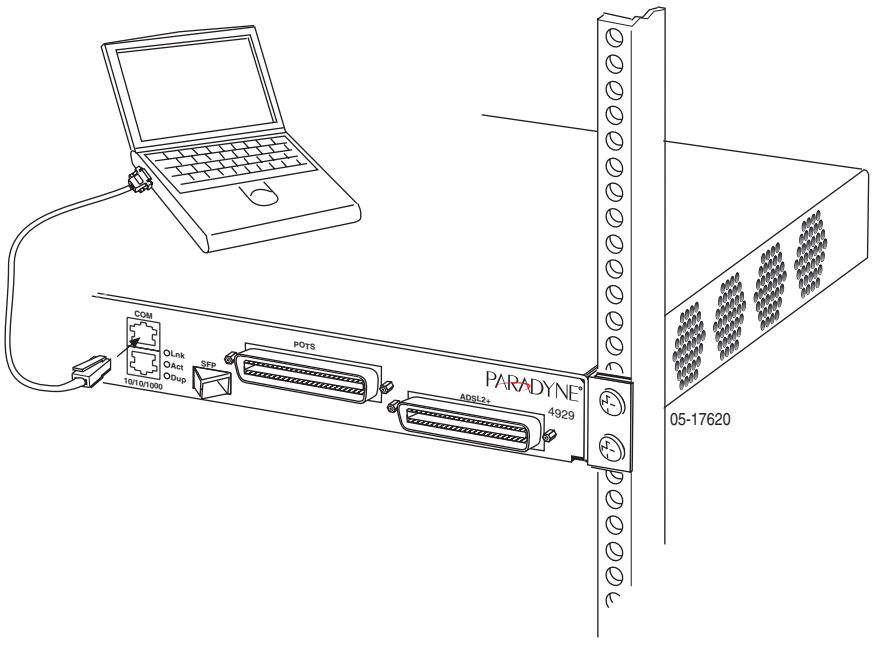
Connecting the COM Port

You can use the COM port to directly connect a PC, terminal, or modem, permitting use of the Command Line Interface (CLI).

Connecting a Terminal or PC to the COM Port

To connect a terminal or PC to the COM port:

1. Configure the terminal or terminal emulation program to use the following parameters:
   - Maximum speed: 9600 bps
   - Data bits: 8
   - Parity: None
   - Flow Control: None
   - Stop bits: 1
2. Determine and procure the proper Data Terminal Equipment (DTE) cable type. The COM port requires an RJ45-type plug connector. The other connector depends on the serial port on your terminal or PC. See *DB9 to RJ45 Adapter Pinouts* in Appendix A, *Connectors and Pin Assignments*.
3. Connect the modular plug of your cable to the COM port socket.



4. Connect the other end of the cable to the serial port of your terminal or PC.

Connecting a Modem to the COM Port

To connect a modem to the COM port:

1. Determine and procure the proper DCE cable type for your modem. The COM port requires an RJ45-type plug connector. The other connector depends on the serial port on your modem. The connection requires an EIA-232E crossover (null modem) cable or adapter. See *DB9 to RJ45 Adapter Pinouts* in Appendix A, *Connectors and Pin Assignments*.
2. Connect the modular plug connector of your cable to the COM port socket.
3. Connect the other end of the cable or adapter to the serial port of your modem.

Connecting to Power

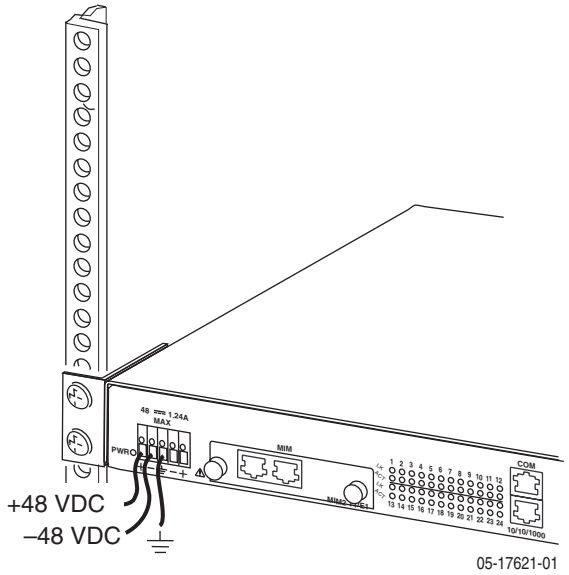
The 4900 Series DSLAM is powered by a nominal –48 VDC source. Dual power feeds are provided for redundancy. The terminal block accepts 18 to 14 AWG wire.

The DC power terminal block on the DSLAM has five terminals: two positive, two negative, and one ground. Only one positive terminal and one negative terminal pair need be connected for operational purposes. The second positive and negative terminal pair may be connected to a backup DC power supply for redundancy. The ground terminal must be connected regardlessly. DO NOT OPERATE THE DSLAM WITHOUT A GROUND CONNECTION.

To connect the DSLAM to power:

1. Make sure that the DC power source wires are not powered (that is, the circuit breakers or fuses are open at the source).
2. Strip about 1/2 inch (13 mm) of insulation off the ends of the 18–14 AWG or 0.75–2.5 mm^2 solid or stranded wires you will use for power.
3. Loosen the screw above the center terminal on the DC terminal strip on the face of your DSLAM.
4. Insert your ground wire into the center terminal and tighten the screw.
5. Attach the other end of the ground wire to an earth ground.
6. Loosen the screws above the positive and negative terminals on one side of the terminal strip.
7. Insert your negative DC power lead into the negative (–) terminal and then tighten the screw.
8. Insert your positive DC power lead into the positive (+) terminal and then tighten the screw.
9. Repeat Step 6 through Step 8 if you have a redundant power source.

10 Turn on your power source and verify that the Power LED on the left side of the DSLAM is illuminated. See Chapter 4, *LEDs*.



4 LEDs

LED Locations

The locations of the System and DSL Port LEDs on the front panel of the DSLAM are shown in Figure 1, Front Panel LEDs.

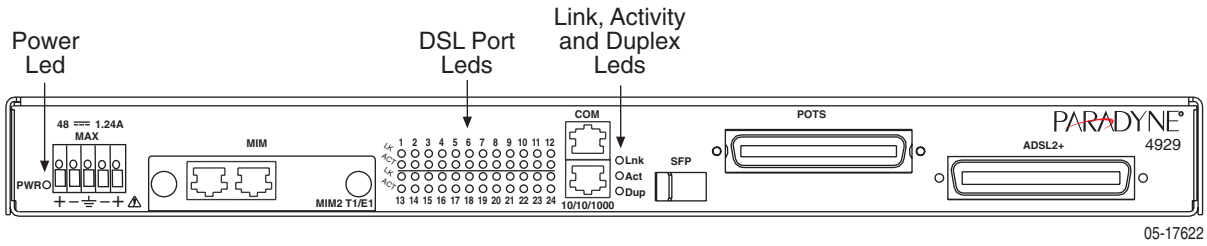


Figure 1: Front Panel LEDs

LED Meanings

The meaning of the front panel LEDs is shown in Table 2, Front Panel LEDs.

Table 2: Front Panel LEDs (Sheet 1 of 2)

LED	Color	State	Meaning
10/100/1000 Lnk	–	Off	No Ethernet link present.
	Green	On	GigE Ethernet link present.
	Amber	On	10/100BaseT link present.
10/100/1000 Act	–	Off	No link or no activity.
	Green	Flashing	Transmitting or receiving.
10/100/1000 Dup	–	Off	Half-duplex or no link.
	Green	On	Full-duplex link.
DSL Ports 1–24 LK	–	Off	No DSL link present.
	Green	On	DSL link present.

Table 2: Front Panel LEDs (Sheet 2 of 2)

LED	Color	State	Meaning
DSL Ports 1–24 ACT	–	Off	No activity or no link.
	Amber	Flashing	Receiving data.
	Green	Flashing	Transmitting data.
PWR	Green	Off	No power is applied to the DSLAM.
		On	Power is applied to the DSLAM.

5 CONFIGURATION USING THE NMS

Overview

The 4900 Series DSLAMs have an integral web interface that you can access with a web browser. The DSLAM's integral Network Management System (NMS) lets you configure and monitor the DSLAM using a standard web browser.

Web Interface System Requirements

- **Web Browser** – Required for running NMS. Compatible web browsers include, but are not limited to, Microsoft Internet Explorer (version 6.0 or higher) and Netscape Navigator (version 6.0 or higher). NMS is optimized for use with Internet Explorer.
- Use your browser's default settings when running NMS. JavaScript must be enabled.
- Screen Resolution – 1024 x 768 pixels is the minimum resolution required for all NMS views to fit within the dimensions of most monitors and laptops. Lower screen resolutions (such as 800 x 600 pixels) may cause NMS screens to exceed the width or height of the screen. To verify screen resolution on a Windows system:
  - — Right click on your desktop
  - — Select Properties
  - — Click the Settings tab
  - — Adjust the Screen Resolution as needed

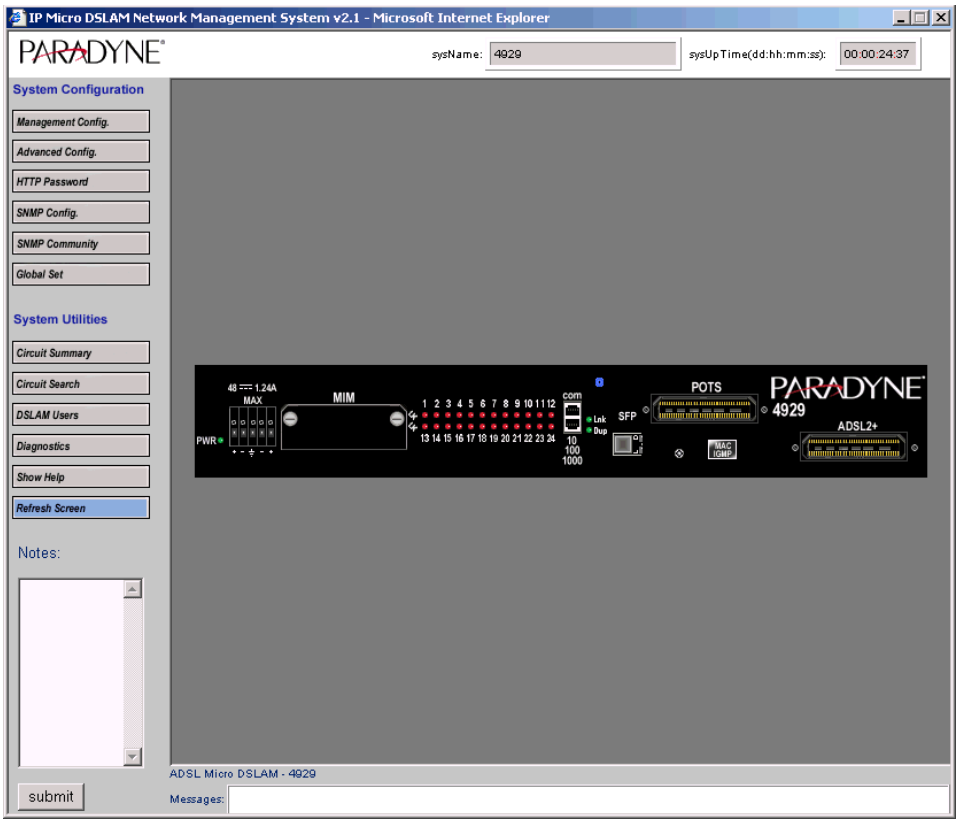
Configuring Your Windows PC to Communicate with NMS

To communicate with NMS, your PC's Ethernet interface must be on the same subnet as the network extender. For example, to configure the IP address under Windows XP:

1. In the Windows task bar, click on the Start button, and then click on Control Panel.
2. Double-click on the Network Connections icon.
3. In the LAN or High-Speed Internet window, right-click on the icon corresponding to your network interface card (NIC) and select Properties. (Often this icon is labeled Local Area Connection.) The Local Area Connection dialog box is displayed with a list of currently installed network items.
4. Ensure that the check box to the left of the item labeled Internet Protocol (TCP/IP) is checked, and click on Properties.
5. Write down the current IP Address and Subnet Mask in the Internet Protocol (TCP/IP) Properties dialog box. When you are done using NMS, you will need to reconfigure your PC with these values.
6. In the Internet Protocol (TCP/IP) Properties dialog box, click in the radio button labeled "Use the following IP address" and type 192.168.254.x (where x is any number between 3 and 250, inclusive) in the IP Address field.
7. Type 255.255.255.0 in the Subnet Mask field.
8. Click on OK twice to confirm your changes, and close the Control Panel.
9. Start your web browser. Type 192.168.254.252 into the Address field and press Enter. The web server opening screen appears.
10. Click on >> Next >>. The login dialog box appears. Log in using:

    Username: superuser
    Password: Password

The NMS home page appears.

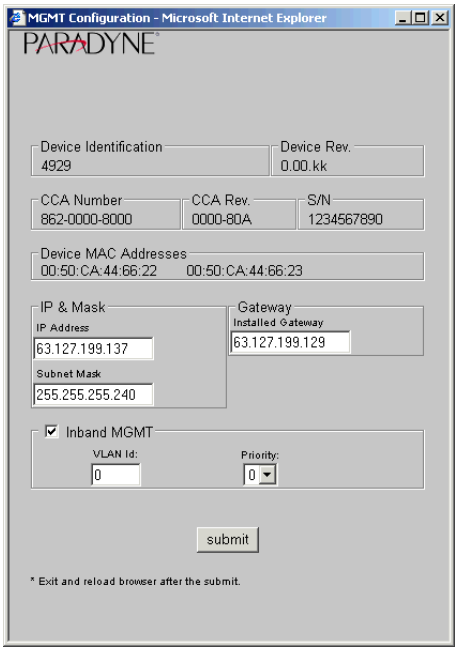


Management Configuration

Use the Management Configuration screen to set the unit's IP address and other management parameters.

To configure management parameters:

1 From the home screen, click on the Management Config button. The Management Configuration screen appears.



2 Select or enter the following parameters:

Parameter	Description
IP Address	Specify the management IP address for the DSLAM.
Subnet Mask	Specify the subnet mask for the IP address.
Gateway	Specify the first-hop gateway address.
Inband MGMT	Check this box if you will use inband management through MIM ports or ADSL ports.
VLAN Id	Specify a VLAN identifier for inband management.
Priority	Specify a priority (0–7) for management traffic.

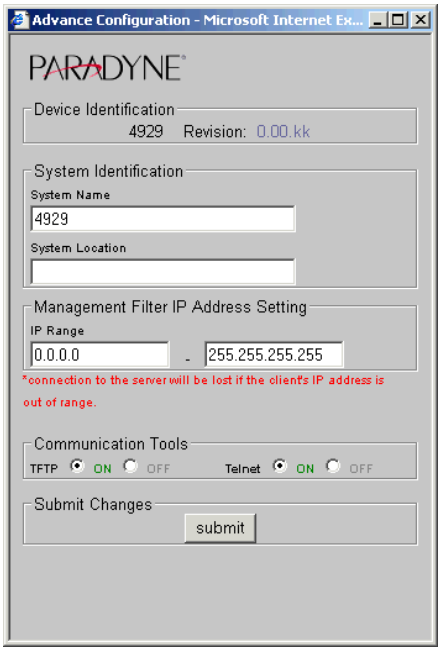
3 Click on Submit.

Advanced Configuration

Use the Advanced Configuration screen to set the unit's system name and other parameters.

To configure advanced system parameters:

1 From the home screen, click on the Advanced Config button. The Advanced Configuration screen appears.



2 Select or enter the following parameters:

Parameter	Description
System Name	Specify a name to identify the DSLAM.
System Location	Specify location information to further identify the DSLAM.
IP Range	Specify a range of IP addresses from which management traffic is accepted. If your PC's IP address is outside the range, contact with the DSLAM will be lost when you click on Submit.
Communication Tools	Click in the On or Off buttons to enable or disable TFTP and Telnet on this DSLAM.

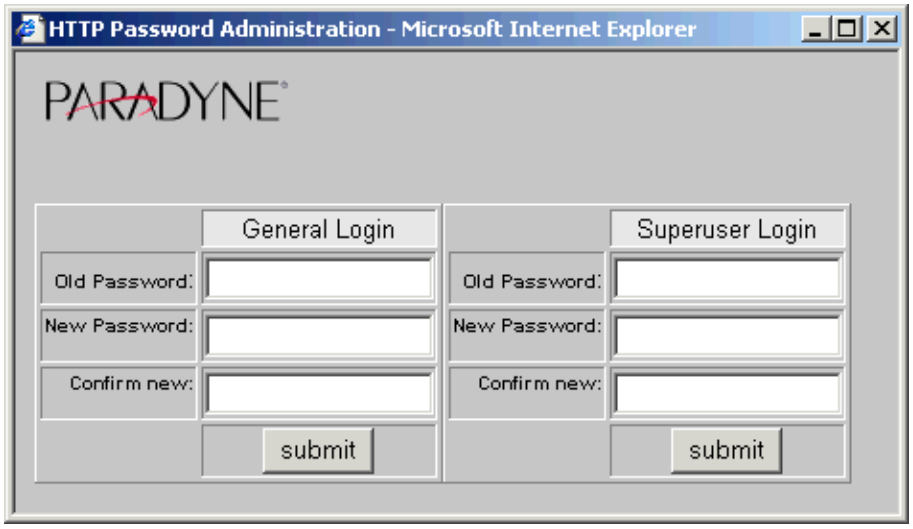
3 Click on Submit.

HTTP Password

Use the HTTP Password screen to set the password for the General and Superuser logins.

To configure HTTP passwords:

1 From the home screen, click on the HTTP Password button. The HTTP Password Administration screen appears.



2 Select or enter the following parameters:

Parameter	Description
Old Password	Specify the current password for the General or Superuser login. The default setting is **Password**.
New Password	Specify the new password for the General or Superuser login.
Confirm New	Type the new password again.

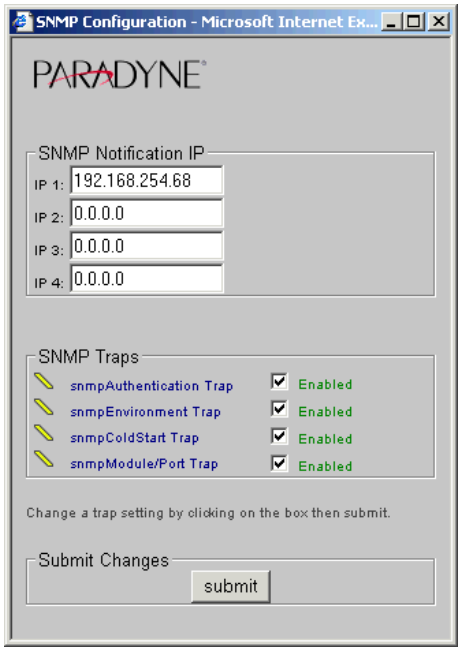
3 Click on Submit.

SNMP Configuration

Use the SNMP Configuration screen to enable traps and establish trap managers.

To configure SNMP parameters:

1 From the home screen, click on the SNMP Config button. The SNMP Configuration screen appears.



2 Select or enter the following parameters:

Parameter	Description
SNMP Notification IP	Specify the IP addresses of hosts that are to receive trap notifications.
SNMP Traps	Click in the check boxes to enable or disable SNMP traps: • snmpAuthentication • snmpEnvironment • snmpColdStart • snmpModule/Port

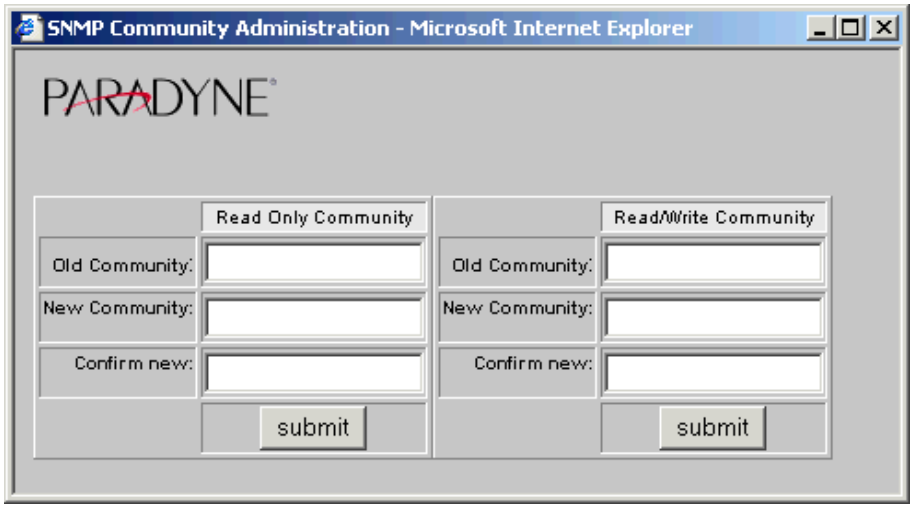
3 Click on Submit.

SNMP Community Administration

Use the SNMP Community Administration screen to set the read and read/write community names.

To configure community names:

1 From the home screen, click on the SNMP Community button. The SNMP Community Administration screen appears.



2 Select or enter the following parameters:

Parameter	Description
Old Community	Specify the current community name for Read or Read/Write operations. The default for both is **Password**.
New Community	Specify the new community name for Read or Read/Write operations.
Confirm New	Type the new community name again.

3 Click on Submit.

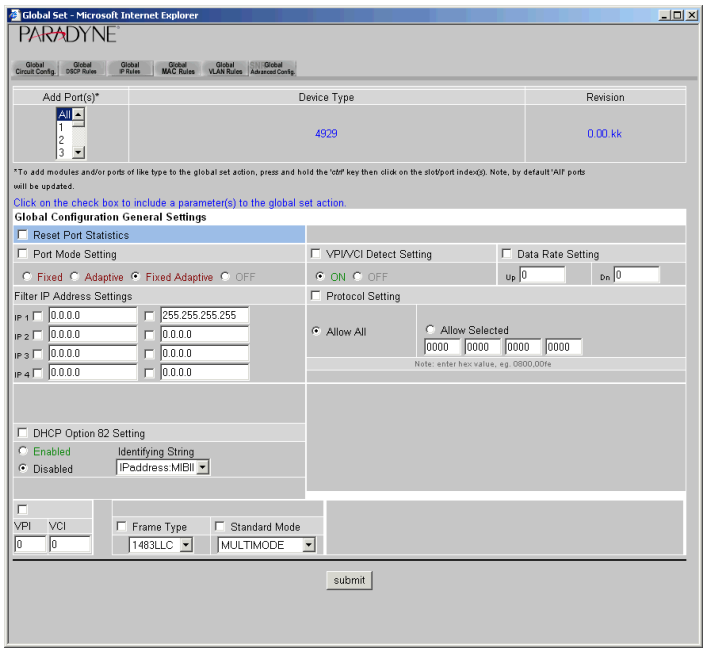
Global Set

Use the Global Set screen to set parameters for all ports or for a group of ports at once.

Global Circuit Configuration

To configure global parameters:

1 From the home screen, click on the Global Set button. The Global Circuit Configuration screen appears.



2 In the Add Ports drop-down list, select All or a group of ports. To select multiple ports, hold the Ctrl key while clicking on your selections.

3 Select or enter the following parameters:

Parameter	Description
Reset Port Statistics	Click in this box to reset statistics when the Submit button is clicked on.

Parameter	Description
Port Mode Setting	Specify a port mode: • Fixed – The upstream and downstream rates are fixed. • Adaptive – The ports will automatically train up to the best possible speed supported by the DSLAM, the modem at the remote end, and the copper cable pair connecting the two. • Fixed Adaptive – The ports will automatically train up to the best possible speed, subject to a user-specified maximum upstream and downstream bandwidth.
VPI/VCI Detect Setting	Specify the port behavior with regard to VPI/VCI detection: • On – The DSLAM will monitor the line to determine the VPI and VCI settings of the remote ADSL modem and set itself accordingly. If no ATM cells are detected (at any VPI/VCI setting), the port will default to VPI 0 and VCI 35. • Off – The port will use the default setting of VPI and VCI (0/35 if not changed by the setting of VPI and VCI, below), or lock in the VPI/VCI already discovered while VPI/VCI detection was On.
Data Rate Setting	If you have selected a Port Mode of Fixed or Fixed Adaptive, specify the maximum upstream and downstream rates, in bps.
Filter IP Address Settings	Specify up to four IP address ranges. Packets are accepted from source IP addresses in the ranges specified.
Protocol Setting	Click in the check box to enable Protocol Setting detection. Select Allow Selected and specify up to four Ethertypes allowed on the ports.
DHCP Option 82	Specify whether DHCP Option 82 is enabled, and if it is, whether packets are identified by IP address or circuit ID. This identifier is added to packets to let your DHCP Server recognize which DSLAM port an IP address request is coming from, thereby allowing the DHCP Server to limit the number of IP addresses assigned per port.
VPI and VCI	Specify a default VPI and VCI if VPI/VCI Detect Setting (above) is Off.

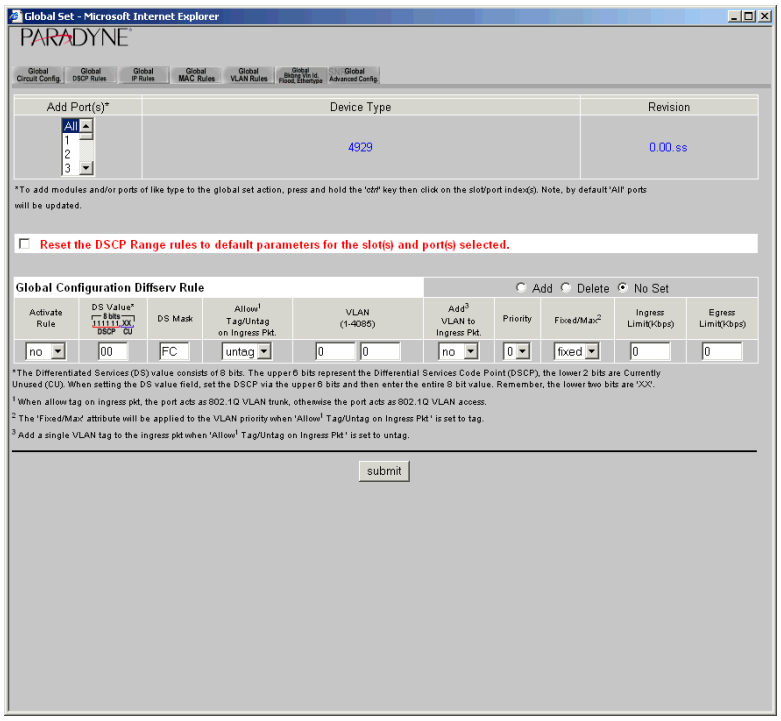
Parameter	Description
Frame Type	Specify whether the ports use Logical Link Control (LLC) or Virtual Channel Multiplexing (VCM) bridged encapsulation. These are defined in RFC 1483.
Standard Mode	Specify the ports' DSL mode.

4 Click on Submit.

Global DSCP Rules

To configure DSCP rules:

1 Click on the Global DSCP Rules tab. The Global DSCP Rules screen appears.



2 In the Add Ports drop-down list, select All or a group of ports. To select multiple ports, hold the Ctrl key while clicking on your selections.

3 Select or enter the following parameters:

Parameter	Description
Reset the DSCP Range rules to default parameters	Click in this box to reset DSCP Range rules when the Submit button is clicked on.

Parameter	Description
Global Configuration Diffserv Rule	Specify Add, Delete, or No Set to add a rule, delete a rule, or perform no action when the Submit button is clicked on.
Activate	Specify whether the rule you are adding is active.
DS Value	Specify the Differentiated Services value. The DS Value of a packet is a hexadecimal value calculated from the upper six bits of an eight-bit field in the packet's IP header.
DS Mask	Specify the DS mask. The DS Mask is a hexadecimal value that indicates which of the DSCP's upper six bits will be utilized in considering a packet's DSCP type. Default is FC, indicating that all of the DSCP's upper six bits will be used in calculating the packet's DS Value.
Allow Tag/Untag on Ingress Pkt.	Specify tag or untag. Tag indicates that ingress packets already matched to the Diffserv Rule must have a VLAN tag to be further considered; packets without a VLAN tag will be dropped. Untag indicates that ingress packets already matched to the Diffserv Rule cannot have a VLAN tag to be further considered; packets with a VLAN tag will be dropped.
VLAN	Specify a VLAN ID range. For each Global Diffserv Rule, if you selected Tag for Allow Tag/ Untag, the VLAN field should specify either an acceptable single VLAN, or an acceptable VLAN Range, for VLAN tags on ingress packets. If you selected Untag, the VLAN field should specify a single VLAN only if you intend to have a VLAN tag added to packets; if you do not intend to have a VLAN tag added to packets, the VLAN field should be left at the 0 - 0 default.
Add VLAN to Ingress Pkt.	Specify whether the VLAN ID should be added to ingress packets.
Priority	Specify the priority to be used when adding a configured VLAN ID to a packet.

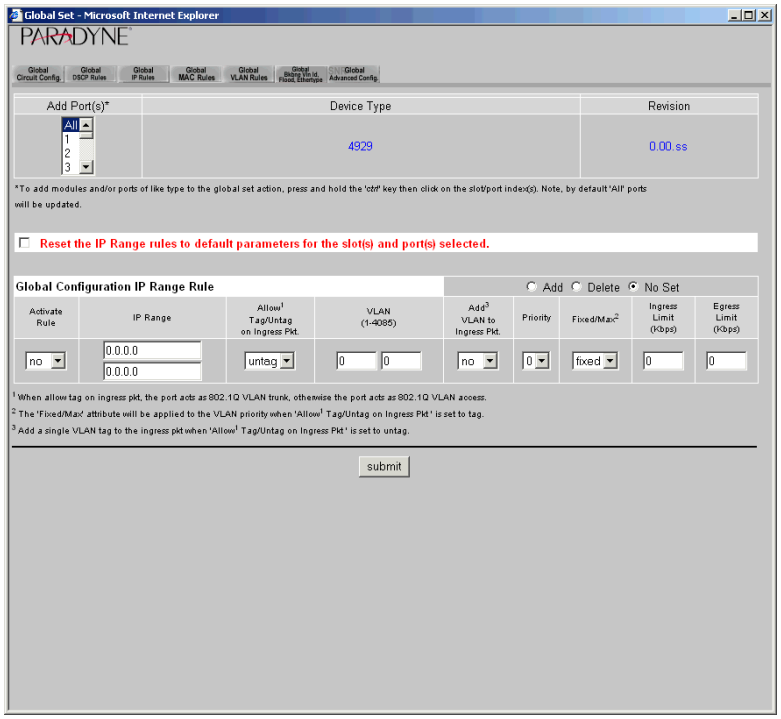
Parameter	Description
Fixed/Max	Specify the handling of VLAN priority (used only if the received packet is already tagged): • Fixed – The packet's original priority will automatically be replaced with the Priority specified above, • Max – The packet's original priority will be replaced with the configured Priority only if the packet's original priority is greater than the configured Priority.
Ingress Limit	Specify the ingress limit in kbps for packets matching this rule.
Egress Limit	Specify the egress limit in kbps for packets matching this rule.

4 Click on Submit.

Global IP Rules

To configure IP rules:

1 Click on the Global IP Rules tab. The Global IP Rules screen appears.



2 In the Add Ports drop-down list, select All or a group of ports. To select multiple ports, hold the Ctrl key while clicking on your selections.

3 Select or enter the following parameters:

Parameter	Description
Reset the IP Range rules to default parameters	Click in this box to reset IP Range rules when the Submit button is clicked on.
Global Configuration IP Range Rule	Specify Add, Delete, or No Set to add a rule, delete a rule, or perform no action when the Submit button is clicked on.
Activate	Specify whether the rule you are adding is active.
IP Range	Specify the range of IP addresses that constitutes a match for this rule.
Allow Tag/Untag on Ingress Pkt.	Specify tag or untag. Tag indicates that ingress packets already matched to the IP Rule must have a VLAN tag to be further considered; packets without a VLAN tag will be dropped. Untag indicates that ingress packets already matched to the IP Rule cannot have a VLAN tag to be further considered; packets with a VLAN tag will be dropped.
VLAN	Specify a VLAN ID range. For each Global IP Range Rule, if you selected Tag for Allow Tag/ Untag, the VLAN field should specify either an acceptable single VLAN, or an acceptable VLAN Range, for VLAN tags on ingress packets. If you selected Untag, the VLAN field should specify a single VLAN only if you intend to have a VLAN tag added to packets; if you do not intend to have a VLAN tag added to packets, the VLAN field should be left at the 0 - 0 default.
Add VLAN to Ingress Pkt.	Specify whether the VLAN ID should be added to ingress packets.
Priority	Specify the priority to be used when adding a configured VLAN ID to a packet.

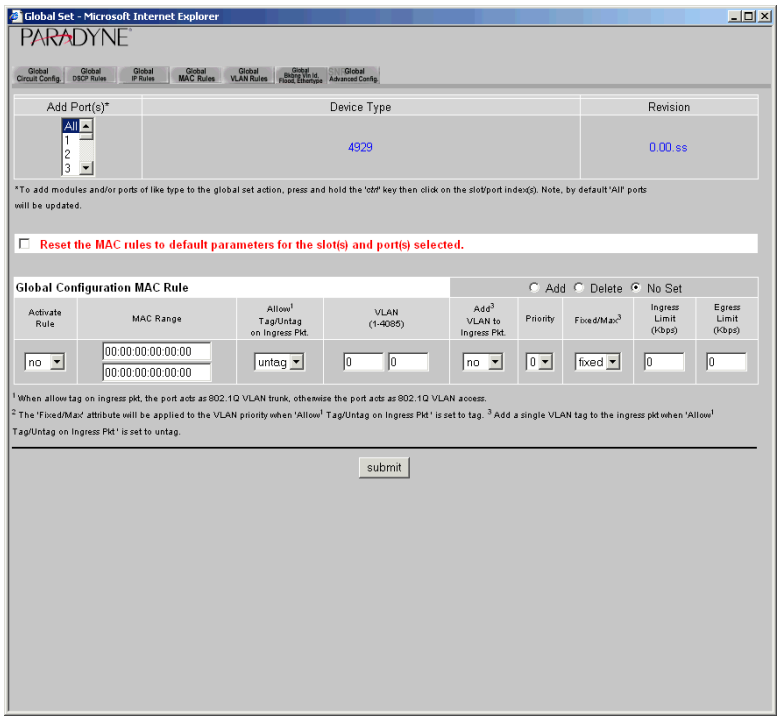
Parameter	Description
Fixed/Max	Specify the handling of VLAN priority (used only if the received packet is already tagged): • Fixed – The packet's original priority will automatically be replaced with the Priority specified above, • Max – The packet's original priority will be replaced with the configured Priority only if the packet's original priority is greater than the configured Priority.
Ingress Limit	Specify the ingress limit in kbps for packets matching this rule.
Egress Limit	Specify the egress limit in kbps for packets matching this rule.

4 Click on Submit.

Global MAC Rules

To configure MAC rules:

1 Click on the Global MAC Rules tab. The Global MAC Rules screen appears.



2 In the Add Ports drop-down list, select All or a group of ports. To select multiple ports, hold the Ctrl key while clicking on your selections.

3 Select or enter the following parameters:

Parameter	Description
Reset the MAC rules to default parameters	Click in this box to reset MAC rules when the Submit button is clicked on.
Global Configuration IP Range Rule	Specify Add, Delete, or No Set to add a rule, delete a rule, or perform no action when the Submit button is clicked on.
Activate	Specify whether the rule you are adding is active.
MAC Range	Specify the range of MAC addresses that constitutes a match for this rule.
Allow Tag/Untag on Ingress Pkt.	Specify tag or untag. Tag indicates that ingress packets already matched to the MAC Rule must have a VLAN tag to be further considered; packets without a VLAN tag will be dropped. Untag indicates that ingress packets already matched to the MAC Rule cannot have a VLAN tag to be further considered; packets with a VLAN tag will be dropped.
VLAN	Specify a VLAN ID range. For each Global MAC Rule, if you selected Tag for Allow Tag/ Untag, the VLAN field should specify either an acceptable single VLAN, or an acceptable VLAN Range, for VLAN tags on ingress packets. If you selected Untag, the VLAN field should specify a single VLAN only if you intend to have a VLAN tag added to packets; if you do not intend to have a VLAN tag added to packets, the VLAN field should be left at the 0 - 0 default.
Add VLAN to Ingress Pkt.	Specify whether the VLAN ID should be added to ingress packets.
Priority	Specify the priority to be used when adding a configured VLAN ID to a packet.

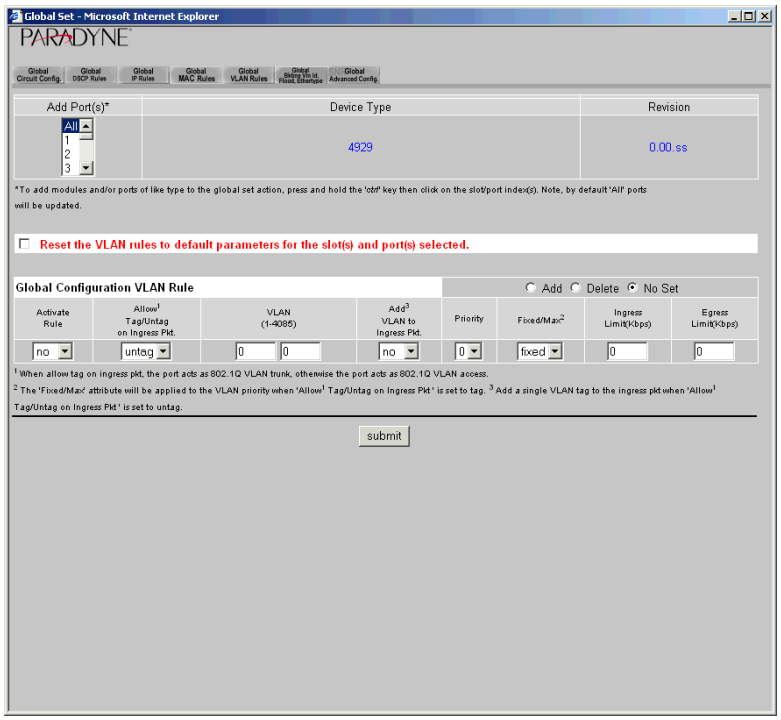
Parameter	Description
Fixed/Max	Specify the handling of VLAN priority (used only if the received packet is already tagged): • Fixed – The packet's original priority will automatically be replaced with the Priority specified above, • Max – The packet's original priority will be replaced with the configured Priority only if the packet's original priority is greater than the configured Priority.
Ingress Limit	Specify the ingress limit in kbps for packets matching this rule.
Egress Limit	Specify the egress limit in kbps for packets matching this rule.

4 Click on Submit.

Global VLAN Rules

To configure VLAN rules:

1 Click on the Global VLAN Rules tab. The Global VLAN Rules screen appears.



2 In the Add Ports drop-down list, select All or a group of ports. To select multiple ports, hold the Ctrl key while clicking on your selections.

3 Select or enter the following parameters:

Parameter	Description
Reset the VLAN rules to default parameters	Click in this box to reset VLAN rules when the Submit button is clicked on.
Global Configuration VLAN Rule	Specify Add, Delete, or No Set to add a rule, delete a rule, or perform no action when the Submit button is clicked on.
Activate	Specify whether the rule you are adding is active.
Allow Tag/Untag on Ingress Pkt.	Specify tag or untag. The DSLAM tries to match to a VLAN rule traffic that has not matched any other rule type. If the packet is untagged it will match the one and only allowed VLAN rule that indicates Untagged. If the packet has a tag then the DSLAM will try to find a Tagged rule that has a VLAN range defined with the packet's VLAN ID. If it finds one it will use that rule, and then the packet will be checked for all other criteria. If it does not find a rule to match the packet VLAN ID the packet is dropped.
VLAN	Specify a VLAN ID range that constitutes a match of this rule. If you selected Untag, the VLAN field should specify a single VLAN only if you intend to have a VLAN tag added to packets; if you do not intend to have a VLAN tag added to packets, the VLAN field should be left at the 0 - 0 default.
Add VLAN to Ingress Pkt.	Specify whether the VLAN ID should be added to ingress packets.
Priority	Specify the priority to be used when adding a configured VLAN ID to a packet.
Fixed/Max	Specify the handling of VLAN priority (used only if the received packet is already tagged): • Fixed – The packet's original priority will automatically be replaced with the Priority specified above, • Max – The packet's original priority will be replaced with the configured Priority only if the packet's original priority is greater than the configured Priority.

Parameter	Description
Ingress Limit	Specify the ingress limit in kbps for packets matching this rule.
Egress Limit	Specify the egress limit in kbps for packets matching this rule.

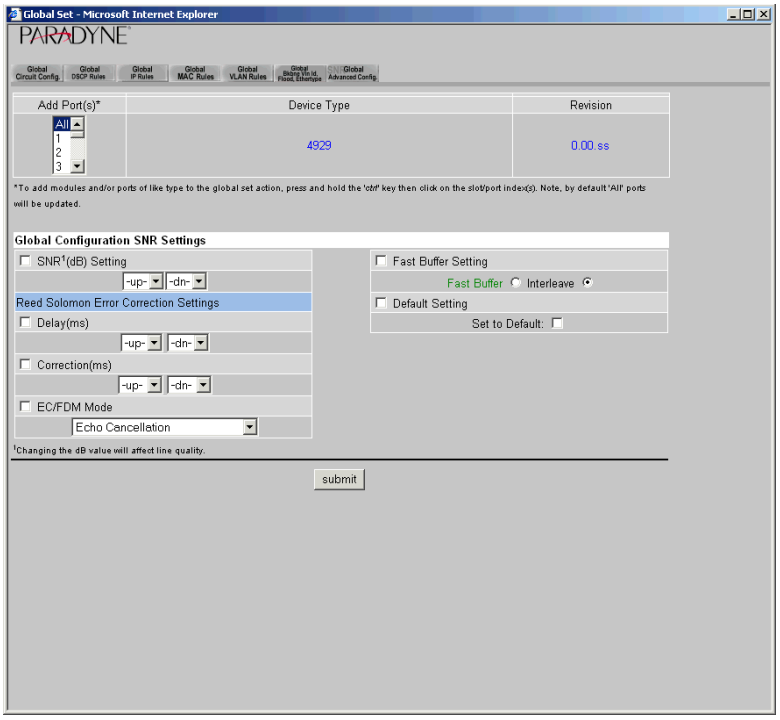
4 Click on Submit.

Global Advanced Configuration

SNR settings may greatly affect ADSL performance. Do not change SNR settings unless so advised by your service provider.

To configure SNR settings:

1 Click on the Global Advanced Config tab. The Global Configuration SNR settings screen appears.



2 In the Add Ports drop-down list, select All or a group of ports. To select multiple ports, hold the Ctrl key while clicking on your selections.

3 Select or enter the following parameters:

Parameter	Description
SNR (dB) Setting	Specify the upstream and downstream Signal to Noise Ratio settings for the selected ports.
Reed Solomon Error Correction Settings: Delay	Specify the upstream and downstream Reed-Solomon delay.
Reed Solomon Error Correction Settings: Correction	Specify the upstream and downstream Reed-Solomon correction.

Parameter	Description
EC/FDM	Specify the upstream and downstream Echo Cancellation or Frequency Division Multiplexing mode.
Fast Buffer Setting	Specify the buffer setting: Fast or Interleave.
Default Setting	To return to the default settings when the Submit button is clicked on, click in the Set to Default check box.

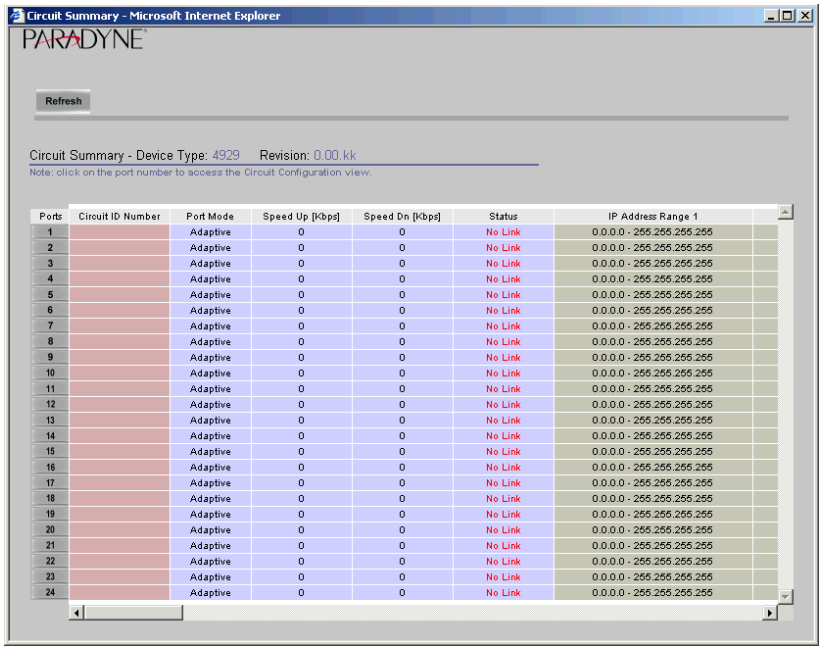
4 Click on Submit.

Circuit Summary

Use the Circuit Summary screen to display information about port configurations.

To display the circuit summary:

1 From the home screen, click on the Circuit Summary button. The Circuit Summary screen appears.



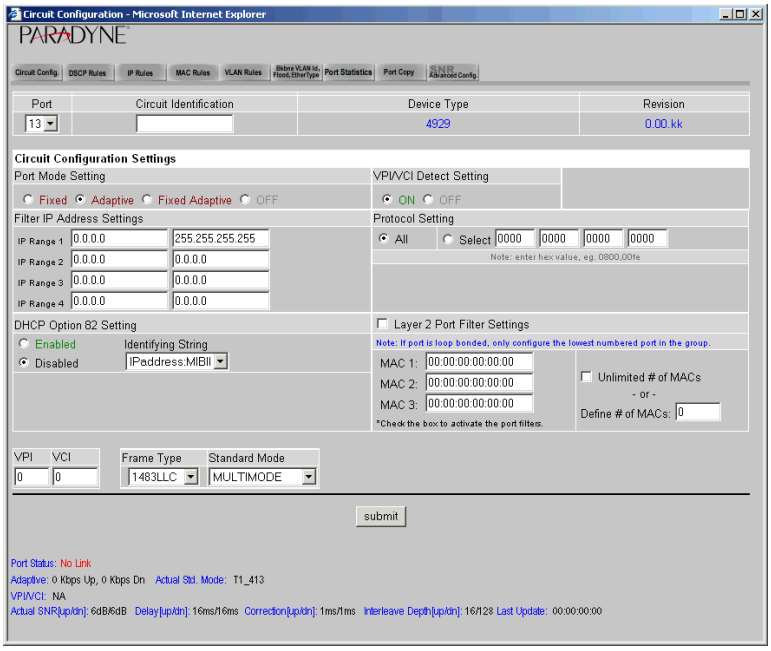
2 Click on Refresh to view current information. Click on a port number in the leftmost column to view the Circuit Configuration screen.

Circuit Configuration

Use the Circuit Configuration screen to set the parameters for a single port.

To configure circuit parameters:

1 From the home screen, click on one of the 24 DSL port LEDs. Alternatively, click on the Circuit Summary button, then click on a port number on the left side of the Circuit Summary listing. The Circuit Configuration screen appears.



2 Select or enter the following parameters:

Parameter	Description
Port	Select a port from the drop-down list.
Port Mode Setting	Specify a port mode: • Fixed – The upstream and downstream rates are fixed. • Adaptive – The ports will automatically train up to the best possible speed supported by the DSLAM, the modem at the remote end, and the copper cable pair connecting the two. • Fixed Adaptive – The ports will automatically train up to the best possible speed, subject to a user-specified maximum upstream and downstream bandwidth.

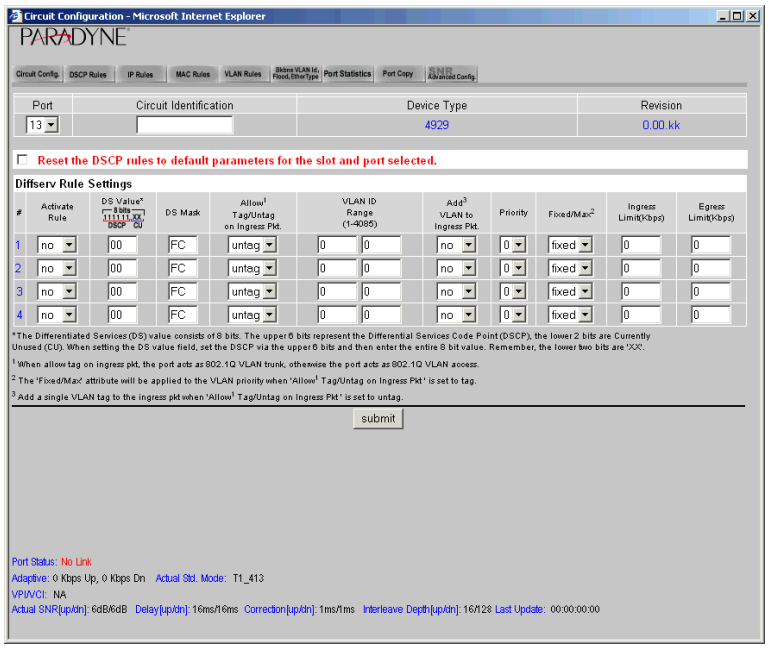
Parameter	Description
VPI/VCI Detect Setting	Specify the port behavior with regard to VPI/VCI detection: • On – The DSLAM will monitor the line to determine the VPI and VCI settings of the remote ADSL modem and set itself accordingly. If no ATM cells are detected (at any VPI/VCI setting), the port will default to VPI 0 and VCI 35. • Off – The port will use the default setting of VPI and VCI (0/35 if not changed by the setting of VPI and VCI, below), or lock in the VPI/VCI already discovered while VPI/VCI detection was On.
Filter IP Address Settings	Specify up to four IP address ranges. Packets are accepted from source IP addresses in the ranges specified.
Protocol Setting	Click in the check box to enable Protocol Setting detection. Select Allow Selected and specify up to four Ethertypes allowed on the ports.
DHCP Option 82	Specify whether DHCP Option 82 is enabled, and if it is, whether packets are identified by IP address or circuit ID. This identifier is added to packets to let your DHCP Server recognize which DSLAM port an IP address request is coming from, thereby allowing the DHCP Server to limit the number of IP addresses assigned per port.
Layer 2 Port Filter Settings	Click in the check box if you want to filter by MAC address the packets on this port.
MAC 1 – MAC 3	Enter up to three MAC addresses.
Unlimited # of MACs or Define # of MACs	Specify whether the number of MAC addresses with access to the port is to be limited to a certain number (not including MAC 1, MAC 2, and MAC 3, if specified above).
VPI and VCI	Specify a default VPI and VCI if VPI/VCI Detect Setting (above) is Off.
Frame Type	Specify whether the ports use Logical Link Control (LLC) or Virtual Channel Multiplexing (VCM) bridged encapsulation. These are defined in RFC 1483.
Standard Mode	Specify the ports' DSL mode.

3 Click on Submit.

DSCP Rules

To configure DSCP rules:

1 Click on the DSCP Rules tab. The DSCP Rules screen appears.



2 Select or enter the following parameters:

Parameter	Description
Port	Select a port from the drop-down list.
Reset the DSCP rules to default parameters	Click in this box to reset DSCP rules when the Submit button is clicked on.
Activate	Specify whether the rule is active.
DS Value	Specify the Differentiated Services value. The DS Value of a packet is a hexadecimal value calculated from the upper six bits of an eight-bit field in the packet's IP header.
DS Mask	Specify the DS mask. The DS Mask is a hexadecimal value that indicates which of the DSCP's upper six bits will be utilized in considering a packet's DSCP type. Default is FC, indicating that all of the DSCP's upper six bits will be used in calculating the packet's DS Value.

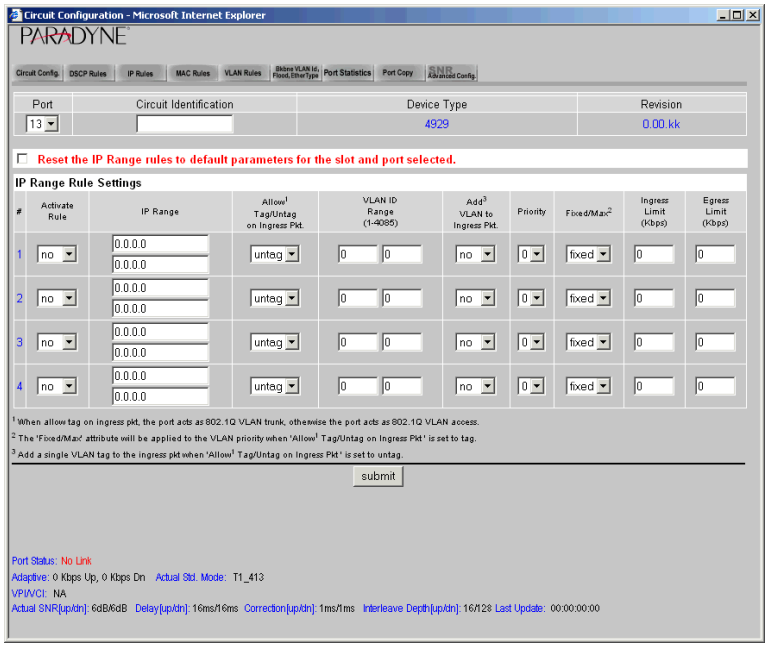
Parameter	Description
Allow Tag/Untag on Ingress Pkt.	Specify tag or untag. Tag indicates that ingress packets already matched to the Diffserv Rule must have a VLAN tag to be further considered; packets without a VLAN tag will be dropped. Untag indicates that ingress packets already matched to the Diffserv Rule cannot have a VLAN tag to be further considered; packets with a VLAN tag will be dropped.
VLAN ID Range	Specify a VLAN ID range. For each rule, if you selected Tag for Allow Tag/Untag, the VLAN field should specify either an acceptable single VLAN, or an acceptable VLAN Range, for VLAN tags on ingress packets. If you selected Untag, the VLAN field should specify a single VLAN only if you intend to have a VLAN tag added to packets; if you do not intend to have a VLAN tag added to packets, the VLAN field should be left at the 0 - 0 default.
Add VLAN to Ingress Pkt.	Specify whether the VLAN ID should be added to ingress packets.
Priority	Specify the priority to be used when adding a configured VLAN ID to a packet.
Fixed/Max	Specify the handling of VLAN priority (used only if the received packet is already tagged): • Fixed – The packet's original priority will automatically be replaced with the Priority specified above, • Max – The packet's original priority will be replaced with the configured Priority only if the packet's original priority is greater than the configured Priority.
Ingress Limit	Specify the ingress limit in kbps for packets matching this rule.
Egress Limit	Specify the egress limit in kbps for packets matching this rule.

3 Click on Submit.

IP Rules

To configure IP rules:

1 Click on the IP Rules tab. The IP Rules screen appears.



2 Select or enter the following parameters:

Parameter	Description
Port	Select a port from the drop-down list.
Activate	Specify whether the rule is active.
IP Range	Specify the range of IP addresses that constitutes a match for this rule.
Allow Tag/Untag on Ingress Pkt.	Specify tag or untag. Tag indicates that ingress packets already matched to the IP Rule must have a VLAN tag to be further considered; packets without a VLAN tag will be dropped. Untag indicates that ingress packets already matched to the IP Rule cannot have a VLAN tag to be further considered; packets with a VLAN tag will be dropped.

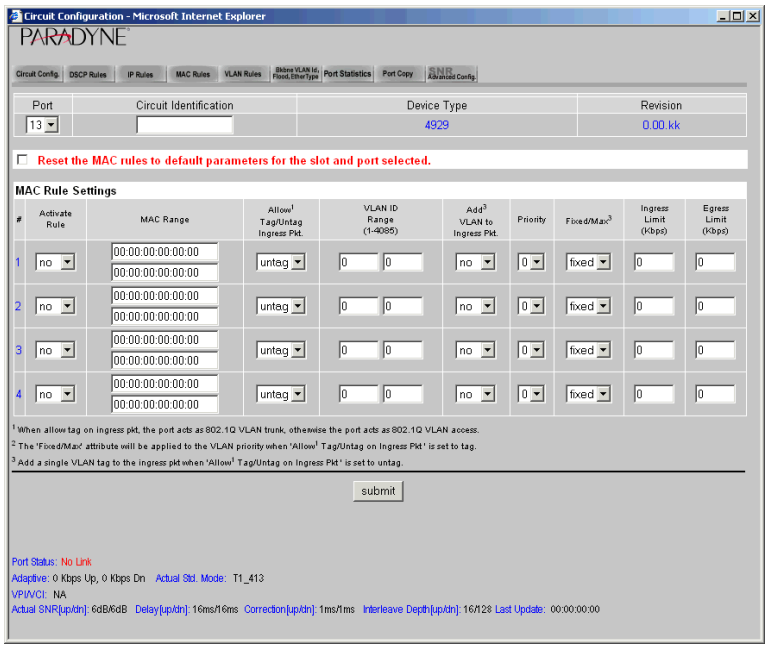
Parameter	Description
VLAN ID Range	Specify a VLAN ID range. For each IP Range Rule, if you selected Tag for Allow Tag/Untag, the VLAN field should specify either an acceptable single VLAN, or an acceptable VLAN Range, for VLAN tags on ingress packets. If you selected Untag, the VLAN field should specify a single VLAN only if you intend to have a VLAN tag added to packets; if you do not intend to have a VLAN tag added to packets, the VLAN field should be left at the 0 - 0 default.
Add VLAN to Ingress Pkt.	Specify whether the VLAN ID should be added to ingress packets.
Priority	Specify the priority to be used when adding a configured VLAN ID to a packet.
Fixed/Max	Specify the handling of VLAN priority (used only if the received packet is already tagged): • Fixed – The packet's original priority will automatically be replaced with the Priority specified above, • Max – The packet's original priority will be replaced with the configured Priority only if the packet's original priority is greater than the configured Priority.
Ingress Limit	Specify the ingress limit in kbps for packets matching this rule.
Egress Limit	Specify the egress limit in kbps for packets matching this rule.

3 Click on Submit.

MAC Rules

To configure MAC rules:

1 Click on the MAC Rules tab. The MAC Rules screen appears.



2 Select or enter the following parameters:

Parameter	Description
Port	Select a port from the drop-down list.
Reset the MAC rules to default parameters	Click in this box to reset MAC rules when the Submit button is clicked on.
Activate	Specify whether the rule is active.
MAC Range	Specify the range of MAC addresses that constitutes a match for this rule.
Allow Tag/Untag on Ingress Pkt.	Specify tag or untag. Tag indicates that ingress packets already matched to the MAC Rule must have a VLAN tag to be further considered; packets without a VLAN tag will be dropped. Untag indicates that ingress packets already matched to the MAC Rule cannot have a VLAN tag to be further considered; packets with a VLAN tag will be dropped.

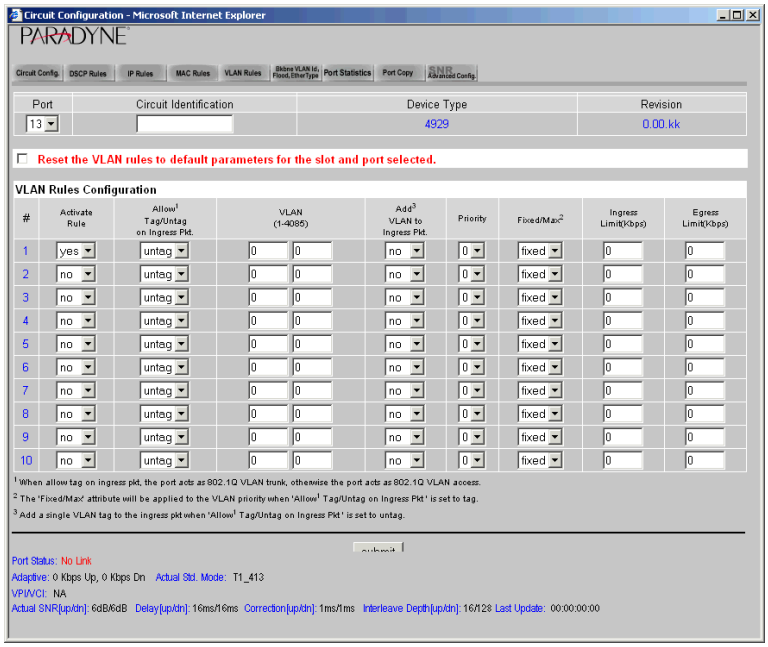
Parameter	Description
VLAN ID Range	Specify a VLAN ID range. For each MAC Rule, if you selected Tag for Allow Tag/Untag, the VLAN field should specify either an acceptable single VLAN, or an acceptable VLAN Range, for VLAN tags on ingress packets. If you selected Untag, the VLAN field should specify a single VLAN only if you intend to have a VLAN tag added to packets; if you do not intend to have a VLAN tag added to packets, the VLAN field should be left at the 0 - 0 default.
Add VLAN to Ingress Pkt.	Specify whether the VLAN ID should be added to ingress packets.
Priority	Specify the priority to be used when adding a configured VLAN ID to a packet.
Fixed/Max	Specify the handling of VLAN priority (used only if the received packet is already tagged): • Fixed – The packet's original priority will automatically be replaced with the Priority specified above, • Max – The packet's original priority will be replaced with the configured Priority only if the packet's original priority is greater than the configured Priority.
Ingress Limit	Specify the ingress limit in kbps for packets matching this rule.
Egress Limit	Specify the egress limit in kbps for packets matching this rule.

3 Click on Submit.

VLAN Rules

To configure VLAN rules:

1 Click on the VLAN Rules tab. The VLAN Rules screen appears.



2 Select or enter the following parameters:

Parameter	Description
Port	Select a port from the drop-down list.
Reset the VLAN rules to default parameters	Click in this box to reset VLAN rules when the Submit button is clicked on.
Activate	Specify whether the rule is active.
Allow Tag/Untag on Ingress Pkt.	Specify tag or untag. The DSLAM tries to match to a VLAN rule traffic that has not matched any other rule type. If the packet is untagged it will match the one and only allowed VLAN rule that indicates Untagged. If the packet has a tag then the DSLAM will try to find a Tagged rule that has a VLAN range defined with the packet's VLAN ID. If it finds one it will use that rule, and then the packet will be checked for all other criteria. If it does not find a rule to match the packet VLAN ID the packet is dropped.

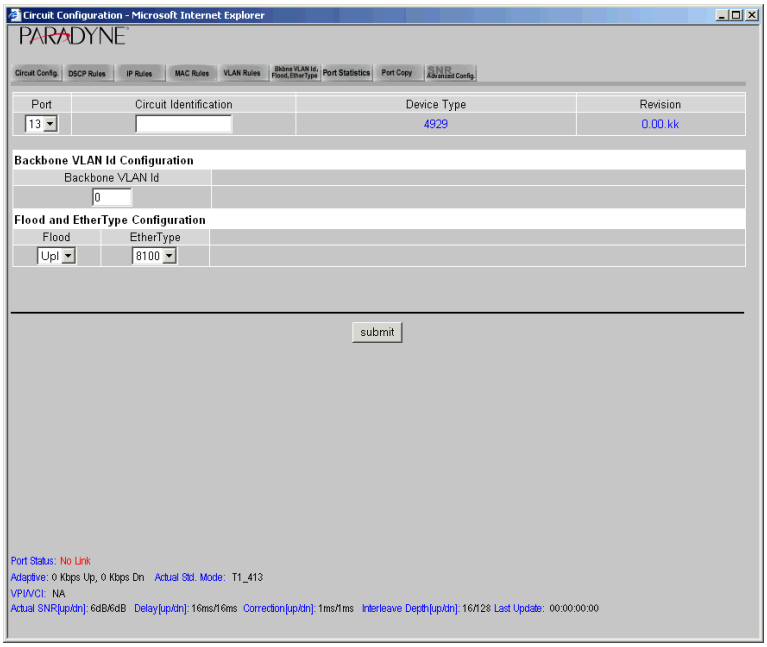
Parameter	Description
VLAN	Specify a VLAN ID range that constitutes a match of this rule. If you selected Untag, the VLAN field should specify a single VLAN only if you intend to have a VLAN tag added to packets; if you do not intend to have a VLAN tag added to packets, the VLAN field should be left at the 0 - 0 default.
Add VLAN to Ingress Pkt.	Specify whether the VLAN ID should be added to ingress packets.
Priority	Specify the priority to be used when adding a configured VLAN ID to a packet.
Fixed/Max	Specify the handling of VLAN priority (used only if the received packet is already tagged): • Fixed – The packet's original priority will automatically be replaced with the Priority specified above, • Max – The packet's original priority will be replaced with the configured Priority only if the packet's original priority is greater than the configured Priority.
Ingress Limit	Specify the ingress limit in kbps for packets matching this rule.
Egress Limit	Specify the egress limit in kbps for packets matching this rule.

3 Click on Submit.

Backbone VLAN ID

To configure the backbone VLAN ID, flood type, and Ethertype:

1 Click on the Bkbone VLAN Id, Flood, Ethertype tab. The Bkbone VLAN Id, Flood, Ethertype screen appears.



2 Select or enter the following parameters:

Parameter	Description
Backbone VLAN Id Configuration	Specify the Backbone VLAN ID. Used in conjunction with standard VLAN tags, the single Backbone VLAN tag will become the primary identifier, allowing a router with backbone capabilities to make smarter decisions in directing unlearned traffic. This helps prevent traffic from being flooded to incorrect networks. Once packets have been directed to the correct network by the Backbone VLAN tag, standard VLAN tags will then direct the packets to the appropriate ports. The default is zero, meaning the port is not configured to utilize the Backbone-VLAN function. A Backbone-VLAN tag cannot be used independently; stardard VLAN tags must be set. Additionally, the DSLAM uplink connection must run through a router in order for a Backbone VLAN tag to function.

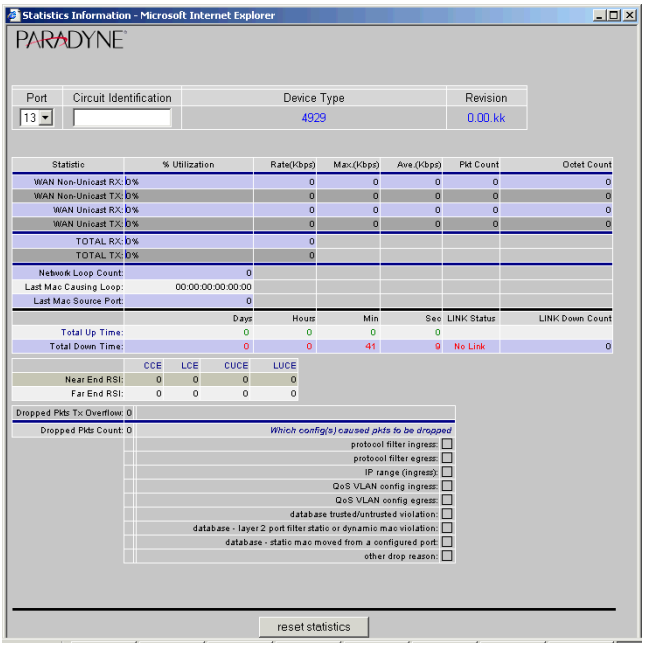
Parameter	Description
Flood	Specify the Flood setting. Flood refers to the method in which interface modules handle unknown unicasts (traffic directed to a single MAC Address), broadcasts (traffic directed to all MAC Addresses) and multicasts (traffic directed to multiple MAC Addresses) for each port. • Upl (Uplink) – Unknown unicast, broadcast and multicast traffic is flooded only to the DSLAM uplink interface ports. This prevents communication between interface ports without the intervention of an upstream device such as a router. If communication between interface ports is desired, the upstream device must be properly configured to allow it. • Vln (VLAN) – Unknown unicast, broadcast and multicast traffic is flooded to the DSLAM's ADSL ports (within the sender's VLAN range) in addition to the uplink interface ports.
Ethertype	Specify the Ethertype of the backbone tag added to traffic if the backbone VLAN ID is configured. Used only in conjunction with backbone VLANs.

3 Click on Submit.

Port Statistics

To view port statistics:

1 Click on the Port Statistics tab. The Port Statistics screen appears.

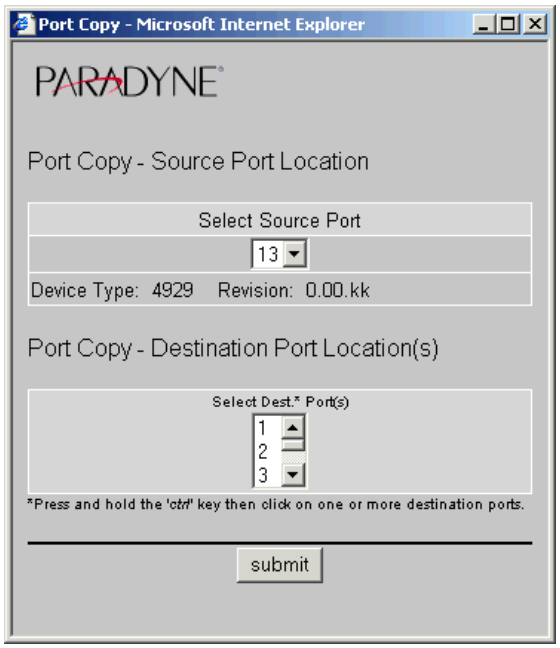


2 Click on Reset Statistics to set all statistics to zero.

Copy Port

To copy a port configuration to one or more other ports:

1 Click on Port Copy. The Port Copy screen appears.



2 Select a source port, then one or more destination ports.

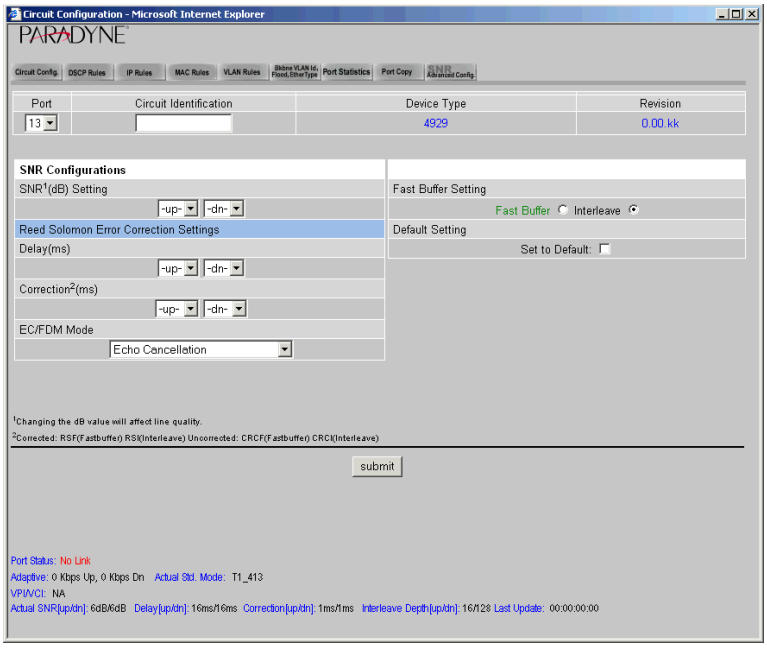
3 Click on Submit. The configuration of the source port is copied to the destination port or ports.

SNR Advanced Configuration

SNR settings may greatly affect ADSL performance. Do not change SNR settings unless so advised by your service provider.

To configure SNR settings:

1 Click on the Advanced Config tab. The Configuration SNR settings screen appears.



2 Select or enter the following parameters:

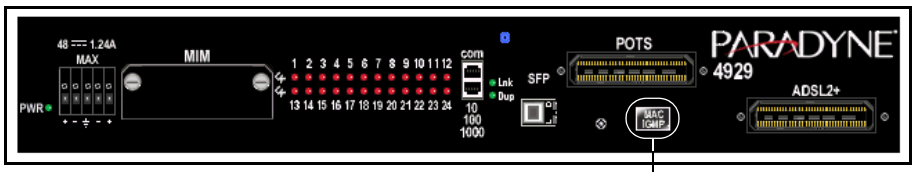
Parameter	Description
Port	Select a port from the drop-down list.
SNR (dB) Setting	Specify the upstream and downstream Signal to Noise Ratio settings for the selected ports.
Reed Solomon Error Correction Settings: Delay	Specify the upstream and downstream Reed-Solomon delay.
Reed Solomon Error Correction Settings: Correction	Specify the upstream and downstream Reed-Solomon correction.
EC/FDM	Specify the upstream and downstream Echo Cancellation or Frequency Division Multiplexing mode.
Fast Buffer Setting	Specify the buffer setting: Fast or Interleave.

Parameter	Description
Default Setting	To return to the default settings when the Submit button is clicked on, click in the Set to Default check box.

3 Click on Submit.

MAC and IGMP Summary

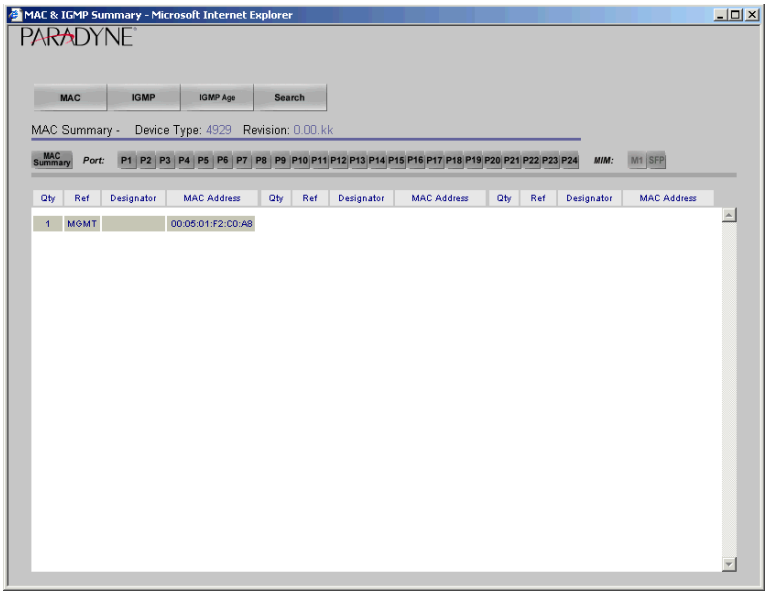
On the home screen of the web interface is a schematic representation of the front panel of the DSLAM. It includes a button not on the actual front panel, labeled MAC-IGMP. This opens the MAC and IGMP Summary screen.



MAC-IGMP Button

To view the MAC and IGMP Summary screens:

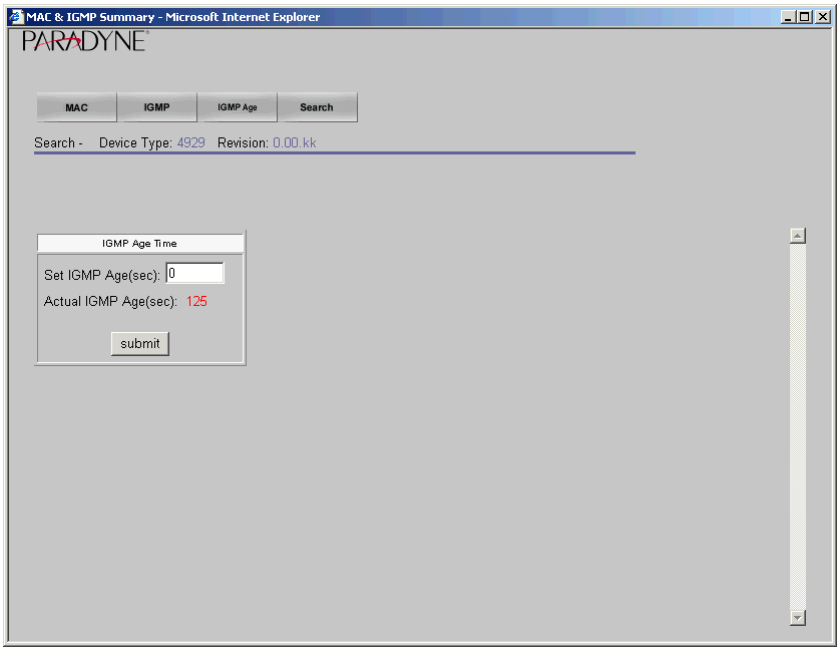
1 From the home screen, click on the MAC-IGMP button. The MAC Summary screen appears.



2 Click on a Port or MIM button to see specific entries in the MAC table, or click on MAC Summary to see all entries.

3 Click on the IGMP tab to display the IGMP table. Click on a Port or MIM button to see specific entries in the IGMP table, or click on IGMP Summary to see all entries.

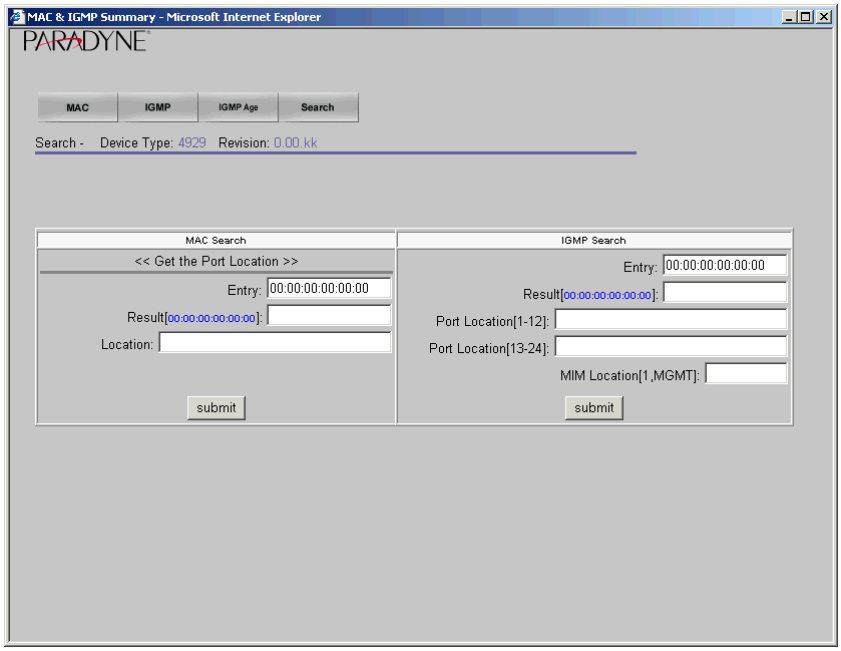
4 Click on the IGMP Age tab to set the IGMP age and enable or disable IGMP proxy. The IGMP Age screen appears.



5 Enter or select the following:

Parameter	Description
IGMP Age Time	Specify an IGMP age interval, in seconds. This should be twice the query rate of your router.

6 To search for MAC or IGMP table entries, click on the Search tab. The Search screen appears.

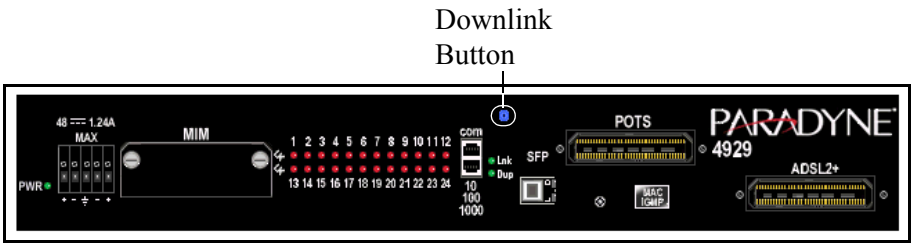


7 Enter a MAC address to search for a MAC table entry, or an IP address to search for an IGMP table entry.

8 Click on the appropriate Submit button.

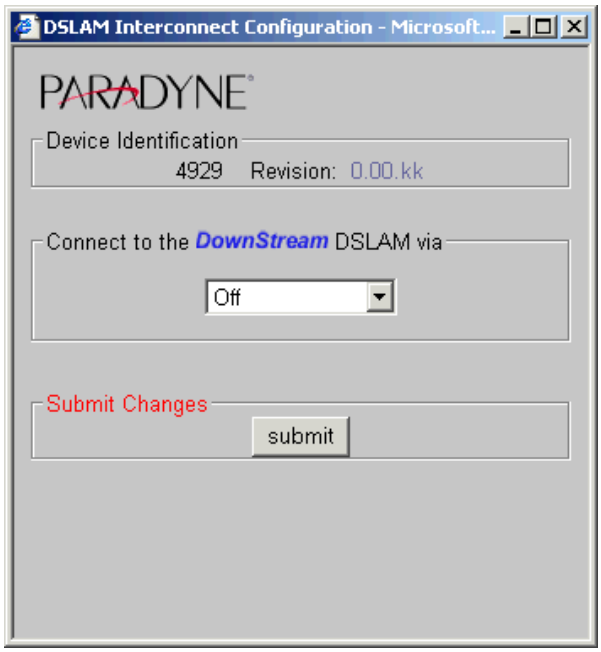
DSLAM Interconnect Configuration

Use the DSLAM Interconnect Configuration screen to specify a port connected to a downstream 4900 Series DSLAM. This information is used to configure internal traffic flows. The screen is accessed using the blue button above the Ethernet uplinks on the schematic representation of the faceplate on the home page.



To specify the port connected to a downstream DSLAM:

1 From the home screen, click on blue button above the 10/100/1000 and SFP connectors. The DSLAM Interconnect Configuration screen appears.



2 Select Off or a port from the drop-down list. For example, if this DSLAM is connected to a downstream DSLAM over the first MIM port, select MIMp1.

3 Click on Submit.

6 COMMAND LINE INTERFACE

Overview

The 4900 Series DSLAMs have an integral command line interface (CLI) that can be accessed by direct connection to the COM port or by Telnet to the DSLAM's management address.

CLI System Requirements

- **Straight-Through RJ45 to RJ45 Ethernet Cable –** Required for establishing a direct connection from the COM port to a DB9 adapter.
- **DB9 Female to RJ45 Male Adapter –** Required for conversion of your PC's RS232 serial port for use with the RJ45 to RJ45 Ethernet cable.
- **Terminal Emulation Program –** Required for running the CLI over a direct connection. The program must emulate a VT100 terminal.
- **Telnet Client –** Required for remote management with the CLI. Microsoft Windows Operating Systems (98, 2000, NT, and XP) include a Telnet client which is executed using the Windows command prompt (cmd.exe). If you are using an operating system other than Windows, you may need to install a Telnet client.

Connecting a PC Directly

To connect a PC directly to the DSLAM to use the CLI:

1. Plug a DB9 to RJ45 adapter into the RS232 serial port on your PC. See *DB9 to RJ45 Adapter Pinouts* in Appendix A, *Connectors and Pin Assignments*.
2. Connect one end of a straight-through RJ45 to RJ45 Ethernet cable into the adapter plugged into your PC, and the other end of the cable into the COM port on the face of the DSLAM.

Launching the Terminal Emulation Program

Launch the terminal emulation program on your PC and configure the program settings. Actual configurations will depend upon the program being used, though settings should be modeled after the list below; most are standard defaults. Refer to your terminal emulation program's user manual for further information.

Baud:	9600	Port:	Com 1
Data Bits:	8	Stop Bits:	1
Flow Control:	none	Transmit Delay:	n/a
Parity:	none		

Logging Into the CLI

Once your terminal emulation program has been launched, device information is displayed, followed by a request for username and password. You must log in as a superuser in order to make configuration changes.

Username: superuser
Password: Password

After you have logged in, enter a question mark (?) to list the available commands.

CLI Commands

The CLI supports the following commands.

Table 3: CLI Commands (Sheet 1 of 2)

Command	Description
?	Lists available commands and their syntax.
ALLOW	Controls by IP address those hosts for which traffic is permitted on the DSLAM. ALL (the default) permits all traffic. Syntax: allow [ALL, IP_ADDRESS [IP address]]
CLEAR_NVRAM	Clears Non-Volatile Random Access Memory, restoring the DSLAM to factory defaults.
DISABLE_TELNET	Disables access to the DSLAM using Telnet.
DISABLE_TFTP	Disables access to the DSLAM using Trivial File Transfer Protocol.

Table 3: CLI Commands (Sheet 2 of 2)

Command	Description
DISABLE_WEB_SERVER]	Disables access to the DSLAM using the web server.
ENABLE_TELNET	Enables access to the DSLAM using Telnet.
ENABLE_TFTP	Enables access to the DSLAM using Trivial File Transfer Protocol.
ENABLE_WEB_SERVER	Enables access to the DSLAM using the web server.
HELP	Lists available commands and their syntax.
LOGOUT	Ends the CLI session.
SET	Sets a configuration option. Most SET commands require that slot be specified, and allow port optionally to be specified. Exceptions are the two system SET commands for session timeout and system name. Syntax: set cli_session_timeout *seconds* set system_name *name* set slot 1 [[port] [all, *port_number*]] [item] [value] Items and values for SET commands are shown in Table 4, Set and Show Command Items and Values.
SHOW	Shows a configuration option. SHOW commands require that slot be specified, and allow port optionally to be specified. Syntax: show slot 1 [[port] [all, *port_number*]] [item] [value] Items and values for SHOW commands are shown in Table 4, Set and Show Command Items and Values.
WHO	Shows who is logged in the system.

The commands use the following parameters.

Table 4: Set and Show Command Items and Values (Sheet 1 of 3)

Items	Values
ADSL_ENCAPSULATION	[RFC1483-LLC,RFC1483-VCMUX]
ADSL_PORT_MODE	[ON,OFF,ADAPTIVE,FIXED_ADAPTIVE]
ADSL_SPEED	[XXXX YYYY] Where: XXXX = downstream rate (in kbps) and YYYY = upstream rate (in kbps)

Table 4: Set and Show Command Items and Values (Sheet 2 of 3)

Items	Values
ADSL_STANDARD	[MULTIMODE,G.DMT,G.LITE,T1.413,ALCATEL]
ADSL_VCI	[0–65535]
ADSL_VPI	[0–255]
ADSL_VPI_VCI_DETECT	[ON,OFF]
BACKBONE_VLAN	[0–4085]
CIRCUIT_ID	circuit_ID Changes the CIRCUIT ID.
CLEAR_NVRAM	Reboots the unit and restores factory defaults
CLI_SESSION_TIMEOUT	[tbd–tbd] CLI Session Timeout sets the amount of time a CLI session can sit idle before the user is automatically logged out. Time is represented in seconds; the minimum value is 30.
DEFAULT_GATEWAY	xxx.xxx.xxx.xxx Value for DEFAULT_GATEWAY is a valid IP address.
DOWNSTREAM_INTERCON-NECT	[MGMT, UPLINK1,UPLINK2,UPLINK3,UPLINK4]
DYNAMIC_MAC	Number of dynamic MAC addresses that can be learned on this port.
ETHER_TYPE	[8100,9100] Changes the Backbone tag type.
FIRMWARE_VERSION	None. Displays the firmware version.
FLOOD	[UPL,VLN]
GENERAL_PASSWORD	None. You will be prompted for values.
IGMP	[dump,stop,snoop 225.1.1.2 123,clear]
INBAND_MANAGEMENT	[ON,OFF]
INBAND_MGMT_VLAN_ID	[0–4085]
IP_ADDRESS	xxx.xxx.xxx.xxx Value for IP_ADDRESS is a valid IP address.
IP_RANGE	SET: [1–4] SHOW: [ALL,1–4]
LAYER2_ENABLE	[on,off] Enables or disables Layer 2 functionality.

Table 4: Set and Show Command Items and Values (Sheet 3 of 3)

Items	Values
MAC	[dump,clear]
MGMT_PORT_UPLINK	[on,off] Allows the PHYSICAL management port to be an UPLINK port.
MIM	[dump,reset_stats]
PHY	PHY DEBUG args->cmd phy_num reg val
PRIORITY	[0–7]
PROTOCOL	[ALL,IP,VALUE] Changes the protocol filter.
RESET	None.
SNMP_READONLY_COMMUNITY	None. You will be prompted for values.
SNMP_READWRITE_COMMUNITY	None. You will be prompted for values.
STATIC_MAC	xx:xx:xx:xx:xx:xx Sets static mac addresses.
SUBNET_MASK	xxx.xxx.xxx.xxx
SUPERUSER_PASSWORD	None. You will be prompted for values.
SYSTEM_NAME	[system_name] Changes the DSLAM System Name and CLI Prompt.
VLAN_RANGE	VLAN_RANGE: SHOW: [ALL,1–10] SET: [1–10] VLAN_ID: [0–4085]–[0–4085]

Using the CLI to Establish Inband Management

CLI Set commands are used to establish inband management. For example:

set slot 1 ip_address 137.182.10.251

set slot 1 subnet_mask 255.255.255.0

set slot 1 default_gateway 137.182.10.10

set slot 1 inband_management on

The DSLAM in this example can now be managed with NMS by attaching a PC to the DSLAM's 10/100/1000 port and opening the address 137.182.10.251 in a web browser.

7 SNMP INTERFACE

Overview

The 4900 Series DSLAM can be managed using the Simple Network Management Protocol (SNMP).

This implementation uses a portion of SNMP v1.0: the MIB-II System Group and Interfaces Group of OIDs. SNMP uses MIBs (Management Information Bases) sanctioned by the IETF (Internet Engineering Task Force). MIBs are composed of OIDs (Object Identifiers), each of which represents a system configuration or request for data.

You will not be able to manage your DSLAM via SNMP until you have set the unit IP address, subnet mask, and default gateway. See *Management Configuration* in Chapter 5, *Configuration Using the NMS* or *Using the CLI to Establish Inband Management* in Chapter 6, *Command Line Interface*.

Downloading MIBs

You must have a MIB browser installed on your PC in order to utilize the Management Information Base.

1. Launch your MIB browser and perform any necessary program configurations. Refer to your MIB browser user manual for further information.
2. Download the MIBs from the Zhone website. Refer to your MIB browser user manual for instructions on how to compile the OIDs into your MIB browser.

SNMP Community Strings

The following are the default community strings for MIB access.

SNMP Community String	
ACCESS	COMMUNITY STRING*
read only	Password
read/write	Password
*Community strings are case sensitive.	

A Connectors and Pin Assignments

Overview

The following sections provide pin assignments for:

- *DSL Ports and POTS Splitter Connectors on page 83*
- *SFP Connector on page 85*
- *10/100/1000BaseT Connector on page 86*
- *DB9 to RJ45 Adapter Pinouts on page 87*

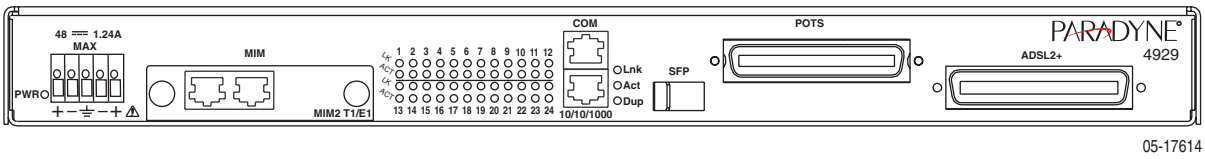


Figure 2: 4929 DSLAM Front Panel

DSL Ports and POTS Splitter Connectors

The 50-pin RJ21X Telco connector labeled DSL Ports 1–24 provides the 2-wire loop interface from each DSL port to the demarcation point. (The Canadian designation for this connector is CA21A.) The 50-pin RJ21X Telco connector labeled POTS 1–24 provides the interface with the internal POTS splitters, if installed.

Table 5 lists the pin assignments for each of these interfaces. Note that Pins 25 and 50 are not used.

Table 5: DSL Connector Pinouts (Sheet 1 of 2)

DSL Port	Connector Pins (Ring, Tip)
1	1, 26
2	2, 27
3	3, 28

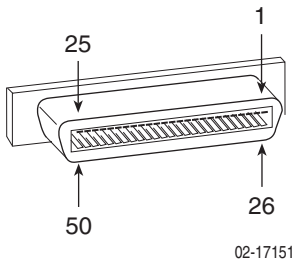


Table 5: DSL Connector Pinouts (Sheet 2 of 2)

4	4, 29
5	5, 30
6	6, 31
7	7, 32
8	8, 33
9	9, 34
10	10, 35
11	11, 36
12	12, 37
13	13, 38
14	14, 39
15	15, 40
16	16, 41
17	17, 42
18	18, 43
19	19, 44
20	20, 45
21	21, 46
22	22, 47
23	23, 48
24	24, 49

SFP Connector

The SFP interface is a standard SFP socket.

Table 6: Port 3 GigE Connector

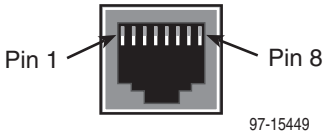
Signal	Pin
VeeT	1
TXFault	2
TXDisable	3
MOD-DEF(2) – I2C_DATA	4
MOD-DEF(1) – I2C_CLK	5
MOD-DEF(0) – SFP_PRESENT_L	6
Rate Select	7
LOS	8
VeeR	9
VeeR	10
VeeR	11
RD-	12
RD+	13
VeeR	14
VccR	15
VccT	16
VeeT	17
TD+	18
TD-	19
VeeT	20

10/100/1000BaseT Connector

The 10/100/1000 port is an 8-pin unkeyed modular jack for a 10/100/1000BaseT interface.

Table 7: 10/100/1000 Pinouts

Signal	Pin
Transmitted Data +	1
Transmitted Data –	2
Received Data +	3
Unused	4
Unused	5
Received Data –	6
Unused	7
Unused	8



DB9 to RJ45 Adapter Pinouts

To connect the COM port to the DB9 serial port of a PC, use an adapter wired as shown:

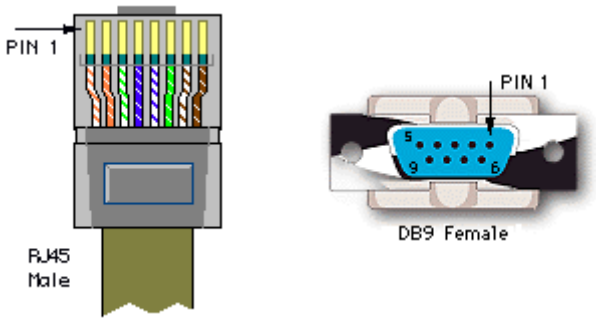


Table 8: DB9 to RJ45 Adapter Pinouts

Pin	RJ45 Port		Direction	PC RS232 Serial Port		Pin
1	Transmit Data	TxD	→	RxD	Receive Data	2
2	Data Set Ready	DSR	←	RTS	Request to Send	7
4	Receive Data	RxD	←	TxD	Transmit Data	3
5	Ground	GND	↔	GND	Ground	5
6	Data Terminal Ready	DTR	→	CTS	Clear to Send	8

Pins not shown are unused.

B EQUIPMENT LIST

4900 Series DSLAM models are listed in Table 9, 4900 Series Models and Features.

Table 9: 4900 Series Models and Features

Model Number	Type	Number of Ports	POTS Splitters
4929-A1-520	ADSL2+ Annex A	24	No
4929-A1-530	ADSL2+ Annex A	24	900-Ohm
4929-A1-531	ADSL2+ Annex A	24	600-Ohm

All 4900 Series DSLAMs come with 19- and 23-inch mounting brackets and hardware, and the Installation Guide.

Table 10: 4900 Series DSLAM Related Equipment

Model Number	Description
4200-F1-001	Mounting Brackets for ETSI 21-inch (535 mm) Rack
4200-F3-000	Single-Mode 1000BaseLX SFP Transceiver (10 km, 1310 nm FP-LD)
4200-F3-001	Single-Mode 1000BaseLX SFP Transceiver (40 km, 1310 nm DFB-LD)
4200-F3-002	Single-Mode 1000BaseZX SFP Transceiver (80 km, 1550 nm DFB-LD)
4200-F3-003	Multimode 1000BaseSX SFP Transceiver (0.55 km, 850 nm VCSEL)
8400-F1-001	LC to SC Multimode Conversion Cable
8400-F1-002	LC to SC Single-Mode Conversion Cable

C TECHNICAL SPECIFICATIONS

Technical specifications are subject to change without notice.

Table 11: 4900 Series DSLAM Technical Specifications (Sheet 1 of 2)

Specifications	Criteria
Cooling and Air Handling	Each 4900 Series DSLAM is independently cooled with integral fans and does not rely on vertical air flow.
DSL Compatibility	• ADSL2+ (G.992.5) Annex A
Electromagnetic Compatibility (EMC)	Meets the following standards: • ICES-003 • EN 300 386-2 • CE Marking • FCC Part 15, Class A
Interfaces	• Access Ports — 24 ADSL2+ ports using RJ21 connector (Annex A) — 24 Splitter ports using RJ21 connector (Annex A) • Uplink ports — 1 - 10/100/1000BaseT or fiber based (SFP) GigE port for management or uplink — 1 - RS232 console port for RS-232 serial management connection — 1 - Micro Interface Module (MIM) modular media independent interface to support additional GigE, T1, E1, or 10/100BaseT ports
Operating Environment	Ambient Temperature:–40° to 149° F (–40° to 65° C) Relative Humidity: 5% to 95% noncondensing Storage Temperature: –40° to 158° F (–40° to 70° C) Altitude: –200 ft to 16,600 ft (–60 m to 5,000 m) Shock and vibration tolerance sufficient to withstand normal shipping
Physical Dimensions	Height: 1.75″ (44.5 mm, or 1U as defined in EIA-310-C) without feet Width: 16.9″ (430 mm) without mounting brackets Depth: 9.5″ (241 mm) without cables
Power	The unit operates from a standard CO –48 VDC power supply. Dual feeds are supported. The terminal block accepts 28 to 18 AWG bare wire.

Table 11: 4900 Series DSLAM Technical Specifications (Sheet 2 of 2)

Specifications	Criteria
Power Consumption	–48 VDC, 1.5 A: 72 Watts Maximum
Standards and Protocols Supported	• Enterprise MIBs Chassis and Module Identification, Configuration, Multimedia Traffic Management • Flash Upgradeable IEEE 802.3 • IEEE 802.1p CoS • IEEE 802.1Q VLAN • IGMP Snooping (IGMPv1 and IGMPv2)
Weight	2.5 lb (1.1 kg)

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