BLACK BOX®
NETWORK SERVICES

Remote Access Server (RAS)

Administrator's Reference Guide

CUSTOMER SUPPORT INFORMATION Order **toll-free** in the U.S. 24 hours, 7 A.M. Monday to midnight Friday: **877-877-BBOX**
FREE technical support, 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**
Mail order: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: www.blackbox.com • E-mail: info@blackbox.com

Radio and TV Interference

The LRA2900A Series generates and uses radio frequency energy, and if not installed and used properly—that is, in strict accordance with the manufacturer's instructions—may cause interference to radio and television reception. The LRA2900A Series has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the LRA2900A Series causes interference to radio or television reception, which can be determined by disconnecting the cables, try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna, and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

This device is not intended to be connected to the public telephone network in Europe.

Industry Canada Radio Frequency Interference Statements

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

Industry Canada Notice

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above condition may not prevent degradation of service in some situations. Repairs to some certified equipment should be made by an authorized maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the ground connections of the power utility, telephone lines and internal metallic water pipe system, are connected together. This protection may be particularly important in rural areas

Users should not attempt to make such connections themselves, but should contact appropriate electric inspection authority, or electrician, as appropriate.

FCC Compliance

The LRA2900A has been tested and found to comply with the specifications found in Part 68 of the FCC rules and regulations. A label on the equipment bears the FCC registration number. You may be requested to provide this information to your telephone company. The telephone company may decide to temporarily dicontinue your service if they believe that the LRA2900A may cause harm to the telephone network. Whenever possible the telephone company will attempt to notify you in advance. You have a right, if you choose, to file a complaint with the FCC.

FCC Information

The LRA2900A Series has been tested and registered in compliance with the specifications in Part 68 of the FCC rules. A label on the equipment bears the FCC registration number. You may be requested to provide this information to your telephone company. Your telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper operation of the LRA2900A Series. If this happens, the telephone company should give you advance notice to prevent the interruption of your service. The telephone company may decide to temporarily discontinue your service if they believe your LRA2900A Series may cause harm to the telephone network. Whenever possible, they will contact you in advance. If you elect to do so, you have the right to file a complaint with the FCC. If you have any trouble operating the LRA2900A Series, please contact Black Box Technical Support at 724-746-5500. The telephone company may ask you to disconnect the equipment from the telephone network until the problem has been corrected or until you are certain that the LRA2900A Series is not malfunctioning. In accordance with FCC rules and regulation CFR 47 68.218(b)(6), you must notify the telephone company prior to disconnection. The following information may be required when applying to your local telephone company for leased line facilities. The Universal Service Order Code (USOC) is RJ 48C. The Facility Interface Codes (FIC) are 04DU9-BN, 04DU9-DN, 04DU9-1KN, and 04DU9-1SN. The Service Order Code (SOC) is 6.0Y.

Service	Facility Interface Code	Service Code	Network Connection
1.544 Mbps SF format without line power	04DU9-BN	6.0Y	RJ48C
1.544 Mbps SF and B8ZS without line power	04DU9-DN	6.0Y	RJ48C
1.544 Mbps ANSI ESF without line power	04DU9-1KN	6.0Y	RJ48C
1.544 Mbps ANSI ESF and B8ZS without line power	04DU9-1SN	6.0Y	RJ48C

FCC Part 68 Compliance Statement

This equipment complies with Part 68 of FCC Rules. Please note the following:

1. You are required to request service from the telephone company before you connnect the CSU to a network. When you request service, you must provide the telephone company with the following data. When you request T1 Service, you must provide the telephone company with the Facility Interface Code. Provide the telephone company with both of the following codes: 04DU9-B (1.544 MB D4 framing format) and 04DU9-C (1.544 MB ESF format). The telephone company will select the code it has available. The Service Order Code(s) (SOC): 6.0Y. The required Universal Service Order Code (USOC) jack: RJ 48C. The make, model number, and FCC Registration number of the CSU.

2. Your telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. The telephone company will notify you in advance of such changes to give you and opportunity to maintain uninterrupted telephone service.

3. If your CSU causes harm to the telephone network, the telephone company may temporarily discontinue your service. If possible, they will notify you in advance, but if advance notice is not practical, you will be notified as soon as possible and will be informed of your right to file a complaint with the FCC.

4. If you experience trouble with the CSU, please contact Black Box Corp. for service or repairs. Repairs should be performed only by Black Box Corp.

5. You are required to notify the telephone company when you disconnect the CSU from the network.

CE Notice

The CE symbol on your Black Box equipment indicates that it is in compliance with the Electromagnetic Compatibility (EMC) directive and the Low Voltage Directive (LVD) of the European Union (EU). A Certificate of Compliance is available by contacting Technical Support.

Trademarks Used In This Manual

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Normas Oficiales Mexicanas (NOM) Electrical Safety Statement

Instrucciones De Seguridad

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.

2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.

3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

    — A: El cable de poder o el contacto ha sido dañado; o

    — B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    — C: El aparato ha sido expuesto a la lluvia; o

    — D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    — E: El aparato ha sido tirado o su cubierta ha sido dañada.

Contents

About this guide

This guide describes configuring a BLACK BOX® Remote Access Server (LRA2900A). This section describes the following:

- Who should use this guide (see "Audience")
- How this document is organized (see "Structure")
- Typographical conventions and terms used in this guide (see "Typographical conventions used in this document" on page 31)

Audience

This guide is intended for the following users:

- System administrators
- Operators
- Installers
- Maintenance technicians

Structure

This guide contains the following chapters:

- Chapter 1 describes configuring the Administration Page window
- Chapter 2 describes configuring the Home window
- Chapter 3 describes configuring the Import/Export window
- Chapter 4 describes configuring the Alarms window
- Chapter 5 describes configuring the Authentication window
- Chapter 6 describes configuring the DAX window
- Chapter 7 describes configuring the Dial In window
- Chapter 8 describes configuring the Dial Out window
- Chapter 9 describes configuring the Drop and Insert window
- Chapter 10 describes configuring the DSP window
- Chapter 11 describes configuring the Ethernet window
- Chapter 12 describes configuring the Filter IP window
- Chapter 13 describes configuring the Frame Relay window
- Chapter 14 describes configuring the Interfaces window
- Chapter 15 describes configuring the IP window
- Chapter 16 describes configuring the MFR Version 2 window

- Chapter 17 describes configuring the RIP Version 2 window
- Chapter 18 describes configuring the SNMP window
- Chapter 19 describes configuring the System window
- Chapter 20 describes configuring the System Log window
- Chapter 21 describes configuring the T1/E1 Ling window
- Chapter 22 describes the contents of the About window
- Chapter 23 describes the contents of the License window
- Appendix A lists supported RADIUS attributes
- Appendix B lists supported RADIUS attributes

Typographical conventions used in this document

This section describes the typographical conventions and terms used in this guide.

General conventions

The procedures described in this manual use the following text conventions:

Table 1. Text conventions

Convention	Meaning
Futura bold type	Indicates the names of menu bar options.
Italicized Futura type	Indicates the names of options on pull-down menus.
Futura type	Indicates the names of fields or windows.
Garamond bold type	Indicates the names of command buttons that execute an action.
< >	Angle brackets indicate function and keyboard keys, such as <SHIFT>, <CTRL>, <C>, and so on.
Are you ready?	All system messages and prompts appear in the `Courier` font as the system would display them.
`% dir *.*`	Bold Courier font indicates where the operator must type a response or command

Mouse conventions

The following conventions are used when describing mouse actions:

Table 2. Mouse conventions

Convention	Meaning
Left mouse button	This button refers to the primary or leftmost mouse button (unless you have changed the default configuration).
Right mouse button	This button refers the secondary or rightmost mouse button (unless you have changed the default configuration)
Point	This word means to move the mouse in such a way that the tip of the pointing arrow on the screen ends up resting at the desired location.
Click	Means to quickly press and release the left or right mouse button (as instructed in the procedure). Make sure you do not move the mouse pointer while clicking a mouse button. Double-click means to press and release the same mouse button two times quickly
Drag	This word means to point the arrow and then hold down the left or right mouse button (as instructed in the procedure) as you move the mouse to a new location. When you have moved the mouse pointer to the desired location, you can release the mouse button.

Chapter 1 **Introduction**

Chapter contents

Introduction

You may configure the access server by using its internal HTTP/HTML Administration Pages. However, to enter into the HTTP/HTML pages, you must first define the LAN Address Technique, LAN IP Address, and LAN Subnet Mask for the access server. If you have not done so, please refer to the Getting Started Guide that came with your access server.

Logging into the HTTP/HTML Administration Pages

To log into the HTTP/HTML Administration pages, you must enter the 4-octet Internet Protocol (IP) (for example, *http://your.server.ip.address*) address as the Universal Resource Locator (URL) into a World-Wide Web (WWW) browser. After you enter the IP address, the access server will ask for your user name and password as shown in figure 1.

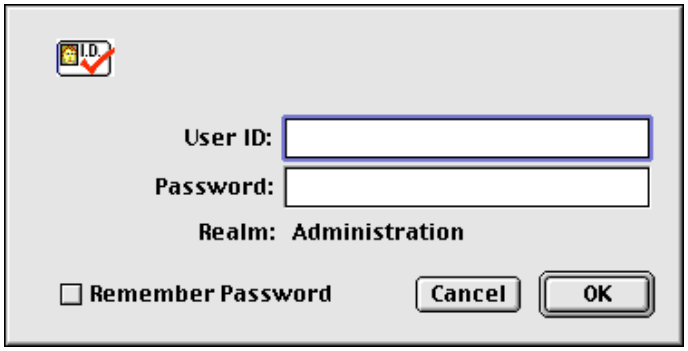


Figure 1. Access server login window

Your access server will accept the following default administrative passwords:

- superuser—this password carries full permission to change and view any parameters in the access server
- monitor—this password allows full viewing of any non-password oriented variables.

Note For security reasons, we recommend that you change these passwords immediately after initial configuration.

HTTP/HTML and SNMP Object Format

In this document, we shall describe the variables found on each of the internal HTTP/HTML pages. This description will include brief definitions of the Black Box Enterprise MIB or SNMP MIB II object identifiers wherever applicable. The format of the variables will resemble figure 2.

Figure 2. HTTP/HTML and SNMP object format

Saving HTTP/HTML Object Changes

Sometimes you will need to save changes that you have made in the HTTP/HTML pages. Do the following to make changes to read/write variables:

1. Select the appropriate Modify screen.
2. Make changes to the desired parameter.
3. Click on the **Submit** button.
4. Return to the HOME screen.
5. Click on the **Record Current Configuration** button.

Note Make sure you follow steps 1 through 5 when modifying the HTTP/HTML pages. Otherwise, your changes will be lost when the access server is power-cycled.

Chapter 2 Home

Chapter contents

Introduction

This chapter describes the HOME window—the first Administration Page that you see after logging into the access server (see figure 3). From HOME, you can monitor current system status, modify the Static User database, save any system changes, or reset the system without power-cycling the server.

Note Clicking on the HOME link in the Configuration Menu pane will return you to the HOME page from any other page.

The HOME window is divided into two *panes*: the Configuration Menu pane and the configuration/information pane (see figure 3). The Configuration Menu contains the links to the various access server subsystems, while the configuration/information pane is where you can view status and other information, or make changes to the system configuration. Unlike the Configuration Menu pane, which looks the same no matter which subsystem page you may move to, the configuration/information pane contents will change as you move from one subsystem page to another.

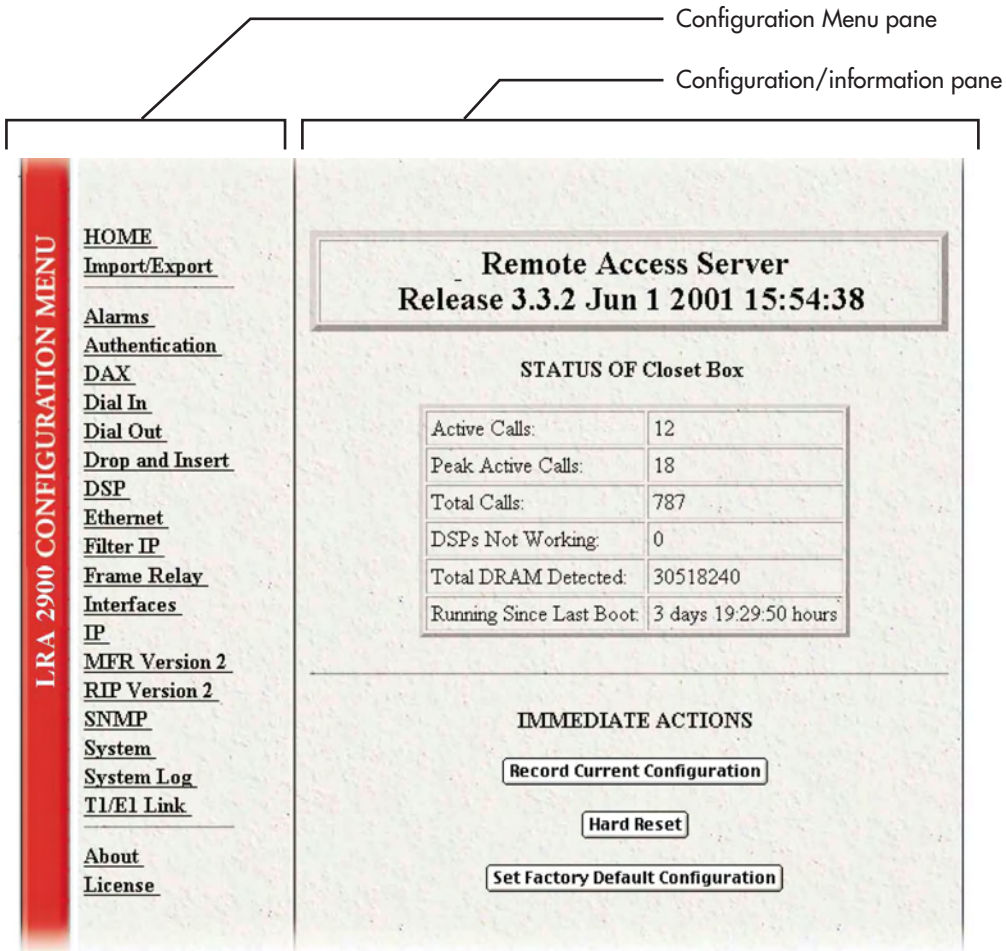


Figure 3. HOME page

Operating Status Variables

There are seven system variables which describe the immediate operating status access server. These variables are shown in figure 4 and are described in the following sections.

Active Calls:	12
Peak Active Calls:	18
Total Calls:	787
DSPs Not Working:	0
Total DRAM Detected:	30518240
Running Since Last Boot:	3 days 19:29:50 hours

Figure 4. STATUS menu

Active Calls (diActive)

This number, ranging from 0 to 60 displays the total number of calls being processed (connecting, dead, authenticating, and so on) in the access server at the time the HOME page was displayed.

Peak Active Calls (diMaxActive)

The maximum number of active calls seen at one time since the access server was powered on.

Total Calls (diTotalCallAttempts)

The total number of calls attempted since the last boot of the box.

DSPs Not Working (dspFailed)

This number should always be zero. The DSPs in the access server are arranged as a resource pool and called upon at ring-time. If a DSP fails to respond to the access server's CPU, it is determined to have failed, at which point the CPU will remove the DSP from the resource pool. If an incoming call attempts to access the failed DSP, the RAS will answer, then terminate the call (to a person monitoring the failed call through a telephone handset, he or she will hear only silence during the call, ending with a faint *click* as the call is terminated). One symptom indicating that a DSP has failed is if the access server is not handling as many calls as it normally does.

Total DRAM Detected (boxDetectedMemory)

This number shows the total number of bits of installed and available DRAM.

Running Since Last Boot (sysUpTime)

This tells you how long the access server has been running since the it was last reset. It displays the number of hours and rolls over after 1,193 hours (497 days).

Immediate Actions

There are several immediate actions (see figure 5) which, when in superuser mode, will cause the access server to operate according to the descriptions in the following sections.

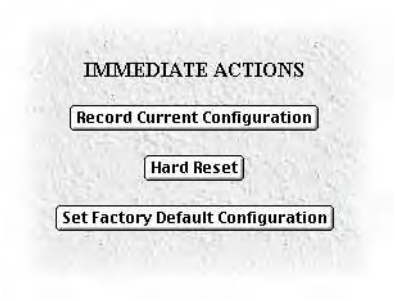


Figure 5. Immediate Actions buttons

- **Record Current Configuration** —clicking this button causes the current configuration to be stored in FLASH memory. Any changes made to the access server configuration are stored in non-volatile RAM. This allows the user to set the box up with a running configuration before committing it to FLASH. Configuration changes become permanent when you select **Record Current Configuration**. You will lose all changes not stored to FLASH the next time the access server is re-booted.
- **Hard Reset**—this button causes the access server to perform a cold restart. When you select **Hard Reset**, the access server confirm that you want to execute this command. Then, the access server will disconnect all current sessions, re-initialize the interfaces, and re-load configuration parameters from FLASH.
- **Set Factory Default Configuration**—this button clears out the configuration in FLASH and loads the factory default parameters into FLASH memory. The factory default settings ***will not*** execute on the access server until it is re-booted.

> **Note** **Set Factory Default Configuration** will delete any routing information, the access server's Ethernet IP address, and any other site specific settings made for your particular installation. You will have to re-enter the access server's Ethernet IP address and netmask using the front panel control port in order to use the HTTP/HTML Management pages.

Chapter 3 Import/Export

Chapter contents

Introduction

The Import/Export function enables you to make a backup (or *export*) copy of your access server's configuration parameters. By exporting the configurations, the saved files can quickly be loaded, or *imported*, into a replacement access server—greatly speeding up the installation process should an access server need replacing.

Note All actions for Import/Export require superuser access privileges.

To import or export a configuration, click on Import/Export under the Configuration Menu to display the Import/Export main window (see figure 6).

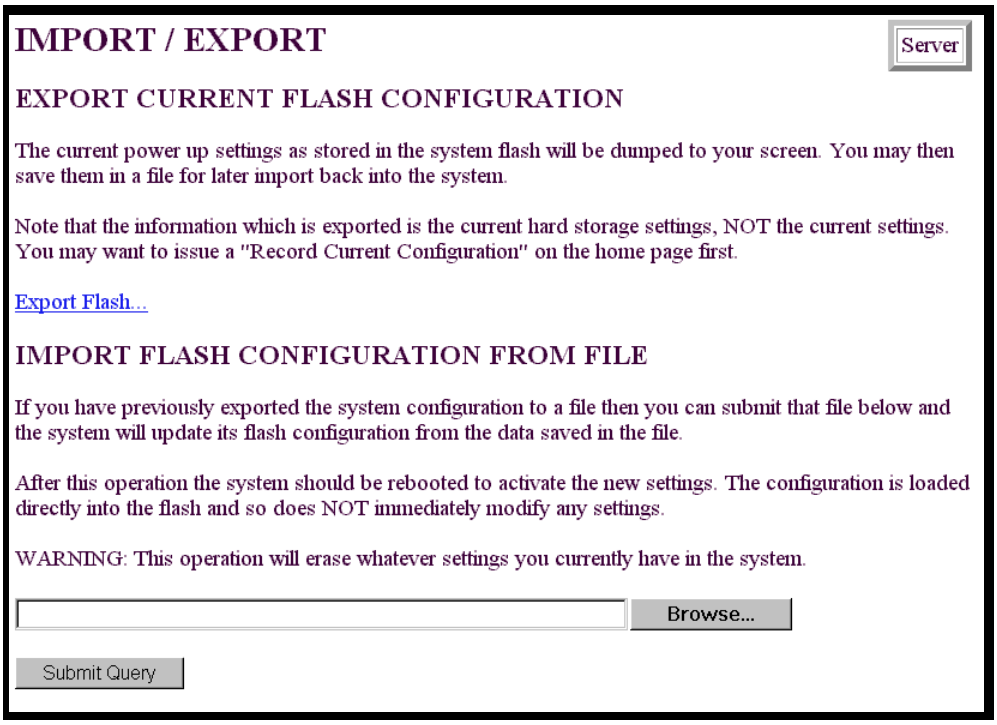


Figure 6. Import/Export main window

Export Configuration

Note The exported configuration file is a text-format file. Do not try, however to edit the operating characteristics contained in the file.

Note The parameters that will be exported are the power-up settings as they are stored in flash memory and *may not* be the current operating parameters. To ensure that you export the most current parameters, go to HOME, then click on the **Record Current Configuration** button under Immediate Actions.

To export the flash configuration, click on the Export Flash link on the Import/Export main page. The access server will display text configuration information resembling that shown in figure 7.

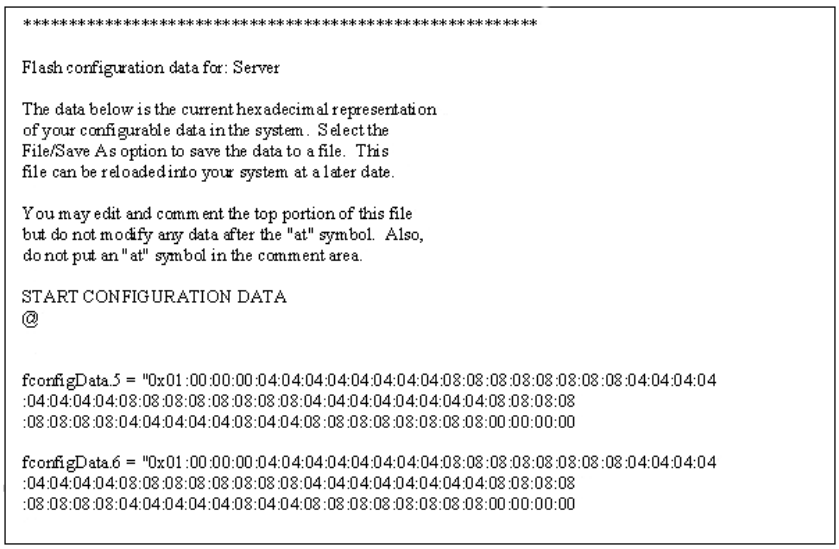


Figure 7. Typical access server flash memory configuration data

To save the displayed data as a text file, select the **Save** option on your browser (see figure 8). For example, under Netscape, select **File** > **Save As**. A dialog box will display enabling you to save the contents of the export parameters to a text file. Select the location where you want the file stored, type a file name, and click **Save**.

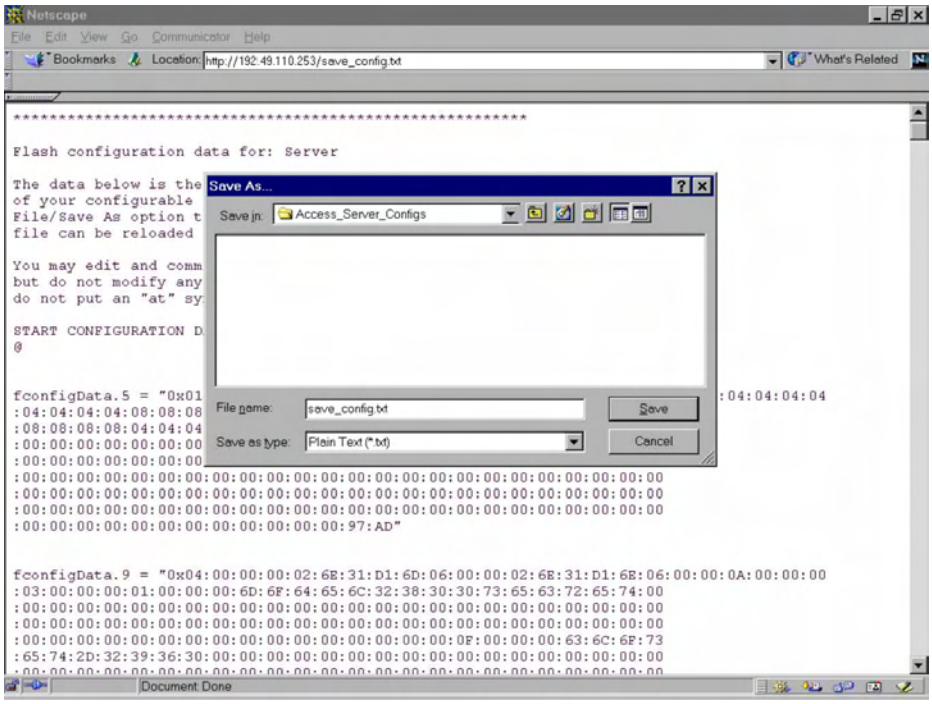


Figure 8. Saving the access server flash memory configuration data as a text file

Import Configuration

To import a configuration file into the access server, type the complete path and filename for the configuration file you wish to load or click on the **Browse…** button to select the desired file, then click on the **Submit Query** button (see figure 6 on page 43).

Upon successfully importing the file, the access server will display *Configuration Load Complete*, indicating that the new operating parameters have been loaded into flash memory.

Click on HOME under the Configuration Menu, then click on the **Hard Reset** button under Immediate Actions.

Note *Do not* select **Record Current Configuration** after importing configuration parameters.

Chapter 4 Alarms

Chapter contents

Introduction

The access server has an extensive alarm reporting system which enables users to configure, monitor, and test major and minor alarms. The alarm system can be set to notify if equipment fails (for example, a power supply failure) or if a T1/E1/PRI port malfunctions. There are 11 access server items that can be configured by the user to generate alerts based on the condition of the access server.

Displaying the Alarms window

Click on Alarms under the Configuration Menu to display the Alarm System main window (figure 9).

Note The system administrator can manually generate a specific alarm for testing purposes or clear the alarm counters from the main window.

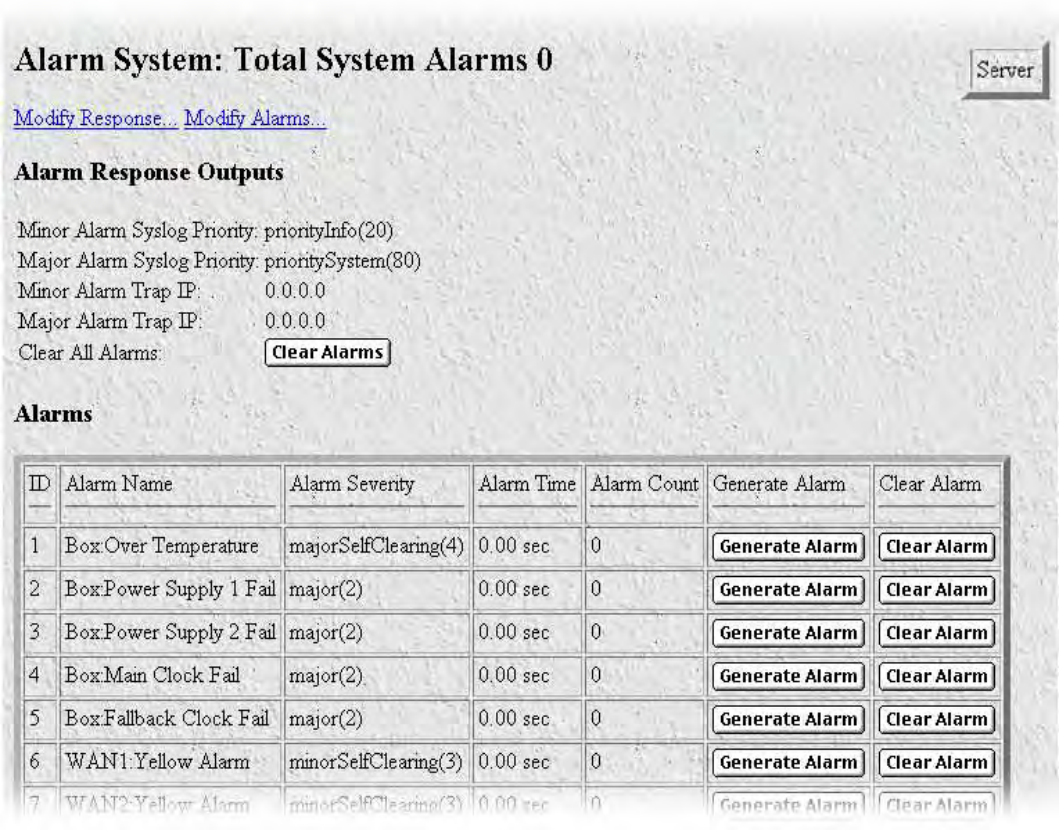


Figure 9. Alarms main window

The access server has three methods to notify of an alarm condition:

- Front panel LED—The front panel ALARM LED has three states that indicate the presence and severity of an alarm. The states are:
  - Off—No alarm present
  - Solid—Minor alarm
  - Flashing—Major alarm.

  Note The POWER LED will flash if a power supply failure alarm is present.

- Administration web page indication—The Alarms window of the administration page uses red highlighting to indicate which items are in an alarm state (see figure 10).

Figure 10. Sample alarm indication

- SYSLOG/SNMP—For external notification, the access server can be configured to send a SYSLOG message or an SNMP TRAP to an external management host. To configure the alarm response for either SNMP Traps or SYSLOG messages, click on the Alarm Response link (go to "Modify Response—Configuring the alarm response system" on page 50).

Besides enabling a user to view current alarm status, manually generate an alarm as a test, and clear the alarm time and alarm count variables, the Alarms main window also contains links to the following:

- Modify Response—Clicking on this link takes you to a window where you can change how the SYSLOG/SNMP function notifies remote users of an alarm (see "Modify Response—Configuring the alarm response system" on page 50)
- Modify Alarms—Clicking on this link takes you to a window where you can change how the access server perceives the severity of each alarm ("Modify Alarms—Configuring alarm severity levels" on page 52)

Alarm Response Outputs

Alarm Response Outputs display the current settings for handling alarm notification via SYSLOG/SNMP messages. To change how the SYSLOG/SNMP function notifies remote users of an alarm, refer to "Modify Response—Configuring the alarm response system" on page 50.

Minor Alarm Syslog Priority (minSyslogPriority)
Displays the SYSLOG priority of the minor alarm SYSLOG message. If the minimum priority for SYSLOG daemon (set under the *System Log* link) is less than this value, the SYSLOG daemon will receive the minor alarm SYSLOG message.

Major Alarm Syslog Priority (majorSyslogPriority)
Displays the SYSLOG priority of the major alarm SYSLOG message. If the minimum priority for SYSLOG daemon (set under the *System Log* link) is less than this value, the SYSLOG daemon will receive the major alarm SYSLOG message.

Minor Alarm Trap IP (minorTrapIp)
Displays the IP address of a host system which is running a SNMP trap daemon. Minor alarm messages will be sent to the system. If set to 0.0.0.0 then no trap message will be sent in response to a minor alarm

Major Alarm Trap IP (majorTrapIp)
Displays the IP address of a host system which is running a SNMP trap daemon. Major alarm messages will be sent to the system. If set to 0.0.0.0 then no trap message will be sent in response to a major alarm

Clear All Alarms
Clicking on this button resets all alarms to a non-alarm condition. Clear All Alarms does the following for all alarms: it resets the alarm, resets Alarm Time to 0.0 seconds, and resets the Alarm Count to 0.

Alarms

This portion of the Alarms main window displays the alarm status table, where you can view current alarm status, manually generate an alarm as a test, and clear the alarm time and alarm count variables.

Alarm ID
This number identifies the alarm item.

Alarm Name
The alarm items are grouped into two categories: Box and WAN trunk alarms. The Box group category lists access server temperature and power supply status. The WAN category monitors the T1/E1/PRI ports for yellow and red alarms.

Alarm Time
The Alarm Time column displays the number of seconds the alarm has been activated.

Alarm Count
The Alarm Count column indicates how many times the alarm has occurred since the last time alarms were cleared. It is a useful tool for monitoring self-clearing alarms.

Generate Alarm
For testing purposes, clicking the **Generate Alarm** button next to each alarm name will cause that alarm condition to be activated, as if the actual alarm trigger had occurred.

Clear Alarm

Clicking the **Clear Alarm** button resets the alarm to a non-alarm condition. Clear Alarm resets Alarm Time to 0.0 seconds, and resets the Alarm Count to 0.

Modify Response—Configuring the alarm response system

The alarm response outputs only effect external notification via SYSLOG/SNMP as the front panel ALARM LED and the web administration pages will always indicate an alarm condition. The following user configuration items can be set to permit external notification of access server alarm conditions:

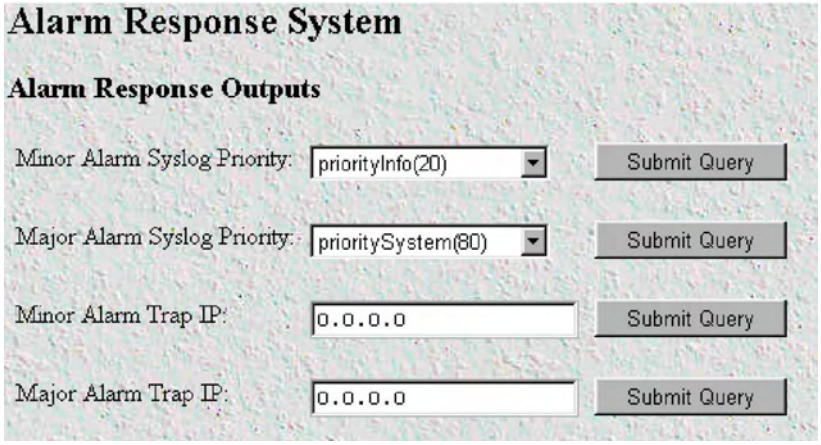


Figure 11. Alarm Response System window

Minor Alarm Syslog Priority (minSyslogPriority)

Sets the SYSLOG priority of the minor alarm SYSLOG message. The higher the minimum priority for SYSLOG daemon (set under the *System Log* link) is, the fewer non-essential messages will be sent to the SYSLOG daemon with the alarm messages. The minor/major alarm SYSLOG priority must be set at least as high as minimum priority for SYSLOG daemon for SYSLOG messages to be generated. PrioritySystem has the highest priority; priorityVerbose the lowest priority.

- priorityVerbose(5)
- priorityDebug(10)
- priorityInfo(20)
- priorityOddity(40)
- priorityService(60)
- prioritySystem(80)
- priorityDisable(1000)

Major Alarm Syslog Priority (majorSyslogPriority)

Sets the SYSLOG priority of the major alarm SYSLOG message. The higher the minimum priority for SYSLOG daemon (set under the *System Log* link) is, the fewer non-essential messages will be sent to the SYSLOG daemon with the alarm messages. The minor/major alarm SYSLOG priority must be set at least as high as min-

imum priority for SYSLOG daemon for SYSLOG messages to be generated. PrioritySystem has the highest priority; priorityVerbose the lowest priority.

- priorityVerbose(5)
- priorityDebug(10)
- priorityInfo(20)
- priorityOddity(40)
- priorityService(60)
- prioritySystem(80)
- priorityDisable(1000)

Minor Alarm Trap IP (minorTrapIp)

The IP address of a host system which is running a SNMP trap daemon. Minor Alarm messages will be sent to the system. If set to 0.0.0.0 then no trap message will be sent in response to a minor alarm

Major Alarm Trap IP (majorTrapIp)

The IP address of a host system which is running a SNMP trap daemon. Minor Alarm messages will be sent to the system. If set to 0.0.0.0 then no trap message will be sent in response to a minor alarm

Modify Alarms—Configuring alarm severity levels

The Modify Alarms window (see figure 12) is where you can set the severity level each alarm condition generates and whether it can be a self-clearing condition.

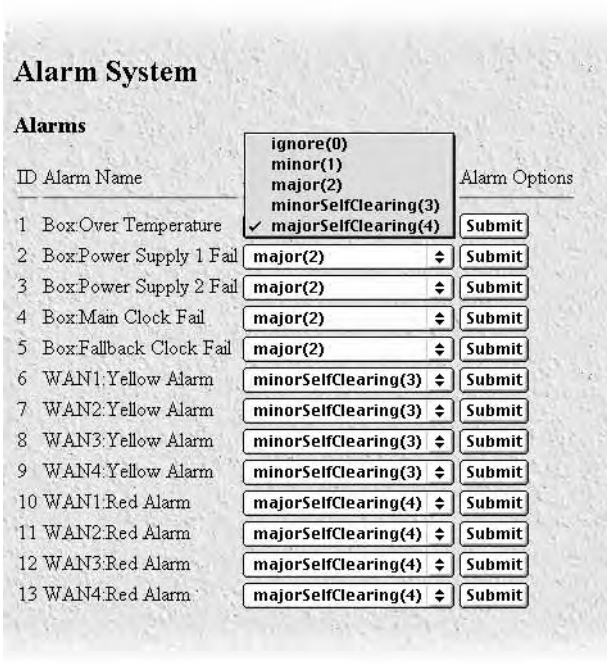


Figure 12. Modify Alarms settings window

The following alarm items that can be configured to generate alarm conditions:

- Box: Over Temperature—An alarm will be triggered when the highest temperature (set under the *System* link) exceeds 80°C.
- Box: Power Supply 1–2 Fail—An alarm will be triggered if power supply 1 or 2 fails.
- Box: Main and Fallback Clock Fail—An alarm will be triggered when either the main or fallback clock fail.
- WAN 1–4 Yellow Alarm—When a WAN port detects a yellow alarm condition, the specific WAN alarm will be set.
- WAN 1–4 Red Alarm—When a WAN port detects a red alarm condition, the specific WAN alarm will be set.

Each alarm item can be set for one of the following severity levels:

- Ignore(0)—Do not generate an alarm
- Minor(1)—Generate a minor alarm that will not reset until the administrator manually clears it
- Major(2)—Generate a major alarm that will not reset until the administrator manually clears it
- MinorSelfClearing(3)—Generate a minor alarm that automatically clears if the alarm condition ceases
- MajorSelfClearing(4)—Generate a major alarm that automatically clears if the alarm condition ceases

Note For maximum flexibility, defining what constitutes a major or minor alarm is left up the administrator. Some examples of typical major and minor include:

- Box Over-temperature—Major Alarm
- Power Supply Failure—Minor Alarm
- WAN Port Yellow Alarm—MajorSelfClearing
- WAN Port Red Alarm—MajorSelfClearing

To set an alarm, click on the drop-down menu for the desired alarm item, choose the new setting, then click on **Submit Query**.

Chapter 5 Authentication

Chapter contents

Introduction

Use the Authentication pages to set up system security and to provide specific users with access to appropriate network services. This section describes the authentication parameters. The access server uses static and/or RADIUS authentication to decide which dial-in users can access the system (refer to Appendix A, "Supported RADIUS Attributes" for a full list of RADIUS attributes).

Displaying the Authentication window

Do the following:

1. Click on Authentication under the Configuration Menu (see figure 13).

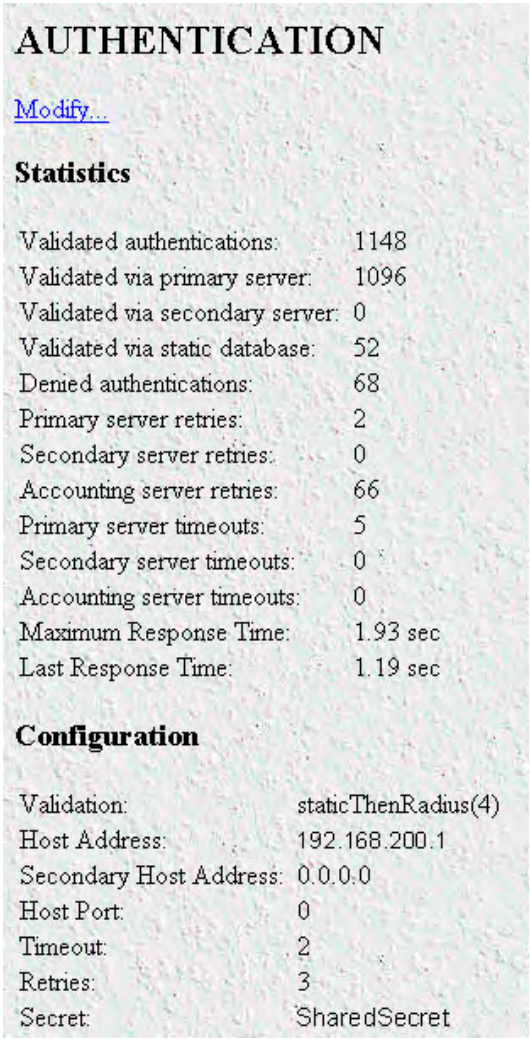


Figure 13. Authentication main screen

2. Select Modify to set up or change access server Authentication parameters.

The Statistics section

The Statistics section of the main Authentication screen lists running totals of statistics for RADIUS and Static User logins gathered since the last access server reset.

Validated authentications (auAuthenticationsValidTotal)

The total number of validated authentications since the last access server reset.

Validated via primary server (auAuthenticationsValidPrimary)

The number of authentications validated by the primary RADIUS authentication server since the last access server reset.

Validated via secondary server (auAuthenticationsValidSecondary)

The number of authentications validated by the secondary RADIUS authentication server since the last access server reset.

Validated via static database (auAuthenticationsValidStatic)

The number of authentications validated by the Static User database since the last access server reset.

Denied authentications (auAuthenticationsDenied)

The total number of authentication attempts requested but denied since the last access server reset.

Primary server retries (auPrimaryServerRetrys)

The number of times the access server needed to make subsequent requests for a call to the primary RADIUS authentication server.

Secondary server retries (auSecondaryServerRetrys)

The number of times the access server needed to make subsequent requests for a call to the secondary RADIUS authentication server.

Accounting server retries (auAccountingServerRetrys)

The number of times the access server needed to make subsequent accounting requests for a call.

Primary server timeouts (auPrimaryServerTimeouts)

The total number of authentication timeouts by the primary RADIUS authentication server.

Secondary server timeouts (auSecondaryServerTimeouts)

The total number of authentication timeouts by the secondary RADIUS authentication server.

Accounting server timeouts (auAccountingServerTimeouts)

The total number of accounting timeouts by the primary RADIUS accounting server.

Maximum Response Time

The maximum time it has taken for authentication to be completed since the server rebooted.

Last Response Time
The time taken for the last authentication to be completed.

Setting Up Authentication

After selecting Modify from the main Authentication screen, you may set up or change authentication parameters for both RADIUS users and Static users. After configuring the Validation method (see "Validation (auValidation)" below), configure the additional parameters as shown in figure 14 to configure RADIUS parameters. See "Static User Authentication" on page 59 to set up Static users.

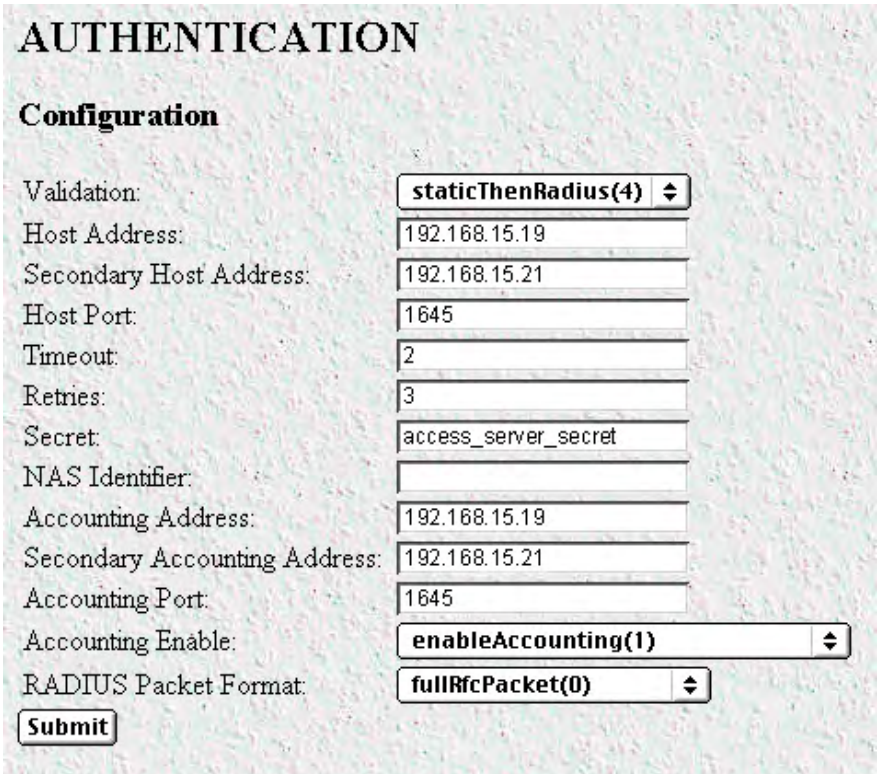


Figure 14. Authentication Configuration screen

Validation (auValidation)
Selects how the access server will authenticate an incoming call. Select from:

- No Validation(0)—Select this to allow un-authenticated calls into the access server, and on to your LAN, using the default service.
- static Users(1)—Use the access server internal user database only to authenticate. Static users are simply users and passwords entered into the access server's internal users database.
- radius Users(2)—Use RADIUS to authenticate and provision user services. RADIUS is a client-server system developed to manage the flexible requirements of remote dial-in users. The RADIUS protocol is specified under RFC 2138 for authentication and RFC 2139 for accounting. RADIUS servers are available as freeware for most computer platforms and is an excellent method for managing user dial-in security. Any RADIUS entries will require an associated server to process authentication requests from the access server or

the access server will reject users access. For more information about RADIUS, see RADIUS User Authentication, below.

- tacacs Users(3)—This feature is not currently available
- static Then RADIUS(4)—Check the internal user database first, if no match is found, then use RADIUS to authenticate and provision user services.
- static Then Tacacs(5)— Check the internal user database first, if no match is found, then use TACACS to authenticate and provision user services. Not currently implemented.

Note The following options apply only when using an external authentication server.

Host Address (auHostAddress)
Tells the access server the IP address of the primary external authentication server. This must be the IP address as the access server will not resolve a Fully Qualified Domain Name.

Secondary Host Address (auSecondaryHostAddress)
When using a remote authentication server (RADIUS) this variable provides an alternative server IP address.

Host Port (auHostPort)
This variable tells the access server which UDP port to use when connecting to the host specified in the Host Address variable. The RADIUS standard, as per RFC 2138, specifies port 1812 for RADIUS authentication. Some older installations of RADIUS use port 1645.

Timeout (auTimeout)
This option specifies the time, in seconds, before the access server will retransmit an authentication request to an external authentication server.

Retries (auRetries)
This option specifies the number of times the access server will resend an authentication request to a RADIUS server after a TIMEOUT occurs. If this number is exceeded then the secondary host will be tried. If this number is exceeded by the secondary host, the user will be rejected.

Secret (auSecret)
The Secret variable sets the shared secret between the authentication client (access server) and the authentication server (RADIUS). It is used to encrypt an authentication request and to decrypt an incoming reply from the server. The secret on the access server and the RADIUS server must match and must be 15 or fewer printable, non space, ASCII characters.

Note The same secret word must used on the access server and in the RADIUS clients file.

NAS Identifier (auNASIdentifier)
This variable is used to identify the access server to the remote authentication server. If this option is blank, then the access server will use it's IP address to identify itself to the remote server. It does this by using the NAS-IP-Address attribute instead of the NAS-Identifier attribute.

Accounting Address (auAcctAddress)
This is the IP address of the accounting server. RADIUS also allows for the recording of accounting information.

Secondary Accounting Address (auSecondaryAcctAddress)
When using a remote accounting server (such as RADIUS Accounting) this variable provides the IP address of the accounting server.

Accounting Port (auAcctPort)
This is the UDP port on the accounting server specified in Acct Address that the access server should use to transfer accounting information. RFC 2139 states that port 1813 is the standard RADIUS accounting port. Some older implementations of RADIUS use port 1646 as the accounting port.

Accounting Enable (auAccountingEnable)
This is a switch that allows the enabling or disabling the reporting of accounting information on the access server. The following options are available:

- enableAccounting—Begin accounting of RADIUS authenticated users.
- disableAccounting—Disable the accounting feature.
- enableAccounting-no validation—When a response is received from either the authentication or the accounting server it is validated using the defined secret. If the secret does not match, the reply packet is dropped just as if it never existed.

  Early versions of the Livingston RADIUS server used a method for encoding the accounting reply packet that was incorrect. Accounting replies from these servers would therefore be dropped because they could not be authenticated, eventually resulting in timeouts and shutting the call down with the reason *authenAccountingTimeout*. As a workaround for this issue, the state *enableAccountingNoValidation*—which does not check for valid encoding on the accounting reply packet—was added as an option.

Radius Packet Format (auRadiusPacketFormat)
The following options are available:

- fullrfcPacket—The accept request packet includes Calling-Station-Id and Service-Type RADIUS attributes.
- minimumrfcPacket—This setting does not include Calling-Station-Id and Service-Type RADIUS attributes.

Static User Authentication
To view or modify the static users in the internal user database, click on Authentication in the Configuration Menu. The Authentication window displays. Scroll down until Static User Identification is displayed (see figure 15).

Static users consist of usernames and passwords entered into the access server's internal users database. You can have up to 111 static users in the access server database.

You must have superuser-level access to make changes to the static users database.

The following sections describe each of the variables found in the Static User Identification section.

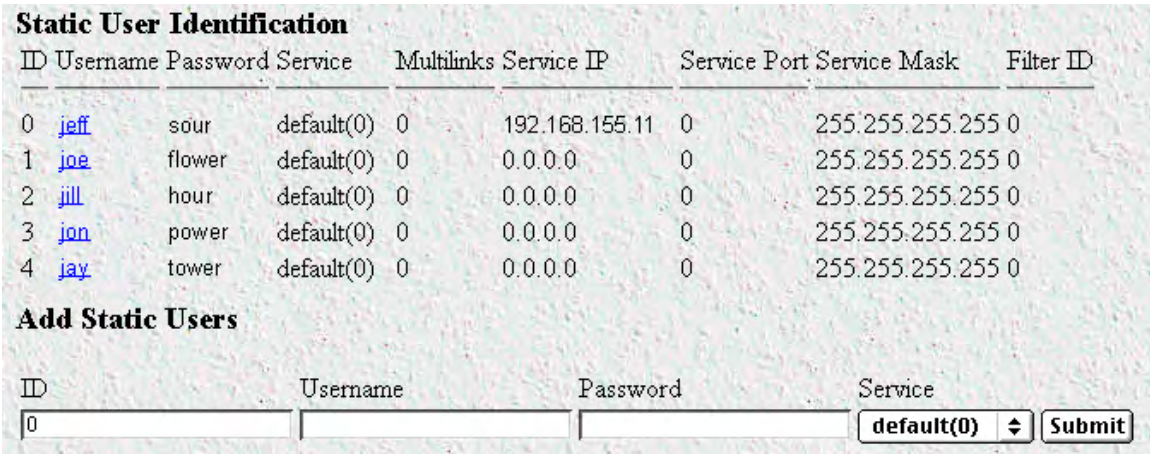


Figure 15. Static User Identification setup

Adding Static Users

ID (suID)

Identifies the entry in the table of users. For the next user, select the next unused number. If you select a number that is already displayed in the Static User Identification table, you will overwrite a current entry in user database.

Username (suUsername)

This is a unique name, to be provided at login time.

Note There is a 19-character limit on the username length.

Password (suPassword)

This is the password that is provided at login time along with the username.

Service (suService)

This option instructs the access server on how to service the incoming call. Select from:

- default—This is the default service as specified under Dial-In (see Chapter 7, "Dial In"). We recommend that you select default.
- admin—Not currently implemented.
- monitor—Not currently implemented.
- rlogin—Causes the access server to rlogin into another host. See "Service IP (suServiceIP)" on page 62 for information on configuring the remote host IP addresss.
- telnet—Causes the access server to telnet into another host.
- tcpraw—All 8 bits are passed unchecked and unaltered.
- ppp—Access server will try to negotiate a PPP session.
- cppp—Access server will try to negotiate a Compressed-PPP session.

Note If a user attempts to login in using a different service than the one he or she has been provided, the access server will reject the user. The exception to this is CPPP which will revert to PPP if CPPP is not available on the client.

- slip—Access server will negotiate a SLIP connection.
- cslip—Access server will negotiate a Compressed-SLIP connection.
- dialout—Access server will give a dialout connection. The dialout connection is an AT command set driven connection into one of the access server modems. On line help is provided by typing **at help <cr>**.
- vpn—This option is currently not supported.

Note If a user attempts to login in using a different service than the one he or she has been provided, the access server will reject the user. The exception to this is CPPP which will revert to PPP if CPPP is not available on the client.

Note All changes made to the running configuration must be saved to FLASH by selecting **Record Current Configuration** under Immediate Actions on the HOME page of the access server. Failure to do so will cause all configuration information to be lost the next time the access server is re-booted.

After the user information has been entered, click **Submit**.

Modify Static User

To modify or further configure the user, click the username you just created to display the Static User window (see figure 16). Refer to the following sections while modifying the Static User settings. When you are finished, click **Submit** to store the changes.

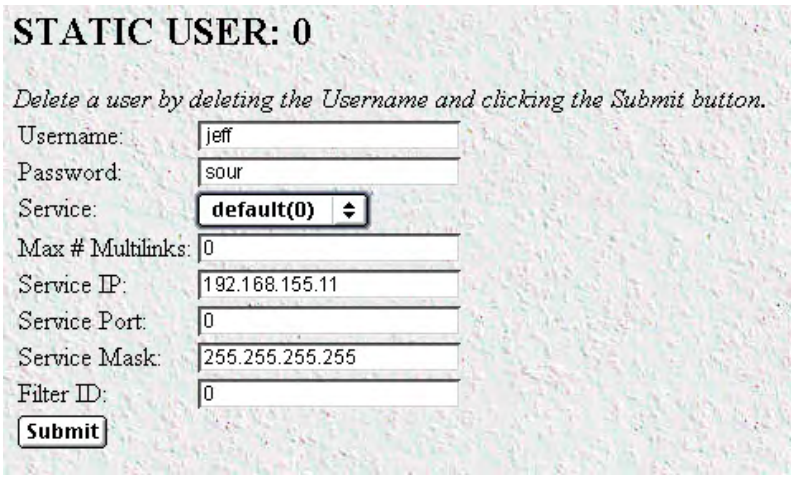


Figure 16. Static User settings window

Service IP (suServiceIP)

This is the IP of the RLogin or Telnet host, or the static IP address assigned to the user. This is determined by the option selected in *Service* (see "Service (suService)" on page 60).

Service Port (suServicePort)

This is the port number to connect to the service host. If the number is 0, the access server will use the default values for Telnet (port number 23) and RLogin (port number 513).

Note After you have submitted all changes, click on the HOME link in the Configuration Menu. Once there, click on the **Record Current Configuration** button (located under Immediate Actions) to save the changes to FLASH memory on the access server.

All changes made to the running configuration must be saved to FLASH memory. Failure to do so will cause all configuration information to be lost the next time the access server is re-booted.

Filter ID (suFilterId)

This is the ID of the filter assigned to the static user. A filter controls packets that can be sent or received by the dial-in user to which it is applied. Only one filter can be assigned to a user defined in the static user authentication database.

Note Explicitly assigning a filter to a static user will keep default dial-in filters from being applied.

Chapter 6 DAX

Chapter contents

Introduction

The digital cross-connect (DAX) link allows configuration of the access servers' digital cross-connect that manages the time slots and clocking between the WAN ports.

The access server uses a single clock source for all WAN ports. Therefore, to avoid data loss caused by variations in network timing, each access server should terminate WAN connections from a single timing provider. WAN connections from multiple timing providers can be terminated in the access server if all the providers source their timing from the same stratum clock or if the access server provides the network clock.

Click on DAX under the Configuration Menu to display the DAX main window (see figure 17).

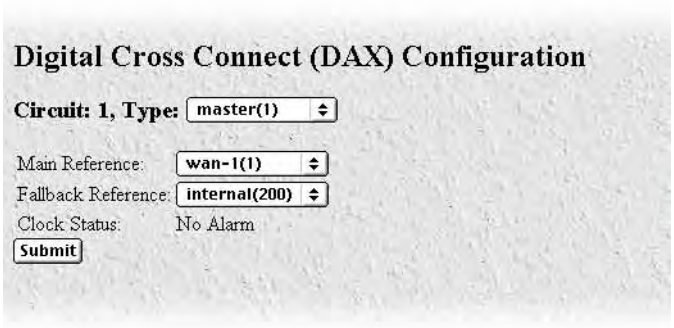


Figure 17. DAX main window

Configuring the DAX

There are three variables to select when configuring the DAX circuit:

- Circuit Type—Defines the overall clocking scheme for the entire access server (refer to "Circuit Type (daxClockMode)"
- Main Reference—Determines which WAN link supplies the clock for the system (refer to "Main Reference (daxClockMainRef)" on page 66)
- Fallback Reference—Enables the configuration of a back-up clock reference should the Main Reference fail (refer to "Fallback Reference (daxClockFallbackRef)" on page 66)

Circuit Type (daxClockMode)

Defines the overall clocking scheme for the entire access server. For each circuit a selection must be made as to the overall clocking scheme of the entire system. If your system has only one circuit displayed, then that circuit must be set to *Master*.

The following settings are available:

- master(1)—The master device is responsible for providing the master system clock in synchronization with one of its references. If your access server has only one circuit, then this setting must be *Master*.
- secondary(2)—The secondary circuit provides the master system clock if the master circuit fails.
- slave(3)—Slave devices provide the system clock references for use by the master or secondary.

Main Reference (daxClockMainRef)

The main reference parameter determines which WAN link will supply the clock for the system.

The following settings are available:

- none(0)—No clock selection. This would be used in conjunction with either a secondary or slave circuit.
- wan-1(1)—Use WAN Port 1 for primary timing. Generally the first WAN connection will be used as the main reference.
- wan-2(2)—Use WAN Port 2 for primary timing. Generally the second WAN connection will be used as the fallback reference (see "Fallback Reference (daxClockFallbackRef)").
- wan-3(3)—Use WAN Port 3 for primary timing.
- wan-4(4)—Use WAN Port 4 for primary timing.
- wan-5(5)—Use WAN Port 5 for primary timing.
- wan-6(6)—Use WAN Port 6 for primary timing.
- wan-7(7)—Use WAN Port 7 for primary timing.
- wan-8(8)—Use WAN Port 8 for primary timing.
- netref-1(101)—Use to obtain system timing from a slave circuit.
- netref-2(102)—Use to obtain system timing from a slave circuit.
- internal(200)—Use internal free-run oscillator for the system clock.
- external(300)—Not currently implemented.

Fallback Reference (daxClockFallbackRef)

The fallback reference enables the configuration of a back-up clock reference should the main reference fail.

The following settings are available:

- none(0)—No clock selection. This would be used in conjunction with either a secondary or slave circuit.
- wan-1(1)—Use WAN Port 1 for secondary timing. Generally the first WAN connection will be used as the main reference.
- wan-2(2)—Use WAN Port 2 for secondary timing. Generally the second WAN connection will be used as the fallback reference. If there is only one WAN connection, then the fallback reference should be set to oscillator.
- wan-3(3)—Use WAN Port 3 for secondary timing.
- wan-4(4)—Use WAN Port 4 for secondary timing.
- wan-5(5)—Use WAN Port 5 for secondary timing.
- wan-6(6)—Use WAN Port 6 for secondary timing.
- wan-7(7)—Use WAN Port 7 for secondary timing.
- wan-8(8)—Use WAN Port 8 for secondary timing.
- netref-1(101)—Use to obtain system timing from a slave circuit.

- netref-2(102)—Use to obtain system timing from a slave circuit.
- internal(200)—Use internal free-run oscillator for the system clock
- external(300)—Not currently implemented.

Clock Status (daxClockFailure)

The clock status indicates alarm conditions relating to the system clock. If there are no alarms, the DAX page will indicate *No Alarms* (see figure 17 on page 65). Should one or more alarms be present, an *Alarms Present* message will be displayed with the following list of potential clock failures (figure 18).

- Main Reference Fail(1)—The main clock reference has failed
- Fallback Reference Fail(2)—The fall back clock reference has failed
- Master System Fail(4)—The Master System clock has failed
- Secondary System Fail(8)—The Secondary System clock has failed.

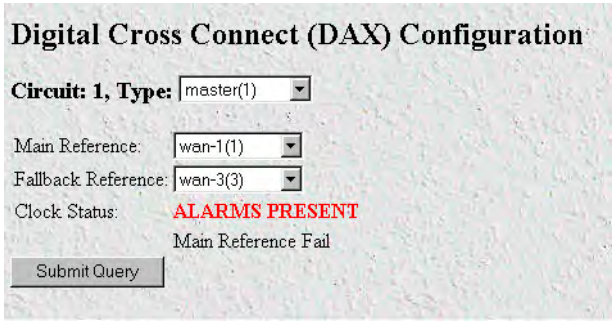


Figure 18. DAX Clock Status alarm condition

Chapter 7 Dial In

Chapter contents

Introduction

The Dial In main window (see figure 19) is where you can change or view items that are associated with the user dialing in—including call statistics, type of service used, modem specific statistics, as well as configuration parameters for login, service, domain name service, login attempts, configuration of link, maximum time, and modem configuration.

Click on Dial In under the Configuration Menu to display the Dial In main window.

The Dial In window contains the following items:

- Statistics for individual users (for example, users jill, jeff, and jay, as shown in figure 19). For more information about the statistics displayed on the Dial In main window, refer to "Dial In main window" below.

  To view or modify individual user settings, select an active user in the State column (for example, if you wanted to modify user jill, you would click on the online(6) link next to jill's username.) For more information about modifying individual user settings, refer to "Dial In User Statistics window" on page 95.

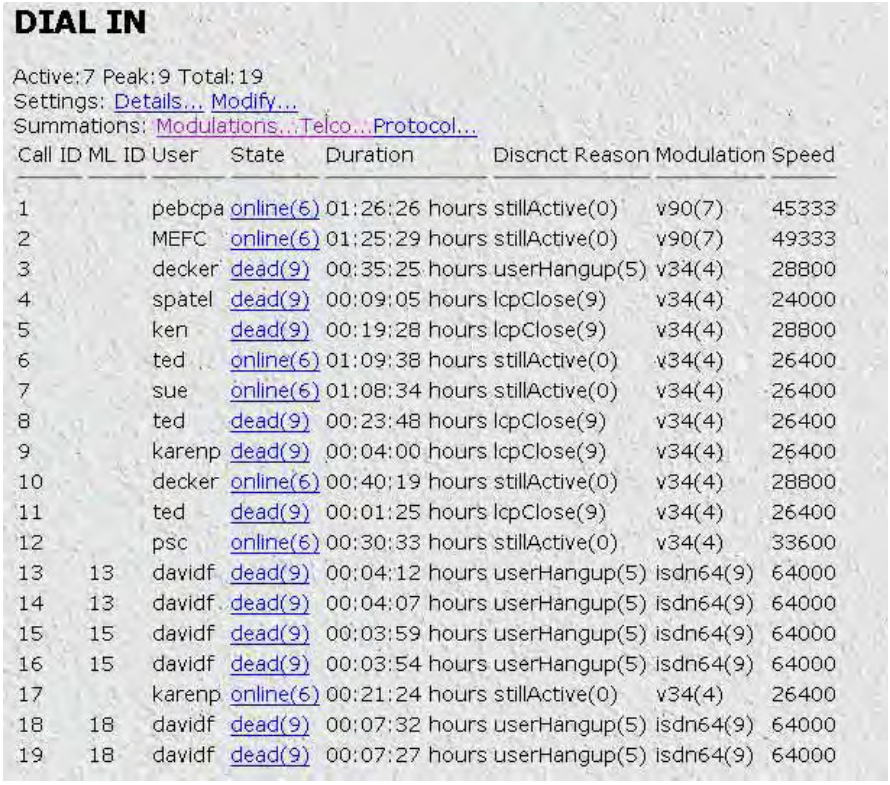
- Details link—clicking on the Details… link takes you to the page where you can see how the system is currently set up to handle dial in users. For more information about the Details page, refer to "Dial In Details" on page 84.

- Modify link—clicking on the Modify… link takes you to the page where you can make global changes to items that are associated with the user dialing in—including type of service used, configuration parameters for login, service, domain name service, login attempts, configuration of link, maximum timeouts, and modem configuration. For more information about the Modify page, refer to "Dial In Modify window" on page 85.

- Modulations link—clicking on the Modulations… link takes you to the page that shows statistics about the modem connection, listed by individual users. For more information about the Modulations page, refer to "Dial Modulations window" on page 76.

- Telco link—clicking on the Telco… link takes you to a page that shows the Telco characteristics for individual users. For more information about the Modify page, refer to "Dial Telco window" on page 79.

- Protocol link—clicking on the Protocol… link takes you to a page that shows the protocol negotiations of the connection for individual users. For more information about the Modify page, refer to "Dial Protocol window" on page 81.



DIAL IN

Active:7 Peak:9 Total:19
Settings: Details... Modify...
Summations: Modulations...Telco...Protocol...

Call ID	ML ID	User	State	Duration	Discnct Reason	Modulation	Speed
1		pebcpa	online(6)	01:26:26 hours	stillActive(0)	v90(7)	45333
2		MEFC	online(6)	01:25:29 hours	stillActive(0)	v90(7)	49333
3		decker	dead(9)	00:35:25 hours	userHangup(5)	v34(4)	28800
4		spatel	dead(9)	00:09:05 hours	lcpClose(9)	v34(4)	24000
5		ken	dead(9)	00:19:28 hours	lcpClose(9)	v34(4)	28800
6		ted	online(6)	01:09:38 hours	stillActive(0)	v34(4)	26400
7		sue	online(6)	01:08:34 hours	stillActive(0)	v34(4)	26400
8		ted	dead(9)	00:23:48 hours	lcpClose(9)	v34(4)	26400
9		karenp	dead(9)	00:04:00 hours	lcpClose(9)	v34(4)	26400
10		decker	online(6)	00:40:19 hours	stillActive(0)	v34(4)	28800
11		ted	dead(9)	00:01:25 hours	lcpClose(9)	v34(4)	26400
12		psc	online(6)	00:30:33 hours	stillActive(0)	v34(4)	33600
13	13	davidf	dead(9)	00:04:12 hours	userHangup(5)	isdn64(9)	64000
14	13	davidf	dead(9)	00:04:07 hours	userHangup(5)	isdn64(9)	64000
15	15	davidf	dead(9)	00:03:59 hours	userHangup(5)	isdn64(9)	64000
16	15	davidf	dead(9)	00:03:54 hours	userHangup(5)	isdn64(9)	64000
17		karenp	online(6)	00:21:24 hours	stillActive(0)	v34(4)	26400
18	18	davidf	dead(9)	00:07:32 hours	userHangup(5)	isdn64(9)	64000
19	18	davidf	dead(9)	00:07:27 hours	userHangup(5)	isdn64(9)	64000

Figure 19. Dial In main window

Dial In main window

The Dial In window displays statistics for individual users. This window shows currently attached users, the users state, and time that the user has been on access server. This window can also display recently disconnected sessions. The following sections explain the meaning of each statistic.

Active Calls (diActive)

The total number of active calls and calls that are being initiated.

Peak Active Calls (diMaxActive)

The maximum number of active calls seen at one time since the unit was powered up.

Total Calls (diTotalCallAttempts)

The total number of calls attempted since the last boot of the box.

Call ID (diactIndex)

Unique identification of this active call for internal use.

Call ID (diactIndex)

Subsequent calls in a multilink PPP/ISDN call refer to this ID as a pointer to the bundlehead or originating call.

ML ID (diactMultiIndex)
Subsequent calls in a multilink PPP/ISDN call have a pointer to the bundlehead or originating call.

User (diactusername)
The user name that the caller entered. This can be a static user or a radius user's login name.

State (diactState)
As the call comes into the access server it can be in one of five states.

- Ringing—The call has been recognized by the access server and is in process of going off hook.
- Connecting—The unit has assigned a DSP to the incoming call and is now in the process of negotiation of the type of modulation—V.34, V.32, ISDN, or 56K.
- Authenticating—The access server is in the process of verifying the users passwords by using static or RADIUS authentication.
- Online—The access server has completed authentication and we are ready to access the Internet.
- Dead—The user has been disconnected and this message will go away after the linger time has expired.
- Bury—Kill the call and remove it from the dial-in main window.

Duration (diactSessionTime)
The number of seconds this call was/is active. Time in seconds the user has been connected.

Disconnect Reason (diactTerminateReason)
The reason a call was disconnected (refer to "Termination Reason (diactTerminateReason)" on page 98 for the complete list of reasons).

Modulation (diactModulation)
The modulation of the link:

- unknown(0)
- v21(1)—V.21 modulation
- v22(2)—V.22 modulation
- v32(3)—V.32 modulation
- v34(4)—V.34 modulation
- k56(5)—K56 Flex modulation
- x2(6)—X.2 modulation
- v90(7)—V.90 modulation
- v110(8)—V.110 modulation (not currently implemented)
- isdn64(9)—ISDN 64 modulation
- isdn56(10)—ISDN 56 modulation (not currently implemented)
- 12tp(11)—12tp tunnelled multilink call

- phase2(20)—Phase 2, an advanced state of modulation in v34 and higher
- answerack(21)—acknowledgement phase of modulation

Connect Speed (diactTxSpeed)
The connected speed of the link.

Dial Modulations window
This window shows statistics about the modem connection, listed by unique user ID.

DIAL MODULATIONS Server

ID	User	State	DSP	Mod	Tx Speed	Rx Speed	Prot	Comp	Loc Ren	Loc Ret	Rem Ren	Rem Ret
1	pebcpa	online(6)	1	v90(7)	45333	24000	v42(2)	v42bis(2)	0	1	3	1
2	MEFC	online(6)	1	v90(7)	49333	24000	v42(2)	v42bis(2)	0	0	0	0
3	decker	dead(9)	2	v34(4)	28800	28800	v42(2)	v42bis(2)	1	0	1	1
4	spatel	dead(9)	2	v34(4)	24000	26400	v42(2)	v42bis(2)	1	0	1	0
5	ken	dead(9)	3	v34(4)	28800	28800	v42(2)	v42bis(2)	1	0	1	0
6	ted	online(6)	3	v34(4)	26400	26400	v42(2)	v42bis(2)	0	0	0	0
7	sue	online(6)	4	v34(4)	26400	19200	v42(2)	v42bis(2)	0	0	0	1
8	ted	dead(9)	4	v34(4)	26400	28800	v42(2)	v42bis(2)	1	0	1	0
9	karenp	dead(9)	5	v34(4)	26400	24000	v42(2)	v42bis(2)	0	0	0	0
10	decker	online(6)	5	v34(4)	28800	31200	v42(2)	v42bis(2)	5	0	5	1
11	ted	dead(9)	6	v34(4)	26400	28800	v42(2)	v42bis(2)	1	0	1	0
12	psc	online(6)	6	v34(4)	33600	31200	v42(2)	v42bis(2)	0	0	0	0
13	davidf	dead(9)	7	isdn64(9)	64000	64000	none(1)	none(1)	0	0	0	0
14	davidf	dead(9)	7	isdn64(9)	64000	64000	none(1)	none(1)	0	0	0	0
15	davidf	dead(9)	8	isdn64(9)	64000	64000	none(1)	none(1)	0	0	0	0
16	davidf	dead(9)	8	isdn64(9)	64000	64000	none(1)	none(1)	0	0	0	0
17	karenp	online(6)	9	v34(4)	26400	24000	v42(2)	v42bis(2)	0	0	0	0
18	davidf	dead(9)	9	isdn64(9)	64000	64000	none(1)	none(1)	0	0	0	0
19	davidf	dead(9)	10	isdn64(9)	64000	64000	none(1)	none(1)	0	0	0	0
20	spatel	online(6)	10	v90(7)	50666	24000	v42(2)	v42bis(2)	0	0	0	0

Figure 20. Dial Modulations window

Call ID: (diactIndex)
Unique identification of this active call (for internal use).

Username (diactUsername)
The caller's username.

State (diactState)
Indicates current progress of the selected call.

- Ringing—The call has been recognized by the access server and is in the process of going off hook
- Connecting—The access server has assigned a DSP to the incoming call and is now in the process of negotiating the type of modulation (V.34, V.32, ISDN, or 56K).
- LcpNegotiate—The link is negotiating LCP parameters.

- Authenticating—The access server is in the process of verifying the user's password by using static or RADIUS authentication.
- Online—The access server has completed authentication and the user is now able to access the Internet.
- 12tpTunneled—Subsequent multilink call that was answered by another access server and tunneled to the access server that has the originating call.
- Kill—The administrator can manually disconnect the user by activating this parameter.
- Dead—The user's call has been disconnected. This message disappears when the linger time expires.
- Bury—The call has been killed and removed from the dial-in main window.

DSP Link (diactDSPIndex)

The physical DSP chip that the user's call is on. This is a number from 0 to 59.

Connection Modulation (diactModulation)

The modulation type of the modem link (for example, V.34). The modem link can have these modulation or data types:

- unknown(0)
- v21(1)—V.21 modulation
- v22(2)—V.22 modulation
- v32(3)—V.32 modulation
- v34(4)—V.34 modulation
- k56(5)—K56 Flex modulation
- x2(6)—X.2 modulation
- v90(7)—V.90 modulation
- v110(8)—V.110 modulation (not currently implemented)
- isdn64(9)—ISDN 64 modulation
- isdn56(10)—ISDN 56 modulation (not currently implemented)
- 12tp(11)—12tp tunnelled multilink call
- phase2(20)—Phase 2, an advanced state of modulation in v34 and higher
- answerack(21)—acknowledgement phase of modulation

Transmit Connection Speed (diactTxSpeed)

The connected speed of the modem link (for example, 28.8 bps). These values, in bits per second, range from 300–33,600.

Receive Connection Speed (diactRxSpeed)
The connected speed of the modem link (for example, 28.8 bps). These values, in bits per second, range from 300–53,000.

Error Correction (diactErrorCorrection)
The modem error correction scheme used during this call.

- None—No error correction on the call.
- V42—Error correction mode
- V120—Mode for ISDN B

Data Compression Protocol (diactCompression)
The modem data compression technique used during this call.

- None—No compression.
- V42bis—Compression is running.
- Stac—Compression is running.

Locally Initiated Renegotiates (diactLocalRenegotiates)
The number of times the local modem has initiated a modem speed renegotiate.

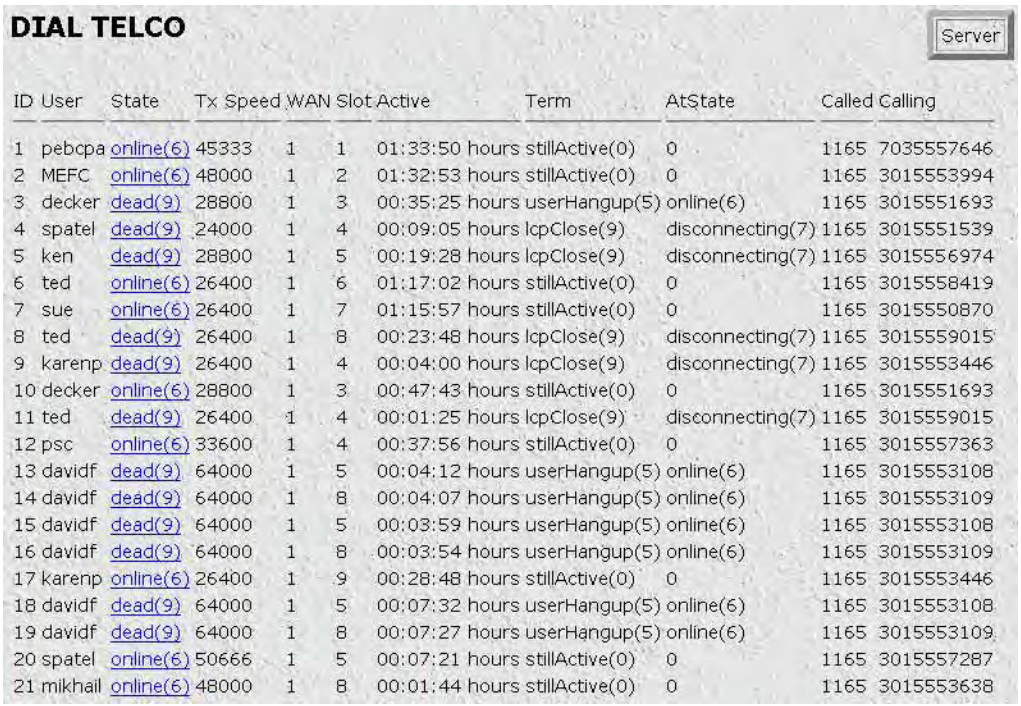
Locally Initiated Retrains (diactLocalRetrains)
The number of times the local modem has initiated a modem carrier retrain.

Remote Initiated Renegotiates (diactRemoteRenegotiates)
The number of times the remote modem has initiated a modem speed renegotiate.

Remote Initiated Retrains (diactRemoteRetrains)
The number of times the remote modem has initiated a modem carrier retrain.

Dial Telco window

This window shows the telco characteristics for individual users.



DIAL TELCO

Server

ID	User	State	Tx Speed	WAN	Slot	Active	Term	AtState	Called	Calling
1	pebcpa	online(6)	45333	1	1	01:33:50 hours	stillActive(0)	0	1165	7035557646
2	MEFC	online(6)	48000	1	2	01:32:53 hours	stillActive(0)	0	1165	3015553994
3	decker	dead(9)	28800	1	3	00:35:25 hours	userHangup(5)	online(6)	1165	3015551693
4	spatel	dead(9)	24000	1	4	00:09:05 hours	lcpClose(9)	disconnecting(7)	1165	3015551539
5	ken	dead(9)	28800	1	5	00:19:28 hours	lcpClose(9)	disconnecting(7)	1165	3015556974
6	ted	online(6)	26400	1	6	01:17:02 hours	stillActive(0)	0	1165	3015558419
7	sue	online(6)	26400	1	7	01:15:57 hours	stillActive(0)	0	1165	3015550870
8	ted	dead(9)	26400	1	8	00:23:48 hours	lcpClose(9)	disconnecting(7)	1165	3015559015
9	karenp	dead(9)	26400	1	4	00:04:00 hours	lcpClose(9)	disconnecting(7)	1165	3015553446
10	decker	online(6)	28800	1	3	00:47:43 hours	stillActive(0)	0	1165	3015551693
11	ted	dead(9)	26400	1	4	00:01:25 hours	lcpClose(9)	disconnecting(7)	1165	3015559015
12	psc	online(6)	33600	1	4	00:37:56 hours	stillActive(0)	0	1165	3015557363
13	davidf	dead(9)	64000	1	5	00:04:12 hours	userHangup(5)	online(6)	1165	3015553108
14	davidf	dead(9)	64000	1	8	00:04:07 hours	userHangup(5)	online(6)	1165	3015553109
15	davidf	dead(9)	64000	1	5	00:03:59 hours	userHangup(5)	online(6)	1165	3015553108
16	davidf	dead(9)	64000	1	8	00:03:54 hours	userHangup(5)	online(6)	1165	3015553109
17	karenp	online(6)	26400	1	9	00:28:48 hours	stillActive(0)	0	1165	3015553446
18	davidf	dead(9)	64000	1	5	00:07:32 hours	userHangup(5)	online(6)	1165	3015553108
19	davidf	dead(9)	64000	1	8	00:07:27 hours	userHangup(5)	online(6)	1165	3015553109
20	spatel	online(6)	50666	1	5	00:07:21 hours	stillActive(0)	0	1165	3015557287
21	mikhail	online(6)	48000	1	8	00:01:44 hours	stillActive(0)	0	1165	3015553638

Figure 21. Dial Telco window

Call ID: (diactIndex)

Unique identification of this active call (for internal use).

Username (diactUsername)

The caller's username.

State (diactState)

Indicates current progress of the selected call.

- Ringing—The call has been recognized by the access server and is in the process of going off hook
- Connecting—The access server has assigned a DSP to the incoming call and is now in the process of negotiating the type of modulation (V.34, V.32, ISDN, or 56K).
- LcpNegotiate—The link is negotiating LCP parameters.
- Authenticating—The access server is in the process of verifying the user's password by using static or RADIUS authentication.
- Online—The access server has completed authentication and the user is now able to access the Internet.
- 12tpTunneled—Subsequent multilink call that was answered by another access server and tunneled to the access server that has the originating call.

- Kill—The administrator can manually disconnect the user by activating this parameter.
- Dead—The user's call has been disconnected. This message disappears when the linger time expires.
- Bury—The call has been killed and removed from the dial-in main window.

Transmit Connection Speed (diactTxSpeed)
The connected speed of the modem link (for example, 28.8 bps). These values, in bits per second, range from 300–33,600.

WAN Link (diactLinkIndex)
The T1/E1 WAN port number that the call is on.

Time Slot (diactSlotIndex)
Shows which T1/E1 channel the call is on. This is a number from 1-30.

Time Call Is/Was Active (diactSessionTime)
The amount of time the call was/is active.

Termination Reason (diactTerminateReason)
The reason a call was disconnected. For the listing of reasons, see "Termination Reason (diactTerminateReason)" on page 98.

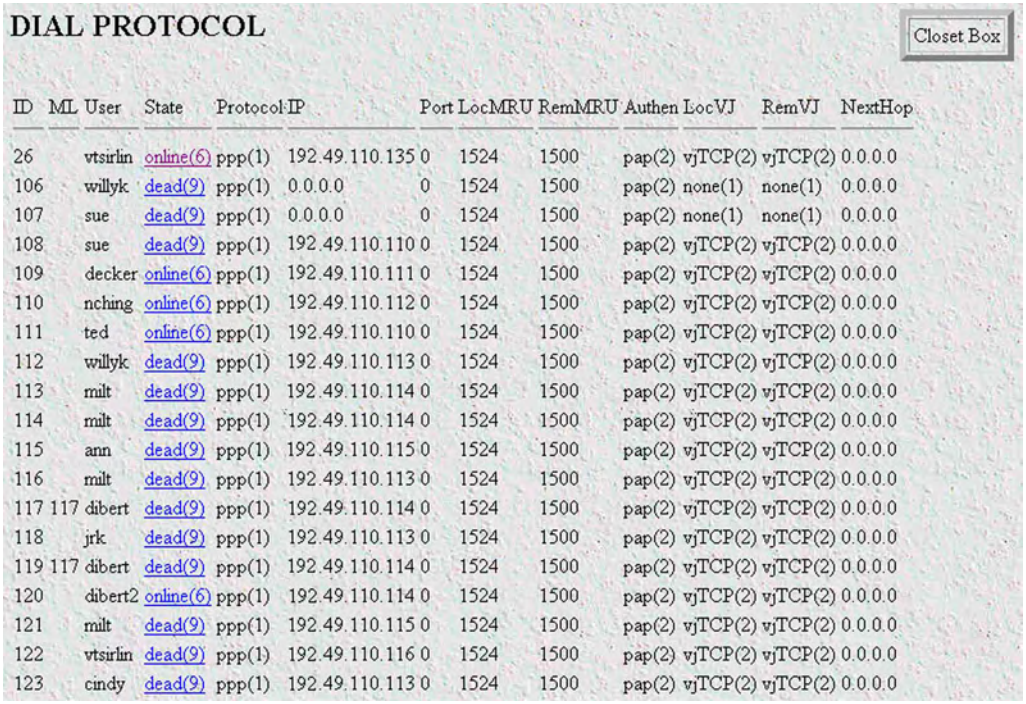
State at termination (diactTerminateState)
Indicates the value of diactState when the call was terminated. A value of 0 indicates the call is still online.

Number Called (diactNumberDialed)
The phone number that was used to dial into the access server.

Number Called From (diactCallingPhone)
The user's phone number—this is a caller ID feature.

Dial Protocol window

This window shows the protocol negotiations of the connection for individual users.



DIAL PROTOCOL

Closet Box

ID	ML	User	State	Protocol	IP	Port	LocMRU	RemMRU	Authen	LocVJ	RemVJ	NextHop
26		vtsirlin	online(6)	ppp(1)	192.49.110.135	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
106		willyk	dead(9)	ppp(1)	0.0.0.0	0	1524	1500	pap(2)	none(1)	none(1)	0.0.0.0
107		sue	dead(9)	ppp(1)	0.0.0.0	0	1524	1500	pap(2)	none(1)	none(1)	0.0.0.0
108		sue	dead(9)	ppp(1)	192.49.110.110	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
109		decker	online(6)	ppp(1)	192.49.110.111	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
110		nching	online(6)	ppp(1)	192.49.110.112	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
111		ted	online(6)	ppp(1)	192.49.110.110	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
112		willyk	dead(9)	ppp(1)	192.49.110.113	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
113		milt	dead(9)	ppp(1)	192.49.110.114	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
114		milt	dead(9)	ppp(1)	192.49.110.114	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
115		ann	dead(9)	ppp(1)	192.49.110.115	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
116		milt	dead(9)	ppp(1)	192.49.110.113	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
117	117	dibert	dead(9)	ppp(1)	192.49.110.114	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
118		jrk	dead(9)	ppp(1)	192.49.110.113	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
119	117	dibert	dead(9)	ppp(1)	192.49.110.114	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
120		dibert2	online(6)	ppp(1)	192.49.110.114	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
121		milt	dead(9)	ppp(1)	192.49.110.115	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
122		vtsirlin	dead(9)	ppp(1)	192.49.110.116	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0
123		cindy	dead(9)	ppp(1)	192.49.110.113	0	1524	1500	pap(2)	vjTCP(2)	vjTCP(2)	0.0.0.0

Figure 22. Dial Protocol window

Call ID: (diactIndex)

Unique identification of this active call (for internal use).

Shared Unique ID (diactMultiIndex)

Used for multi-link PPP, this is the unique identification shared between multi-link active calls.

Username (diactUsername)

The caller's username.

State (diactState)

Indicates current progress of the selected call.

- Ringing—The call has been recognized by the access server and is in the process of going off hook
- Connecting—The access server has assigned a DSP to the incoming call and is now in the process of negotiating the type of modulation (V.34, V.32, ISDN, or 56K).
- LcpNegotiate—The link is negotiating LCP parameters.

- Authenticating—The access server is in the process of verifying the user's password by using static or RADIUS authentication.
- Online—The access server has completed authentication and the user is now able to access the Internet.
- 12tpTunneled—Subsequent multilink call that was answered by another access server and tunneled to the access server that has the originating call.
- Kill—The administrator can manually disconnect the user by activating this parameter.
- Dead—The user's call has been disconnected. This message disappears when the linger time expires.
- Bury—The call has been killed and removed from the dial-in main window.

Protocol (diactProtocol)
Indicates the type of service or link being provided for this call.

- PPP—The user has a PPP link running.
- Slip—The user has a Slip link running
- Telnet—The user has a telnet session running
- Rlogin —The user has an rlogin session running

IP Address (diactIP)
The currently assigned IP address from the IP address pool or the RADIUS server. The remote users' PC is assigned to this address. The address appears in the IP address (0.0.0.0) format.

Port # on Remote Machine (diactPort)
The TCP port number being used by this connection. The range is from 0 to 65,535. Ports in the range of 0 to 1023 are well-known ports used to access standard services. Telnet uses port 23 and rlogin uses port 513.

Local MRU (diStatLocalMRU)
The current value of the MRU for the local PPP entity. This value is the MRU that the remote entity is using when sending packets to the local PPP entity. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105).

Remote MRU (diStatRemoteMRU)
The current value of the MRU for the remote PPP entity. This value is the MRU that the local entity is using when sending packets to the remote PPP entity. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105).

LCP Authentication (LCPAuthOptions)
Authentication type used by the dial-in user. The following options are available:

- none(1)
- pap(2)
- chap(3)

- MSChap(4)—not currently implemented
- tacacs(5)—not currently implemented
- edp(6)
- ShivaPap(7)—not currently implemented

Local-Remote VJ Protocol Comprsn (dilpLocalToRemoteCompProt)

The IP compression protocol that the local IP entity uses when sending packets to the remote IP entity. The available settings are:

- none(1)—no compression
- vjTCP(2)—compression is enabled

Remote-Local VJ Protocol Comprsn (dilpRemoteToLocalCompProt)

The IP compression protocol that the remote IP entity uses when sending packets to the local IP entity. The available settings are:

- none(1)—no compression
- vjTCP(2)—enabled

Force Next Hop(diForceNextHop)

All packets received on the dial-up link are forwarded to this gateway. A setting of *0.0.0.0* indicates that this option is not in effect.

Dial In Details

The Dial In Details window (see figure 23) shows how the system is currently set up to handle dial in users. To view this page, select Details from the main Dial In window. Scroll down the window to view additional Dial In access server parameters. To modify the Dial In access server parameters, click on the Modify… link. For more information about modifying Dial In settings, refer to "Dial In Modify window" on page 85.

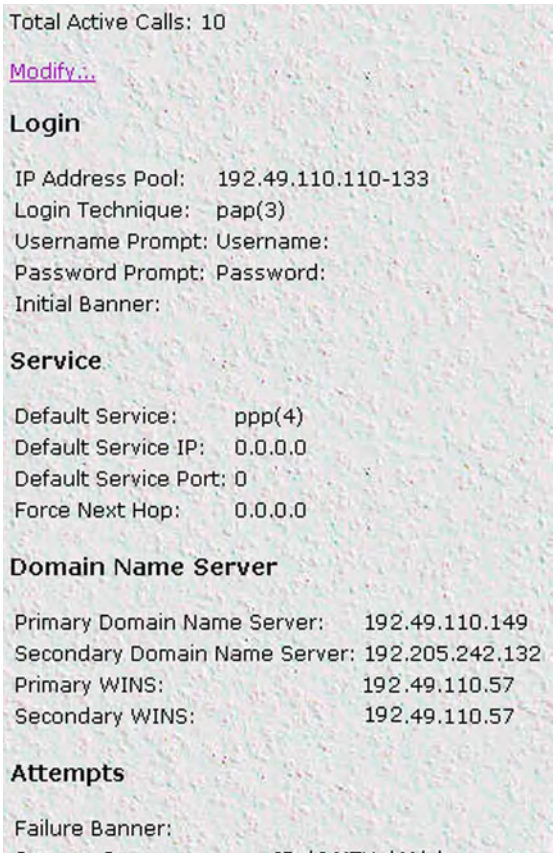


Figure 23. Dial In Details window

Dial In Modify window

The Dial In Modify window (see figure 24) is where you can make changes to the following:

- Login access server parameters (see "Modify Login")
- User login services (see "Modify Service" on page 87)
- Primary and secondary domain name servers (see "Modify Domain Name Server" on page 88)
- Dial-in attempts access server parameters (see "Modify Attempts" on page 89)
- Link compression, MRUs, MultiLink, and MultiBox access server parameters (see "Modify Configuration" on page 89)
- Time-out access server parameters for the session idle time to login and the MIB data linger time (see "Modify Maximum Time" on page 91)
- Modem configuration objects for dial in users (see "Modify Modem Configuration" on page 92)

To reach this window, select Modify from the Dial In Details window or the Dial In main window.

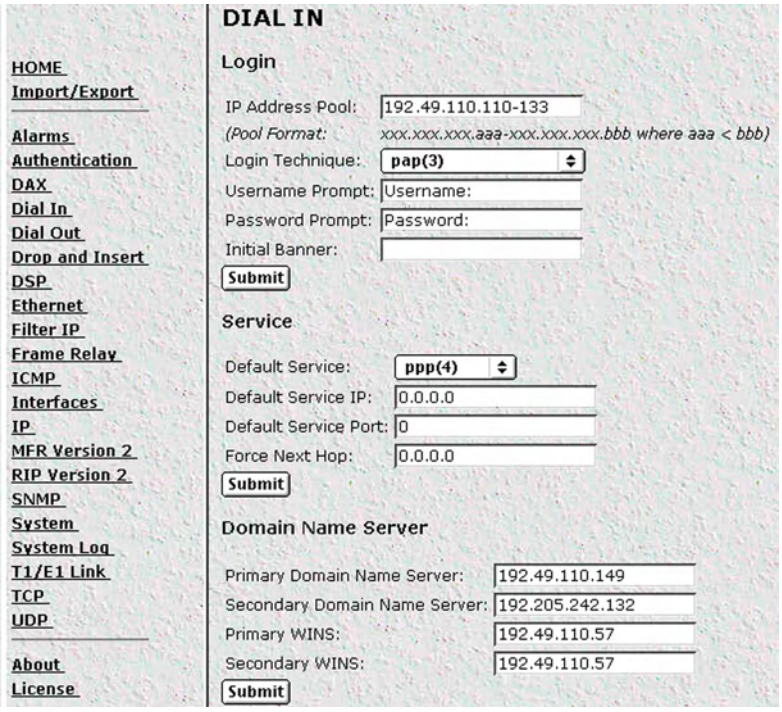


Figure 24. Dial In Modify window (modify Login, Service, and DNS objects)

Modify Login

This portion of the Dial In Modify window (see figure 24 on page 85) describes configuring the IP address pool, login technique and general login information.

IP Address Pool (diIpPool)

The IP address pool contains the IP addresses that are assigned dynamically to the dial-in connections. Type the IP address pool in the space provided. The IP addresses can be non-contiguous addresses configured as follows:

- Blocks of IP addresses are designated with a dash (-) separating the first and last host in the block (for example, *192.49.110.151-155*)
- The addresses can be from a subnet other than the local network the RAS is on
- The IP address pool can have IP addresses from multiple subnets. The subnets must be separated by a semi-colon (for example, *192.155.155.1-6; 192.155.160.41-46*)

Note The IP address pool is limited to 39 characters.

Login Technique (diLoginTechnique)

This variable defines the login sequence that a dial-up user will see. The various options are defined below:

- none(0)—no login sequence is enabled
- textORpap(1)—This setting enables clear text logins or PPP calls using PAP authentication.
- text(2)—A username prompt is displayed and a username must be entered. If the received username is a static user with no password defined, then the connection completes and no password prompt is issued. If a password is required then a password prompt is displayed and a password must be entered.

  Note Text login with ISDN is not currently implemented.

- pap(3)—This setting assumes that all calls will be PPP users. No username or password prompt will be displayed. The system will go directly to PPP processing. The dial-up user must be configured for PAP authentication.

  Note If the user trying to connect to the access server is not configured for PAP he will be disconnected.

- chap(4)—This setting assumes that all calls will be PPP users. No username or password prompt will be displayed. The system will go directly to PPP processing. The dial-up user must be configured on his computer for CHAP authentication.

  Note If the user trying to connect to the access server is not configured for CHAP he will be disconnected.

- chapORpap(5)—This setting assumes that all calls will be PPP users. No username or password prompt will be displayed. The system will go directly to PPP processing. The dial-up user must be configured for PAP or CHAP authentication. The access server will always request CHAP authentication first. Therefore, if a user can negotiate either CHAP or PAP, CHAP authentication will be performed.

- textORchapORpap(6)—This setting enables clear text logins or PPP calls using PAP or CHAP authentication.

Username Prompt (diUsernamePrompt)
This is what will be displayed when the user first connects after the Initial Banner is displayed. The string can be up to 39 characters. This should be a ASCII printable string and can include carriage returns and line feeds. This applies only for text users not PPP. (See also Initial Banner.) For example the prompt could be:

Enter your username:

Password Prompt (diPasswordPrompt)
This defines the character string that will be displayed at user authentication time to request the users password. The string can be up to 39 characters. This should be a ASCII printable string and can include carriage returns and line feeds. This applies only for text users not PPP. For example, the prompt could be:

Enter your password:

Initial Banner (diBanner)
This is usually a message welcoming the user. The message can be up to 39 characters and should be an ASCII printable string. It can include carriage returns and line feeds. The username prompt immediately follows the initial banner. This banner only appears for text login users.

Modify Service

This portion of the Dial In Modify window (see figure 24 on page 85) describes changing user login services.

Default Service (diService)
This object defines the default service that will be provided if the authentication technique does not specifically name a service type, and if no service is specified in the static user's profile under Authentication. For information about the static users database, see Chapter 5, "Authentication".

The options are:

- rlogin(1)—User will be automatically given a rlogin prompt.
- telnet(2)—User will be automatically given a telnet prompt.
- tcpraw(3)—All 8 bits are passed unchecked and unaltered.
- ppp(4)—Only a PPP connection will be allowed.
- slip(5)—SLIP or PPP connection will be allowed.
- vpn(6)—Not currently implemented.

Default IP Service (diServiceIP)
This object defines the IP address that will be used for login connections (telnet or rlogin) when the authentication technique has not provided an IP address to connect to.

Default Service Port (diServicePort)

This object defines the IP port number that will be used for login connections (telnet or rlogin) when the authentication technique has not provided a port number to connect to. If no TCP port number is provided then the following UNIX defaults will be used:

- telnet port 23
- rlogin port 513

Force Next Hop (diForceNextHop)

All packets received on the specified dial-up link will be forwarded to the specified gateway. The gateway *must* be on the same network at the remote access server. This is the default setting that will be used if the setting is not overridden by the RADIUS response for that particular user. A setting of *0.0.0.0* indicates that this option is not in effect.

The RADIUS attribute used to set the Force Next Hop is attribute 209, a Black Box vendor extension. For a full list of RADIUS attributes, see Appendix A, "Supported RADIUS Attributes".

Modify Domain Name Server

This portion of the Dial In Modify window (see figure 24 on page 85) describes modifying the primary and secondary domain name servers for IP and Microsoft Windows.

Primary Domain Name Server (diPrimaryDNS)

The primary domain name server address to pass to the caller (Win95 PPP). The first place to try to resolve host names. i.e. IP address 204.91.99.128

Secondary Domain Name Server (diSecondaryDNS)

The secondary domain name server address to pass to the caller (Win95 PPP). The next place to try to resolve the host name.

Primary WINS (diPrimaryWINS)

The primary Windows name server address to pass to the caller (Win95 PPP). The Windows Internet Naming Service (WINS).

Secondary WINS (diSecondaryWINS)

The secondary Windows name server address to pass to the caller (Win95 PPP). The Windows Internet Naming Service (WINS).

Modify Attempts

This portion of the Dial In Modify window (see figure 25) describes modifying the login attempts parameters for dial in users.

Figure 25. Dial In Modify window (modify Attempts, Configuration, and Maximum Time objects)

Failure Banner (diFailureBanner)

This defines a message of up to 254 characters in length that will be displayed to a user if authentication fails. This message only appears when the authentication technique is Text.

Login Attempts Allowed (diAllowAttempts)

The maximum number of attempts a user will be given to login before being disconnected. This applies to Text authentication only. PAP and CHAP authentication are only allowed a single attempt.

Modify Configuration

This portion of the Dial In Modify window (see figure 25 on page 89) describes modifying the link compression, MRUs, and MultiLink, and MultiBox parameters.

Link Compression (diLinkCompression)

This object enables the PPP link layer address and protocol field compression. The following options are available:

- enable(1)—PPP negotiations will perform link compression unless the other end of the link is unable to work with compression
- disable(2)—No compression will be used on the PPP link. This is the default setting

Default Max Receive Unit (diConfigInitialMRU)

This is the default setting for Maximum Receive Unit (MRU). This value can be changed by authentication or PPP.

Allow Magic Number Negotiation (diConfigMagicNumber)

Determines if magic number negotiation should be done. This access server parameter is used to check whether a link is in a looped-back state. The following options are available:

- enable(1)—The local node will attempt to perform Magic Number negotiation with the remote node.
- disable(2)—Magic Number negotiation will not be performed.

In any event, the local node will comply with any magic number negotiations attempted by the remote node, per the PPP specification. Changes to this object take effect when the link is restarted.

For more information, see Section 7.6, "Magic Number," of RFC1331.

Frame Check Sequence Size (diConfigFcsSize)

The size (in bits) of the frame check sequence (FCS) that the local node will generate when sending packets to the remote node. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105).

Compression (diIpConfigCompression)

Determines whether the local node will attempt to negotiate IP compression. The following options are available:

- none(1)—The local node will not attempt to negotiate IP compression
- vj-tcp(2)—The local node will attempt to negotiate compression mode indicated by the enumerated value

Changes to this object take effect when the link is restarted.

For more information, see Section 4.0, "Van Jacobson TCP/IP Header Compression" of RFC1332.

MultiLink (diConfigMultilink)

MultiLink enables a user to connect using multiple channels. This enables dial-up users whose equipment supports MultiLink PPP or multi-channel ISDN to use multiple channels to get higher data transfer rates.

Set the MultiLink - Max # of Calls per User parameter to the maximum number of channels a user can take for a single connection. Setting the parameter to *0* disables the MultiLink option.

MultiBox (diConfigMMP)

MultiBox enables a user to have multiple connections even if the subsequent call for an additional channel is on a different access server from the originating channel (bundlehead). MultiBox is useful when a single number called by a user accesses multiple T1/E1s and subsequently different access servers.

Setting the MultiBox - Query timeout parameter to enable(1) activates the MultiBox option. Setting the parameter to disable(0) disables the MultiBox option. If MultiBox is disabled, then acquiring an additional channel will fail if the bundlehead is not on the same access server.

Modify Maximum Time

This portion of the Dial In Modify window (see figure 25 on page 89) describes modifying the time-out values for the session idle time, time to login, and the MIB data linger time.

Maximum Session Time (min) (diSessionTimeout)

This is the maximum time (in minutes) that a connection is allowed to be maintained. After this time the connection will be terminated, even if there is active traffic on the connection. This is a default setting, and it can be overridden by the authentication settings of a specific user. Setting the parameter to *0* means the connection will never be terminated.

Maximum Idle Time (min) (diIdleTimeout)

This is the maximum time (in minutes) that a connection is allowed to be idle with no traffic. After this time, the connection will be terminated. This is a default setting, and it can be overridden by the authentication settings of a specific user.

Time to login (sec) (diLoginTimeout)

This is the maximum time (in seconds) that a user is given to log in. This only applies to the time before the user is authenticated. This setting should take into account any time delays incurred when querying a remote authentication server (such as a RADIUS).

Call History Timeout (min) (diLingerTime)

Number of minutes a MIB entry will remain in the Active table after the call it pertains to is disconnected. Up to 15 dead calls can be displayed. Setting the parameter to *0* disables the timeout feature.

Modify Modem Configuration

This portion of the Dial In Modify window (see figure 26) describes modifying modem configuration access server parameters for dial in users.

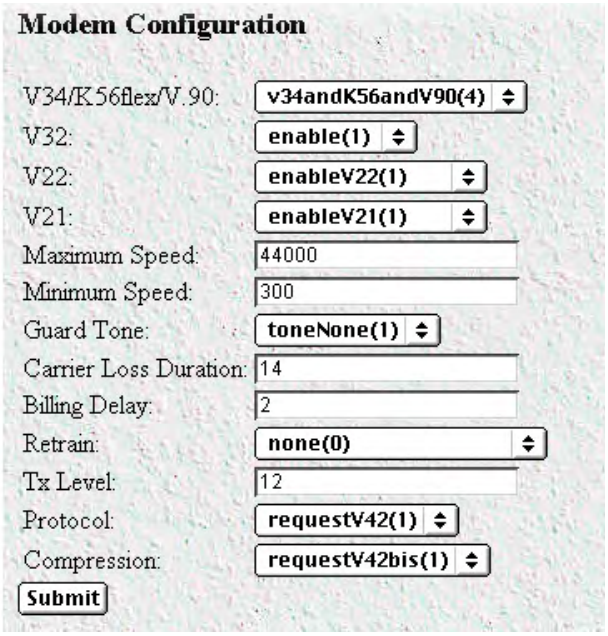


Figure 26. Dial In Modify window (modify Modem Configuration objects)

V34 (diModemV34Enable)

Allow V.34, K56 Flex, and V.90 options up to 56 kbps. The following options are available:

- disable(0)—None of the options are enabled
- v34Only(1)—Support V.34 operation only
- v34andK56(2)—Support V.34 and K56 Flex operation only
- v34andV90(3)—Support V.34 and V.90 operation only
- v34 and k56 and v90(4)—Support V.34, K56 Flex, and V.90 operation

V32 (diModemV32Enable)

Allow V.32 and V.32bis modulations up to 14.4 kbps. The following options are available:

- disable(0)—Neither option is enabled
- enable(1)—Support V.32 and V.32bis modulations

V22 (diModemV22Enable)

Allow V.22 or Bell 212 modulations. The following options are available:

- disable(0)—Neither option is enabled
- enableV22(1)—Enable V.22 modulation

- enableBell212(2)—Enable Bell 212 modulation

V21(diModemV21Enable)
Allow V.21 or Bell 103 modulations. The following options are available:

- disable(0)—Neither option is enabled
- enableV21(1)—Enable V.21 modulation
- enableBell103(2)—Enable Bell 103 modulation

MaxSpeed (diModemMaxSpeed)
This variable assigns the fastest data rate that will be negotiated. The range is 300–64000.

MinSpeed (diModemMinSpeed)
This variable assigns the slowest data rate that will be negotiated. The range is 300–33600.

> **Note** Increasing this number may prevent users with slower modems from successfully connecting.

Guard Tone (diModemGuardTone)
Normally a guard tone is not required, but one can be inserted. This setting works for Phase Shift Key (PSK) modulations only, not for V.32 or V.34.

- tone None(1)—Guard tone is not used
- tone1800(3)—Guard tone is enabled

CarrierLossDuration (diModemCarrierLossDuration)
The number of seconds that the carrier signal must be missing before the connection is considered lost. Choosing a setting of 25 indicates forever. The range is 1 to 25.

Billing Delay (diBillingDelay)
The number of seconds after answering the call during which the modem should remain silent.

Retrain (diModemRetrain)
Enables the modem to monitor line quality and request a fallback or retrain for poor quality and a fall forward for good quality.

- none (0)—Do not allow modem to retrain, fallback, or fall forward.
- retrain(1)—Allow the modem to retrain if the line quality is poor.
- FallForwardFallBack(2)—Allow the modem to fallback to a slower speed if the line quality is poor, or fall forward to a faster speed if the line quality is good.

TxLevel (diModemTxLevel) - Not Currently in Use
This variable should be set with caution; and normally only after talking to a factory representative. This sets the transmit level power level of the modem. The scale is 12 (-12 dB) to 20 (-20 dB) in 1 db increments.

Note Larger numbers mean less transmit power is being output (in other words, a setting of 20 will result in less power than a setting of 12).

Protocol (diModemProtocol)

Assigns the error correction protocol to use with the modem. The following options are available:

- Direct(0)—No error correction will be used.
- requestV42(1)—Enables V.42 error correction. If this is selected, the modem will either negotiate for V.42 error correction or—if V.42 correction is not available—will use no error correction.
- requireV42(2)—V.42 error correction is mandatory, otherwise disconnect.

Compression (diModemCompression)

Assigns the data compression protocol to use with the modem. This setting is in effect only when V.42bis error correction (see "Protocol (diModemProtocol)") is active.

- Direct(0)—No compression will be used.
- requestV42bis(1)—Enable V.42bis compression. If this is selected, the modem will either negotiate for V.42bis data compression or—if V.42bis compression is not available—will use no data compression.
- requireV42bis(2)—V.42bis data compression is mandatory, otherwise disconnect.

Dial In User Statistics window

This window shows statistics for individual dial-in users. The headings DSP Link, Interface Link, and WAN Link, shown in figure 27, pertain to the unique time slot defined for each of these links. For specific details on the function of access server parameters defined under these sections, refer to each under the access server Configuration Menu.

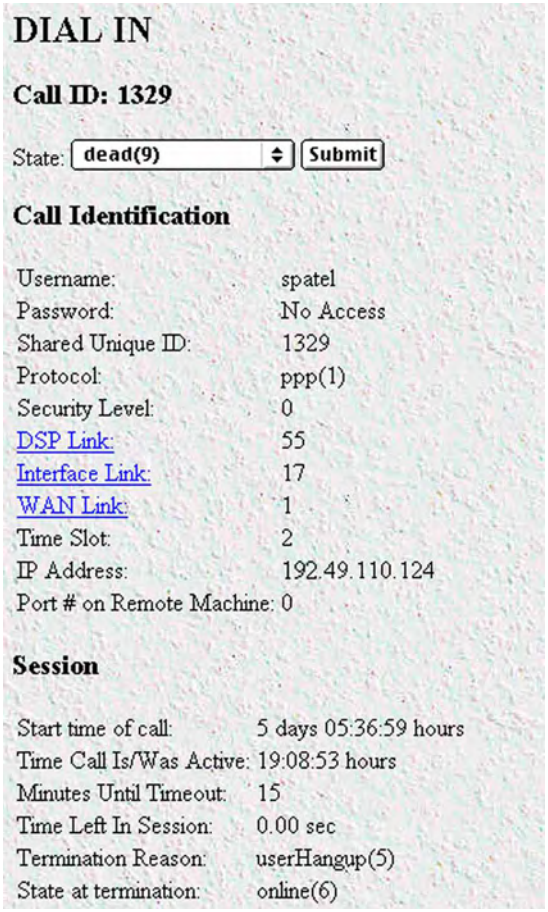


Figure 27. User Statistics (Call Identification, Session)

The Dial In User Statistics window (see figure 24) is where you can view the following:

- Call Identification information (see "Call Identification" on page 96)
- Session information (see "Session" on page 97)
- PPP statistics (see "PPP Statistics" on page 101)
- IP statistics (see "IP" on page 105)
- Phone information (see "Phone" on page 106)
- Data transfer statistics (see "Data" on page 107)
- Physical layer configuration information (see "Physical Layer" on page 107)

To view individual user statistics, select an active user in the State column on the Dial In main window (see "Dial In main window" on page 74). For example, if you wanted to modify user jill, you would click on the online(6) link next to jill's username.

Call Identification

This portion of the Dial In User Statistics window (see figure 27 on page 95) shows user information for a unique user ID.

Call ID: (diactIndex)

Unique identification of this active call (for internal use).

State (diactState)

Indicates current progress of the selected call.

- Ringing—The call has been recognized by the access server and is in the process of going off hook
- Connecting—The access server has assigned a DSP to the incoming call and is now in the process of negotiating the type of modulation (V.34, V.32, ISDN, or 56K).
- LcpNegotiate—The link is negotiating LCP parameters.
- Authenticating—The access server is in the process of verifying the user's password by using static or RADIUS authentication.
- Online—The access server has completed authentication and the user is now able to access the Internet.
- 12tpTunneled—Subsequent multilink call that was answered by another access server and tunneled to the access server that has the originating call.
- Kill—The administrator can manually disconnect the user by activating this parameter.
- Dead—The user's call has been disconnected. This message disappears when the linger time expires.
- Bury—The call has been killed and removed from the dial-in main window.

Username (diactUsername)

The caller's username.

Password (diactPassword)

The caller's password.

Shared Unique ID (diactMultiIndex)

Used for multi-link PPP, this is the unique identification shared between multi-link active calls.

Protocol (diactProtocol)

Indicates the type of service or link being provided for this call.

- PPP—The user has a PPP link running.
- Slip—The user has a Slip link running
- Telnet—The user has a telnet session running

- Rlogin —The user has an rlogin session running

Security Level (diactAccessLevel)
This is the security level assigned to the selected call. Passthru is the default security level. Monitor and Change security levels are used by the access server administrator.

- Passthru(1)—Allows no access to the configuration screens.
- Monitor(2)—Allows read-only access to the configuration screens.
- Admin(4)—Allows full read and write access to the configuration screens.
- None(0)—Validation failed.

DSP Link (diactDSPIndex)
The physical DSP chip that the user's call is on. This is a number from 0 to 59.

Interface Link (diactIFIndex)
Virtual interface in the PPP multiplexer inside the access server that accepts packets from the Ethernet port for the connected dial-in user.

WAN Link (diactLinkIndex)
The T1/E1 WAN port number that the call is on.

Time Slot (diactSlotIndex)
Shows which T1/E1 channel the call is on. This is a number from 1-30.

IP Address (diactIP)
The currently assigned IP address from the IP address pool or the RADIUS server. The remote users' PC is assigned to this address. The address appears in the IP address (0.0.0.0) format.

Port # on Remote Machine (diactPort)
The TCP port number being used by this connection. The range is from 0 to 65,535. Ports in the range of 0 to 1023 are well-known ports used to access standard services. Telnet uses port 23 and rlogin uses port 513.

Session

This portion of the Dial In User Statistics window (see figure 27 on page 95) shows session information for a unique user ID.

Start time of call (diactSessionStartTime)
The amount of time the access server had been up when the call was initiated.

Time Call Is/Was Active (diactSessionTime)
The amount of time the call was/is active.

Minutes Until Timeout (diactRemainingIdle)
Number of minutes remaining until idle timeout.

Time Left In Session (diactRemainingSession)
Number of seconds remaining in this session. This value is only displayed if session timeout has been activated.

Termination Reason (diactTerminateReason)
The reason a call was disconnected.

- stillActive(0)—Call is currently connected
- idleTimeout(2)—Call exceeded idle timeout parameter
- killed(3)—Call terminated by administrator
- userHangup (5)—DSP discovered remote modem was hung up abruptly. Examples could be that the phone line was pulled out of the wall jack or the user terminated the communications without closing the connection down. If the modems are unable to bring up the physical line by successfully negotiating the modulation, userHangup will be registered if the remote modem gave up trying to complete the call.
- modemCanNotConnect(6)—The modems are not able to bring up the physical line by successfully negotiating the modulation. The remote access server has given up trying further to complete the physical connection.
- pppClose(8)—This termination reason will be given after PPP is initiated and the connection is disconnected. An example would be if LCP negotiations failed. Another cause could be if the bundlehead in a multilink call is terminated before the tunneled call is termination.
- lcpClose(9)—Close initiated by LCP. normal shutdown of call
- loginTimeOut(10)—Exceeded login timeout parameter
- userTerminated(11)—A problem is discovered initiating the dial-in users telnet, rlogin or tcpclear session.
- maxNumCalls(21)—Exceeds maximum number of channels that can be allocated to the same call.
- notPapReq(24)—The access server is waiting for a PAP request packet containing the username/password for a call but the packet received was not a PAP request packet.
- noIpPoolAddr(30)—Authentication server did not assign an IP address and access had no IP address pool defined to assign an IP address
- noIpAddr(31)—Authenticator did not return an IP address for the service (e.g. telnet or rlogin) and the default service defined does not specify the service IP address
- maxLoginAttempts(32)—Exceeded maximum login attempts as defined under the Dial-in link.
- invalidDefaults(44)—Default service is set to a value other than rlogin, telnet, tcpraw, ppp, slip or vpn when using a login technique of None. No IP address is defined when using rlogin or telnet. Invalid telnet or rlogin services ports have been defined in the default service.
- noDspAvailable(45)—When the remote access server attempted to connect the incoming call to an available DSP, no DSP could be found. Some examples why a DSP could not be found are:
  - DSPs are no longer available to the resource pool because they are in reboot or hardware failure states.
  - DSPs are in an unavailable administrative state although they are functional.
  - The DSP resource pool is split between link A and link B and a call has been routed to a link over and above the number of DSPs allocated to that link.

- papAuthenticationFailure(49)—Invalid username/password combination
- papInvalidPacket(50)—Non-printable characters in username or password received from remote end during authentication
- authenServerTimeout(51)—Authentication request timed out. The RADIUS server did not send a response to the authentication request before the timer expired.
- authenAccountingTimeout(52)—Accounting request timed out. The RADIUS server did not send a response to the accounting request before the timer expired.
- unknownProtocol(53)—The user initiates a PPP connection but the RADIUS replies to the remote access server that the user is not allowed to connect using PPP.
- mfr2DisWaitCalled(54)—Call disconnected while we were waiting for the next expected called number digit. The number of called number digits expected is more than the digits actually being sent or the Last response code is configured incorrectly so the remote access server and switch can not continue on with the interregister signalling.
- mfr2DisAckCalled(55)—Call disconnected while we were in the process of sending back the ack tone for a called number digit or while we were waiting for the termination of the far end tone in response to our ack.
- mfr2DisAckLastCalled(56)—Call disconnected while we were in the process of sending back the ack tone for the last expected called digit or while we were waiting for the termination of the far end tone in response to our ack.
- mfr2DisWaitCalling(57)—Call disconnected while we were waiting for the next expected calling number digit. The number of calling number digits expected is more than the digits actually being sent or the Last response code is configured incorrectly so the remote access server and switch can not continue on with the interregister signalling.
- mfr2DisAckCalling(58)—Call disconnected while we were in the process of sending back the ack tone for a calling number digit or while we were waiting for the termination of the far end tone in response to our ack.
- mfr2DisAckLastCalling(59)—Call disconnected while we were in the process of sending back the ack tone for the last expected calling digit or while we were waiting for the termination of the far end tone in response to our ack.
- mfr2DisWhileComplete(60)—Call disconnected after the last expected digit was sent and acked. The number of calling digits expected may be less than the number of digits sent or the last response code for the calling number is incorrect.
- exceedsMultiLinkLimit(64)—Exceeds multilink channel limit set either on the remote access server or in the user entry on the RADIUS server
- sessionTimeout(66)—The length of the connection exceeds the session time limit allowed
- l2tpCallDisconnected—l2tp tunnel disconnected. The tunnel will be disconnected at the normal termination of the call.

The following error messages are as a result of problems with connecting to the IP address/port specified for the connection:

- tcpSideClosure(61)
- telnetError(62)

- rloginError(63)
- tcpConnAborted(67)—Connection to the remote service has been disconnected abruptly. For example, the administrator of the remote machine killed the process.
- tcpConnRefused(69)—Connection to specified service on the remote machine was refused
- tcpConnReset(70)—Connection was reset
- tcpTimedOut(71)—Request to initiate connection to the remote service timed out. Connection timed out because the remote side did not respond on the connection in a timely manner.

The following are internal access server errors. Please contact technical support if you see these termination reasons:

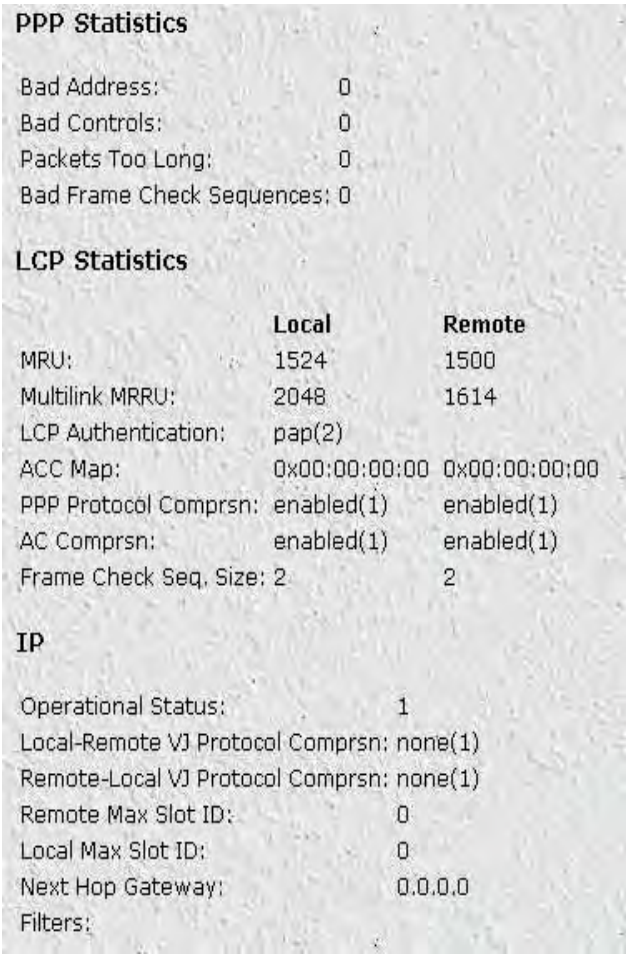
- noPoll(12)
- ipcPutMsdErr(13)
- pollErr(15)
- ioctlErr(16)
- pppPutMsgErr(17)
- dspIoctlErr(18)
- timerErr(19)
- pppOpenErr(22)
- ipLinkErr(23)
- pppLinkErr(25)
- tcpOpenErr(26)
- tcpPushErr(27)
- tcpPutMsgErr(28)
- invalidPrim(29)
- noTimers(33)
- tcpLinkErr(34)
- dspLinkErr(35)
- dspPutMsgErr(36)
- noDsp(37)
- lisIpcErr(38)
- dspOpenErr(39)
- invalidCode(40)
- callContention(41)
- dspCommErr(42)

- unknownBearerContent(43)
- dspOutOfState(46)
- dspRequestUnsupported(47)
- dspBadPrimitive(48)
- tcpNoBuffers(68)
- udpOpenErr(75)
- udpBindErr(76)
- l2tpOpenErr(77)
- l2tpLinkErr(78)
- reLinkErr(79)

State at termination (diactTerminateState)
Indicates the value of diactState when the call was terminated. A value of 0 indicates the call is still online.

PPP Statistics

This portion of the Dial In User Statistics window (see figure 28) shows PPP statistics (as 32-bit variables) of the current user selected.



PPP Statistics

Bad Address:	0
Bad Controls:	0
Packets Too Long:	0
Bad Frame Check Sequences:	0

LCP Statistics

	Local	Remote
MRU:	1524	1500
Multilink MRRU:	2048	1614
LCP Authentication:	pap(2)	
ACC Map:	0x00:00:00:00	0x00:00:00:00
PPP Protocol Comprsn:	enabled(1)	enabled(1)
AC Comprsn:	enabled(1)	enabled(1)
Frame Check Seq. Size:	2	2

IP

Operational Status:	1
Local-Remote VJ Protocol Comprsn:	none(1)
Remote-Local VJ Protocol Comprsn:	none(1)
Remote Max Slot ID:	0
Local Max Slot ID:	0
Next Hop Gateway:	0.0.0.0
Filters:	

Figure 28. User Statistics (PPP Statistics, LCP Statistics, IP)

Bad Address (diStatBadAddresses)
The number of packets received with an incorrect address field.

Bad Controls (diStatBadControls)
The number of packets received on this link with an incorrect control field.

Packets Too Long (diStatPacketTooLongs)
The number of received packets that have been discarded because their length exceeded the maximum receive unit (MRU).

Note Packets that exceed the MRU but are successfully received and processed anyway are *not* included in this count.

Bad Frame Check Sequences (diStatBadFCSs)
The number of packets received on this link with an incorrect control field.

LCP Statistics

This portion of the Dial In User Statistics window (see figure 28 on page 102) shows LCP statistics of the current user selected.

Local MRU (diStatLocalMRU)

The current value of the MRU for the local PPP entity. This value is the MRU that the remote entity is using when sending packets to the local PPP entity. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105).

Remote MRU (diStatRemoteMRU)

The current value of the MRU for the remote PPP entity. This value is the MRU that the local entity is using when sending packets to the remote PPP entity. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105).

Local Multilink MRRU (diStatLcpLocalMRRU)

Multilink maximum receive reconstruction unit for the local device.

Remote Multilink MRRU (diStatLcpRemoteMRRU)

Multilink maximum receive reconstruction unit for the remote device.

LCP Authentication (LCPAuthOptions)

Authentication type used by the dial-in user. The following options are available:

- none(1)
- pap(2)
- chap(3)
- MSChap(4)—not currently implemented
- tacacs(5)—not currently implemented
- edp(6)
- ShivaPap(7)—not currently implemented

ACC Map (diStatLocalToPeerACCMap)

The current value of the ACC Map used for sending packets from the local modem to the remote modem. The local modem sends this character map to the remote peer modem to ensure that the data being transferred is interpreted correctly. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105).

Peer-Local ACC Map (diStatPeerToLocalACCMap)

The current value of the ACC Map used by the remote peer modem when transmitting packets to the local modem. The local modem sends this character map to the remote peer modem to ensure that the data being transferred is interpreted correctly. The remote peer modem combines its ACC Map with the map received

from the local modem. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105).

Local-Remote PPP Protocol Comprsn (diStatLocalToRemoteProtComp)

Indicates whether the local PPP entity will use protocol compression when transmitting packets to the remote PPP entity. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105). These are the available options:

- disabled(0)—PPP compression is disabled
- enabled(1)—PPP compression is enabled

Remote-Local PPP Protocol Comprsn (diStatRemoteToLocalProtComp)

Indicates whether the remote PPP entity will use protocol compression when transmitting packets to the local PPP entity. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105). These are the available options:

- disabled(0)—PPP compression is disabled
- enabled(1)—PPP compression is enabled

Local-Remote AC Comprsn (diStatLocalToRemoteACComp)

Indicates whether the local PPP entity will use address and control compression (ACC) when transmitting packets to the remote PPP entity. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105). These are the available options:

- disabled(0)—ACC is disabled
- enabled(1)—ACC is enabled

Remote-Local AC Comprsn (diStatRemoteToLocalACComp)

Indicates whether the remote PPP entity will use address and control compression (ACC) when transmitting packets to the local PPP entity. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105). These are the available options:

- disabled(0)—ACC is disabled
- enabled(1)—ACC is enabled

Transmit Frame Check Seq. Size (diStatTransmitFcsSize)

The size of the Frame Check Sequence (FCS) in bits that the local node will generate when sending packets to the remote node. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105). The values are from 0 to 128.

Receive Frame Check Seq. Size (diStatReceiveFcsSize)
The size (in bits) of the frame check sequence (FCS) that the remote node will generate when sending packets to the local node. This setting becomes active when the link is in the *up*—able to pass packets—operational state (for more information, refer to "Operational Status (diIpOperStatus)" on page 105). The values are from 0 to 128.

IP

This portion of the Dial In User Statistics window (see figure 28 on page 102) shows operational status and the type of IP compression used.

Operational Status (diIpOperStatus)
The current operational state of the interface. These are the available options:

- up(1)—able to pass packets
- down(2)—unable to pass packets
- testing(3)—in test mode and unable to pass packets

Local-Remote VJ Protocol Comprsn (diIpLocalToRemoteCompProt)
The IP compression protocol that the local IP entity uses when sending packets to the remote IP entity. The available settings are:

- none(1)—no compression
- vjTCP(2)—compression is enabled

Remote-Local VJ Protocol Comprsn (diIpRemoteToLocalCompProt)
The IP compression protocol that the remote IP entity uses when sending packets to the local IP entity. The available settings are:

- none(1)—no compression
- vjTCP(2)—enabled

Remote Max Slot ID (diIpRemoteMaxSlotId)
The Max-Slot-Id access server parameter that the remote node has announced and that is in use on the link. If vjTCP header compression is not in use on the link, the value of this object will be 0. The range is from 0 to 255.

Local Max Slot ID (diIpLocalMaxSlotId)
The Max-Slot-Id access server parameter that the local node has announced and that is in use on the link. If vjTCP header compression is not in use on the link, the value of this object will be 0. The range is from 0 to 255.

Force Next Hop(diForceNextHop)
All packets received on the dial-up link are forwarded to this gateway. A setting of *0.0.0.0* indicates that this option is not in effect.

Filters (diStatIpFilterAtoJ)
The filters applied to the user's connection.

Phone

This portion of the Dial In User Statistics window (see figure 29) shows the phone numbers that were used by this caller.

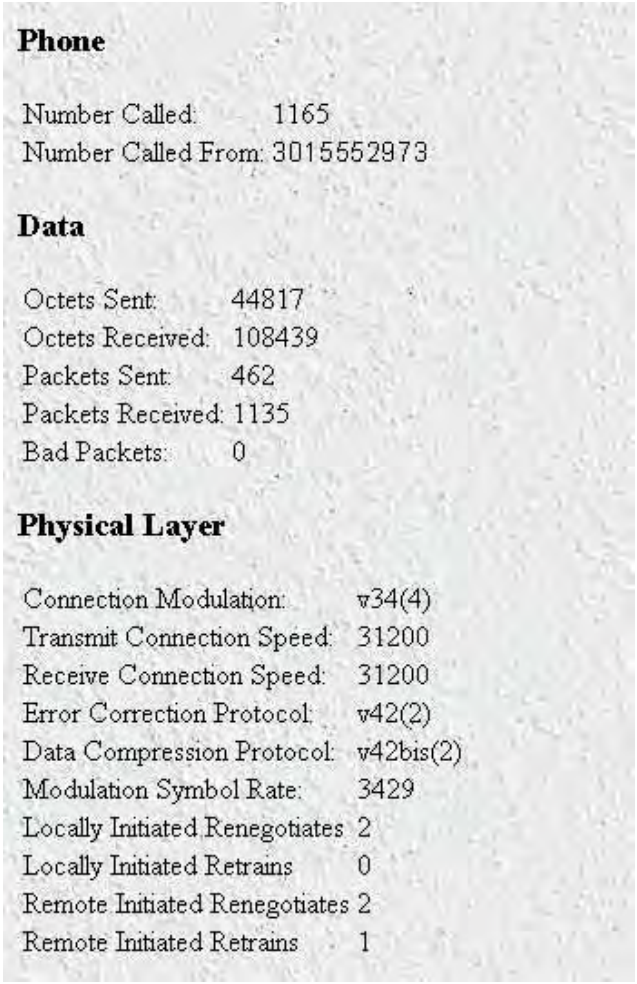


Figure 29. User Statistics (Phone, Data, Physical Layer)

Number Called (diactNumberDialed)

The phone number that was used to dial into the access server.

Number Called From (diactCallingPhone)

The user's phone number—this is a caller ID feature.

Data

This portion of the Dial In User Statistics window (see figure 29 on page 106) describes the amount of PPP data sent and received by this user.

Octets Sent (diactSentOctets)
The number of octets (bytes) sent during this call.

Octets Received (diActReceivedOctets)
The number of octets (bytes) received during this call.

Packets Sent (diactSentDataFrames)
The number of packets sent to the user during this call. Version 6 nomenclature for a packet is Ipv6 header plus payload.

Packets Received (diactReceivedDataFrames)
The number of packets received by the user during this call. Version 6 nomenclature for a packet is Ipv6 header plus payload.

Bad Packets (diactErrorFrames)
Number of bad received packets received during this call. Bad packets are those that failed CRC error checks.

Physical Layer

This portion of the Dial In User Statistics window (see figure 29 on page 106) contains statistics about the modem connection. It includes modulation, levels, and other modem-related statistics that are helpful when troubleshooting modem problems. This section covers only modem-type statistics, not ISDN connections.

Connection Modulation (diactModulation)
The modulation type of the modem link (for example, V.34). The modem link can have these modulation or data types:

- unknown(0)
- v21(1)—V.21 modulation
- v22(2)—V.22 modulation
- v32(3)—V.32 modulation
- v34(4)—V.34 modulation
- k56(5)—K56 Flex modulation
- x2(6)—X.2 modulation
- v90(7)—V.90 modulation
- v110(8)—V.110 modulation (not currently implemented)
- isdn64(9)—ISDN 64 modulation
- isdn56(10)—ISDN 56 modulation (not currently implemented)
- 12tp(11)—12tp tunnelled multilink call

- phase2(20)—Phase 2, an advanced state of modulation in v34 and higher
- answerack(21)—acknowledgement phase of modulation

Transmit Connection Speed (diactTxSpeed)
The connected speed of the modem link (for example, 28.8 bps). These values, in bits per second, range from 300–33,600.

Receive Connection Speed (diactRxSpeed)
The connected speed of the modem link (for example, 28.8 bps). These values, in bits per second, range from 300–53,000.

Error Correction (diactErrorCorrection)
The modem error correction scheme used during this call.

- None—No error correction on the call.
- V42—Error correction mode
- V120—Mode for ISDN B

Data Compression Protocol (diactCompression)
The modem data compression technique used during this call.

- None—No compression.
- V42bis—Compression is running.
- Stac—Not currently implemented.

Modulation Symbol Rate (diactSymbolRate)
The modulation symbol rate during the call. This is used only when in V.34 and above modulations.

Locally Initiated Renegotiates (diactLocalRenegotiates)
The number of times the local modem has initiated a modem speed renegotiate.

Locally Initiated Retrains (diactLocalRetrains)
The number of times the local modem has initiated a modem carrier retrain.

Remote Initiated Renegotiates (diactRemoteRenegotiates)
The number of times the remote modem has initiated a modem speed renegotiate.

Remote Initiated Retrains (diactRemoteRetrains)
The number of times the remote modem has initiated a modem carrier retrain.

Chapter 8 Dial Out

Chapter contents

Introduction

This Dial Out main window (see figure 30) is where you can change items that are associated with making dial out connections from the access server to remote locations—including login, maximum time, session, physical layer, and outgoing modem configuration information.

Click on Dial Out under the Configuration Menu to display the Dial Out main window.

The Dial Out window contains the following items:

- Statistics for individual users (for example, user test, as shown in figure 30). For more information about the statistics displayed on the Dial In main window, refer to "Dial Out Main Window" below.

  To view or modify individual user settings, select an active user in the State column (for example, if you wanted to modify user test, you would click on the online(3) link next to test's username. For more information about modifying individual user settings, refer to "Dial Out User Statistics window" on page 120.

- Details link—clicking on the Details… link takes you to the page where you can view current dial out parameters. For more information about the Details page, refer to "Dial Out Details window" on page 114.

- Modify link—clicking on the Modify… link takes you to the page where you can make global changes to items that are associated with dial-out operations—including modifying login settings, attempts, maximum time, modem configuration settings. For more information about the Modify page, refer to "Dial Out Modify window" on page 115.

Figure 30. Dial Out main window

Dial Out Main Window

The Dial Out window displays statistics for individual users. The following sections explain the meaning of each statistics.

Total Active Calls (doActive)

The total number of active calls.

User (doactUsername)

The username that the caller entered.

State (doactState)

Indicates current call progress as follows:

- authenticating(0)—User connection to dial-out port is in the authentication process
- commandmode(1)—Dial-out user is connected to access server, but has no active outbound call
- connecting(2)—Dial-out user is connecting to remote site
- online(3)—Dial-out user is connected to remote site
- dead(4)—Dial-out user has disconnected from remote access server
- kill(5)—Kills dial-out user's connection to access server

Session Time (doactSessionTime)

The amount of time the call session has been active.

Disconnect Reason (doactTerminateReason)

The reason a call was disconnected, listed as follows.

- stillActive(0)—call is currently connected.
- idleTimeout(2)—call exceeded idle timeout parameter.
- killed(3)—call terminated by administrator.
- userHangup (5)—DSP discovered remote modem was hung up abruptly. Examples could be that the phone line was pulled out of the wall jack or the user terminated the communications without closing the connection down. If the modems are unable to bring up the physical line by successfully negotiating the modulation, userHangup will be registered if the remote modem gave up trying to complete the call.
- modemCanNotConnect(6)—The modems are not able to bring up the physical line by successfully negotiating the modulation. The access server has stopped trying to complete the physical connection.
- ModemError(7)—Not able to activate the modem. NO CARRIER shown to user.
- loginTimeOut(10)—Exceeded login timeout parameter.
- userTerminated(11)—A problem is discovered initiating the dial-out users telnet, rlogin or tcpclear session.
- maxLoginAttempts(32)—Exceeded maximum login attempts as defined under the Dial-out link.
- sessionTimeout(66)—The length of the connection exceeds the session time limit allowed

The following are internal access server errors. Please contact technical support if you see these termination reasons:

- noPoll(12)
- pollErr(15)
- ioctlErr(16)
- dspIoctlErr(18)
- timerErr(19)
- tcpOpenErr(26)

- tcpPushErr(27)
- tcpPutMsgErr(28)
- invalidPrim(29)
- noTimers(33)
- tcpLinkErr(34)
- dspLinkErr(35)
- dspPutMsgErr(36)
- lisIpcErr(38)
- dspOpenErr(39)
- invalidCode(40)
- dspCommErr(42)
- unknownBearerContent(43)

Dial Out Details window

The Dial Out Details window (see figure 31) shows the active Dial Out configuration of the access server. Scroll down the window to view additional Dial Out access server parameters.You can modify Dial Out parameters by clicking on the Modify… link (see figure 31). For more information about modifying Dial Out settings, refer to "Dial Out Modify window" on page 115.

Figure 31. Dial Out Details window

Dial Out Modify window

The Dial Out Modify window (see figure 32) is where you can make changes to the following:

- Login settings (see "Modify Login")
- Maximum number of login attempts and the authentication failure banner (see "Modify Attempts" on page 116)
- Maximum session time, idle time, time to login, and call history timeout (see "Modify Maximum Time" on page 117)
- Outgoing modem configuration parameters "Modify Modem Configuration" on page 118)

To reach this window, select Modify from the Dial Out Details window or in the Dial Out main window.

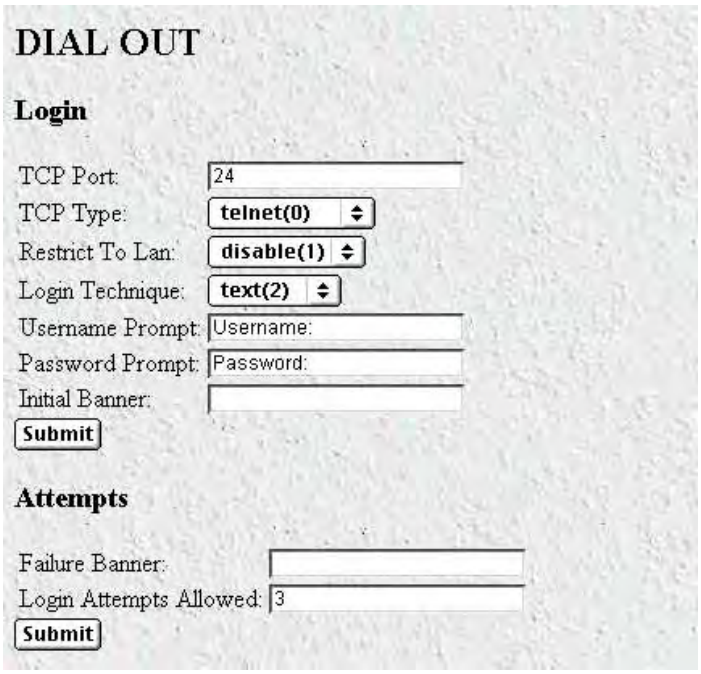


Figure 32. Dial Out Modify window (Login, Attempts)

Modify Login

Use this section to configure the outgoing TCP port and general login information.

TCP Port (doTcpPort)

The TCP port number that the dialout operation will listen to for connections.

TCP Type (doServiceType)

TCP Service Type that will be placed on the TCP connection when established.

- telnet(0)—Telnet protocol.
- tcpclear(1)—All 8 bits are passed unchecked and unaltered.

Restrict to Lan (doRestrictToLan)
Enabling the restriction to LAN will stop dialout attempts from originating at any port other than the LAN port. The options are defined below:

- disable(1)
- enable(2)

Login Technique (doLoginTechnique)
This variable defines the login sequence that a dial-up user will see. The options are defined below:

- none(1)—Simply connecting to the TCP pipe enables dialout.
- text(2)—A valid username must be entered. If the username is a static user with no password defined, the connection will complete without requesting a password. Otherwise, a valid password must be entered.

Username Prompt (doUsernamePrompt)
This prompt for a username is displayed at user authentication time. A valid username should consist of ASCII characters and can include carriage returns and line feeds. For example, the prompt could be:

Enter your username:

Password Prompt (doPasswordPrompt)
This prompt for a password is displayed at user authentication time. A valid password should consist of ASCII characters and can include carriage returns and line feeds. For example, the prompt could be:

Enter your password:

Initial Banner (doBanner)
This is usually a message welcoming the user. The message should consist of ASCII and can include carriage returns and line feeds.

Modify Attempts

This portion of the Dial Out Modify window (see figure 32 on page 115) describes configuring the maximum number of login attempts and the authentication failure banner.

Failure Banner (doFailureBanner)
This defines a message that will be displayed to a user if authentication fails. This message only appears when the authentication technique is Text.

Login Attempts Allowed (doAllowAttempts)
The maximum number of attempts a user will be given to login before being disconnected. This applies to Text authentications only.

Modify Maximum Time

This portion of the Dial Out Modify window (see figure 33) describes configuring the maximum session time, idle time, time to login, and call history timeout settings.

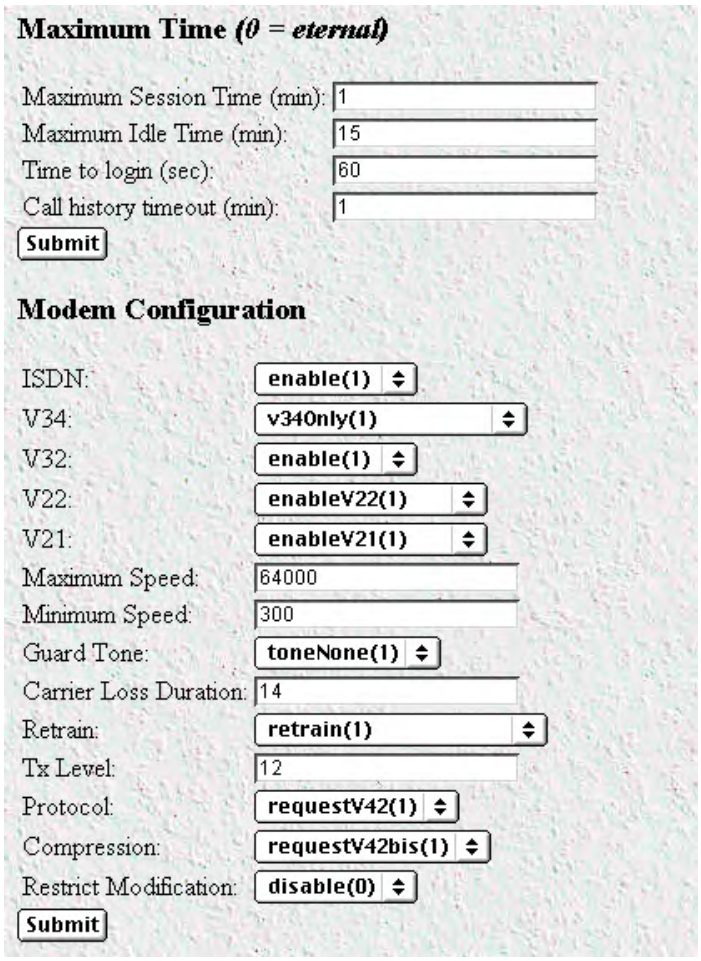


Figure 33. Dial Out Modify window (Maximum Time, Modem Configuration)

Maximum Session Time (doSessionTimeout)

This is the maximum time (in minutes) that a connection is allowed to be maintained. After this time the connection will be terminated, even if there is active traffic on the connection. This is a default setting which can be overridden by the authentication of a specific user.

Maximum Idle Time (doIdleTimeout)

This is the maximum time (in minutes) that a connection is allowed to be idle with no traffic. After this time, the connection will be terminated. This is a default setting that can be overridden by the authentication of a specific user.

Time to Login (sec) (doLoginTimeout)
This is the maximum time (in seconds) that a user is given to log in. This only applies to the time before the user is authenticated. This setting should take into account any time delays incurred when querying a remote authentication server (such as a RADIUS).

Call History Timeout (min) (doLingerTime)
Number of minutes a MIB entry remains in the Active table after the call it pertains to is disconnected. This setting is the amount of time dead calls remain on the dial out page.

Modify Modem Configuration

This portion of the Dial Out Modify window (see figure 33 on page 117) describes modifying the outgoing modem configuration.

ISDN (doModemISDNEnable)
Enables ISDN modulation. Not currently implemented.

V34 (doModemV34Enable)
Allow V.34 and V.34 annex 12 K56 and V.90 modulations. The following options are available:

- disable(0)—V.34 and V.34 annex 12 modulations are disabled
- V34only(1)
- V34andK56(2)
- V34andV90(3)
- V34andK56andV90(4)

V32 (doModemV32Enable)
Allow V.32 and V.32bis modulations. The following options are available:

- disable(0)—V.32 and V.32bis modulations are disabled
- enable(1)—V.32 and V.32bis modulations are enabled

V22 (doModemV22Enable)
Allow V.22 or Bell 212 modulations. The following options are available:

- disable(0)—Neither option is enabled
- enableV22(1)—V.22 modulation is enabled
- enableBell212(2)—Bell 212 modulation is enabled

V21 (doModemV21Enable)
Allow V.21 or Bell 103 modulations. The following options are available:

- disable(0)—Neither option is enabled
- enableV21(1)—V.21 modulation is enabled
- enableBell103(2)—Bell 103 modulation is enabled

Maximum Speed (doModemMaxSpeed)
This setting determines the fastest data rate that will be negotiated.

Minimum Speed (doModemMinSpeed)
This setting determines the slowest data rate that will be negotiated.

Guard Tone (doModemGuardTone)
Normally a guard tone is not required. But, one can be inserted. This operates for Phase Shift Key modulations only.

- toneNone(1)
- tone1800(3)

Carrier Loss Duration (doModemCarrierLossDuration)
The number of seconds the carrier must be lost before the connection is determined to have been lost. A setting above 25 indicates forever.

Retrain (doModemRetrain)
Enables the modem to monitor the line quality and request a fallback or retrain for poor quality and a fall forward for good quality.

- none(0)—Do not allow modem to retrain, fallback, or fall forward
- retrain(1)—Allow the modem to retrain if the line quality is poor
- fallForwardFallBack(2)—Allow the modem to fallback to a slower speed if the line quality is poor, of fall forward to a faster speed if the line quality is good

Tx Level (doModemTxLevel)
This variable should be set with caution; and normally only after talking to a factory representative. This sets the transmit level power level of the modem. The scale is 12 (-12 dB) to 20 (-20 dB) in 1 dB increments.

> **Note** Larger numbers mean less transmit power is being output (in other word, a setting of 20 will result in less power than a setting of 12).

Protocol (doModemProtocol)
Assigns the data error correction protocol to use with the modem. The following options are available:

- Direct(0)—No compression will be used.
- requestV42(1)—Enable V.42 compression. If this is selected, the modem will either negotiate for V.42 data compression or—if V.42 compression is not available—will use no data compression.
- requireV42(2)—V.42 data compression is mandatory, otherwise disconnect.

Compression (doModemCompression)
Assigns the data compression protocol to use with the modem. This setting is in effect only when V.42bis error correction (see "Protocol (doModemProtocol)") is active.

- Direct(0)—No compression will be used.

- requestV42bis(1)—Enable V.42bis compression. If this is selected, the modem will either negotiate for V.42bis data compression or—if V.42bis compression is not available—will use no data compression.
- requireV42bis(2)—V.42bis data compression is mandatory, otherwise disconnect.

Restrict Modification (doModemRestrictMods)
Enabling this feature restricts the dialout user from modifying the modem settings. Normally, the dialout user has the ability to alter modem operation through the use of AT commands.

- disable(0)—The user can alter modem operation through the use of AT commands
- enable(1)—The user is prevented from modifying the modem settings

Dial Out User Statistics window

This window shows statistics for individual dial out users. The hyperlink headings DSP Link, and WAN Link shown below point to the DSP and WAN information used for the dial-out call. For specific details on the function of parameters defined under these sections, refer to the appropriate section under the access server Configuration Menu

The Dial Out User Statistics window (see figure 34) is where you can view the following:

- Unique ID information (see "Unique ID" on page 121)
- Activity time for the current or most recent session (see "Session" on page 121)
- Phone information (see "Phone" on page 121)
- Data transfer statistics (see "Data" on page 122)
- Physical layer configuration information (see "Physical Layer" on page 122)

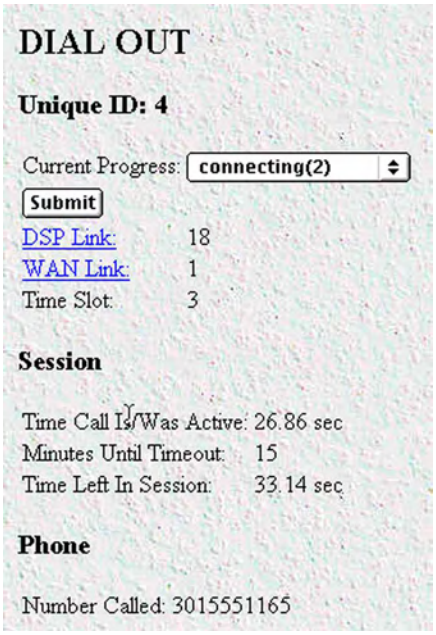


Figure 34. Dial Out User Statistics window (Unique ID, Session, Phone)

To view individual user statistics, select an active user in the State column on the Dial Out main window (see "Dial Out Main Window" on page 112). For example, if you wanted to view user test, you would click on the online(3) link next to test's username.

Unique ID

This portion of the Dial Out User Statistics window (see figure 34 on page 120) is where you can view current call progress, and the DSP, WAN link, and time slot this call the call is using.

Current Progress (doactState)
Indicates current progress.

- authenticating(0)—User connection to dial-out port is in the authentication process
- commandmode(1)—Dial-out user is connected to access server, but has no active outbout call
- connecting(2)—Dial-out user is connecting to remote site
- online(3)—Dial-out user is connected to remote site
- dead(4)—Dial-out user has disconnected from remote access server
- kill(5)—Kills dial-out user's connection to access server

DSP Link (doactDSPIndex)
Indicates which DSP the current call is using (points to a DSP table).

WAN Link (doactLinkIndex)
Indicates which WAN link the current call is using (points to the Link table).

Time Slot (doactSlotIndex)
Indicates which time slot the current call is using.

Session

This portion of the Dial Out User Statistics window (see figure 34 on page 120) contains activity time for the current or most recent session.

Time Call Is/Was Active (doactSessionTime)
The amount of time this call is/was active.

Minutes Until Timeout (doactRemainingIdle)
Number of minutes until idle timeout (counts down).

Time Left In Session (doactRemainingSession)
Amount of time left in this session (counts down).

Phone

This portion of the Dial Out User Statistics window (see figure 34 on page 120) shows the phone numbers that were used by this caller.

Number Called (doactNumberDialed)
The phone number that was dialed into.

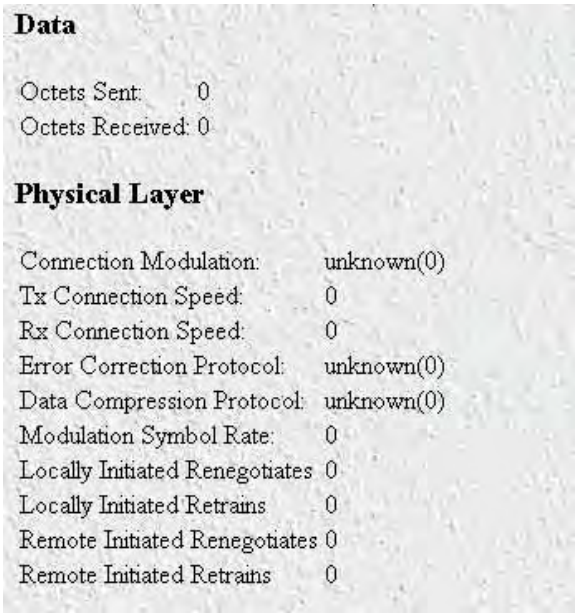


Figure 35. Dial Out User Statistics window (Data, Physical Layer)

Data

This portion of the Dial Out User Statistics window (see figure 35) describes the amount of PPP data sent and received by this user.

Octets Sent (doactSentOctets)
The number of octets sent on this call.

Octets Received (doactReceivedOctets)
The number of octets received on this call.

Physical Layer

This portion of the Dial Out User Statistics window (see figure 35) contains statistics about the modem connection. It includes modulation and other modem-related statistics that are helpful when troubleshooting modem problems. This section covers only modem-type statistics, not ISDN connections.

Connection Modulation (doactModulation)
The modulation of the link.

- unknown(0)
- v21(1)
- v22(2)
- v32(3)

- v34(4)
- k56(5)
- v90(7)
- v110(8)—Not currently implemented.
- isdn64(9)—Not currently implemented.
- isdn56(10)—Not currently implemented.
- 12tp(11)—Not currently implemented.
- phase2(20)—Phase 2, an advanced state of modulation in v34 and higher
- answerack(21)—Acknowledgement phase of modulation

Connection Speed (doactSpeed)
The connected speed of the link.

Error Correction Protocol (doactErrorCorrection)
The error correction scheme used on this call.

- unknown(0)
- none(1)
- v42(2)
- mnp(3)
- v120(4)

Data Compression Protocol (doactCompression)
The compression technique used on this call.

- unknown(0)
- none(1)
- v42bis(2)
- mnp5(3)

Modulation Symbol Rate (doactSymbolRate)
The symbol rate of the call (modem only).

Locally Initiated Renegotiates (doactLocalRenegotiates)
The number of times the local side (this unit) has initiated a modem speed renegotiate.

Locally Initiated Retrains (doactLocalRetrains)
The number of times the local side (this unit) has initiated a modem carrier retrain.

Remote Initiated Renegotiates (doactRemoteRenegotiates)
The number of times the far modem has initiated a modem speed renegotiate.

Remote Initiated Retrains (doactRemoteRetrains)
The number of times the far modem has initiated a modem carrier retrain.

An example demonstrating how Dial-Out is used

1. Display the Dial-Out main window.
   - Click on the Modify link.
   - Set the TCP port to 24 or some other unused port.
   - Set TCP Type to telnet.
   - Set Login Technique to Text.
   - Click on **Submit Query**.
2. Display the Authentication main window. Scroll down until Static User Identification is displayed (see figure 15 on page 60) then click on Static User Identification.
   - Refer to "Adding Static Users" on page 60 to create a static user with dialOut as the service.
   - Click on **Submit Query**.
3. Telnet *x.x.x.x aa*
   where *x.x.x.x* is the IP of your remote access server and
   aa is the port Dial-Out is listening to for connections
4. Log in as the user you made in the static database in step 2.
5. At the OK prompt, type *ATDT* then a phone number.

Chapter 9 Drop and Insert

Introduction

The Drop and Insert window (see figure 36) contains setup objects associated with using the access server as a drop and insert box to an upstream or downstream location.

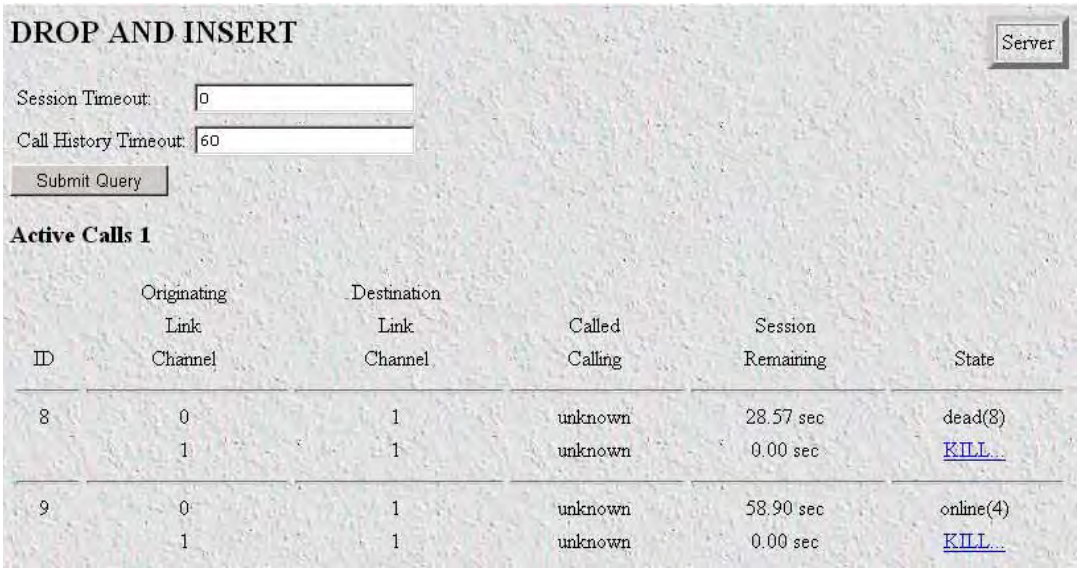


Figure 36. Drop and Insert window

Click on Drop and Insert under the Configuration Menu to display the Drop and Insert main window.

Drop and Insert main window

This Drop and Insert window contains channel information for each unique session ID. If there are no drop and insert connections to the access server, this screen will be blank.

Session Timeout (drSessionTimeout)

This is the maximum time (in minutes) which a connection is allowed to be maintained. After this time the connection will be terminated, even if there is active traffic on the connection. A setting of *0* disables the time-out.

Call History Timeout (drLingerTime)

Number of seconds a MIB entry remains in the Active table will remain after the call is disconnected.

Active Calls (drActive)

The total number of active calls.

Session ID (dractIndex)

Unique identification of this active call

Originating Link (dractLinkIndex)
Which WAN link this call originated on.

Originating Channel (dractChannel)
Which channel this call originated on.

Passed to Link (dractPassLinkIndex)
Which link this call was passed to.

Passed to Channel (dractPassChannel)
Which channel this call was passed to.

Number Dialed (dractNumberDialed)
The phone number that was used to dialed into the server (if this service is available from the exchange).

Calling Number (dractCallingPhone)
The phone number that was dialed from (if this service is available from the exchange).

Session Time (dractSessionTime)
The amount of time this call was/is active.

Remaining Time (dractRemainingSession)
The amount of time remaining in this session.

State (dractState)
Indicates current call progress.

- setup(1)—Idle state waiding for call to be attached
- alerting(2)—Channel is being alerted for transfer of call connecting on other WAN link
- flash(3)—An incoming and outgoing call are contending for the same channel
- online(4)—Call is actively being transferred through remote access server
- sessiontime(5)—Call is transitioning to down state
- clearForward(6)—Call is transitioning to down state
- clearBackward(7)—Call is transitioning to down state
- dead(8)—Call is disconnected
- kill(9)—Call is disconnected by administrator

How Drop and Insert works

The Telco informs the RAS that a call is inbound on a specific channel. If the desired function for that channel is set for dropInsert then the RAS will redirect the call out another WAN port (see figure 37). In effect, it looks as if the RAS is not there.

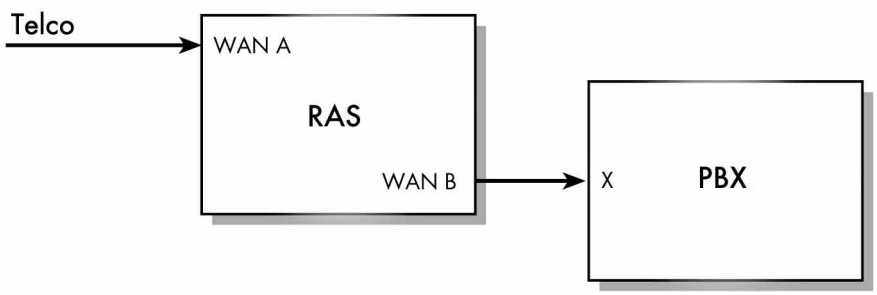


Figure 37. Drop and insert diagram

Note This functionality can only be done on robbed bit lines. You can not perform drop and insert on a PRI line.

Using Drop and Insert

1. Configure each WAN port doing drop and insert. Links 1 and 2 perform drop and insert together. Links 3 and 4 perform drop and insert together.

   The line type/coding for all of the lines can be either D4/AMI or ESF/B8ZS
   WAN A can have the following types of line signalling:
   - EMWinkStart
   - GroundStart
   - LoopStart
   - EMImmediate

   WAN B and x on PBX must be configured identically.
   WAN B can have the following types of line signalling:
   - EMWinkStart
   - EMImmediateStart

2. Set the Desired Function for each channel on WAN A and B to dropInsert(7) (using channel assignment under the T1/E1 link that is going to be performing drop and insert). The channels on WAN A selected for drop and insert must match the channels on WAN B selected for drop and insert.

Note We do not send digits with the EMWinkStart signalling. What this means is that you can not direct the inbound call to a specific extension on the PBX.

Chapter 10 Digital Signal Processing (DSP)

Chapter contents

Introduction

The access server uses between 12 and 48 digital signal processors (DSPs) to pass digital information. Each DSP can accept two incoming calls, one on each "instance." The DSPs are located on chips that contain eight DSPs each. The access server can access these DSPs in several ways:

- On a per-instance basis—When a DSP is set to AvailableSecondOnly, the access server can disable the second instance of a DSP.
- On a per-DSP basis—Each DSP can be set to available or unavailable, disabling or enabling both instances simultaneously
- On a per-chip basis—When a DSP is selected to be rebooted, not only will that DSP be rebooted but so will the other seven DSPS that are located on the same chip. For example, if DSP 1 is set to reboot, DSPs 2–8 will be rebooted also.

Click on DSP under the Configuration Menu to display the DSP Settings main window.

The DSP main window (see figure 38) displays the current state of the DSPs (see "DSP Settings main window").

Clicking on the Connection Summary… link takes you to a page that displaying summarized statistics for the DSPs as a group, and individual statistics for each DSP. For more information about the Connection Summary window, refer to "DSP Connection Performance" on page 134).

Clicking on the DSP Index link displays detailed information about the DSP (see section "DSP information window" on page 138.

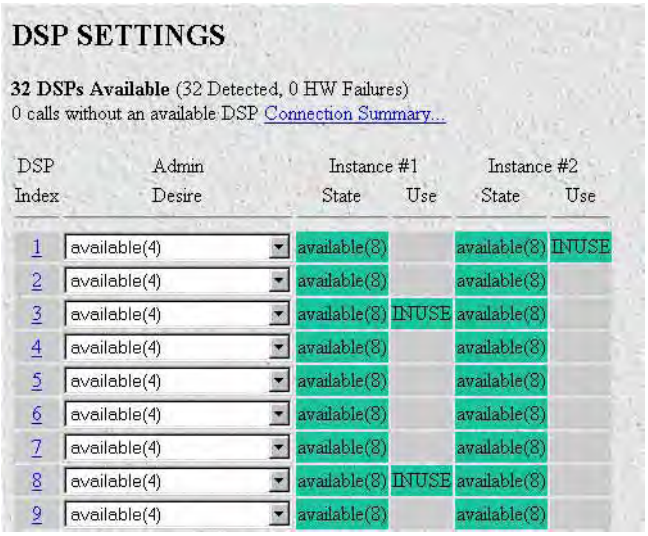


Figure 38. DSP main window

DSP Settings main window

This is where you can view and modify current DSP parameters. The following sections describe each parameter.

DSPs Available (dspAvailable)

Indicates the number of DSPs available for use.

Detected (dspDetected)

Indicates the number of installed DSPs the access server detected at time of boot up.

HW Failures (dspFailed)

Indicates the number of DSPs taken out of the DSP resource pool.

Calls without an available DSP (dspDspNotAvailable)

Indicates the number of calls taken by the RAS when a DSP was not available to be assigned to the call. This statistic is only valid for PRI. For CAS lines, channels on the T1/E1 are busied out if DSP resources are not available.

DSP Index (dspIndex)

The unique identifier of the DSP being reported on.

Admin Desire (dspDesiredState)

The state of the DSP desired by the administrator—this state may be different than its actual state.

- pendingReboot(1)—This will put the individual DSP into the pendingBoot reset state and reserve all DSPs in the group. It will not perform the reboot until there are no calls in the group of associated DSPs, or until one hour has elapsed, at which point it will disconnect any remaining calls to do the reboot.
- RebootNow(2)—This will disconnect all calls on the group of associated DSPs and perform the DSP reboot immediately.
- unavailable(3)—DSP has been taken out of the resource pool.
- available(4)—DSP is available for use.
- availableFirstOnly(17)—Marks the second instance of the DSP unavailable.
- availableSecondOnly(18)—Marks the first instance of the DSP available.
- ForceDerail(19)—This is for use by the engineers and technical support for testing purposes only. Do not use.

Instance #1 State (dspStatefirst)

Identifies the current state of the first instance of the DSP.

- hardwareFailure(1)—During power up a self test routine detected a problem with this DPS. It will not be booted with code or used for calls.
- pendingBoot(2)—Software on this DSP has stopped acting properly. This DSP will not be used for calls. At the next convenient time the DSP will be rebooted.
- booting(4)—The DSP has just been loaded with code and we are now waiting for an indication from the DSP that the code loaded properly and is running.
- unavailable(5)—The instance is fully operational and could be used to take a call except that the administrator has indicated that this instance should not be used.
- reserved—The instance is fully operational and could be used to take a call. But, another DSP in the same boot group as this one is pendingBoot. Therefore we are not to use this until the reboot occurs.
- suspect(7)—The instance is operational and could be used to take a call. But, we have seen a number of consecutive failures so it will not be used until no other available instances can be found. A successful call will place this instance back into the available state.
- available(8)—The instance is fully operational and can be used to take a call

Instance #1 Use (dspUsefirst)

Identifies whether the first instance of the DSP is in use or free.

Instance #2 State (dspStateSecond)

Identifies the current state of the second instance of the DSP. See "Instance #1 State (dspStatefirst)" for parameter values.

Instance #2 Use (dspUseSecond)

Identifies whether the second instance of the DSP is in use or free.

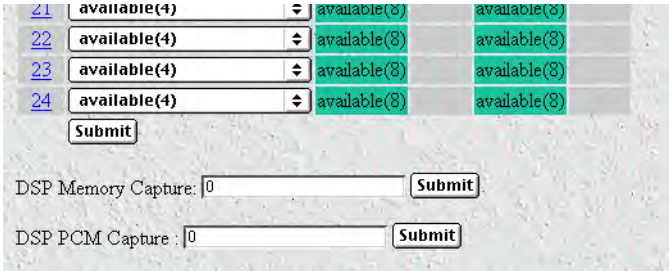


Figure 39. DSP Memory Capture and DSP PCM Capture settings

DSP Memory Capture

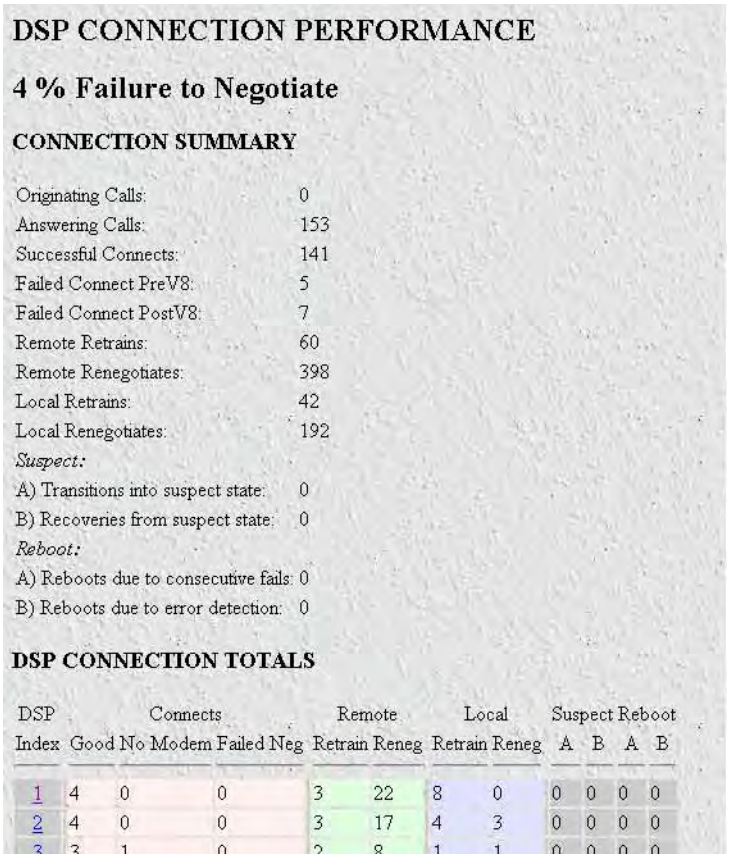
This portion of the DSP Settings window (see figure 39) will store the memory content in 5 rotating circular buffers. Each buffer contains the program and data memory associated with a call on the DSP. The buffer content is saved when the memory capture is triggered. Do not turn on unless requested by technical support.

DSP PCM Capture

This portion of the DSP Settings window (see figure 39) captures the first 30 seconds of the pulse code modulation on the incoming call on the specified DSP. Do not turn on unless requested by technical support

DSP Connection Performance

This window (see figure 40) shows connection summaries and statistics about the individual DSPs. Click on Connection Summary… on the DSP main window (see figure 38 on page 132) to display this window.



DSP CONNECTION PERFORMANCE

4 % Failure to Negotiate

CONNECTION SUMMARY

Originating Calls:	0
Answering Calls:	153
Successful Connects:	141
Failed Connect PreV8:	5
Failed Connect PostV8:	7
Remote Retrains:	60
Remote Renegotiates:	398
Local Retrains:	42
Local Renegotiates:	192
Suspect:	
A) Transitions into suspect state:	0
B) Recoveries from suspect state:	0
Reboot:	
A) Reboots due to consecutive fails:	0
B) Reboots due to error detection:	0

DSP CONNECTION TOTALS

DSP	Connects			Remote		Local		Suspect		Reboot	
Index	Good	No Modem	Failed Neg	Retrain	Reneg	Retrain	Reneg	A	B	A	B
1	4	0	0	3	22	8	0	0	0	0	0
2	4	0	0	3	17	4	3	0	0	0	0
3	3	1	0	2	8	1	1	0	0	0	0

Figure 40. DSP Connection Performance window

Failure to Negotiate (dspFailurePercent)

Indicates the percentage of incoming calls that failed during modem negotiation.

Connection Summaries

This part of the window shows DSP statistics as a whole.

Originating Calls (dspTotalOriginatingCalls)

The number of calls the DSP initiates for outbound calls.

Answering Calls (dspTotalAnsweringCalls)

The number of calls answered regardless if the call was successfully completed.

Successful Connects (dspTotalSuccessfulConnects)

The number of calls that successfully connected.

Failed Connect PreV8 (dspTotalFailedConnectPreV8)

The number of calls that failed before modulation V8 was completed.

Failed Connect PostV8 (dspTotalFailedConnectPostV8)
The number of calls that failed to connect after V8 modulation was completed.

Remote Retrains (dspTotalRemoteRetrains)
The number of times the remote modem has asked for a retrain to be done.

Remote Renegotiates (dspTotalRemoteRenegotiates)
The number of times the remote modem has asked for a renegotiation to be done.

Local Retrains (dspTotalLocalRetrains)
The number of times the local DSP has requested a retrain to be done.

Local Renegotiates (dspTotalLocalRenegotiates)
The number of times the local DSP has requested a renegotiation to be done.

Suspect—A) Transitions into suspect state (dspTotalWentSuspect)
The number of times an instance went into the suspect state. An instance will go into the suspect state when it fails to complete several calls in succession.

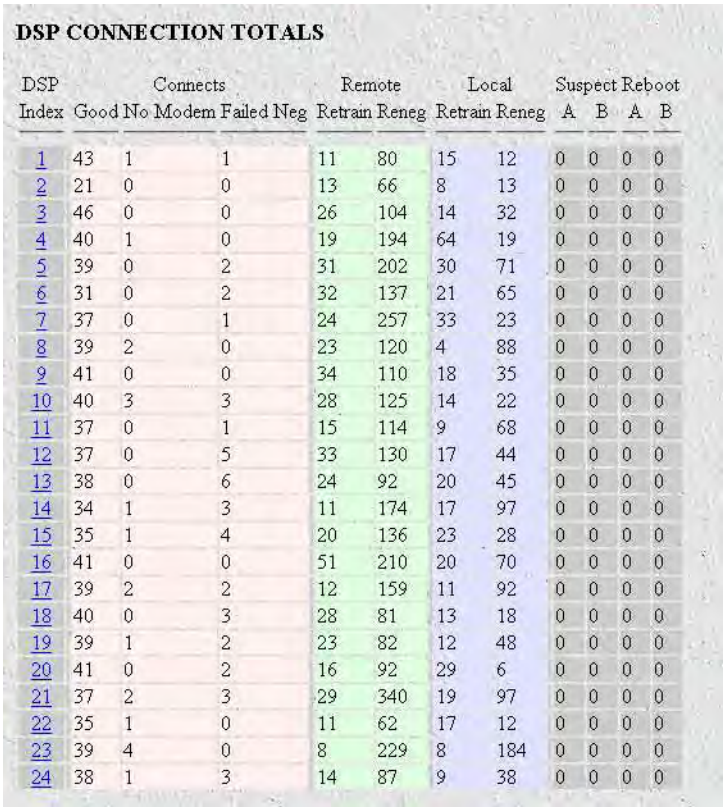
Suspect—B) Recoveries from suspect state (dspTotalSavedFromSuspect)
An instance in the suspect state will recover from the suspect state as soon as it successfully takes an incoming call.

Reboot—A) Reboots due to consecutive fails (dspTotalRebootDueToFails)
The number of times a DSP has been rebooted because it was in the suspect state and then took additional calls which also did not connect successfully.

Reboot—B) Reboots due to error detection (dspTotalRebootDueToError)
The number of times a DSP has been rebooted because it was not responding properly to the main CPU driver code.

DSP Connection Totals

This portion of the window (see figure 41) shows statistics on a per-DSP basis.



DSP CONNECTION TOTALS

DSP	Connects			Remote		Local		Suspect Reboot			
Index	Good	No Modem	Failed Neg	Retrain	Reneg	Retrain	Reneg	A	B	A	B
1	43	1	1	11	80	15	12	0	0	0	0
2	21	0	0	13	66	8	13	0	0	0	0
3	46	0	0	26	104	14	32	0	0	0	0
4	40	1	0	19	194	64	19	0	0	0	0
5	39	0	2	31	202	30	71	0	0	0	0
6	31	0	2	32	137	21	65	0	0	0	0
7	37	0	1	24	257	33	23	0	0	0	0
8	39	2	0	23	120	4	88	0	0	0	0
9	41	0	0	34	110	18	35	0	0	0	0
10	40	3	3	28	125	14	22	0	0	0	0
11	37	0	1	15	114	9	68	0	0	0	0
12	37	0	5	33	130	17	44	0	0	0	0
13	38	0	6	24	92	20	45	0	0	0	0
14	34	1	3	11	174	17	97	0	0	0	0
15	35	1	4	20	136	23	28	0	0	0	0
16	41	0	0	51	210	20	70	0	0	0	0
17	39	2	2	12	159	11	92	0	0	0	0
18	40	0	3	28	81	13	18	0	0	0	0
19	39	1	2	23	82	12	48	0	0	0	0
20	41	0	2	16	92	29	6	0	0	0	0
21	37	2	3	29	340	19	97	0	0	0	0
22	35	1	0	11	62	17	12	0	0	0	0
23	39	4	0	8	229	8	184	0	0	0	0
24	38	1	3	14	87	9	38	0	0	0	0

Figure 41. Connection Summary portion of DSP Connection Performance window

DSP Index (dspIndex)
The unique identifier of the DSP being reported on. Clicking on the DSP Index link displays detailed information about the DSP (see section "DSP information window" on page 138).

Connects—Good (dspSuccessfulConnects)
The number of calls that successfully connected

Connects—No Modem (dspFailedConnectPreV8)
The number of calls that failed before modulation V8 was completed.

Connects—Failed Neg (dspFailedConnectPostV8)
The number of calls that failed to connect after V8 modulation was completed.

Remote—Retrain (dspRemoteRetrains)
The number of times the remote modem has asked for a retrain to be done.

Remote—Reneg (dspRemoteRenegotiates)
The number of times the remote modem has asked for a renegotiation to be done.

Local—Retrain (dspLocalRetrains)
The number of times the local DSP has requested a retrain to be done.

Local—Reneg (dspLocalRenegotiates)
The number of times the local DSP has requested a renegotiation to be done.

Suspect—A (dspTotalWentSuspect)
The number of times an instance on this DSP went into the suspect state. An instance will go into the suspect state when it fails to complete several calls to succession.

Suspect—B (dspTotalSavedFromSuspect)
An instance in the suspect state will recover from the suspect state as soon as it successfully takes an incoming call.

Reboot—A (dspTotalRebootDueToFails)
The number of times a DSP has been rebooted because it was in the suspect state and then took additional calls which also did not connect successfully.

Reboot—B (dspTotalRebootDueToError)
The number of times a DSP has been rebooted because it was not responding properly to the main CPU driver code.

DSP information window

This is where you can view and modify parameters for a single DSP.

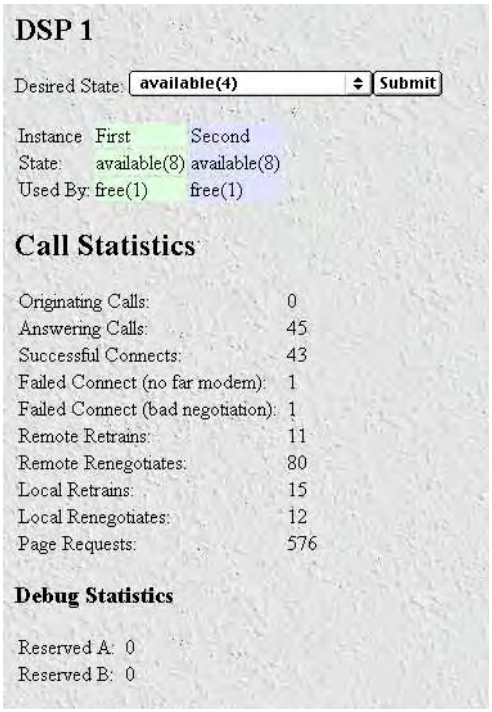


Figure 42. DSP information window (Call and Debug Statistics)

DSP Status

This portion of the DSP information window shows information about the overall status of the selected DSP.

Desired State (dspDesiredState)

The state of the DSP desired by the administrator—this state may be different than its actual state.

- pendingReboot(1)—This will put the individual DSP into the pendingBoot reset state and reserve all DSPs in the group. It will not perform the reboot until there are no calls in the group of associated DSPs. OR when one hour has elapsed, it will disconnect any remaining calls to do the reboot.
- RebootNow(2)—This will disconnect all calls on the group of associated DSPs and perform the DSP reboot now.
- unavailable(3)—DSP has been taken out of the resource pool
- available(4)—DSP is available for use
- availableFirstOnly(17)—Marks the second instance of the DSP unavailable.
- availableSecondOnly(18)—Marks the first instance of the DSP available.
- forceDerail(19)—This is for use by the engineers and technical support for testing purposes only. Do not use.

Instance First State (dspStatefirst)

Identifies the current state of the first instance of the DSP.

- hardwareFailure(1)—During power up a self test routine detected a problem with this DPS. It will not be booted with code or used for calls.
- pendingBoot(2)—Software on this DSP has stopped acting properly. This DSP will not be used for calls. At the next convenient time the DSP will be rebooted.
- booting(4)—The DSP has just been loaded with code and we are now waiting for an indication from the DSP that the code loaded properly and is running.
- unavailable(5)—The instance is fully operational and could be used to take a call except that the administrator has indicated that this instance should not be used.
- reserved—The instance is fully operational and could be used to take a call. But, another DSP in the same boot group as this one is pendingBoot. Therefore we are not to use this until the reboot occurs.
- suspect(7)—The instance is operational and could be used to take a call. But, we have seen a number of consecutive failures so it will not be used until no other available instances can be found. A successful call will place this instance back into the available state.
- available(8)—The instance is fully operational and can be used to take a call

Instance First Used By (dspUseFirst)
Identifies whether the first instance is in use or free.

Instance Second State (dspStateSecond)
Identifies the current state of the second instance of the DSP. See dspStateFirst for parameter values.

Instance Second Used By (dspUseSecond)
Identifies whether the second instance of the DSP is in use or free.

Call Statistics

This portion of the DSP information window (see figure 42 on page 139) shows the statistics of the individual DSP.

Originating Calls (dspOriginatingCalls)
The number of calls the DSP initiates for outbound calls.

Answering Calls (dspAnsweringCalls)
The number of calls answered regardless if the call was successfully completed.

Successful Connects (dspSuccessfulConnects)
The number of calls that successfully connected.

Failed Connect (no far modem) (dspFailedConnectPreV8)
The number of calls that failed before modulation V8 was completed.

Failed Connect (bad negotiation) (dspFailedConnectPostV8)
The number of calls that failed to after V8 modulation was completed.

Remote—Retrain (dspRemoteRetrains)
The number of times the remote modem has asked for a retrain to be done.

Remote—Reneg (dspRemoteRenegotiates)
The number of times the remote modem has asked for a renegotiation to be done.

Local—Retrain (dspLocalRetrains)
The number of times the local DSP has requested a retrain to be done.

Local—Reneg (dspLocalRenegotiates)
The number of times the local DSP has requested a renegotiation to be done.

Page Requests(dspPageRequests)
This is the number of page requests the DSP has made. The DSP does not have enough memory to hold all of the modulation protocols. The DSP will make a page request when it needs to download a new protocol not currently in its memory.

Debug Statistics

This portion of the DSP information window (see figure 42 on page 139) shows statistics on DSP rebooting. The information contained within these MIB variables are subject to change without notice.

Reserved A (dspReservedA)
No assigned functionality at this time

Reserved B (dspReservedB)
No assigned functionality at this time.

Chapter 11 Ethernet

Chapter contents

Introduction

The access server provides management and statistical information in the Ethernet window (see figure 45). Detailed information regarding the SNMP MIB II variables may be downloaded from *RFC 1643, Definitions of Managed Objects for the Ethernet-like Interface Types*.

Click on Ethernet under the Configuration Menu to display the Ethernet main window.

The Ethernet main window displays information about the configuration of the ethernet interface including IP addresses, subnet masks, and state of the ethernet link.

The ethernet interface contains the following links:

- Statistics link - Clicking on the Statistics link takes you to the page where you can see the statistics on the ethernet interface. For more information about the Statistics page, refer to "Ethernet Statistics" on page 145.
- Modify - Clicking on the Modify link takes you to the page where you can change the configuration of your ethernet interface. For more information about modifying Ethernet settings, refer to "Ethernet Modify Window" on page 144.

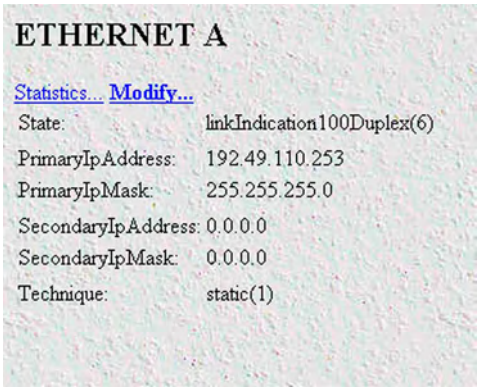


Figure 43. Ethernet Main Window

Ethernet Main Window

The Ethernet main window shows the current configuration of the ethernet interface. The following sections describe each parameter.

State (boxEtherAState)

Indicates the state of the ethernet interface. The following states are valid:

- notInstalled(0) - ethernet interface is not physically present
- noLinkIndication(1) - no cable is connected ethernet interface. Hub is not seen.
- adminOff(2) - Ethernet interface has been turned off by setting technique to disable
- linkIndication10M(3) - Ethernet is 10M
- linkIndication10Duplex(4) - Ethernet is 10M full duplex

- linkIndication100M(5) - Ethernet is 100M
- linkIndication100Duplex(6) - Ethernet is 100M full duplex

PrimaryIPAddress (boxEtherAPrimaryIpAddress)
The Primary ethernet IP address.

PrimaryIpMask (boxEtherAPrimaryIpMask)
The primary ethernet IP subnet mask.

SecondaryIpAddress (boxEtherASecondaryIpAddress)
The secondary ethernet IP address.

Note This address is not propagated via RIP.

SecondaryIpMask (boxEtherASecondaryIpMask)
The secondary IP ethernet IP subnet mask.

Technique (boxEtherATechnique)
Turns ethernet port off and on.

- disable(0) - ethernet port is disabled
- static(1) - ethernet port is turned on. IP address(es) and mask(s) are obtained from data entered under the Ethernet link. The remote access server must be reset for this setting to take place.

Ethernet Modify Window

This window allows you to make changes to the ethernet configuration.

To reach this window, select Modify from the Ethernet main window.

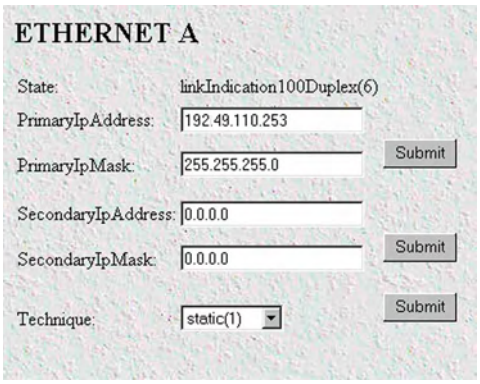


Figure 44. Ethernet Modify Window

State (boxEtherAState)
Indicates the state of the ethernet interface. The following states are valid:

- notInstalled(0) - ethernet interface is not physically present
- noLinkIndication(1) - no cable is connected to ethernet interface. Hub is not seen.
- adminOff(2) - Ethernet interface has been turned off by setting technique to disable
- linkIndication10M(3) - Ethernet is 10M
- linkIndication10Duplex(4) - Ethernet is 10M full duplex
- linkIndication100M(5) - Ethernet is 100M
- linkIndication100Duplex(6) - Ethernet is 100M full duplex

PrimaryIPAddress (boxEtherAPrimaryIpAddress)
The Primary ethernet IP address.

PrimaryIpMask (boxEtherAPrimaryIpMask)
The primary ethernet IP subnet mask.

SecondaryIpAddress (boxEtherASecondaryIpAddress)
The secondary ethernet IP address.

Note This address is not propagated via RIP.

SecondaryIpMask (boxEtherASecondaryIpMask)
The secondary IP ethernet IP subnet mask.

Technique (boxEtherATechnique)
Turns ethernet port off and on.

- disable(0) - ethernet port is disabled
- static(1) - ethernet port is turned on. IP address(es) and mask(s) are obtained from data entered under the Ethernet link. The remote access server must be reset for this setting to take place.

Ethernet Statistics

This window shows statistics about the Ethernet Interface. To reach this window select Statistics from the Ethernet main window.

Alignment Errors (dot3StatsAlignmentErrors)
The number of frames received that are not an integral number of octets in length and do not pass the FCS check.

Figure 45. Ethernet window

FCS Errors (dot3StatsFCSErrors)
The number of frames received that are an integral number of octets in length but do not pass the FCS check.

Single Collision Frames (dot3StatsSingleCollision Frames)
The number of successfully transmitted frames in which there was exactly one collision.

Multiple Collision Frames (dot3StatsMultipleCollisionFrames)
The number of successfully transmitted frames in which there was more than one collision.

SQE Test Errors (dot3StatsSQETestErrors)
The number of times that the SQE TEST ERROR message is generated by the PLS sublayer.

Deferred Transmissions (dot3StatsDeferredTransmissions)
The number of times in which the first transmission attempt is delayed because the medium is busy. This number does not include frames involved in collisions.

Late Collisions (dot3StatsLateCollisions)
The number of times that a collision is detected later than 512 bit-times into the transmission of a packet. Five hundred and twelve bit-times corresponds to 51.2 microseconds on a 10 Mbps system.

Excessive Collisions (dot3StatsExcessiveCollisions)
The number of frames in which transmission failed due to excessive collisions.

Other Errors (dot3StatsInternalMacTransmitErrors)
The number of frames transmission on a fails due to an internal MAC sublayer transmit error.

Carrier Sense Errors (dot3StatsCarrierSenseErrors)
The number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame on a particular interface.

Received Frames Too Long (dot3StatsFrameTooLongs)
The number of frames received that exceed the maximum permitted frame size.

Other Received Errors (dot3StatsInternalMacReceiveErrors)
The number of frames in which reception fails due to an internal MAC sublayer receive error.

Chip Set ID (dot3StatsEtherChipSet)
Ethernet-like interfaces are typically built out of several different chips. This value identifies the chip set that gathers the transmit and receive statistics and error indications.

Chapter 12 **Filter IP**

Chapter contents

Introduction

The access server software provides an IP filtering system that enables you to set up security as well as to provision services for selected customers. While IP filters are typically thought of as a security measure, many providers wish to limit some services a customer may have access to. These could include such things as limited access only to an e-mail server or proxy server. IP filters also include the ability to encapsulate all packets received on the specified dialup link in an extra IP header using RFC 2003. This would allow packets on a dialup link to be tunneled to a specific host.

Each filter is a defined list of parameters based upon attributes in the IP, TCP, and UDP headers. There are two major steps to filter creation: first defining the filter, then applying it to a user connection. The same filter can be shared by several users.

The access server enables 20 separate filters to be defined, of which up to 10 can be used on a single user connection. A single filter can be assigned to a user via the Static Users Authentication. Multiple filters can be assigned by using the RADIUS Filter-Id attribute.

Filters can be configured with default settings that are used for all dial-in sessions. If any filters are applied through either RADIUS or the Static User filter parameter, then all of the dial-in defaults will be disabled and only the specified filters will be applied.

Click on Filter IP under the Configuration Menu to display the Filter IP main window (see figure 46). The following sections describe each of the parameters found in FilterIP.

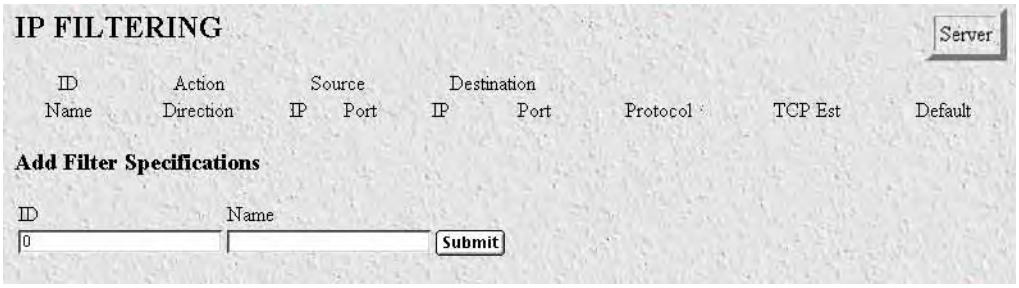


Figure 46. Filter IP main window

Defining a filter

To define a new filter, select a number and a name, then click on the **Submit Query** button to submit the request. The number and name must not already exist in the IP FILTER list, and the number must be an integer between 1 and 20. To delete a filter, enter just the ID number without a name and click on the **Submit Query** button.

Modify Filter

After entering a number and name, click on the name of the filter to display the filter parameters window (see figure 47).

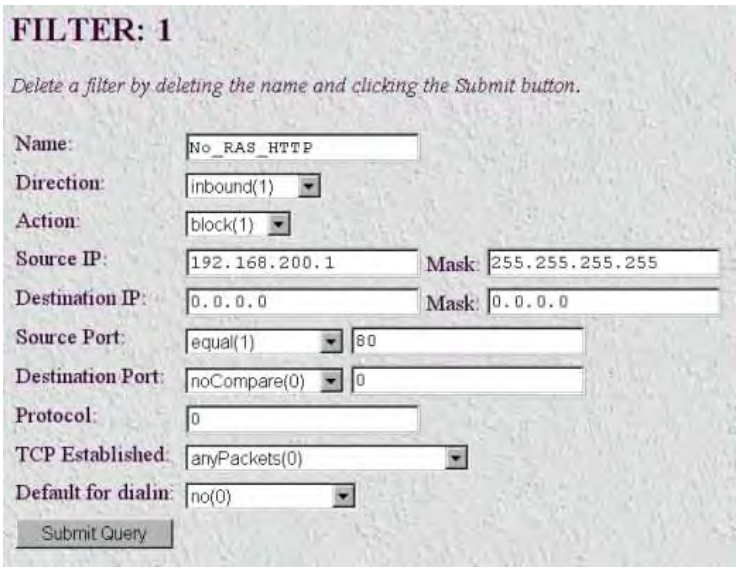


Figure 47. Filter IP parameters window

The following parameters can be configured for IP Filtering:

Note Any changes to a filter take place immediately. This can aid in troubleshooting a filter profile while the user is online.

Name (filterIpName)

This is the name of the filter

Direction (filterIpDirection)

Specifies the direction of the filter (that is, whether it applies to data packets inbound or outbound from the access server). The filter only applies to dial in users, users on other interfaces (that is, Ethernet, Frame Relay, and so on) are not affected. The following options are available:

- inactive(0)—Disables filter operation
- inbound(1)—Relates to packets coming into the access server
- outbound(2)—Relates to packets leaving the access server
- both(3)—Specifies both inbound and outbound operation

Action (filterIpAction)

Specifies the action to take on a packet whether to block or pass the packet. The following options are available:

- pass(0)—If pass is selected, checking will continue on to other filters until either a match occurs, a block occurs, or there are no more filters remaining to check.

Note If there are any applied PASS filters, then at least one of them must match or the packet will be dropped.

- block(1)—If a filter has block set and the filter matches the block, the packet is discarded and no further processing is done.
- wrap(2)—All packets received on the specified dialup link will be encapsulated in an extra IP header as defined in RFC2003. The destination IP address of the wrapper is given by the destination IP setting in the filter. The source IP address of the wrapper is the ethernet address of the remote access server.

  All wrap filters are inbound only.

Note Block filters take priority, therefore any applied and matching block filters will drop the packet. Next, pass filters are examined, if PASS filters have been defined, then at least one of them must match or else the packet will be dropped. After the block and pass filters are examined, the WRAP filter, if it exists, will be applied.

Source IP (filterIpSourceIp)

This is the IP address used when comparing a packet's source address in the IP header. Bit positions that are set to 1 will be compared and 0's will be ignored. Thus, a setting of 0.0.0.0 will have the effect of disabling source IP address comparison.

Source IP Mask (filterIpSourceMask)

This is the Source IP Mask used when comparing a packet's source address. Bit positions that are set to 1 will be compared and 0's will be ignored. Thus, a setting of 0.0.0.0 will have the effect of disabling source IP address comparison.

Destination IP (filterIpDestinationIp)

This is the IP address used when comparing a packet's destination address in the IP header. Bit positions that are set to 1 will be compared and 0's will be ignored. Thus, a setting of 0.0.0.0 will have the effect of disabling destination IP address comparison.

Destination Mask (filterIpDestinationMask)

This is the destination mask used when comparing a packet's destination address. Bit positions that are set to 1 will be compared and 0's will be ignored. Thus, a setting of 0.0.0.0 will have the effect of disabling destination IP address comparison.

Source Port (FilterIpSourcePort)

Specifies the source port number (TCP or UDP) that the access server compares. The source port action will determine how the source port is treated.

Action (filterIpSourcePortCmp)

Specifies the Action (filterIpSourcePortCmp) that the access server compares. The source port action will determine how the source port is treated.

- noCompare(0) – No Comparison to the source port in the IP packet.
- equal(1)—The port in the source IP packet is the same
- lessThan(2)—The port in the source IP packet is less than
- greaterThan(3)—The port in the source IP packet is greater than

Destination Port (filterIpDestinationPort)

Specifies the destination port number which the access server compares. The destination action will determine how the destination port is treated.

- noCompare(0)—No Comparison to the destination port in the IP packet.
- equal(1)—The port in the destination IP packet Is the same
- lessThan(2)—The port in the destination IP packet is less than
- greaterThan(3)—The port in the destination IP packet is greater than

Action (filterIpDestinationPortCmp)

Specifies the action (TCP or UDP) which the access server compares. The destination action will determine how the destination port is treated.

- noCompare(0)—No Comparison to the destination port in the IP packet.
- equal(1)—The port in the destination IP packet Is the same
- lessThan(2)—The port in the destination IP packet is less than
- greaterThan(3)—The port in the destination IP packet is greater than

Protocol (filterIpProtocol)

Specifies the IP Protocol number to use for filtering. Some examples of protocol numbers are 1 for ICMP; 6 for TCP; and 17 for UDP. A list of protocol numbers can be found in RFC 1340. A setting of 0 disables processing based on protocol number.

TCP Established (filterIpTcpEstablished)

Specifies whether the filter should match only those packets which indicate in the TCP header flags that the connection is established. The following choices are available:

- anyPackets(0)—Applies the filter to all packets
- onlyEstablishedConnections(1)—Only applies the filter to established TCP connections

Default for dialin (filterIpDefaultDialin)

This option applies the filter to as a default filter for all dial-in users. If another filter is specified, either in RADIUS or in the static user profiles, then all dial-in defaults are disabled and only the specified filters are applied. The following choices are available:

- no(0)
- applyToDialin(1)

An example of using a filter

The customer is limited to the local mail server (mail.internal.com) and an internal website (www.internal.com).

- The IP address for mail.internal.com is: 192.10.10.1
- for: www.internal.com is: 192.10.10.2

- DNS server for name resolution is 192.10.10.1.

The filters needed:

- ID:1
  - Name: Mail Server
  - Direction: inbound
  - Action: pass
  - Source IP and mask: not set
  - Destination IP: 192.10.10.1 mask: 255.255.255.255
  - Source Port: no compare
  - Destination Port: equal 110 for POP3 or 25 for SMTP
  - Protocol: not set
  - TCP Established: anyPackets
  - Default for dial-in: apply to Dial-in
- ID:2
  - Name: WebSite
  - Direction: inbound
  - Action:pass
  - Source IP and mask: not set
  - Destination IP: 192.10.10.2 mask: 255.255.255.255
  - Source Port: no compare
  - Destination Port: equal 80
  - Protocol: not set
  - TCP Established: anyPackets
  - Default for dial-in: apply to Dial-in
- ID:3
  - Name:DNS
  - Direction: inbound
  - Action:pass
  - Source IP and mask: not set
  - Destination IP: 192.10.10.1 mask: 255.255.255.255
  - Source Port: no compare
  - Destination Port: equal 53

- Protocol: not set
- TCP Established anyPackets
- Default for dial-in: apply to Dial-in

Note If the DNS filter was not created, then users would have to use IP addresses to access the web server and the mail server.

Now if you wanted to add the ability to ping to test the dial-in users connectivity to the network, the following filter would be created:

- ID:4
- Name: PING
- Direction: both
- Action: pass
- Source IP and mask: not set
- Destination IP and mask: not set
- Source Port: no compare
- Destination Port: no compare
- Protocol: 1
- TCP Established: anyPackets
- Default for dial-in: apply to Dial-in

Note This would also allow traceroute to work.

Chapter 13 **Frame Relay**

Chapter contents

Introduction

Frame Relay is a high-speed datalink communications technology that is used in hundreds of networks throughout the world to connect LAN, SNA, Internet, and voice applications. Within the network, Frame Relay uses a simple form of packet switching that provides high throughput and reliability. (For more information, refer to the Frame-Relay MIB: *1315 Management Base for Frame Relay DTEs*.)

The access server offers IP-in-Frame Relay, or RFC-1490 Multi-protocol encapsulation. Because the access server has a built-on router, the access server can route IP traffic to multiple locations over multiple virtual channels. Using a T1 or E1 WAN link the access server can function as a network-to-network interface (NNI) switch or as a User-to-Network Interface (UNI). Most applications will be as an UNI.

A Frame Relay network consists of endpoints (the access server), frame relay access equipment (bridges, routers, hosts, frame relay access devices) and network devices (switches, network routers, T1/E1 multiplexers). The most popular application is to use the access server as a POP-in-a-box with a Frame Relay IP connection to the Internet backbone.

Configuring a Frame Relay link

The most common configuration is setting up the access server as a DCE and connecting to a provider's Frame switch via a T1 /E1 line. In this application, the access server will establish a point-to-point link via one or more DLCI's or virtual channels. Each DLCI is a pipe with an associated far-end IP address. You may then modify the access server's routing table and enter in routes to use the Frame Relay link as the next-hop.

A Frame Relay link is configured as follows:

- Configuring the WAN link for Frame Relay
- Selecting the correct Frame Link configuration parameters (LMI)
- Assigning an IP address to the DLCI.
- Assigning next-hop routes to the new DLCI.

Line Configuration

The first stage in setting up a Frame Relay WAN link is configuring a T1 or E1 line for Frame Relay service.

1. Click on T1/E1 Link under the Configuration Menu to display the T1/E1 Link Activity main window (see figure 85 on page 247).
2. Verify which port the T1/E1 cable is connected into on the access server—that port number corresponds to the *Link: x* (where *x* is the same number as the port number) portion of the T1/E1 Link Activity main window (see figure 85 on page 247). Click on *Configuration* in the appropriate *Link: x* section (for example, if the T1/E1 cable was connected to port 2, you would click on Configuration in the Link: 2 section).

   Note If your access server's ports are labeled *A* and *B*. Port *A* corresponds to *Link: 1* and port *B* with *Link: 2*.

3. Click on Modify.

Note The following settings must match the line configuration provided by the local telephone company. For more information on setting up your T1/E1, see the Getting Started guide that came with your access server.

4. Click on the Line Type drop-down menu and choose one of the following options:
   - For a T1 line, select *dsx1ESF(2)* (Extended SuperFrame DS1) or *dsx1D4(3)* (A&T D4 format DS1).
   - For an E1 line, choose either *dsx1E1(4)* or *dsx1E1-CRC(5)*.
5. Click on the Line Coding drop-down menu and choose one of the following options:
   - For T1: If you selected *dsx1D4(3)* line type, select *dsx1AMI(5)* line coding. If you selected *dsx1ESF(2)* line type, choose *dsx1B8ZS(2)* line coding.
   - For E1: Select either *dsx1AMI(5)* or *dsx1HDB3(3)*. Most installations will use HDB3.
6. Click on the Line Build Out drop-down menu and choose one of the following options:
   - For T1: Select *t1pulse0dB(2)*.
   - For E1, select *e1pulse(1)*.
7. Click **Submit**.
8. Click on the Signal Mode drop-down menu and choose the appropriate signalling mode:
   - robbedBit
   - messageOriented
   - bitOriented
9. For a robbed-bit line, select the appropriate signalling protocol.
10. For a PRI, select the appropriate message-oriented switch type.
11. Click **Submit**.

At this point, the access server's front panel LEDs should now be showing signs that the line is active. If the phone company line is not connected to the access server, the error indicator will glow red for that line/connection.

WAN Channel Assignment main screen

The next stage in configuring a Frame Relay link is to set the number of 64-kbps channels on the T1/E1 that will carry the data. Each channel is 64 kbps in speed and must correspond to the same channels that your provider is using. Usually your provider will start from channel 1. For example: a 256-kbps link could be divided into 64-kbps channels numbered 1, 2, 3, and 4.

To set the channel assignment:

1. Click on T1/E1 Link under the Configuration Menu to display the T1/E1 Link Activity main window (see figure 85 on page 247).
2. Click on Channel Assignment in the appropriate *Link: x* section (for example, if the T1/E1 cable was connected to port 2, you would click on Channel Assignment in the Link: 2 section).

3. Click on the channel 1 drop-down menu and select *frameRelay(3)*.

> **Note** You can have some channels as a Frame Relay link on the same WAN link that you are also using for dial-up calls. Each channel that is set to Frame Relay will reduce the number of simultaneous calls. You also must arrange with your provider to allow both Frame Relay and circuit-switched calls on the same WAN link.

4. Repeat step 3 to configure remaining channels.
5. Click **Submit**.

The link is now activated on your access server. The next stages will configure Frame Relay and IP routing.

Configuring Frame Relay link parameters

Click on Frame Relay under the Configuration Menu to display the T1/E1 Link Activity main window (see Figure 48).

Figure 48. Frame Relay main window

The Frame Relay main window

The Frame Relay main window displays diagnostic information about the Frame Relay link, and lists complete statistics/configuration information for each WAN link that has been selected for Frame Relay service.

> **Note** If frame relay has not already been configured under T1/E1, this window will only show the Produce Status Change Trap setting.

The Frame Relay main window also has the following links:

- Modify—Clicking on the Modify link enables you to set-up Frame Relay or to change any configuration parameters (see "DLMI window" on page 163).
- DLCI—The Data Link Connection Identifier (DLCI) provides each PVC with a unique identifier at both the access server and the Frame Relay switch. Within each link (DLMI) there can be multiple Permanent Virtual Circuits (PVC). Each of these PVCs are point-to-point links to remote locations, and define the data path between the access server and the Frame Relay network. Clicking on the DLCI link displays the DLCI window (see "DLCI window" on page 165) that enables you to configure PVCs on the access server.

Link: X Status (framerelStatus)

This specifies LMI Link Status. If the management DLCI (either DLCI 0 or 1023) is established, then the status will be UP. If the management channel has not been established, the status will indicate DOWN.

HDLC Statistics on Link

The HDLC statistics on the link are defined as follows:

Transmit (Bits/Sec) (framerelTxOctets)
This statistic shows the transmit rate in bits-per-second.

Receive (Bits/Sec) (framerelRxOctets)
This statistic shows the receive rate in bits-per-second.

No Buffers Available (framerelRxNoBufferAvailable)
The number of packets received when no buffers were available.

Data Overflow (framerelRxDataOverflow)
The number of packets received with overflow (as indicated by hardware).

Message Ends (framerelRxMessageEnds)
The number of packets received with message-correct endings. This value increases each time a valid Frame Relay packet is received.

Packets Too Long (framerelRxPacketTooLong)
The number of packets received that were too long.

Overflow (framerelRxOverflow)
The number of packets received with overflow (as indicated by software).

Aborts (FramerelRxAbort)
The number of packets received that were aborted.

Bad CRC (framerelRxBadCrc)
The number of packets received that had bad CRC values.

Invalid Frames (framerelRxInvalidFrame)
The number of packets received that had invalid frames.

Tx Underrruns (framerelTxUnderrun)
The number of times the transmit buffer was not replenished in time to be sent out on the line.

LINK Resets (framerelResets)
Number of times the link management (LMI) was reset.

Produce Status Change Trap (frTrapState)
This feature is not currently implemented.

DLMI window

Each Frame Relay instance with the access server is known as the Data Link Management Interface or DLMI. The access server software currently supports one Frame Relay Link, or DLMI, on each of the T1/E1 WAN ports. Frame Relay has a set of protocols responsible for maintaining the link. This is known as the management link interface or LMI. The management protocol link must agree with your service provider. In most cases, the signaling setting may be the only variable you will need to change.

The DLMI window (see Figure 49) is where you set-up Frame Relay or change configuration parameters.

Note Most of the factory default settings can be left as is when setting up your link, requiring only minor changes to comply with your service provider's Frame Relay link configuration.

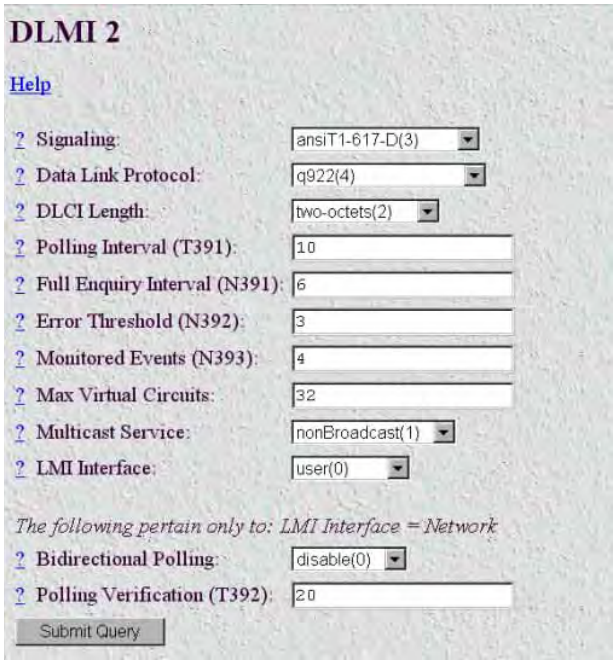


Figure 49. DLMI window

The common link management, or signaling, protocols are:

- LMI. Frame Relay Forum Implementation agreement. Uses DLCI = 1023 for management
- Annex D. ANSI T1.617 Uses DLCI = 0 for management
- Annex A. ITU Q.933 Uses DLCI = 0 for management

The most commonly used protocol will be ansiT1-617-D(3).

Do the following to change the signaling method:

1. Click on the Signaling drop-down menu and select *ansiT1-617-D(3)*.
2. Click **Submit**.

The Frame Relay link is now available. The final stage will be to configure PVCs and IP routing so they can use these new links.

The following sections describe the additional variables on the DLMI window.

Note Be careful not to change these variables unless your provider instructs you to do so. The factory defaults generally provide the appropriate settings for service.

Data Link Protocol

The layer 2 link protocol for Frame Relay is LAPF, otherwise referred to as Q.922. The factory default of *q922(4)* will be the most common.

DLCI Length

The DLCI identifies the virtual connection on the bearer channel for the Frame Relay Interface. The factory setting of *two-octets(2)* represents 10-bit addressing. Your access server can support a maximum of 32 separate PVCs or virtual channels per Frame Relay link.

Polling Interval (T391)

Each side of the Frame Relay interface, the Network side and the User side, communicate status. T391 is the number of seconds between subsequent Status Enquiry messages. An Error Count is logged if no response from the previous Status Enquiry message was received during the T391 interval. The default value is *10*.

Full Enquiry Interval (N391)

Status Enquiry messages are of two different varieties: 1) Link Integrity Verification, which simply exchange sequence numbers between peers and 2) Full Status messages, which is a request from the peer for the list of all active/inactive PVCs. The default is *6*.

Error Threshold (N392)

N392 is the number of errors (T392 and T391 timeouts and sequence number errors) before action is taken. Action consists of changing all the PVCs from active to inactive. N392 must be less than or equal to N393. The default value is *3*.

Monitored Events (N393)

Expected and unexpected events are counted up till the Event Count reaches N393, whereupon the Event Count is cleared and the Error Threshold Count is cleared. Events consist of timer (T391 and T392) expirations and received Status Enquiry messages. N393 must be greater or equal to N392. The default value is *4*.

Max Virtual Circuits

The maximum number of PVCs determines the amount of internal resources are allocated for the Frame Relay system. The default value is *32*.

LMI Interface

LMI is used in the generic sense as an in-band signaling system. The signaling is slightly different depending on which end of the Frame Relay Interface it is, or in other words its orientation. The User end issues periodic STATUS ENQUIRY messages and waits for a STATUS reply from the Network. The USER setting is correct if the access server is a DCE connecting to a Frame Relay network. It is possible to configure an access server to

"look" like a Frame Relay Network. By setting the LMI Interface to NETWORK, you can connect another Frame Device directly to the access server. This is also the setting if you were to connect two access servers back-to-back without the benefit of an established Frame Relay network.

Bidirectional Polling

Bidirectional Polling pertains only to the Network LMI side. If enabled, the Network LMI issues STATUS ENQUIRY messages and waits for a STATUS reply from the User.

Polling Verification (T392)

Polling Verification pertains only to the Network LMI side. It is the amount of time permitted without receiving a STATUS ENQUIRY message from the User before Counting an Error.

Configuring Permanent Virtual Circuits

The Data Link Connection Identifier (DLCI) provides each PVC with a unique identifier at both the access server and the Frame Relay switch. Within each link (DLMI) there can be multiple Permanent Virtual Circuits (PVC). Each of these PVCs are point-to-point links to remote locations, and define the data path between the access server and the Frame Relay network.

DLCI window

Within each DLMI are one or more Data Link Channel Identifier (DLCIs). This is the identification of a PVC within the Frame Relay link.

There will be at least one PVC automatically installed. This is the management DLCI or LMI. This DLCI, often DLCI 0, is the communication channel between the access server and the Frame Relay network switch. This management channel communicates configuration and health information of the Frame Relay link. If your Frame Relay service provider has properly configured your connection, you will automatically see a listing of the valid DLCIs on your link.

Figure 50 shows an example Frame Relay connection with the management DLCI and one PVC with the DLCI of 100. DLCI 100 has been configured by the Frame Relay service provider as the datalink the provider will use for transporting your data.

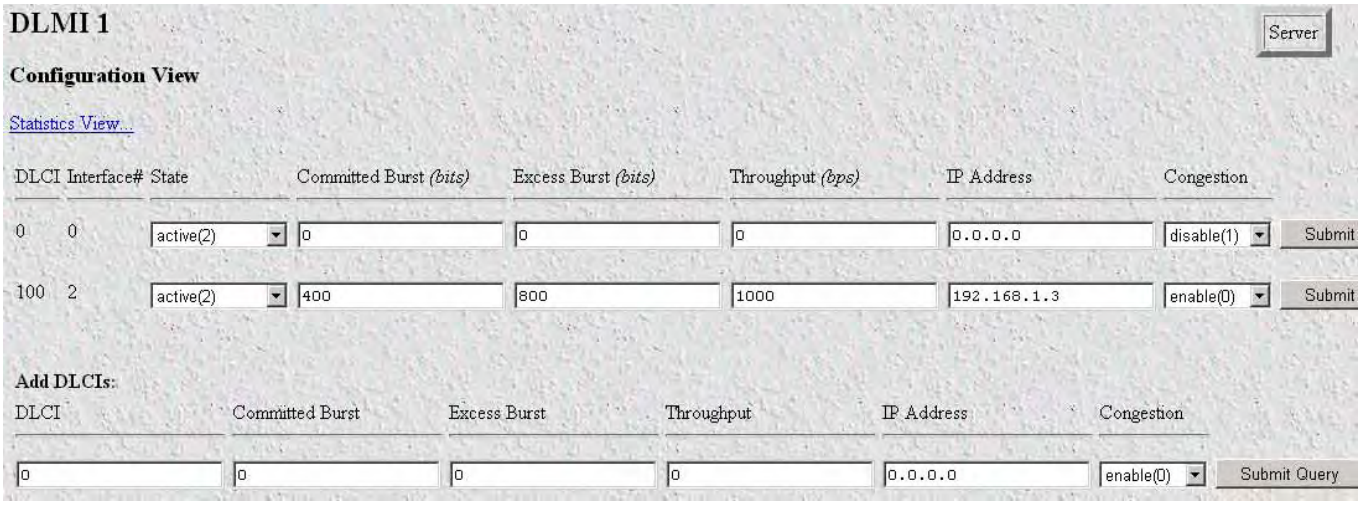


Figure 50. DLMI—Configuration View window

To configure a DLCI you will need the DLCI number and the IP address of the far-end router. If you have connected your access server to your provider's Frame Relay network, you may automatically see one or more DLCIs on the screen. These DLCIs will simply need an IP address to identify the next hop.

You can also manually enter in DLCIs using the Add DLCIs feature (see "Adding DLCIs" on page 167).

Note The channels you assign must match what your provider has assigned for your service or your connection will not function properly. If your provider has informed you of the DLCIs and IP addresses, you may manually enter in the connections.

DLCI (frCircuitDlci)

The Data Link Connection Identifier (DLCI) for this virtual circuit. Note: DLCIs can automatically appear if your Frame Relay Service provider has already configured your link. In this case, all you will need to enter is the IP address of the router at the far end of the link.

Interface # (FrameIPInterfaceNum)

The interface number assigned to a DLCI. This is a variable number which is assigned from a resource pool within the access server.

State (frCircuitState)

This is the state of the interface with the following definitions:

- invalid(1)—Use this setting to delete DLCI's on your access server's configuration view. To delete a DLCI, simply set the state to invalid(1) and Submit Query. Note: A deleted DLCI will reappear if your service provider's Frame Relay switch is still configured to recognize that DLCI. This occurs after a Frame Relay Full Status Enquiry.

- active(2)—The link is up and passing data. This is the desired condition of the link.
- invalid(3)—The link is down and not passing data. Reasons for this may be your service provider hasn't enabled your service or the link is not yet connected to your access server.
- needIPaddr(4)—This is when the IP address needs to be entered for this DLCI.
- wait4peer(5)—In this state, the Link is waiting for the far end to synchronize.

Committed Burst (bits) (frCircuitCommitedBurst)
This specifies the committed data rate for the link in bits-per-second.

Excess Burst (bits) (frCircuitExcessBurst)
This specifies the excess data rate for the link in bits-per-second.

Throughput (bits) (frCircuitThroughput)
This specifies the throughput for the link in bits-per-second.

IP Address (FrameIPAddr)
As all of the interfaces on the access server run in un-numbered mode, the IP address to enter is that of the far end router. This is not the IP address of the access server. After the IP address is entered, it will appear as a point-to-point link in the IP routing table with this address.

Congestion (frameEnableCongestion)
This option enables or disables congestion tracking.

- enable(0)—Enables Congestion tracking
- disable(1)—Disables Congestion tracking

Adding DLCIs
To add DLCIs, type the following information under the Add DLCIs section:

1. Under the DLCI entry, type the number given to you by your provider.
2. Under the IP Address entry, type the IP address of the far-end router. That would be the next-hop router for this DLCI. Often, this will be the Ethernet address or loopback address for that router.
3. Click on **Submit Query**.

Configuring IP routing with a Frame Relay Link
As each properly configured DLCI will have an IP address representing the next hop on that link, the access server can use a Frame Relay link to access many remote networks. The IP address of the Frame Relay link is unnumbered and specifies the next hop to another router. As such, it is a single-host route with a mask of 255.255.255.255. By using the access server's routing table, you can apply any number of network routes to use the Frame Relay link. You can even use a PVC as the default gateway (0.0.0.0).

Do the following to access the IP routing table in the access server:

1. Click on IP under the Configuration Menu to display the IP window (see figure 56 on page 179).
2. Click on Routing Info (see figure 56 on page 179).

When the Frame Relay link (DLMI) and a DLCI is in the UP state, its IP address and interface, will appear in the IP Routing table (see Figure 51). The IP address of the PVC will not appear in the IP routing table if the Frame Relay link is down, or the DLCI is not configured or inactive.

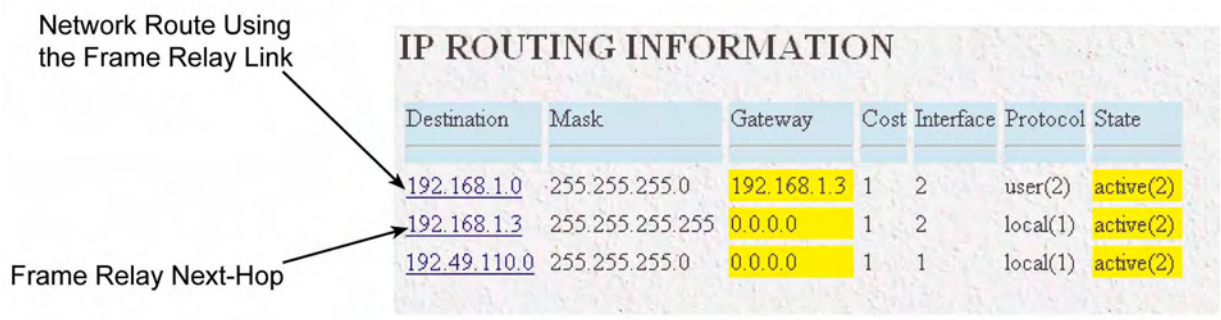


Figure 51. IP routing with Frame Relay example

In Figure 51, the Frame Relay link shows the address of 192.168.1.3. As IP routing dictates the best fit for any forwarding decisions, any destination with this address will automatically be sent across the Frame Relay link.

Figure 51 also shows a network route using the Frame Relay link as its next hop. The destination of 192.168.1.0 255.255.255.255 specifies the gateway, or next-hop, of 192.168.1.3. With this entry, any IP packet with the destination address in the range of 192.168.1.1- 192.168.1.254 will automatically be sent down the Frame Relay link to the device with the IP address of 192.168.1.3.

Adding a route

To add a route, do the following:

To access the IP routing table in the access server:

1. Click on IP under the Configuration Menu to display the IP window (see figure 56 on page 179).
2. Click on Routing Info (see figure 56 on page 179).

Note To add a network route, use the second set of entry items which allow for a destination, mask and gateway:

3. Type in the Destination network (see Figure 52). This number must correspond to the mask specified. (For example, if you wish to forward a C class address you would leave the last octet as 0.)

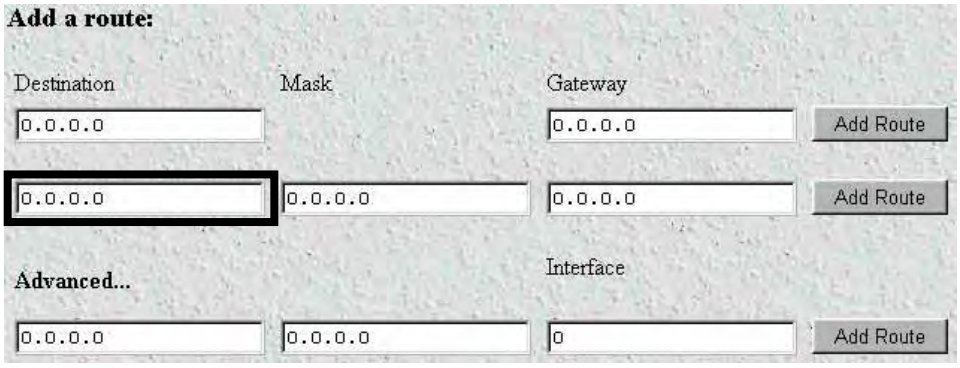


Figure 52. Adding a route

4. Type in the Mask to define the network. This must correspond to the destination network. (For example, if you wish to forward a C class address you would specify the mask as 255.255.255.0.)
5. Type in the next-hop gateway.
6. Click **Add Route**.

The route will now appear in the routing table. To use the frame relay as the default gateway, enter the next-hop gateway of the frame relay link in the gateway field of the first set of entry items. Click **Add Route**.

Link Status and the IP Forwarding

If the Frame Relay link is down, the address will automatically be removed from the routing table. If there are any routes which specify this IP address as the next-hop, the routing table will show the state of noPath(3) (see Figure 53).

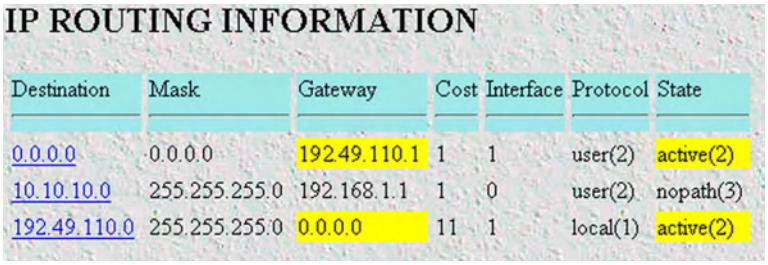


Figure 53. Link status and IP forwarding

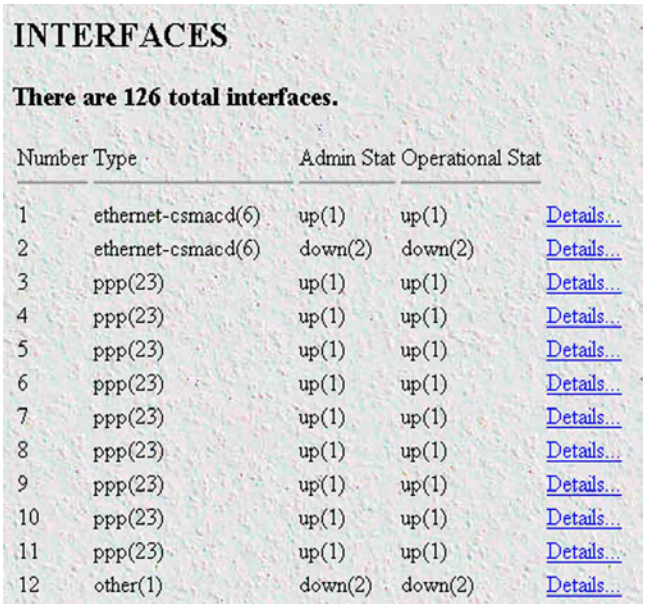
When the Frame Relay Link returns to the UP state, the IP route for the link will be re-added and used to forward IP packets. Any routes that specify this IP address as the next-hop will automatically return to the active state.

Chapter 14 Interfaces

Chapter contents

Introduction

The Interfaces window (see figure 54) shows the quantity of incoming and outgoing traffic, as well as errors that cause frames to be discarded for each of the local interfaces. The statistics listed on the access server Interfaces page comprise those contained in *RFC 1213—Management Information Base for Network Management of TCP/IP-based internets: MIB-II*. Frames are counted when they arrive on the network. Some frames are then discarded during error screening. The remaining frames are delivered to the appropriate higher layer or sublayer. Implementation of the Interfaces group is mandatory for all systems.



INTERFACES

There are 126 total interfaces.

Number	Type	Admin Stat	Operational Stat	
1	ethernet-csmacd(6)	up(1)	up(1)	Details...
2	ethernet-csmacd(6)	down(2)	down(2)	Details...
3	ppp(23)	up(1)	up(1)	Details...
4	ppp(23)	up(1)	up(1)	Details...
5	ppp(23)	up(1)	up(1)	Details...
6	ppp(23)	up(1)	up(1)	Details...
7	ppp(23)	up(1)	up(1)	Details...
8	ppp(23)	up(1)	up(1)	Details...
9	ppp(23)	up(1)	up(1)	Details...
10	ppp(23)	up(1)	up(1)	Details...
11	ppp(23)	up(1)	up(1)	Details...
12	other(1)	down(2)	down(2)	Details...

Figure 54. Interfaces main window

Click on Interfaces under the Configuration Menu to monitor interfaces statistics.

Interfaces main window

This section explains the meaning of the other items contained in the main window.

Click on the Details link to monitor the status of each connected interfaces (see "Interface Details" on page 173).

The Interfaces main window displays the total number (ifNumber) of network interfaces (regardless of their current state) present on this system.

Number (ifIndex)

A unique number for each interface that ranges between 1 and the value of ifNumber. The value for each interface must remain constant at least from one re-initialization of the entity's network management system to the next re-initialization. Many MIB tables refer back to the interfaces table. For example, there is an Ethernet table that counts error collision statistics.

Type (ifType)

The type of interface, distinguished according to the physical/link protocol(s) immediately "below" the network layer in the protocol stack. The following valid interface options are available:

- other(1)
- ethernet-csmacd(6)
- iso88023-csmacd(7)
- ds1(18)
- e1(19)
- basicISDN(20)
- primaryISDN(21)
- ppp(23)
- softwareLoopback(24)
- slip(28)
- frame-relay(32)

Admin Stat (ifAdminStatus)

The desired state of the interface.

- up(1)—The selected interface is ready to pass frames
- down(2)—The selected interface is not ready to pass frames
- testing(3)—The selected interface is being tested. No operational frames may be passed in this mode.

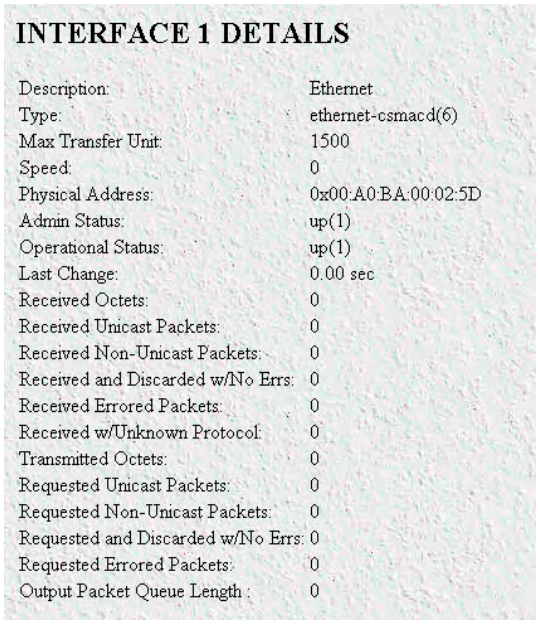
Operational Status (ifOperStatus)

The current operational state of the interface.

- up(1)—The selected interface is ready to pass frames.
- down(2)—The selected interface is not ready to pass frames.
- testing(3)—The selected interface is being tested. No operational frames may be passed in this mode.

Interface Details

When you click on a Details link, the type and description of the interface, speed, status, maximum size of protocol data units (PDUs), and physical address display (see figure 55). The SNMP variables for this table are referenced through the SNMP MIB interfaces table.



INTERFACE 1 DETAILS

Description:	Ethernet
Type:	ethernet-csmacd(6)
Max Transfer Unit:	1500
Speed:	0
Physical Address:	0x00:A0:BA:00:02:5D
Admin Status:	up(1)
Operational Status:	up(1)
Last Change:	0.00 sec
Received Octets:	0
Received Unicast Packets:	0
Received Non-Unicast Packets:	0
Received and Discarded w/No Errs:	0
Received Errored Packets:	0
Received w/Unknown Protocol:	0
Transmitted Octets:	0
Requested Unicast Packets:	0
Requested Non-Unicast Packets:	0
Requested and Discarded w/No Errs:	0
Requested Errored Packets:	0
Output Packet Queue Length :	0

Figure 55. Interface Details window

Description (ifDescr)

A textual string containing information about the interface. This string should include the name of the manufacturer, the product name and the version of the hardware interface.

Type (ifType)

The type of interface, distinguished according to the physical/link protocol(s) immediately "below" the network layer in the protocol stack. The following interface types are available:

- other(1)
- ethernet-csmacd(6)
- iso88023-csmacd(7)
- ds1(18)
- e1(19)
- basicISDN(20)
- primaryISDN(21)
- ppp(23)
- softwareLoopback(24)

- slip(28)
- frame-relay(32)

Max Transfer Unit (ifMTU)
The size of the largest protocol data unit which can be sent/received on the interface, specified in octets. For interfaces that are used for transmitting network protocol data units, this is the size of the largest network protocol data unit that can be sent on the interface.

Speed (ifSpeed)
An estimate of the interface's current bandwidth in bits per second. For interfaces which do not vary in bandwidth or for those in which no accurate estimation can be made, this object should contain the nominal bandwidth.

Physical Address (ifPhysAddress)
This value is the MAC address of the Ethernet port.

Admin Stat (ifAdminStatus)
The desired state of the interface.

- up(1)—The selected interface is ready to pass frames.
- down(2)—The selected interface is not ready to pass frames.
- testing(3)—The selected interface is being tested. No operational frames may be passed in this mode.

Operational Status (ifOperStatus)
The current operational state of the interface.

- up(1)—The selected interface is ready to pass frames.
- down(2)—The selected interface is not ready to pass frames.
- testing(3)—The selected interface is being tested. No operational frames may be passed in this mode.

Last Change (ifLastChange)
The value of sysUpTime at the time the interface entered its current operational state. If the current state was entered prior to the last re-initialization of the local network management subsystem, then this object will be zero.

Received Octets (ifInOctets)
The number of octets received on the interface, including framing characters.

Received Unicast Packets (ifUcastPkts)
The number of subnetwork-unicast packets delivered to a higher layer protocol.

Received Non-Unicast Packets (ifNUcastPkts)
The number of non-unicast (that is, sub-network-broadcast or sub-network-multicast) packets delivered to a higher layer protocol.

Received and Discarded w/No Errs (ifInDiscards)
The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher layer protocol. One possible reason for discarding such a packet could be to free up buffer space.

Received Errored Packets (ifInErrors)
The number of inbound packets that contained errors preventing them from being deliverable to a higher layer protocol.

Received w/Unknown Protocol (ifInUnknownProtos)
The number of packets received via the interface which were discarded because of an unknown or unsupported protocol.

Transmitted Octets (ifOutOctets)
The total number of octets transmitted out of the interface, including framing characters.

Requested Unicast Packets (ifOutUcastPkts)
The total number of packets that higher level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.

Requested Non-Unicast Packets (ifOutNUcastPkts)
The total number of packets that higher level protocols requested be transmitted to a non-unicast (that is, a sub-network-broadcast or sub-network-multicast) address, including those that were discarded or not sent.

Requested and Discarded w/No Errs (ifOutDiscards)
The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being transmitted. One possible reason for discarding such a packet could be to free up buffer space.

Requested Errored Packets (ifOutErrors)
The number of outbound packets that could not be transmitted because of errors.

Output Packet Queue Length (ifOutQLen)
The length of the output packet queue (in packets).

Chapter 15 IP

Chapter contents

Introduction

The IP (Internet Protocol) window lists IP configuration statistics and parameters, and enables you to modify IP settings.

All items described in this chapter are defined in *RFC 1213: Management Information Base for Network Management of TCP/IP-based internets: MIB-II*. As specified in the RFC, implementation of the IP, TCP, UDP, and ICMP MIB groups are required for all TCP/IP networks.

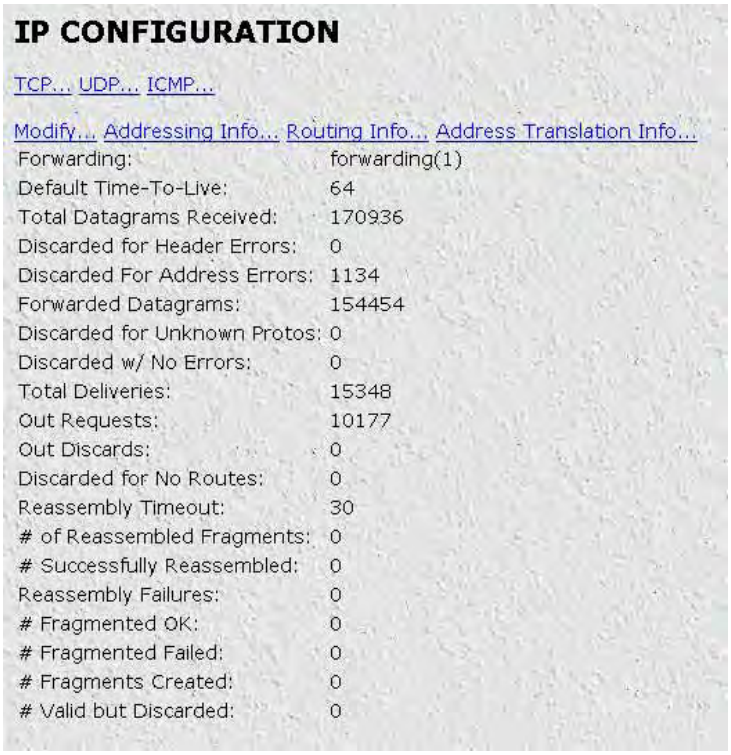


Figure 56. IP main window

Click on IP under the Configuration Menu to display the IP window.

IP main window

The IP main window contains basic IP configuration parameters and statistics, and it has the following links to windows that will enable you to modify IP parameters and view IP statistics:

- TCP—Displays information about the TCP protocol such as TCP segments received and sent, and remote and local TCP connections. (See "TCP" on page 183.)
- UDP—Displays information about the UDP protocol such as the number of UDP datagrams sent and received. (See "UDP" on page 186.)
- ICMP—Displays information about the ICMP protocol such as the number of echo replies sent. (See "ICMP" on page 187.)

- Modify—This window is where you can modify forwarding and time-to-live settings (see "Modify" on page 182).
- Addressing Info—This window (see "Addressing Information" on page 190) displays IP addressing details for the default address for outgoing IP datagrams, the local or loopback address of the box and the IP address of the box as defined in Chapter 19, "System".
- Routing Info—This window displays routing information for routing IP datagrams (the IP address, subnet mask, next hop router, and interface for each network interface defined in the box) (see "Routing Information" on page 191).
- Address Translation Info—The IP address translation table contains the IP address to physical address equivalences (see "Address Translation Information" on page 198).

Forwarding (ipForwarding)

The indication of whether this entity is acting as an IP gateway in respect to the forwarding of datagrams received by, but not addressed to, this entity. IP gateways forward datagrams, IP hosts do not (except those source-routed via the host).

> **Note** For some managed nodes, this object may take on only a subset of the values possible. Accordingly, it is appropriate for an agent to return a "badValue" response if a management station attempts to change this object to an inappropriate value.

The following conditions can be displayed:

- forwarding(1)—acting as a gateway
- not-forwarding(2)—*not* acting as a gateway; in this condition, packets will not be forwarded to dial-in users

Default Time-To-Live (ipDefaultTTL)

The default value inserted into the time-to-live field of the IP header of datagrams originated at this entity, whenever a TTL value is not supplied by the transport layer protocol.

Total Datagrams Received (ipInReceives)

The total number of input datagrams received from interfaces, including those received in error.

Discarded for Header Errors (ipInHdrErrors)

The number of input datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, and so on.

Discarded for Address Errors (ipInAddrErrors)

The number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity. This count includes invalid addresses (e.g., 0.0.0.0) and addresses of unsupported Classes (e.g., Class E). For entities which are not IP Gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.

Forwarded Datagrams (ipForwDatagrams)
The number of input datagrams for which this entity was not their final IP destination, as a result of which an attempt was made to find a route to forward them to that final destination. In entities which do not act as IP Gateways, this counter will include only those packets which were source-routed via this entity, and the source-route option processing was successful.

Discarded for Unknown Protos (ipInUnknownProtos)
The number of locally-addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.

Discarded w/No Errors (ipInDiscards)
The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded (for example, due to lack of buffer space).

Note The Discarded w/No Errors counter does not include any datagrams discarded while awaiting re-assembly.

Total Deliveries (ipInDelivers)
The total number of input datagrams successfully delivered to IP user-protocols (including ICMP).

Out Requests (ipOutRequests)
The total number of IP datagrams which local IP user-protocols (including ICMP) supplied to IP in requests for transmission.

Note The Out Requests counter does not include any datagrams counted in ipForwDatagrams.

Out Discards (ipOutDiscards)
The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (e.g., for lack of buffer space).

Note The Out Discards counter would include datagrams counted in ipForwDatagrams if any such packets met this (discretionary) discard criterion.

Discarded for No Routes (ipOutNoRoutes)
The number of IP datagrams discarded because no route could be found to transmit them to their destination.

Note The Discarded for No Routes counter includes any packets counted in ipForwDatagrams which meet this "no-route" criterion. This includes any datagrams which a host cannot route because all of its default gateways are down.

Reassembly Timeout (ipReasmTimeout)
The maximum number of seconds which received fragments are held while they are awaiting reassembly at this entity.

of Reassembled Fragments (ipReasmReqds)
The number of IP fragments received which needed to be reassembled at this entity.

Successfully Reassembled (ipReasmOKs)
The number of IP datagrams successfully reassembled.

Reassembly Failures (ipReasmFails)
The number of failures detected by the IP reassembly algorithm (for whatever reason: timed out, errors, etc.).

Note The Reassembly Failures value is not necessarily a count of discarded IP fragments since some algorithms (notably the algorithm in RFC 815) can lose track of the number of fragments by combining them as they are received.

Fragmented OK (ipFragOKs)
The number of IP datagrams that have been successfully fragmented at this entity.

Fragmented Failed (ipFragFails)
The number of IP datagrams that have been discarded because they required fragmenting at this entity, but were not fragmented because their *Don't Fragment* option was set.

Fragments Created (ipFragCreates)
The number of IP datagram fragments that have been generated at this entity.

Valid but Discarded (ipRoutingDiscards)
The number of routing entries which were chosen to be discarded even though they are valid. One possible reason for discarding such an entry could be to make more buffer space available for other routing entries.

Modify
The Modify IP configuration window (see figure 57) is where you can change IP forwarding and time-to-live settings.

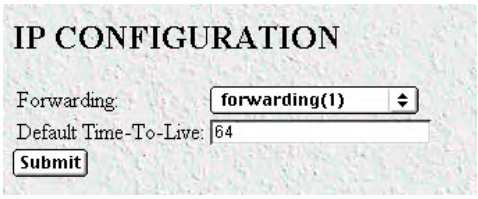


Figure 57. IP configurations modification window

Forwarding (ipForwarding)
Determines whether this entity is acting as an IP gateway that will forward datagrams received by—but not addressed to—this entity. IP gateways forward datagrams, IP hosts do not (except those source-routed via the host).

Note For some managed nodes, this object may take on only a subset of the values possible. Accordingly, it is appropriate for an agent to return a "badValue" response if a management station attempts to change this object to an inappropriate value.

The following options are available:

- forwarding(1)—acting as a gateway
- not-forwarding(2)—*not* acting as a gateway

Note Setting forwarding to *not-forwarding* will prevent the access server from forwarding packets to dial-in users.

Default Time-To-Live (ipDefaultTTL)

The default value inserted into the Time-To-Live (TTL) field in the IP header of datagrams originating from this entity, whenever a TTL value is not already supplied by the transport layer protocol.

TCP

Transmission Control Protocol (TCP) is the most widely used protocol among the TCP/IP suite. The access server provides management and statistical information on TCP.

Click on TCP under the Configuration Menu to display the TCP main window (see figure 58).

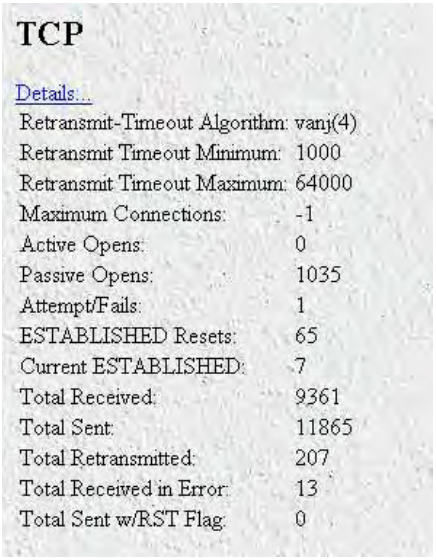


Figure 58. TCP main window

TCP main window

The TCP main window contains the Details… link that displays port details for remote and local TCP connections (see "TCP Details" on page 185), and TCP statistics.

Retransmit-Timeout Algorithm (tcpRtoAlgorithm)
The algorithm that determines the timeout value used for retransmitting unacknowledged octets.

Retransmit-Timeout Minimum (tcpRtoMin)
The minimum value permitted by a TCP implementation for the retransmission timeout, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout. In particular, when the timeout algorithm is rsre(3), an object of this type has the semantics of the LBOUND quantity described in RFC 793.

Retransmit-Timeout Maximum (tcpRtoMax)
The maximum value permitted by a TCP implementation for the retransmission timeout, measured in milliseconds. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout. In particular, when the timeout algorithm is rsre(3), an object of this type has the semantics of the UBOUND quantity described in RFC 793.

Maximum Connections (tcpMaxConn)
The limit on the total number of TCP connections the entity can support. In entities where the maximum number of connections is dynamic, this object should contain the value -1.

Active Opens (tcpActiveOpens)
The number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.

Passive Opens (tcpPassiveOpens)
The number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state.

Attempt/Fails (tcpAttemptFails)
The number of times TCP connections have made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections have made a direct transition to the LISTEN state from the SYN-RCVD state.

ESTABLISHED Resets (tcpEstabResets)
The number of times TCP connections have made a direct transition to the CLOSED state from either the ESTABLISHED state or the CLOSE-WAIT state.

Current ESTABLISHED (tcpCurrEstab)
The number of TCP connections for which the current state is either ESTABLISHED or CLOSE-WAIT.

Total Received (tcpInSegs)
The total number of segments received, including those received in error. This count includes segments received on currently established connections.

Total Sent (tcpOutSegs)
The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.

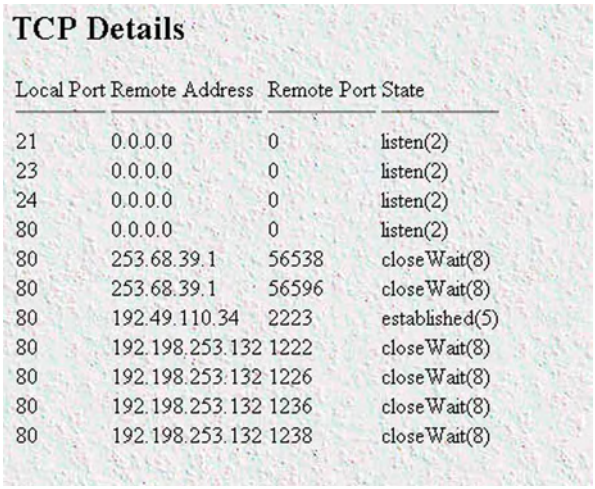
Total Retransmitted (tcpRetransSegs)
The total number of segments retransmitted—that is, the number of TCP segments transmitted containing one or more previously transmitted octets.

Total Received in Error (tcpInErrs)
The total number of segments received in error (e.g., bad TCP checksums).

Total Sent w/RST Flag (tcpOutRsts)
The number of TCP segments sent containing the RST flag.

TCP Details

From this screen you can view port details for remote and local TCP connections (see figure 59). You must enable the Facility Data Link (FDL) object in the T1/E1 Link section to read remote TCP port connections. To reach this screen, click on the Details link from the TCP main window.



TCP Details

Local Port	Remote Address	Remote Port	State
21	0.0.0.0	0	listen(2)
23	0.0.0.0	0	listen(2)
24	0.0.0.0	0	listen(2)
80	0.0.0.0	0	listen(2)
80	253.68.39.1	56538	closeWait(8)
80	253.68.39.1	56596	closeWait(8)
80	192.49.110.34	2223	established(5)
80	192.198.253.132	1222	closeWait(8)
80	192.198.253.132	1226	closeWait(8)
80	192.198.253.132	1236	closeWait(8)
80	192.198.253.132	1238	closeWait(8)

Figure 59. TCP Details window

Local Port (tcpConnLocalPort)
The local port number for this TCP connection.

Remote Address (tcpConnRemAddress)
The remote IP address for this TCP connection.

Remote Port (tcpConnRemPort)
The remote port number for this TCP connection.

State (tcpConnState)
The state of this TCP connection. The only value which may be set by a management station is deleteTCB(12). Accordingly, it is appropriate for an agent to return a 'badValue' response if a management station attempts to set this object to any other value. If a management station sets this object to the value

deleteTCB(12), then this has the effect of deleting the TCB (as defined in RFC 793) of the corresponding connection on the managed node, resulting in immediate termination of the connection.

- closed(1)—Connection closed
- listen(2)—The access server is listening for connections
- synSent(3)—Waiting for a matching connection request after having sent a connection request
- synReceived(4)—Waiting for a confirming connection request acknowledgement after having both received and sent a connection request
- established(5)—The link is open, data can be transferred
- finWait1(6)—Waiting for a connection termination request from the remote TCP or an acknowledgement of the connection termination request previously sent
- finWait2(7)—Waiting for a connection termination request from the remote TCP
- closeWait(8)—Waiting for a connection termination request from the local user
- lastAck(9)—Waiting for an acknowledgement of the connection termination request previously sent to the remote TCP
- closing(10)—Waiting for a connection termination request acknowledgement from the remote TCP
- timeWait(11)—Waiting for enough time to pass to be sure the remote TCP received the acknowledgement of its connection termination request
- deleteTCB(12)—Delete connection immediately

UDP

User Datagram Protocol (UDP) is supported by the access server. To manage and collect statistics on UDP, click on UDP under the Configuration Menu to display the UDP window (see figure 60).

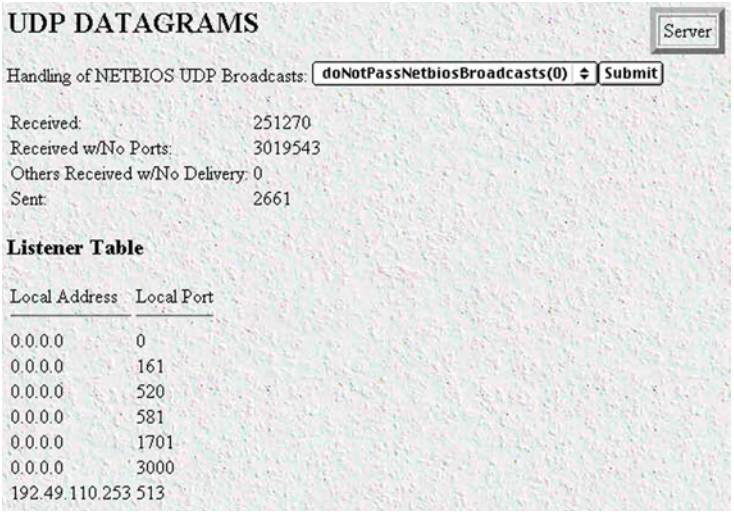


Figure 60. UDP window

Handling of NETBIOS UDP Broadcasts (boxNetbiosUdpBridging)
Enables the passing of broadcast UDP packets with a port of 137 and 138 from other interfaces to the local LAN interface. Netbios uses these packets to communicate with WINS servers. A WINS server can work without this option enabled, but the remote PC will appear to be on the LAN. The following options are available:

- doNotPassNetbiosBroadcasts(0)
- passNetbiosBroadcasts(1)

Received (udpInDatagrams)
The total number of UDP datagrams delivered to UDP users.

Received With No Ports (udpNoPorts)
The total number of received UDP datagrams for which there was no application at the destination port.

Others Received with No Delivery (udpInErrors)
The number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port.

Sent (udpOutDatagrams)
The total number of UDP datagrams sent from this entity.

Listener Table (udpTable)
A table containing UDP listener information.

Local Address (udpLocalAddress)
The local IP address for this UDP listener. In the case of a UDP listener that is willing to accept datagrams for any IP interface associated with the node, the value 0.0.0.0 is used.

Local Port (udpLocalPort)
The local port number for this UDP listener.

ICMP
Under normal circumstances, IP makes very efficient use of system resources. However errors, congestion and system malfunctions occur periodically. ICMP (Internet Control Message Protocol) assists network managers with IP routing by sending control and error reporting messages between IP hosts.

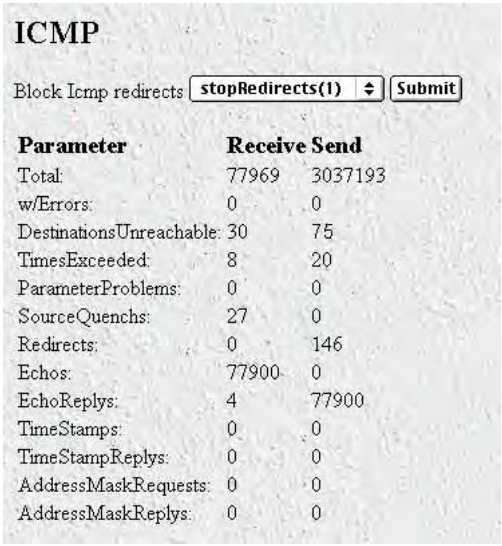


Figure 61. ICMP window

Click on ICMP under the Configuration Menu to monitor access server ICMP statistics (see figure 61).

Block ICMP redirects (boxBLockIcmpRedirects)

Enables you to configure how the access server handles ICMP redirects. Enabling the access server to receive redirected messages is generally considered a security breach.

The following options are available:

- allowredirects(0)
- stopredirects(1)

ICMP Receive/Send Messages window

The ICMP window displays the ICMP message counters. ICMP messages are displayed in the window as columns comprising two types of messages:

- Messages received by the access server (InMibVariable)
- Messages sent by the access server (OutMibVariable)

The numbers following the parameters can be a good source of what is happening on the network to point out potential problems. Both gateways (routers) and hosts can send ICMP messages.

Total Received/Sent (icmpInMsgs, imcpOutMsgs)

The number of ICMP messages the access server has received/sent. This number also includes ICMP messages received/sent which have ICMP specific errors.

w/Errors (icmpInErrors, icmpOutErrors)

The number of ICMP messages which the access server has received/sent but are deemed to be faulty (for example, bad ICMP checksums, bad length, or non-routable errors).

Destinations Unreachable (IcmpInDestUnreachs, IcmpOutDestUnreachs)
The number of ICMP destination unreachable messages received/sent. For instance, if the information in a gateway's routing table determines that the network specified in a packet is unreachable, the gateway will send back an ICMP message stating that the network is unreachable. The following conditions will send back an unreachable message:

- The network is unreachable.
- The host is unreachable.
- The protocol is not available to the network.
- The port on the host is unavailable. A specified source route failed.
- A packet must be fragmented (that is, broken up into two or more packets) before being sent to the next hop, but the packet was sent anyway with instructions *not* to be fragmented.

Times Exceeded (icmpInTimeExcds, icmpOutTimeExcds)
The number of ICMP time exceeded messages received/sent. Each time a packet passes through a gateway, that gateway reduces the time-to-live (TTL) field by one. The default starting number is defined under the IP section. If the gateway processing a packet finds that the TTL field is zero it will discard the packet and send the ICMP time exceeded message. Time exceeded will also be incremented when a host which is reassembling a fragmented packet cannot complete the reassembly due to missing packets within its time limit. In this case, ICMP will discard the packet and send the time exceeded message.

Parameter Problems (icmpInParmProbs, icmpOutParmProbs)
The number of ICMP parameter problem messages received/sent. If while processing a packet, a gateway or host finds a problem with one or more of the IP header parameters which prohibits further processing, the gateway or host will discard the packet and return an ICMP parameter problem message. One potential source of this problem may be with incorrect or invalid arguments in an option. ICMP sends the parameter problems message if the gateway or host has discarded the whole packet.

Source Quenchs (icmpInSrcQuenchs, icmpOutSrcQuenchs)
The number of ICMP source quench messages received/sent. A gateway will discard packets if it cannot allocate the resources, such as buffer space, to process the packet. If a gateway discards the packet, it will send an ICMP source quench message back to the sending device. A host may send this messages if packets arrive too fast to be processed or if there is network congestion. The source quench message is a request to reduce the rate at which the source is sending traffic. If the access server receives a source quench, it will wait for acknowledgment of all outstanding packets before sending more packets to the remote destination. Then it will begin sending out packets at an increasing rate until the connection is restored to standard operating conditions.

Redirects (icmpInRedirects, icmpOutRedirects)
The number of ICMP redirect messages received/sent. A gateway sends a redirect message to a host if the network gateways find a shorter route to the destination through another gateway.

Echos (icmpInEchos, icmpOutEchos)
The number of ICMP echo request messages received/send. The ICMP echo is used whenever one uses the diagnostic tool *ping*. Ping is used to test connectivity with a remote host by sending regular ICMP echo request packets and then waiting for a reply. Received echos (icmpInEchos) will increment when the access server is *pinged*.

Echo Replys (icmpInReps, icmpOutReps)
The number of ICMP echo reply messages received/sent. An echo reply is a response to an echo request. Send echos (icmpOutEchos) will increment when the access server is pinged.

Time Stamps (icmpInTimestamps, icmpInTimestamps)
The number of ICMP time stamp messages received/sent. Time stamp and time stamp replies were originally designed into the ICMP facility to allow network clock synchronization. Subsequently, a new protocol—Network time protocol (NTP) has taken over this function. Normally, this number will be zero.

Time Stamp Replys (icmpInTimestampsReps) (icmpOutTimestampsReps)
The number of ICMP timestamp reply messages received/sent. This message is part of a time stamp (see "Time Stamps (icmpInTimestamps, icmpInTimestamps)") request. Normally, this number will be zero.

Address Mask Requests (icmpInAddrMasks) (icmpOutAddrMasks)
The number of ICMP address mask request messages received/sent. this message is generally used for diskless workstations which use this request at boot time to obtain their subnet mask. This number will increase if there are hosts on the network which broadcast these requests.

Address Mask Replys (icmpInAddrMasksReps) (icmpOutAddrMasksReps)
The number of ICMP address mask reply messages received/sent. Normally, this number will be zero.

Addressing Information

The IP addressing Information window (see figure 62) is where you can view the default address for outgoing IP datagrams, the local or loopback address of the box, and the IP address of the box as defined in Chapter 19, "System".

Figure 62. IP addressing Information window

Click on the Details link to display IP address Table entries for each defined network interface (see "IP addressing Information Details".

IP addressing Information Details

This window (see figure 63) shows IP address Table entries for each defined network interface.

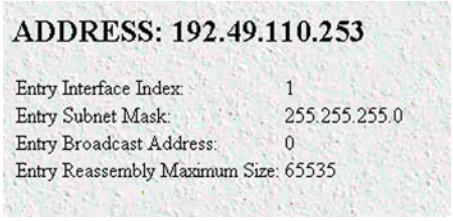


Figure 63. IP addressing Details window

Entry Interface Index (ipAdEntIfIndex)
The index value that identifies the interface to which this entry applies.

Entry Subnet Mask (ipAdEntNetMask)
The subnet mask associated with the IP address of this entry. The value of the mask is an IP address with all the network bits set to 1 and all the hosts bits set to 0.

Entry Broadcast Address (ipAdEntBcastAddr)
The value of the least-significant bit in the IP broadcast address used for sending datagrams on the interface associated with the IP address of this entry. For example, when the Internet standard all-ones broadcast address is used, the value will be 1. This value applies to both the subnet and network broadcast addresses used by the entity on this interface.

Entry Reassembly Maximum Size (ipAdEntReasmMaxSize)
The size of the largest IP datagram which this entity can re-assemble from incoming IP fragmented datagrams received on this interface.

Routing Information

The IP Routing Information window (see figure 64) displays information required to route IP datagrams, including the IP address, subnet mask, next-hop router, and interface for each network interface defined in the access server.

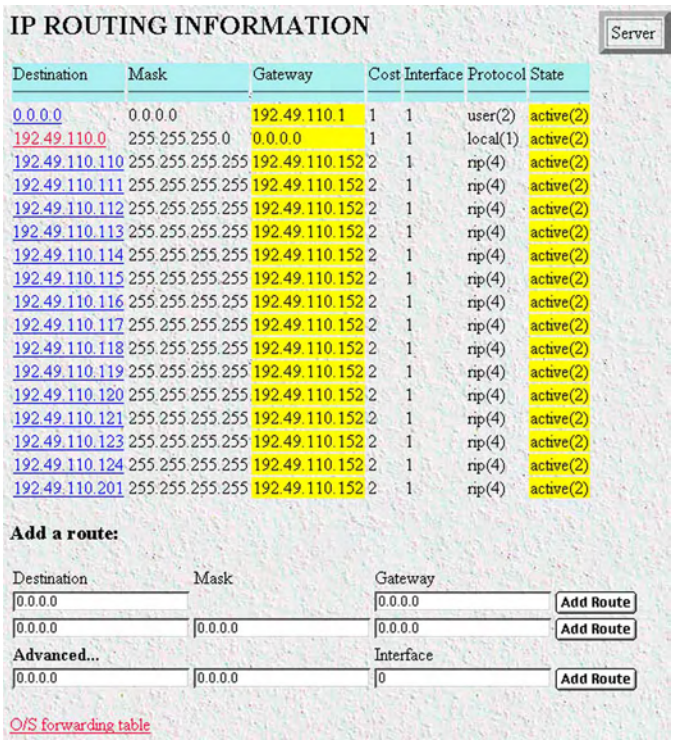


Figure 64. IP Routing Information window

The IP Routing Information window also has a link to the O/S forwarding table where the forwarding parameters are displayed ("O/S forwarding table window" on page 195).

Destination (ipRouteDest)

The destination IP address of this route. An entry with a value of 0.0.0.0 is considered a default route. Multiple routes to a single destination can appear in the table, but access to such multiple entries is dependent on the table-access mechanisms defined by the network management protocol in use.

To view or modify next-hop routing information for each destination, click on a destination link in the Destination column. For more information about modifying next-hop routing information settings, refer to "IP Routing Destination window" on page 197.

Mask (ipRouteMask)

Indicates the mask to be logical-ANDed with the destination address before being compared to the value in the ipRouteDest field. For those systems that do not support arbitrary subnet masks, an agent constructs the value of the ipRouteMask by determining whether the value of the corresponding ipRouteDest field belongs to a Class A, B, or C network, and then using the appropriate mask from table 3.

Table 3. Masks

Mask	Network
255.0.0.0	class-A
255.255.0.0	class-B
255.255.255.0	class-C

Gateway (RouteGateway)

Specifies the IP address to which the packets should be forwarded.

Cost (RouteCost)

This is the cost of the route as defined by RIP standards. Cost is sometimes considered to be number of hops. A cost of 16 is considered to be infinite. A cost can be given to user-entered routes so their preference in relation to learned routes can be calculated.

Interface (ipRouteIfIndex)

The index value that identifies the local interface through which the next hop of this route should be reached. The interface identified by a particular value of this index is the same interface as identified by the same value of ifIndex.

State (RouteState)

- invalid(1)—This setting deletes the route.
- active(2)—A valid route is in use.
- nopath(3)—No route is available to the specified gateway. The gateway is not known to local networks.
- agedout(4)—Invalid route (soon to be removed).
- costly(5)—A valid route, but not in use because of it's higher cost.

Add a route:

This portion of the IP Routing Information window is where you can add a new route to the IP Routing Information table. The first entry (see figure 65) can be used to add or change the default gateway or as a short-cut to creating a point-to-point connection. The second entry under Add a route: (see figure 65) is where static routes to remote networks or a specific remote host are created.

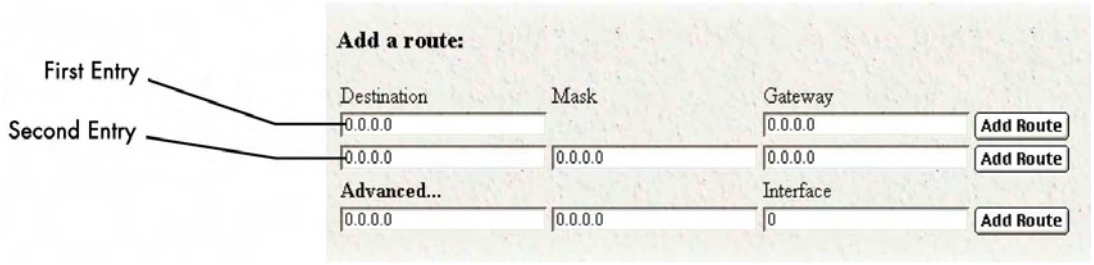


Figure 65. *Add a route* portion of *IP Routing Information* window

Adding the default gateway

Do the following:

1. Type the IP address of the host that serves as a gateway for your local network in the Gateway column of the first entry.
2. Click **Add Route**.

Adding a point-to-point route

Do the following:

1. Under Destination in the first entry, type the IP address of the remote host to which you want make a point-to-point connection.
2. Under Gateway, type the IP address of the host that will be forwarding packets to the IP address you entered in the Destination field in step 1.
3. Click **Add Route**.

> **Note** The appropriate subnet mask (255.255.255.255) for a point-to-point route will automatically be added for you.

Adding a static point-to-point route to a remote host

Do the following:

1. Under Destination in the second entry, type the IP address of the remote host to which you want to make a point-to-point connection.
2. Type *255.255.255.255* for the subnet mask.
3. Under Gateway, type the IP address of the host that will be forwarding packets to the IP address you entered in the Destination field in step 1.
4. Click **Add Route**.

Adding a static routes to a remote network

Do the following:

1. Under Destination, type the IP address of the remote network for which you want to provide a static route.
2. Type the appropriate subnet mask in the Mask field.
3. Under Gateway, type the IP address of the host that will be forwarding packets to the network you entered in the Destination field in step 1.
4. Click **Add Route**.

Note If the destination and subnet mask are incompatible or the Gateway address is not entered an error screen will appear.

Examples of correct and incorrect routes are shown in table 4.

Table 4. Examples of IP routes

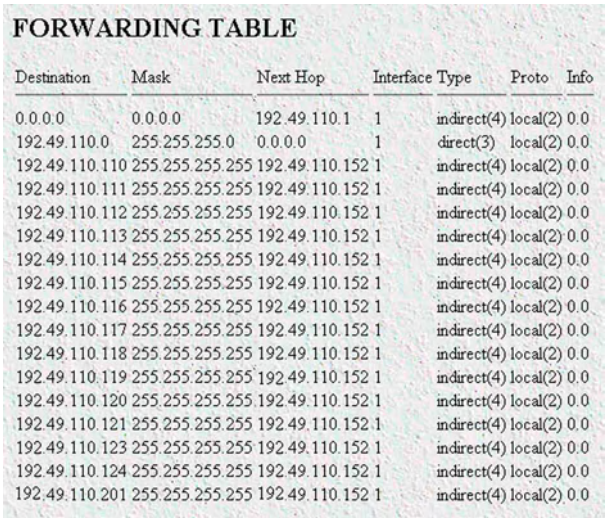
Examples of correct entries		Examples of incorrect entries	
Destination	**Mask**	**Destination**	**Mask**
192.10.10.11	255.255.255.255	192.10.10.11	255.255.255.0
192.10.10.0	255.255.255.0		
178.3.4.32	255.255.255.224		
178.3.4.16	255.255.255.240	178.3.4.16	255.255.255.224

Advanced...

Enables a route to be attached to an interface. Packets to a network will be routed to that interface, allowing the gateway IP address to be dynamic.

O/S forwarding table window

The O/S forwarding table window lists forwarding information for all routes.



FORWARDING TABLE

Destination	Mask	Next Hop	Interface	Type	Proto	Info
0.0.0.0	0.0.0.0	192.49.110.1	1	indirect(4)	local(2)	0.0
192.49.110.0	255.255.255.0	0.0.0.0	1	direct(3)	local(2)	0.0
192.49.110.110	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.111	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.112	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.113	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.114	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.115	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.116	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.117	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.118	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.119	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.120	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.121	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.123	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.124	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0
192.49.110.201	255.255.255.255	192.49.110.152	1	indirect(4)	local(2)	0.0

Figure 66. IP Routing Forwarding Table

Destination (ipRouteDest)

The destination IP address of this route. An entry with a value of 0.0.0.0 is considered a default route. Multiple routes to a single destination can appear in the table, but access to such multiple entries is dependent on the table-access mechanisms defined by the network management protocol in use.

Mask (ipRouteMask)

Indicates the mask to be logical-ANDed with the destination address before being compared to the value in the ipRouteDest field. For those systems that do not support arbitrary subnet masks, an agent constructs the value of the ipRouteMask by determining whether the value of the correspondent ipRouteDest field belongs to a Class A, B, or C network, and then using the appropriate mask from table 3 on page 192.

Next Hop (ipRouteNextHop)

The IP address of the next hop of this route. (In the case of a route bound to an interface which is realized via a broadcast media, the value of this field is the agent's IP address on that interface.)

Interface (ipRouteIfIndex)

The index value that identifies the local interface through which the next hop of this route should be reached. The interface identified by a particular value of this index is the same interface as identified by the same value of ifIndex.

Type (ipRouteType)

One of the following route types:

- other(1)—none of the following
- invalid(2)—an invalidated route

- direct(3)—route to directly connected (sub-)network
- indirect(4)—route to a non-local host/network/sub-network

Note The values direct(3) and indirect(4) refer to the notion of direct and indirect routing in the IP architecture.

Note Setting this object to the value invalid(2) has the effect of invalidating the corresponding entry in the ipRouteTable object. That is, it effectively disassociates the destination identified with said entry from the route identified with said entry. It is an implementation-specific matter as to whether the agent removes an invalidated entry from the table. Accordingly, management stations must be prepared to receive tabular information from agents that corresponds to entries not currently in use. Proper interpretation of such entries requires examination of the relevant ipRouteType object.

Protocol (ipRouteProto)

The routing mechanism via which this route was learned. Inclusion of values for gateway routing protocols is not intended to imply that hosts must support those protocols.

- unknown(0)
- local(1)—Added by the access server to support an interface. For example, adding a route for a new dial-in user.
- user(2)—Added by an administrator on the IP Routing Information table or via SNMP management tools.
- dspf(3)—Not currently implemented.
- rip(4)—Learned via reception of RIP packet.
- icmp(5)—Learned via reception of ICMP packet.
- radius(6)—Provided in RADIUS response packet.

Info (ipRouteInfo)

A reference to MIB definitions specific to the particular routing protocol which is responsible for this route, as determined by the value specified in the route's ipRouteProto value. If this information is not present, its value should be set to the OBJECT IDENTIFIER { 0 0 }, which is a syntactically valid object identifier, and any conformant implementation of ASN.1 and BER must be able to generate and recognize this value.

IP Routing Destination window

The IP Routing Destination window (see figure 67) shows next-hop routing information. Clicking on a Destination in the IP Routing Information window displays this window.

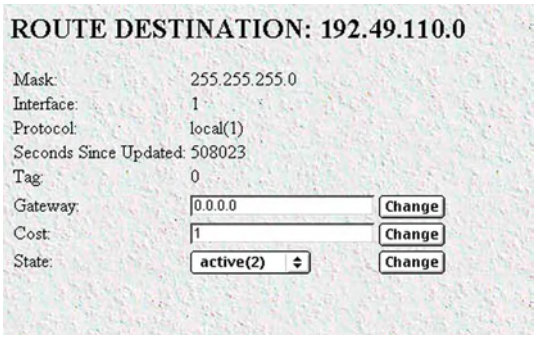


Figure 67. Routing Destination window

Route Destination (ipRouteDest)

The destination IP address of this route. An entry with a value of 0.0.0.0 is considered a default route. Multiple routes to a single destination can appear in the table, but access to such multiple entries is dependent on the table-access mechanisms defined by the network management protocol in use.

Mask (ipRouteMask)

Indicates the mask to be logical-ANDed with the destination address before being compared to the value in the ipRouteDest field. For those systems that do not support arbitrary subnet masks, an agent constructs the value of the ipRouteMask by determining whether the value of the corresponding ipRouteDest field belongs to a Class A, B, or C network, and then using the appropriate mask from table 3 on page 192.

Interface (ipRouteIfIndex)

The index value which uniquely identifies the local interface through which the next hop of this route should be reached. The interface identified by a particular value of this index is the same interface as identified by the same value of ifIndex.

Protocol (ipRouteProto)

The routing mechanism via which this route was learned. Inclusion of values for gateway routing protocols is not intended to imply that hosts must support those protocols.

- unknown(0)
- local(1)—Added by the access server to support an interface. For example, adding a route for a new dial-in user.
- user(2)—Added by an administrator on the IP Routing Information table or via SNMP management tools.
- dspf(3)—Not currently implemented.
- rip(4)—Learned via reception of RIP packet.

- icmp(5)—Learned via reception of ICMP packet.
- radius(6)—Provided in RADIUS response packet.

Seconds Since Updated (ipRouteAge)
The number of seconds since this route was last updated or otherwise determined to be correct.

Tag (RouteTag)
An identifier associated with the route. This can have different meanings depending on the protocol. For example, this gives the tag that was passed with a learned RIP route.

Gateway (RouteGateway)
Specifies the IP address to which the packets should be forwarded.

Cost (RouteCost)
This is the cost of the route as defined by RIP standards. Cost is sometimes considered to be number of hops. A cost of 16 is considered to be infinite. A cost can be given to user-entered routes so their preference in relation to learned routes can be calculated.

State (RouteState)
Defines the state which a route may be in during its lifetime.

- invalid(1)—This setting deletes the route.
- active(2)—A valid route is in use.
- nopath(3)—No route is available to the specified gateway. The gateway is not known to local networks.
- agedout(4)—Invalid route (soon to be removed).
- costly(5)—A valid route, but not in use because of it's higher cost.

Address Translation Information

The IP address translation table window (see figure 68) contain the IP address to physical address equivalences. Some interfaces do not use translation tables for determining address equivalences (for example, DDN-X.25 uses an algorithmic method)—if all interfaces are of this type, then the Address Translation table is empty (zero entries).

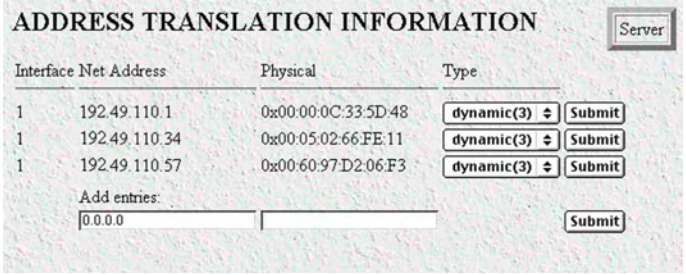


Figure 68. Address Translation Information window

Interface (ipNetToMediaEntry)
Each entry contains one IP address to physical address equivalence.

Net Address (ipNetToMediaNetAddress)
The IP address corresponding to the media-dependent physical address.

Physical (ipNetToMediaPhysAddress)
The media-dependent physical address.

Type (ipNetToMediaType)
The type of mapping. Setting this object to the value invalid(2) has the effect of invalidating the corresponding entry in the ipNetToMediaTable. That is, it effectively disassociates the interface identified with said entry from the mapping identified with said entry. It is an implementation-specific matter as to whether the agent removes an invalidated entry from the table. Accordingly, management stations must be prepared to receive tabular information from agents that corresponds to entries not currently in use. Proper interpretation of such entries requires examination of the relevant ipNetToMediaType object.

- other(1)—none of the following
- invalid(2)—an invalidated mapping
- dynamic(3)—created by access server
- static(4)—created by administrator

Chapter 16 MFR Version 2

Chapter contents

Introduction

The MFR Version 2 window (see figure 69) contains objects for networks that use Signalling System R2. (To set up R2 Signalling in the access server, refer to Recommendations Q.400—Q.490 *and* to the host country's PTT for national signalling specifications).

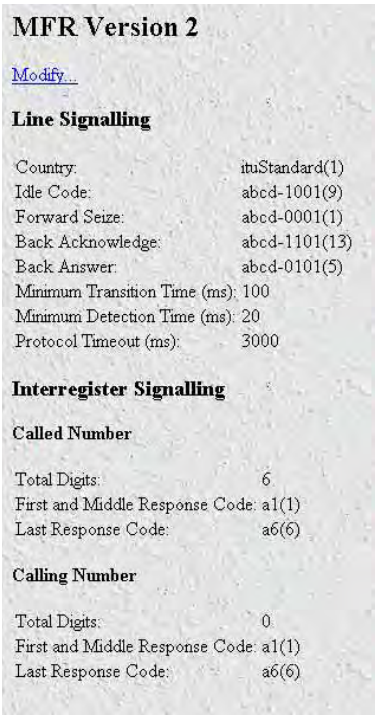


Figure 69. MFR Version 2 main window

Click on MFR Version 2 under the Configuration Menu to display the MFR Version 2 main window.

MFR Version 2 main window

The MFR Version 2 window displays parameters for networks that use Signalling System R2. The MFR Version 2 window also has the Modify link that you can click to modify Line Signalling parameters (see "MFR Version 2—Modify" on page 204).

Line Signalling

This portion of the MFR Version 2 main window contains information described in the following sections.

Country (lineSigCountry)

Displays a particular country or itu Standard. Custom allows for any values in the following fields (Line Signalling objects are country-specific. Please refer to the host country's PTT for national signalling specifications).

Idle Code (lineSigIdleCode)

Code to indicate that a line is in use.

Forward Seize (lineSigForwardSeize)
Code to indicate there is a desire to use a line.

Back Acknowledge (lineSigBackAck)
Code to indicate there is an agreement to use a line.

Back Answer (lineSigBackAnswer)
Code to indicate a call has been completed.

Minimum Transition Time (lineSigMinTransTime)
The minimum transition time in milliseconds.

Minimum Detection Time (lineSigMinDetectTime)
The minimum detect time in milliseconds.

Protocol Timeout (lineSigProtoTimeout)
The time for a protocol timeout in milliseconds.

Interregister Signalling

This portion of the MFR Version 2 main window contains information described in the following sections.

Called Number
Total Digits (interRegCalledNumDig). The number of digits expected for the called number.

First and Middle Response Code (interRegCalledNumFirst). The code specifying what is done after every digit is sent except the last for the called number.

Last Response Code (interRegCalledNumLast). The code specifying what is done after the last digit is sent for the called number.

Calling Number
Total Digits (interRegCallingNumDig). The number of digits expected for the calling number.

First and Middle Response Code (interRegCallingNumFirst). The code specifying what is done after every digit is sent except the last for the calling number.

Last Response Code (interRegCallingNumLast). The code specifying what is done after the last digit is sent for the calling number.

MFR Version 2—Modify

In the MFR Version 2 Modify window (see figure 70) you can modify Line Signalling parameters. The Line Signalling parameters are link-by-link digital signals that use two signalling channels in each direction per circuit.

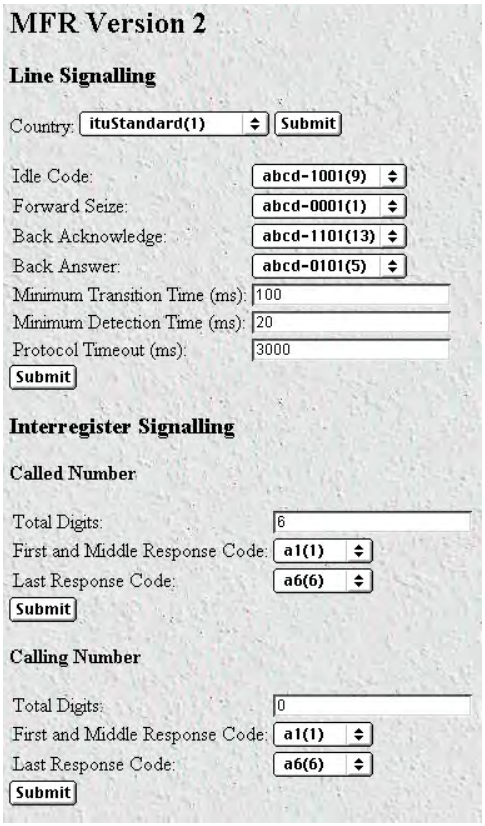


Figure 70. MFR Version 2 Modify window

Line Signalling

This portion of the MFR Version 2—Modify window contains information described in the following sections.

Set the access server objects based upon codes that pertain to Idle, Seized, Answered, Clear-back, Release, and Blocked conditions.

Note Line Signalling setup codes are country-specific. Please refer to Recommendation Q.400 -Q.490 and to the host country's PTT for national signalling specifications.

Country (lineSigCountry)

Specifying a particular country or itu Standard defines the values of the remaining fields based on the specs. Custom allows for any values in the following fields (Line Signalling objects are country-specific. Please refer to the host country's PTT for national signalling specifications).

- ituStandard(1)
- custom(2)
- mexicoModified(3)
- czechRepublic(4)
- pbxDropOut(5)
- brazil(6)
- chinaRI(7)
- southAfrica(8)
- india(9)

Idle Code (lineSigIdleCode)

Code to indicate that a line is in use.

- abcd-0000(0)
- abcd-0001(1)
- abcd-0010(2)
- abcd-0011(3)
- abcd-0100(4)
- abcd-0101(5)
- abcd-0110(6)
- abcd-0111(7)
- abcd-1000(8)
- abcd-1001(9)
- abcd-1010(10)
- abcd-1011(11)
- abcd-1100(12)
- abcd-1101(13)
- abcd-1110(14)
- abcd-1111(15)

Forward Seize (lineSigForwardSeize)
Code to indicate there is a desire to use a line.

- abcd-0000(0)
- abcd-0001(1)
- abcd-0010(2)
- abcd-0011(3)
- abcd-0100(4)
- abcd-0101(5)
- abcd-0110(6)
- abcd-0111(7)
- abcd-1000(8)
- abcd-1001(9)
- abcd-1010(10)
- abcd-1011(11)
- abcd-1100(12)
- abcd-1101(13)
- abcd-1110(14)
- abcd-1111(15)

Back Acknowledge (lineSigBackAck)
Code to indicate there is an agreement to use a line.

- abcd-0000(0)
- abcd-0001(1)
- abcd-0010(2)
- abcd-0011(3)
- abcd-0100(4)
- abcd-0101(5)
- abcd-0110(6)
- abcd-0111(7)
- abcd-1000(8)
- abcd-1001(9)
- abcd-1010(10)
- abcd-1011(11)

- abcd-1100(12)
- abcd-1101(13)
- abcd-1110(14)
- abcd-1111(15)

Back Answer (lineSigBackAnswer)
Code to indicate a call has been completed.

- abcd-0000(0)
- abcd-0001(1)
- abcd-0010(2)
- abcd-0011(3)
- abcd-0100(4)
- abcd-0101(5)
- abcd-0110(6)
- abcd-0111(7)
- abcd-1000(8)
- abcd-1001(9)
- abcd-1010(10)
- abcd-1011(11)
- abcd-1100(12)
- abcd-1101(13)
- abcd-1110(14)
- abcd-1111(15)

Minimum Transition Time (lineSigMinTransTime)
The minimum transition time in milliseconds.

Minimum Detection Time (lineSigMinDetectTime)
The minimum detect time in milliseconds.

Protocol Timeout (lineSigProtoTimeout)
The time for a protocol timeout in milliseconds.

Interregister Signalling

The Interregister Signalling parameters are end-to-end 2-out-of-6 in-band code signals that use backward and forward-compelled signalling. Set the access server objects based upon codes that pertain to Forward Line Signals, Forward Register Signals, Backward Line, and Backward Register Signals.

Note Interregister Signalling setup codes are country-specific. Please refer to Recommendation Q.400 -Q.490 and to the host country's PTT for national signalling specifications.

Called Number

Total Digits (interRegCalledNumDig). The number of digits expected for the called number.

First and Middle Response Code (interRegCalledNumFirst). The code specifying what is done after every digit is sent except the last for the called number.

- a1(1)
- a2(2)
- a3(3)
- a4(4)
- a5(5)
- a6(6)
- a7(7)
- a8(8)
- a9(9)
- a10(10)
- a11(11)
- a12(12)
- a13(13)
- a14(14)
- a15(15)

Last Response Code (interRegCalledNumLast). The code specifying what is done after the last digit is sent for the called number.

- a1(1)
- a2(2)
- a3(3)
- a4(4)
- a5(5)
- a6(6)
- a7(7)
- a8(8)
- a9(9)

- a10(10)
- a11(11)
- a12(12)
- a13(13)
- a14(14)
- a15(15)

Calling Number

Total Digits (interRegCallingNumDig). The number of digits expected for the calling number. If an a15 tone will be sent after all the calling number digits are sent, set the total digits to a large number (for example, 30). The access server will send the last response code when it sees the a15 tone

First and Middle Response Code (interRegCallingNumFirst). The code specifying what is done after every digit is sent except the last for the calling number.

- a1(1)
- a2(2)
- a3(3)
- a4(4)
- a5(5)
- a6(6)
- a7(7)
- a8(8)
- a9(9)
- a10(10)
- a11(11)
- a12(12)
- a13(13)
- a14(14)
- a15(15)

Last Response Code (interRegCallingNumLast). The code specifying what is done after the last digit is sent for the calling number.

- a1(1)
- a2(2)
- a3(3)
- a4(4)

- a5(5)
- a6(6)
- a7(7)
- a8(8)
- a9(9)
- a10(10)
- a11(11)
- a12(12)
- a13(13)
- a14(14)
- a15(15)

Chapter 17 RIP Version 2

Chapter contents

Introduction

The RIP Version 2 main window (see figure 71) describes routing information as defined by the Routing Information Protocol (RIP). All object identifiers described in this chapter comply with those contained in *RFC 1389: RIP Version 2 MIB Extension*.

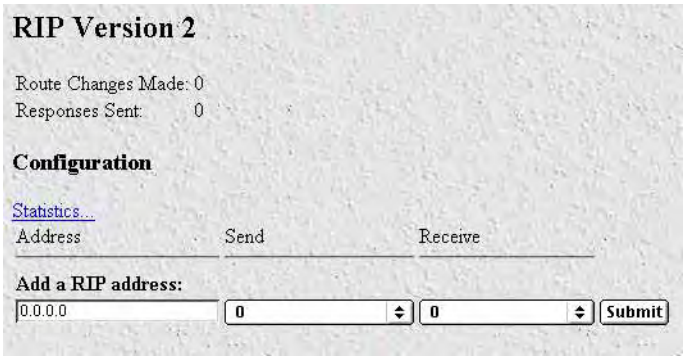


Figure 71. RIP Version 2 window

Click on RIP Version 2 under the Configuration Menu to display the RIP Version 2 main window.

RIP Version 2 main window

The RIP Version 2 window describes routing information as defined by the Routing Information Protocol (RIP). The window also contains the following links:

- Statistics (xxx.xx.xxx.xxx)—Clicking on the link under the Address column displays the RIP Version 2 Status window (see "RIP Version 2 (Statistics)" on page 216) where you can view routing and update information for each subnet address
- Address—Clicking on this link displays the RIP Version 2 Configuration window (see "RIP Version 2—Configuration" on page 215). This window is where you can configure objects for each subnet address including authentication method, RIP Version 1 or Version 2 compatibility, and metric value.

Route Changes Made (rip2GlobalRouteChanges)

The number of route changes made to the IP Route Database by RIP. This does not include the refresh of a route's age.

Responses Sent (rip2GlobalQueries)

The number of responses sent to RIP queries from other systems.

Address (rip2IfConfAddress)

The IP address of the interface on the access server.

Send (rip2IfConfSend)

The types of RIP packets the router sends on this interface.

- doNotSend (1)
- ripVersion1 (2)—Send RIP updates compliant with RFC 1058

- rip1Compatible (3)—Broadcast RIP-2 updates using RFC 1058 route subsumption rules
- ripVersion2 (4)—Send multicasting RIP-2 updates

Receive (rip2IfConfReceive)

This indicates which version of RIP updates are to be accepted. Note that rip2 and rip1OrRip2 implies reception of multicast packets.

- rip1 (1)—Accept RIP updates compliant with RFC 1058
- rip2 (2)—Accept multicasting RIP-2 updates
- rip1OrRip2 (3)—Accept both
- doNotRecieve (4)

Adding a RIP address

Do the following:

1. Enter the IP network address of the interface on the access server that you want to enable RIP. This is *not* the IP address of the device you want to direct RIP packets to.
2. Enter the protocol version to be used for sending RIP packets. The following choices are available:
   - doNotSend (1)
   - ripVersion1 (2)—Broadcasting RIP updates compliant with RFC 1058
   - rip1Compatible (3)—Broadcasting RIP-2 updates using RFC 1058 route subsumption rules
   - ripVersion2 (4)—Multicasting RIP-2 updates
3. Enter the protocol version to be used for receiving RIP packets. The following choices are available (note that rip2 and rip1OrRip2 implies reception of multicast packets):
   - rip1 (1)—Accept RIP updates compliant with RFC 1058
   - rip2(2)—Accept multicasting RIP-2 updates
   - rip1Orrip2(3)—Accept both
   - doNotReceive(4)
4. Click on **Submit**.

Further modifications can be made by clicking on the Address link of the specific subnet (see "RIP Version 2—Configuration").

RIP Version 2—Configuration

The RIP Version 2 Configuration window (see figure 72) shows objects for each subnet address including authentication method, RIP Version 1 or Version 2 compatibility, and metric value.

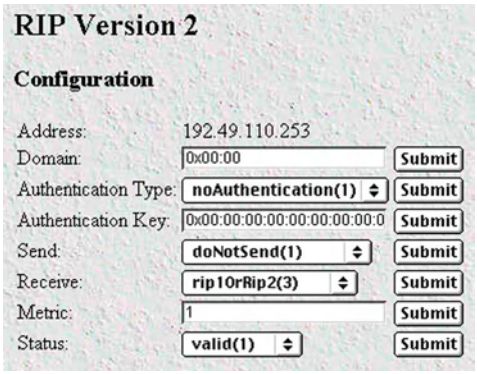


Figure 72. RIP Version 2—Statistics Configuration window

Address (rip2IfConfAddress)

The IP address of the interface on the access server.

Domain (rip2IfConfDomain)

Value inserted into the Routing Domain field of all RIP packets sent on this interface.

Authentication Type (rip2IfConfAuthType)

The type of Authentication used on this interface.

- noAuthentication (1)
- simplePassword (2)

Authentication Key (rip2IfConfAuthKey)

The value to be used as the Authentication Key whenever the corresponding instance of rip2IfConfAuthType has a value other than authentication. A modification of the corresponding instance of rip2IfConfAuthType does not modify the rip2IfConfAuthKey value. If a string shorter than 16 octets is supplied, it will be left-justified and padded to 16 octets, on the right, with nulls (0x00).

Reading this object always results in an OCTET STRING of length zero; authentication may not be bypassed by reading the MIB object.

Send (rip2IfConfSend)

The types of RIP packets the router sends on this interface.

- doNotSend (1)
- ripVersion1 (2)—Send RIP updates compliant with RFC 1058
- rip1Compatible (3)—Broadcast RIP-2 updates using RFC 1058 route subsumption rules
- ripVersion2 (4)—Send multicasting RIP-2 updates

Receive (rip2IfConfReceive)

This indicates which version of RIP updates are to be accepted. Note that rip2 and rip1OrRip2 implies reception of multicast packets.

- rip1 (1)—Accept RIP updates compliant with RFC 1058
- rip2 (2)—Accept multicasting RIP-2 updates
- rip1OrRip2 (3)—Accept both
- doNotRecieve (4)

Metric (rip2IfConfDefaultMetric)

This variable indicates the metric that is to be used for the default route entry in RIP updates originated on this interface. A value of zero indicates that no default route should be originated; in this case, a default route via another router may be propagated.

Status (rip2IfConfStatus)

Choosing invalid has the effect of deleting this interface.

- valid (1)
- invalid (2)

RIP Version 2 (Statistics)

The RIP Version 2 Status window (see figure 73) displays routing and update information for each subnet address.

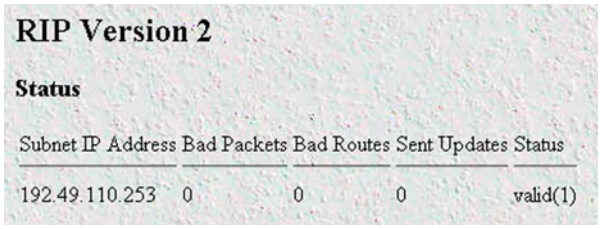


Figure 73. RIP Version 2 details window

Subnet IP Address (rip2IfStatAddress)

The IP address of the interface on the access server.

Bad Packets (rip2IfStatRcvBadPackets)

The number of RIP response packets received by the RIP process which were subsequently discarded for any reason (e.g. a version 0 packet, or an unknown command type).

Bad Routes (rip2IfStatRcvBadRoutes)

The number of routes, in valid RIP packets, which were ignored for any reason (e.g. unknown address family, or invalid metric).

Sent Updates (rip2IfStatSentUpdates)

The number of triggered RIP updates actually sent on this interface. This explicitly does NOT include full updates sent containing new information.

Status (rip2IfStatStatus)

Indicates validity of this interface.

Chapter 18 SNMP

Chapter contents

Introduction

The access server provides management and statistical information on SNMP. Detailed information on the SNMP MIB variables are found in *RFC 1213: Management Information Base for Network Management of TCP/IP-based internets: MIB-II*. Select SNMP from the access server Configuration Menu to monitor SNMP statistics. Click on SNMP under the Configuration Menu to display the SNMP window (see figure 74).

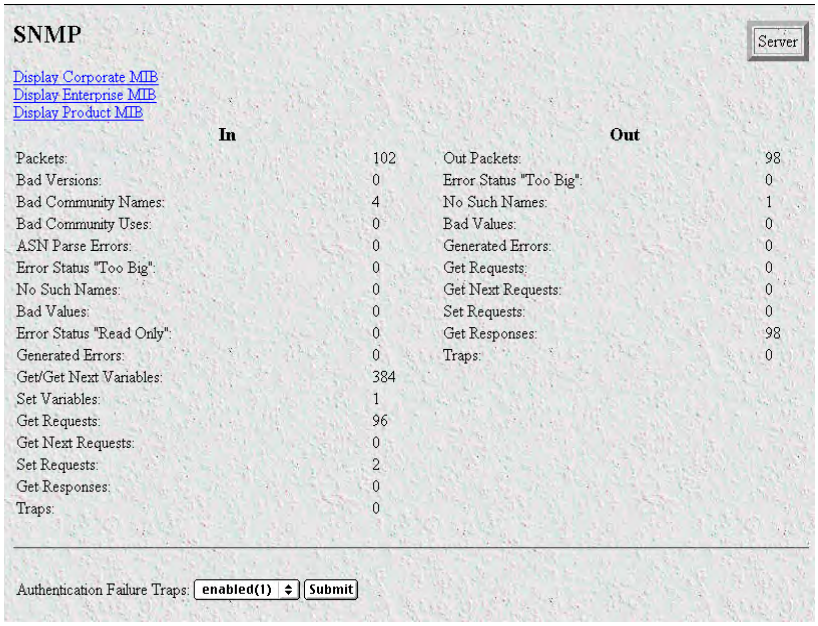


Figure 74. SNMP window

SNMP window

The SNMP window displays incoming and outgoing SNMP statistics, and has links for downloading and displaying the following MIB documents:

- Corporate MIB—defines overall structure of the RAS MIB
- Enterprise MIB—defines MIB variables applicable to a group of products
- Product MIB—defines MIB variables specific to a particular product

The access server also supports MIB variables defined in the following RFCs:

- *1155—Structure and Identification of Management Information for TCP/IP-based Internets*
- *1213—Management Information Base for Network Management of TCP/IP-based Internets: MIB-II*
- *1315—Management Information Base for Frame Relay DTEs*
- *1389—RIP Version 2 MIB Extension*
- *1406—Definitions of Managed Objects for the DS1 and E1 Interface Types*
- *1643—Definitions of Managed Objects for the Ethernet-like Interface Types*

In

Packets (snmpInPkts)
The total number of Messages delivered to the SNMP entity from the transport service.

Bad Version (snmpInBadVersions)
The total number of SNMP Messages that were delivered to the SNMP protocol entity and were for an unsupported SNMP version.

Bad Community Names (snmpInBadCommunityNames)
The total number of SNMP Messages delivered to the SNMP protocol entity which used a SNMP community name not known to said entity.

Bad Community Uses (snmpInBadCommunity)
The total number of SNMP messages delivered to the SNMP protocol entity which represented an SNMP operation which was not allowed by the SNMP community named in the message.

ASN ParseErrors (snmpInASNParseErrs)
The total number of ASN.1 or BER errors encountered by the SNMP protocol entity when decoding received SNMP messages.

Error Status "Too Big" (snmpInTooBigs)
The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is *tooBig*.

No Such Names (snmpInNoSuchNames)
The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is *noSuchName*.

Bad Values (snmpInBadValues)
The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is *badValue*.

Error Status "Read Only" (snmpInReadOnlys)
The total number of valid SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is *readOnly*. It should be noted that it is a protocol error to generate an SNMP PDU which contains the readOnly value in the error-status field, as such this object is provided as a means of detecting incorrect implementations of the SNMP.

Generated Errors (snmpInGenErrs)
The total number of SNMP PDUs that were delivered to the SNMP protocol entity and for which the value of the error-status field is *genErr*.

Get/Get Next Variables (snmpInTotalReqVars)
The total number of MIB objects that have been retrieved successfully by the SNMP protocol entity as the result of receiving valid SNMP Get-Request and Get-Next PDUs.

Set Variables (snmpInTotalSetVars)
The total number of MIB objects that have been altered successfully by the SNMP protocol entity as the result of receiving valid SNMP Set-Request PDUs.

Get Requests (snmpInGetRequests)
The total number of SNMP Get-Request PDUs that have been accepted and processed by the SNMP protocol entity.

Get Next Requests (snmpInGetNexts)
The total number of SNMP Get-Next PDUs that have been accepted and processed by the SNMP protocol entity.

Set Requests (snmpInSetRequests)
The total number of SNMP Set-Request PDUs that have been accepted and processed by the SNMP protocol entity.

Get Responses (snmpInGetResponses)
The total number of SNMP Get-Response PDUs that have been accepted and processed by the SNMP protocol entity.

Traps (snmpInTraps)
The total number of SNMP Trap PDUs that have been accepted and processed by the SNMP protocol entity.

Out

Out Packets (snmpOutPkts)
The total number of SNMP messages that were passed from the SNMP protocol entity to the transport service.

Error Status "Too Big" (snmpOutTooBigs)
The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status field is *tooBig*.

No Such Names (snmpOutNoSuchNames)
The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status is *noSuchName*.

Bad Values (snmpOutBadValues)
The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status field is *badValue*.

Generated Errors (snmpOutGenErrs)
The total number of SNMP PDUs that were generated by the SNMP protocol entity and for which the value of the error-status field is *genErr*.

Get Requests (snmpOutGetRequests)
The total number of SNMP Get-Request PDUs that have been generated by the SNMP protocol entity.

Get Next Requests (snmpOutGetNexts)
The total number of SNMP Get-Next PDUs that have been generated by the SNMP protocol entity.

Set Requests (snmpOutSetRequests)
The total number of SNMP Set-Request PDUs that have been generated by the SNMP protocol entity.

Get Responses (snmpOutGetResponses)
The total number of SNMP Get-Response PDUs that have been generated by the SNMP protocol entity.

Traps (snmpOutTraps)
The total number of SNMP Trap PDUs that have been generated by the SNMP protocol entity.

Authentication Failure Traps (snmpEnableAuthenTraps)
Indicates whether the SNMP agent process is permitted to generate authentication-failure traps. The value of this object overrides any configuration information; as such, it provides a means whereby all authentication-failure traps may be disabled.

- enable (1)
- disable (2)

Using SNMP with the Access Server

SNMP is used to configure and monitor the access server. There are numerous third-party software applications available that are capable of using SNMP to control the access server.

To interact with the access server, these network management applications need:

- A community string which determines their level of access to the access server
- An object identifier which identifies the specific parameter the application wants to view or modify

SNMP has two levels of access:

- Read-only, for which the community string is the user password
- Read/write, for which the community string is the superuser password

Object identifiers (OIDs) comprise a series of integers separated by dots that identify a specific parameter (for example, 1.3.6.1.4.1.1768.5.25).

The series of integers are built by traversing down a tree structure (see figure 76 on page 225). As a decision is made at each branch of the tree structure, a new integer (identifying the branch chosen) is added to the object identifier. When the last branch is selected—taking you to the desired parameter—the OID is completed.

The following sections give an example of building an OID. In the example, a customer wants to monitor the number of active calls to find out if the access server becomes full during peak hours.

Finding the SNMP Name
The Access Server Guide gives the SNMP name for each parameter that appears on the web interface.

The total number of active calls can be found on the dial-in screen. The description for that parameter gives the following information:

Figure 75. Parameter format

Finding the section of the MIB tree in which the SNMP parameter resides

Refer to figure 76 on page 225 and look at the Model LRA 2900 MIB tree. There two sections in the tree:

- The Internet standards section, identified by the shaded box surrounding it. In this section are MIBs (Management Information Base) that deal with Internet standards such as SNMP, IP, ICMP, Frame-Relay, and Ethernet. It contains parameters that could potentially be on any machine that implements these features.
- The private Black Box MIB—In this section are MIB variables that are specific to Black Box products. This section is further divided into:
  - Those variables valid for a group of products
  - Those variables valid for a Model LRA2900A

Active Calls is a product specific parameter.

Now, the OID can start to be built up. Choose the nodes that will take you to the private Black Box MIB (these nodes are shaded red in figure 76 on page 225). All private Black Box MIB variables will begin with this series (1.3.6.1.4.1.1768).

Finding the branch where the SNMP parameter resides

On the SNMP web page are links to the Black Box MIB definitions. Most of the MIBs are common to all Black Box access server products, therefore the parameter is likely to be found in the Enterprise MIB. Click on Enterprise MIB and open the file. Search for the SNMP name diActive that maps to *Active Calls*. The following entry is listed:

```
diActive OBJECT-TYPE
  SYNTAX   INTEGER
  ACCESS   read-write
  STATUS   mandatory
  DESCRIPTION "The total number of active calls."
  ::= { calldialin 25 }
```

The entry includes the name, the type, the access available, and the description of the parameter. The last line gives another part of the OID. There the diActive parameter is identified as parameter 25 under the calldialin branch. Looking at the MIB tree, the calldialin node is labeled as branch 5 (shaded green in figure 76 on page 225).

Note For the purpose of this example, figure 76 on page 225 shows parameter identifier 25 (diActive). Normally, a MIB tree shows only branches and nodes, it will not show the myriad of parameters that come under each node. Therefore, while you can use the MIB diagrams in Appendix B, "MIB trees" to map out the OID through the Enterprise node level, you will need to refer to section "Using SNMP

with the Access Server" on page 222 for help in determining where the parameter you are interested in resides.

The *calldialin* node is immediately under the *Black Box* branch, therefore the OID is 1.3.6.1.4.1.1768.5.25, as shown in figure 76 on page 225. This new OID is used by the network management software to query the RAS for the total number of active calls.

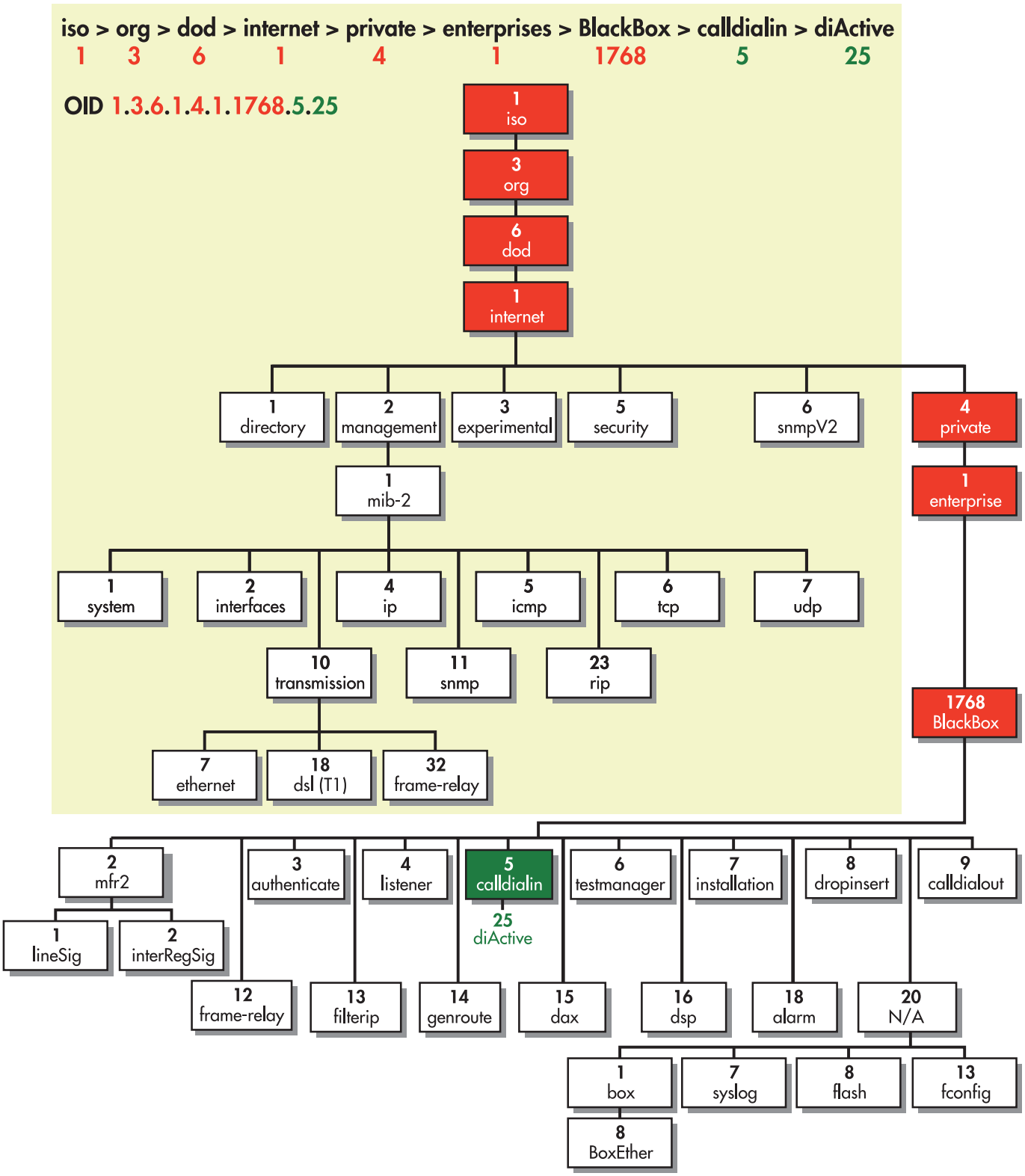


Figure 76. OID tree for Model LRA 2900 access server

Chapter 19 System

Chapter contents

Introduction

The System main window (see figure 77) contains general setup information about the access server. System parameters are Black Box Enterprise MIB object identifiers, though some are contained in *RFC 1213, Management Information Base for Network Management of TCP/IP-based internets: MIB-II*. Click on System under the Configuration Menu to display the System main window.

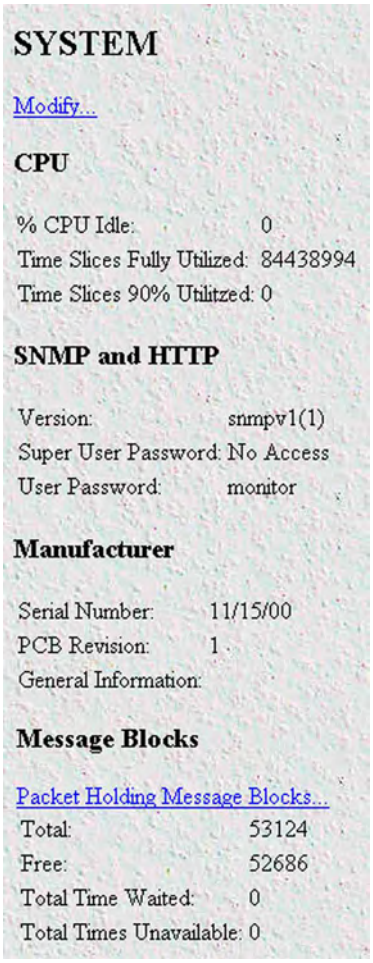


Figure 77. System main window (CPU, SNMP and HTTP, LAN IP, Manufacturer, and Message Blocks)

System main window

From this window you can view CPU, SNMP and HTTP, LAN IP, manufacturer, and message block information.

The main window also has the following links:

- Modify—click on this link to change SNMP and HTTP, LAN IP, payable features, country of installation, and other parameters (see "System—Modify window" on page 233)
- Packet Holding Message Blocks—click on this link to view message block statistics (see "System—Packet Holding Message Blocks..." on page 235)

This section describes certain CPU utilization parameters.

CPU

This portion of the System main window contains information described in the following sections (see figure 77 on page 228).

Percentage CPU Idle (boxidletime)
This indicates what percentage of the I960 CPU processing power is not being utilized.

Time Slices Fully Utilized (boxCPUcritical)
This value represents a count of how many times the CPU was fully utilized expressed in 1/100th seconds.

Time Slices 90% Utilized (boxCPUWarning)
This value represents a count of how many times the CPU approached full utilization expressed in 1/100th seconds.

SNMP and HTTP

This portion of the System main window contains information described in the following sections (see figure 77 on page 228).

Version (boxSnmpVersion)
This parameter indicates the SNMP version number supported by this unit (for example *snmpv1(1)* means SNMP version 1 is supported). SNMP2 is not currently supported.

Super User Password (boxSnmpMasterPassword)
This displays the super user password for SNMP and HTTP.

User Password (boxSnmpMonitorPassword)
This displays the user monitoring password for SNMP and HTTP.

Manufacturer

This portion of the System main window contains information described in the following sections (see figure 77 on page 228).

Serial Number (boxManufactureDatecode)
The datecode of manufacture and serial number.

PCB Revision (boxManufacturePcbRevision)
The revision of the printed circuit board.

General Information (boxManufactureGeneralInfo)
A manufacturing notes area for additional information.

Message Blocks

This portion of the System main window contains information described in the following sections (see figure 77 on page 228).

Packet Holding Message Blocks...
Buffer usage of access server message blocks based upon message block sizes.

Total (boxMsgBlksConfigured)
The total number of message blocks on the system.

Free (boxMsgBlksFree)
The number of free message blocks available.

Total Time Waited (boxCountMsgBlkTaskWait)
The number of times a CPU task had to wait for a message block.

Total Times Unavailable (boxCountMsgBlkUnavailable)
The number of times a message block was unavailable.

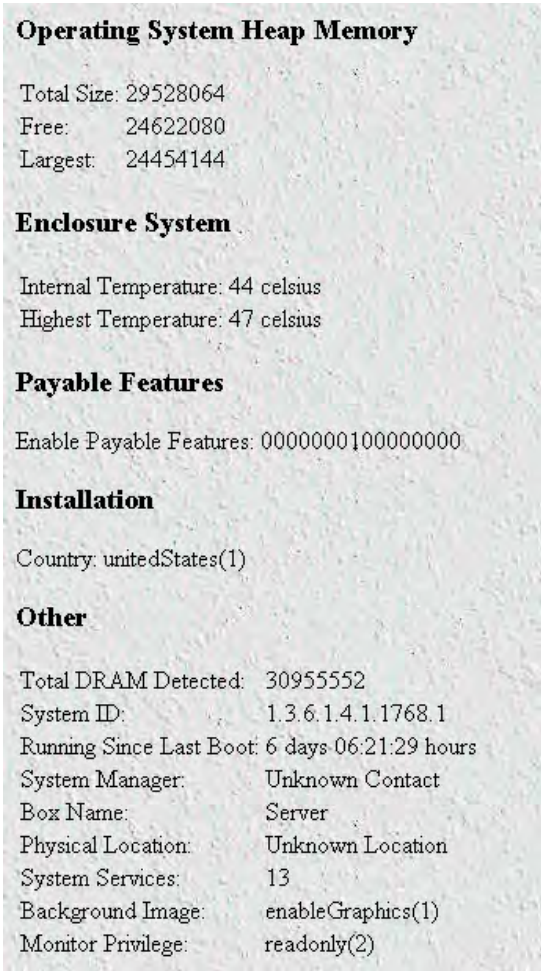


Figure 78. System main window (Operating System Heap Memory, Enclosure System, Payable Features, Installation, and Other)

Operating System Heap Memory

This portion of the System main window contains information described in the following sections (see figure 78).

Total Size (boxHeapSize)
The size of the operating system heap memory.

Free (boxHeapFreeSpace)
The amount of operating system heap memory currently available.

Largest (boxHeapLargestSpace)
The largest contiguous memory block in the memory heap.

Enclosure System

This portion of the System main window contains information described in the following sections (see figure 78 on page 230).

Internal Temperature (boxTemperature)
Displays the current temperature in celsius (centigrade).

Highest Temperature (boxMaxTemperature)
The highest temperature registered in celsius (centigrade) sinc the access server was last re-booted.

Payable features

This portion of the System main window contains information described in the following section (see figure 78 on page 230).

Enable Payable Features (boxFeatureEnableKey)
This encoded string is used to enable payable features. This feature is not currently implemented.

Installation

This portion of the System main window contains information described in the following section (see figure 78 on page 230).

Country (installCountry)
Specifies the country that the access server is installed in so it can be configured in accordance with local laws.

Other

This portion of the System main window contains information described in the following sections (see figure 78 on page 230).

Total DRAM Detected (boxDetectedMemory)
The total number of bytes of DRAM detected by the CPU

SystemID (sysObjectID)
This SNMP variable represents the type of access server being managed as defined by specification RFC1213.MIB.

Running Since Last Boot (sysUpTime)
This SNMP variable represents the time (in hundreds of seconds) since the network management portion of the system was last re-initialized, as specified in RFC1213.MIB.

System Manager (sysContact)
This SNMP variable represents the textual identification of the contact person for this managed node, together with information on how to contact this person as defined by specification RFC1213.MIB.

Box Name (sysName)
This is "An administratively assigned name for this managed node. By convention, this is the node's fully-qualified domain name." (RFC1213.MIB).

Physical Location (sysLocation)
"The physical location of this node (e.g., *telephone closet, 3rd floor*)." (RFC1213.MIB).

System Services (sysServices)
"A value which indicates the set of services that this entity primarily offers" (RFC1213.MIB).

Web Settings (boxBackgroundFlag)
The following options are available:

- disableGraphics(0)—When this option is selected, graphics on WWW pages will not be displayed. This results in faster page display times.
- enableGraphics(1)—When this option is selected, graphics on WWW pages are displayed.
- disableWeb(2)—When this option is selected, access to the WWW pages is denied for everyone.

Monitor Privilege (boxMonitorPrivilege)
Specifies the privileges given to the monitor user. Privileges can be removed or additional write access can be given beyond read-only access. The following options are available:

- none(0)—The monitor user can not log in.
- read-only(2)—This is the default setting. The monitor user can view but not change any parameters. Monitor can not view passwords.
- writeUser(18)—The monitor user can change all parameters—except passwords— under authentication, drop-and-insert, and dial-in links.
- writeUserlp(50)—The monitor user can change all parameters—except passwords— under authentication, drop-and-insert, dial-in, and IP links.
- writeUserlpWan(114)—The monitor user can change all parameters—except passwords— under authentication, drop-and-insert, dial-in, IP, T1/E1, and Frame Relay links.

- writeUserIpWanSystem(242)—The monitor user can change all parameters—except passwords— under authentication, drop-and-insert, dial-in, IP, T1/E1, Frame Relay, System, and System Log links.
- writeUserIpWanSystemUpload(498)—The monitor user can change all parameters—except passwords—under authentication, drop-and-insert, dial-in, IP, T1/E1, Frame Relay, System, and System Log links. The monitor user can also load firmware updates into the access server.

System—Modify window

The System—Modify window (see figure 79) is where you can change SNMP and HTTP, payable features, country of installation, and other parameters.

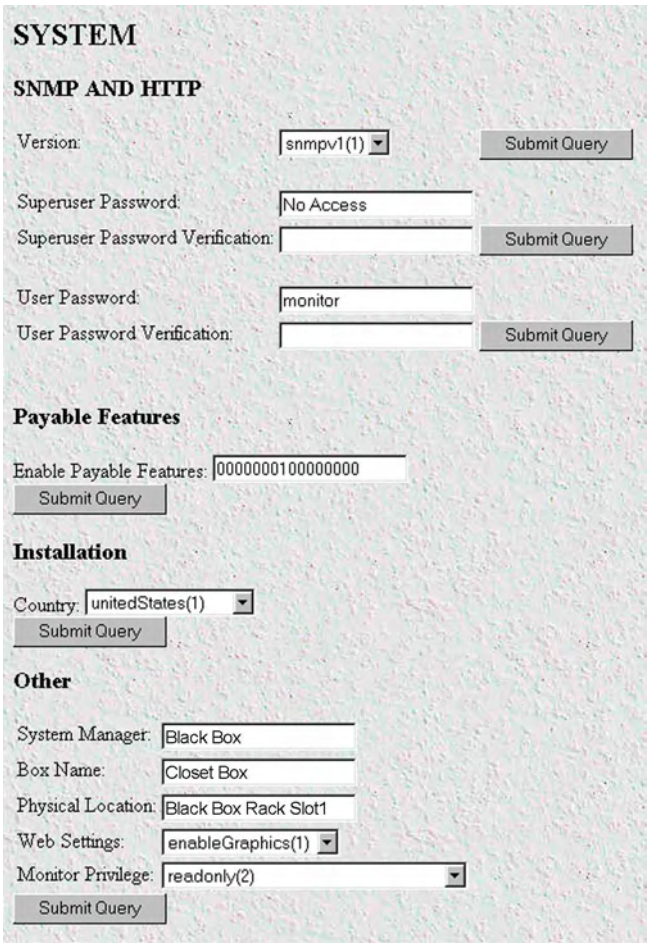


Figure 79. System—Modify window

SNMP and HTTP

This portion of the System—Modify window contains information described in the following sections.

Version (boxSnmpVersion)

This parameter selects the SNMP version number supported by this unit (see figure 79). Select *snmpv1(1)* only, SNMP2 is not currently supported.

Super User Password (boxSnmpMasterPassword)
This modifies the super user password for SNMP and HTTP (see figure 79 on page 233).

User Password (boxSnmpMonitorPassword)
This modifies the user monitoring password for SNMP and HTTP.

Payable Features

This portion of the System—Modify window contains information described in the following section.

Enable Payable Features(boxFeatureEnableKey)
Not currently implemented.

Installation

This portion of the System—Modify window contains information described in the following section.

Country (installCountry)
Specifies the country that the access server is installed in so it can be configured in accordance with local laws. The following options are available:

- other(0)
- unitedStates(1)
- australia(2)
- canada(3)
- europeanUnion(4)
- france(5)
- germany(6)

Other

This portion of the System—Modify window contains information described in the following sections.

System Manager (sysContact)
This SNMP variable represents the textual identification of the contact person for this managed node, together with information on how to contact this person as defined by specification RFC 1213.

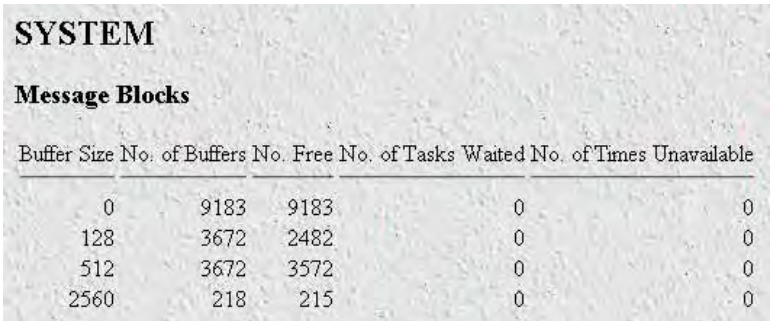
Box Name (sysName)
This is an administratively assigned name for this managed node. By convention, this is the node's fully-qualified domain name, as defined in RFC 1213.MIB.

Physical Location (sysLocation)
The physical location of this node (e.g., 'telephone closet, 3rd floor), as defined in RFC 1213.MIB.

System Services (sysServices)
A value which indicates the set of services that this entity primarily offers, as defined in RFC 1213.MIB.

System—Packet Holding Message Blocks...

The access server system manages the I960 processor utilization by allocating message blocks for data transfers. This Message Blocks window (see figure 80) buffer usage of access server message blocks based upon message block sizes.



SYSTEM

Message Blocks

Buffer Size	No. of Buffers	No. Free	No. of Tasks Waited	No. of Times Unavailable
0	9183	9183	0	0
128	3672	2482	0	0
512	3672	3572	0	0
2560	218	215	0	0

Figure 80. Packet Holding Message Blocks window

Buffer Size (boxbuffersize)

The size in bytes of the buffer.

No. of Buffers (boxbuffercount)

The number of buffers this size which are currently free for use

No. Free (boxbuffersfree)

The number of buffers this size which are currently free for use

No. of Tasks Waited (boxCountBufferTaskWait)

The number of times a task has waited for this buffer size.

No. of Times Unavailable(boxCountBufferUnavailable)

The number of times one of these buffers was unavailable.

Chapter 20 System Log

Chapter contents

Introduction

The System Log window (see figure 81) displays the results from the system-wide error reporting utility. The object parameters in the system log are all Black Box Enterprise MIB object identifiers.

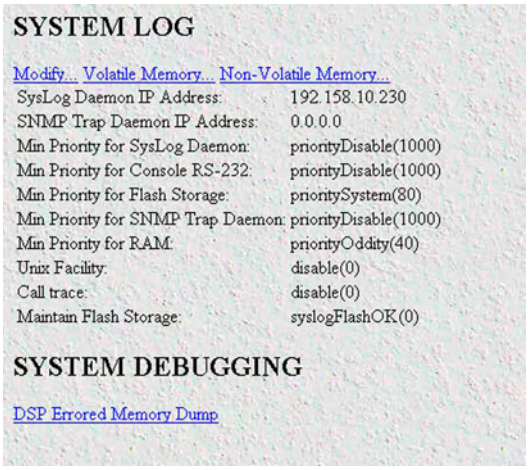


Figure 81. System Log main window

System Log Main Window

Besides displaying the results from the system-wide error reporting utility, the System Log main window also contains links to the following:

- Modify—Clicking on this link displays syslog and SNMP trap daemon locations, priority and maintenance information (see "System Log—Modify" on page 238)
- Volatile Memory—Clicking on this link displays timestamp and stored system log message information ("System Log—Volatile Memory" on page 242)
- Non-Volatile Memory—Clicking on this link displays non-volatile RAM messages for each 10ms time stamp (see "System Log—Non-Volatile Memory" on page 243)
- DSP Errored Memory Dump—Clicking on this link exports or "dumps" the DSP memory to a text file. The memory dump gives those troubleshooting the RAS information about registers and the state of the DSPs at the moment of the dump. It is intended for debugging purposes. (See "What the System Log messages are telling you" on page 243.)

Click on System Log under the Configuration Menu to display the System Log main window.

System Log—Modify

The System Log—Modify window (see figure 82) displays syslog and SNMP trap daemon locations, priority and maintenance information.

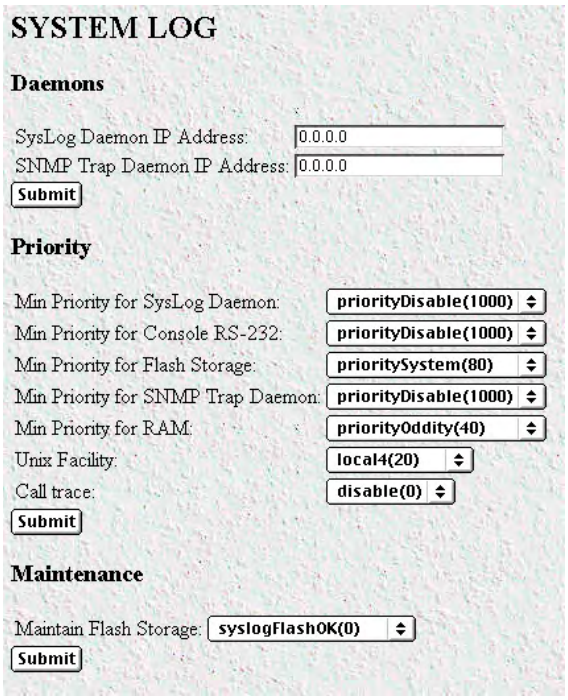


Figure 82. System Log—Modify window

Daemons

This portion of the System Log—Modify window contains information described in the following sections.

SysLog Daemon IP Address(syslogDaemonIP)

The IP address of a host system which is running a syslog daemon. System messages with a priority greater than or equal to Min. Priority for SysLog Daemon will be sent to this IP address.

SNMP Trap Daemon IP Address (syslogTrapIP)

The IP address of a host system which is running a SNMP trap daemon. System messages with a priority greater than or equal to Min. Priority for SNMPtrap Daemon will be sent to this IP address.

Priority

This portion of the System Log—Modify window contains information described in the following sections.

Min Priority for SysLog Daemon (syslogDaemonPriority)

System messages which have a priority equal to or greater than this setting will be sent to the syslog daemon defined by Syslog Daemon IP address. The lower the number next to the priority listed below, the more details

system logging will provide. PriorityVerbose will generate the most messages, while priorityDisable will turn off all messages.

- priorityVerbose(5)
- priorityDebug(10)
- priorityInfo(20)
- priorityOddity(40)
- priorityService(60)
- prioritySystem(80)
- priorityDisable(1000)

Min Priority for Console RS-232 (syslogConsolePriority)

System messages which have a priority equal to or greater than this setting will be printed directly to the RS-232 configuration port. Messages will be printed regardless of the current operating state of the RS-232 configuration port. If a manager is logged into the RS-232 port using PPP then syslog messages are not packed into PPP packets. The lower the number next to the priority listed below, the more details system logging will provide. PriorityVerbose will generate the most messages, while priorityDisable will turn off all messages.

- priorityVerbose(5)
- priorityDebug(10)
- priorityInfo(20)
- priorityOddity(40)
- priorityService(60)
- prioritySystem(80)
- priorityDisable(1000)

Min Priority for Flash Storage (syslogFlashPriority)

System messages which have a priority equal to or greater than this setting will be permanently stored in the Flash PROM. Some maximum number of messages may be stored in the Flash PROM before this storage area must be cleared.

- prioritySystem(80)—Flash PROM will be used to store system-level messages.
- priorityDisable(1000)—No system-level messages will be stored.

Min Priority for SNMP Trap Daemon (syslogTrapPriority)

System messages which have a priority equal to or greater than this setting will be sent to the SNMP trap daemon defined by syslogTrapIP. The lower the number next to the priority listed below, the more details system logging will provide. PriorityVerbose will generate the most messages, while priorityDisable will turn off all messages.

- priorityVerbose(5)
- priorityDebug(10)

- priorityInfo(20)
- priorityOddity(40)
- priorityService(60)
- prioritySystem(80)
- priorityDisable(1000)

Min Priority for RAM (SyslogTablePriority)

System messages which have a priority equal to or greater than this setting will appear in System Log—Volatile Memory. The lower the number next to the priority listed below, the more details system logging will provide. PriorityVerbose will generate the most messages, while priorityDisable will turn off all messages.

- priorityVerbose(5)
- priorityDebug(10)
- priorityInfo(20)
- priorityOddity(40)
- priorityService(60)
- prioritySystem(80)
- priorityDisable(1000)

Unix Facility (syslogUnixFacility)

This setting is used when syslog messages are sent to a Unix-type syslog daemon. In this case the message will include the facility and priority coding. Syslog messages from the access server can be directed to an individual log file by selecting local0–local7. Syslog messages will be directed to a file called *local0* if local0 is selected.

Note The Syslog Daemon must be configured to direct incoming Syslog messages to different files. If it is not configured correctly, the Syslog messages will be dropped. The messages will *not* be recorded in the primary Syslog file.

- disable(0)
- user(1)
- mail(2)
- daemon(3)
- auth(4)
- syslog(5)
- lpr(6)
- news(7)
- uucp(8)
- cron(9)

- authpriv(10)
- ftp(11)
- local0(16)
- local1(17)
- local2(18)
- local3(19)
- local4(20)
- local5(21)
- local6(22)
- local7(23)

Call Trace (syslogCallTrace)

Enabling this will activate the call tracing utility. This is a powerful debugging utility which will log every single function call and return. At the death of a box the call trace will be printed out and can be sent to tech support. This utility will take a large amount of CPU power, therefore *do not turn this feature on* unless instructed to do so by technical support.

- disable(0)—Disable function call tracing.
- enable(1)—Enable function call tracing.
- dump(2)—Display function call tracing on the computer monitor.

Maintenance

This portion of the System Log—Modify window contains information described in the following section.

Maintain Flash Storage (syslogFlashClear)

Setting this variable to syslogFlashClear will cause the erasing of any system messages which have been saved in the Flash. On reading this variable, it will indicate if the syslog Flash is rejecting messages because it is full.

- syslogFlashOK(0)—Flash is accepting messages.
- syslogFlashFull(1)—Flash is rejecting messages because it is full. To empty the Flash PROM, click on the **Set Factory Default Configuration** button (refer to section "Immediate Actions" on page 41), then click on **Record Current Configuration**.
- syslogFlashClear(2)—Erase system messages stored in Flash.

System Log—Volatile Memory

The System Log—Volatile Memory window (see figure 83) displays timestamp and stored system log message information.

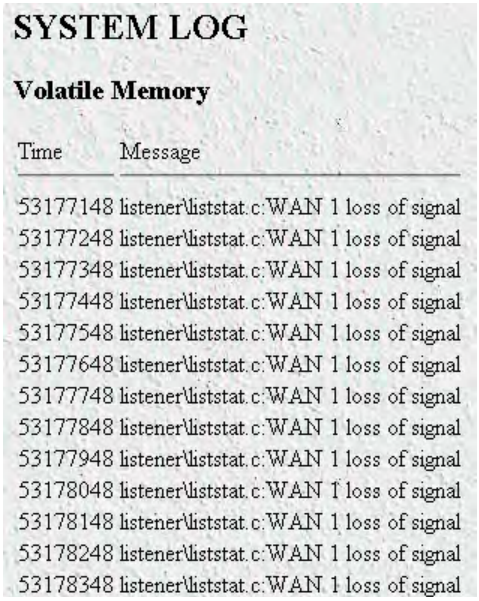


Figure 83. System Log—Volatile Memory window

Time (slTick)

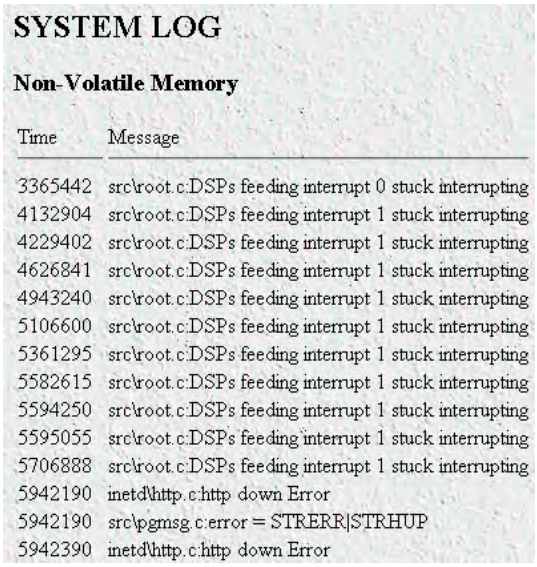
The time stamp in 10 ms intervals of the stored message.

Message (slMessage)

Stored system log message.

System Log—Non-Volatile Memory

The System Log—Non-Volatile window (see figure 84) displays non-volatile RAM messages for each 10 ms time stamp.



SYSTEM LOG

Non-Volatile Memory

Time	Message
3365442	src\root.c:DSPs feeding interrupt 0 stuck interrupting
4132904	src\root.c:DSPs feeding interrupt 1 stuck interrupting
4229402	src\root.c:DSPs feeding interrupt 1 stuck interrupting
4626841	src\root.c:DSPs feeding interrupt 1 stuck interrupting
4943240	src\root.c:DSPs feeding interrupt 1 stuck interrupting
5106600	src\root.c:DSPs feeding interrupt 1 stuck interrupting
5361295	src\root.c:DSPs feeding interrupt 1 stuck interrupting
5582615	src\root.c:DSPs feeding interrupt 1 stuck interrupting
5594250	src\root.c:DSPs feeding interrupt 1 stuck interrupting
5595055	src\root.c:DSPs feeding interrupt 1 stuck interrupting
5706888	src\root.c:DSPs feeding interrupt 1 stuck interrupting
5942190	inetd\http.c:http down Error
5942190	src\pgmsg.c:error = STRERR|STRHUP
5942390	inetd\http.c:http down Error

Figure 84. System Log—Non-Volatile Memory window

Time (slfTick)

The time stamp in 10 ms intervals of the stored message.

Message (slfMessage)

Stored system log message.

What the System Log messages are telling you

- **DSP going suspect on 0x0000**—An instance on this DSP transitioned into the Suspect state. If an entire DSP is put into the suspect state this message will appear twice; once for each instance.
- **DSP recovered from suspect on 0x0000**—An instance on this DSP was in the suspect state and was placed back into the Available state because it connected on the last call
- **DSP being rebooted due to instance consecutive failures on 0x0000** or **DSP being rebooted due to total consecutive failures on 0x0000**, followed by **DSP group 0 HW reset**—This DSP has been rebooted because it was in the suspect state and then took additional calls which also did not connect successfully. The DSP group refers to which group of 8 DSPs were rebooted. DSPs 1-8 are in group 0.
- **DSP error detected initiating reboot on 0x0000** followed by **DSP group 0 HW reset**—This DSP has been rebooted because it was not responding properly to the main CPU driver code. The DSP group refers to which group of 8 DSPs were rebooted. DSPs 1-8 are in group 0.

Chapter 21 T1/E1 Link

Chapter contents

Introduction

The T1/E1 Link Activity window (see figure 85) shows the configuration of the T1/E1 Interface, and reports statistics on the quality of the T1/E1 connection. The statistics listed in this section comprise those contained in *RFC 1406—Definitions of Managed Objects for the DS1 and E1 Interface Types*.

Figure 85. T1/E1 Link Activity main window

Click on T1/E1 Link under the Configuration Menu to display the T1/E1 Link Activity main window.

The T1/E1 Link Activity main window contains the following items:

- Information that identifies the DS1 Interface on a managed device, indicates the type of DS1 line using the circuit, and shows the transmission vendor's circuit identifier (see figure 85). For more information about the objects in this window, refer to "T1/E1 Link Activity main window" on page 248.
- Line Status—This variable indicates interface line status. If any condition other than No Alarms exists, you can click on the Alarms Present link to view the Line Status Alarms window. For more information about these objects, refer to "Line Status (dsx1LineStatus)" on page 249.
- Line Status—Configuration… link—clicking on this link takes you to the page that displays the WAN Circuit Configuration window. This window contains general information about the DS1 interface, amount of time intervals passed, and kind of line coding). For more information about this page, refer to "Line Status—Configuration" on page 252.
- Line Status—Channel Assignment… link—clicking on this link takes you to the page that displays the WAN Circuit Channel Assignment window, where T1/E1 lines are segmented into individual channels or time slots. For more information about this page, refer to "Line Status—Channel Assignment" on page 257.

- Near End Line Statistics—Current… link—clicking on this link takes you to the page that displays line statistics for the current 15-minute interval. For more information about this page, refer to "Near End Line Statistics—Current" on page 258.
- Near End Line Statistics—History… link—clicking on this link takes you to the page that displays line statistics for previous 15-minute intervals. For more information about this page, refer to "Near End Line Statistics—History" on page 260.
- Near End Line Statistics—Totals… link—clicking on this link takes you to the page that displays the total statistics of errors that occurred during the previous 24-hour period. For more information about this page, refer to "Near End Line Statistics—Totals" on page 261.
- Far End Line Statistics—Current… link—clicking on this link takes you to the page that displays far-end statistics for the current 15-minute interval. For more information about this page, refer to "Far End Line Statistics—Current" on page 263.
- Far End Line Statistics—History… link—clicking on this link takes you to the page that displays far-end statistics for previous 15-minute intervals. For more information about this page, refer to "Far End Line Statistics—History" on page 264.
- Far End Line Statistics—Totals… link—clicking on this link takes you to the page that displays the total far-end statistics of errors that occurred during the previous 24-hour period. For more information about this page, refer to "Far End Line Statistics—Totals" on page 266.

T1/E1 Link Activity main window

The T1/E1 Link Activity window has three main sections that display the following T1/E1 parameters:

- Line Status—Shows the configuration of the T1/E1 Interface and service provided on each user time slot.
- Near End Line Statistics—Show error statistics collected from the near-end of the T1/E1 line.
- Far End Line Statistics—Show statistics collected from the far-end T1/E1 line. Far End Line Statistics can be used by devices that support the facility data link (FDL)

Link (dsx1LineIndex)

This object identifies a DS1 Interface on a managed device.

Type (dsx1LineType)

This variable indicates the type of DS1 line using the circuit. The circuit type determines the bits-per-second rate that the circuit can carry and how it interprets error statistics. The values are as follows:

- dsx1ESF—Extended Superframe DS1
- dsx1D4—AT&T D4 format DS1
- dsx1E1—Based on CCITT/ITU G.704 without CRC
- dsx1E1-CRC—Based on CCITT/ITU G.704 with CRC
- dsx1E1-MF—Based on CCITT/ITU G.704 with TS16 multiframing, without CRC
- dsx1E1-CRC-MF—Based on CCITT/ITU G.704 with TS16 multiframing, with CRC

Circuit ID (dsx1CircuitIdentifier)

This is the transmission vendor's circuit identifier. Knowing the circuit ID can be helpful during troubleshooting.

Line Status (dsx1LineStatus)

This variable indicates interface line status. It contains loopback, failure, received alarm and transmitted alarm information. If any condition other than No Alarms exists, you can click on the Alarms Present link to view the Line Status Alarms window (see figure 86).

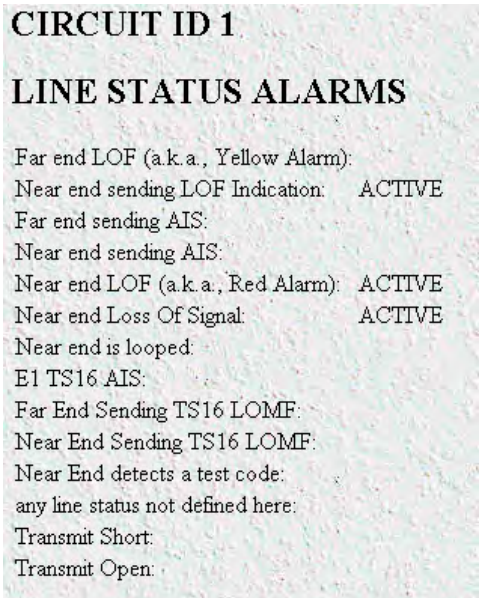


Figure 86. Line Status Alarms window

The alarms currently present on the line will be indicated by the ACTIVE label next to the alarm type.

Failure States

The following failure states are reported in the dsx1LineStatus object. The items listed in this section comprise those contained in *RFC 1406—Definitions of Managed Objects for the DS1 and E1 Interface Types*.

Far End Alarm Failure

Far End Alarm failure is also known as a *Yellow Alarm* in the T1 case or *Distant Alarm* in the E1 case.

For D4 links, the Far End Alarm failure occurs when bit 6 of all channels has been zero for at least 335 ms. The alarm is cleared when bit 6 of at least one channel is non-zero for a period *T*, where *T* is usually less than 1 second and always less than 5 seconds. The Far End Alarm failure is not declared for D4 links when a Loss of Signal is detected.

For ESF links, the Far End Alarm failure is declared if the Yellow Alarm signal pattern occurs in at least 7 out of 10 contiguous 16-bit pattern intervals. The alarm is cleared when the Yellow Alarm signal pattern has not occurred for 10 contiguous 16-bit signal pattern intervals.

For E1 links, the Far End Alarm failure is declared when bit 3 of time-slot zero is received set to 1 on two consecutive occasions. The Far End Alarm failure is cleared when bit 3 of time-slot zero is received set to zero.

Alarm Indication Signal (AIS) Failure

The Alarm Indication Signal failure is declared when an AIS defect is detected at the input and the AIS defect still exists after the Loss Of Frame failure (which is caused by the unframed nature of the *all-ones* signal) is declared. The AIS failure is cleared when the Loss Of Frame failure is cleared.

Loss Of Frame Failure

For T1 links, the Loss Of Frame failure is declared when an OOF or LOS defect has persisted for T seconds, where $2 \leq T \leq 10$. The Loss Of Frame failure is cleared when there have been no OOF or LOS defects during a period T where $0 \leq T \leq 20$. Many systems will perform *hit integration* within the period T before declaring or clearing the failure (for more information, see TR 62411 [16]).

For E1 links, the Loss Of Frame Failure is declared when an OOF defect is detected.

Loss Of Signal Failure

For T1, the Loss Of Signal failure is declared upon observing 175 +/- 75 contiguous pulse positions with no pulses of either positive or negative polarity. The LOS failure is cleared upon observing an average pulse density of at least 12.5% over a period of 175 ±75 contiguous pulse positions, starting with the receipt of a pulse.

For E1 links, the Loss Of Signal failure is declared when greater than 10 consecutive zeroes are detected (see O.162 Section 3.4.4).

Loopback Pseudo-Failure

The Loopback Pseudo-Failure is declared when the near end equipment has placed a loopback (of any kind) on the DS1. This allows a management entity to determine from one object whether the DS1 can be considered to be in service or not (from the point of view of the near end equipment).

TS16 Alarm Indication Signal Failure

For E1 links, the TS16 Alarm Indication Signal failure is declared when time-slot 16 is received as all ones for all frames of two consecutive multiframes (see G.732 Section 4.2.6). This condition is never declared for T1.

Loss Of MultiFrame Failure

The Loss Of MultiFrame failure is declared when two consecutive multiframe alignment signals (bits 4 through 7 of TS16 of frame 0) have been received with an error. The Loss Of Multiframe failure is cleared when the first correct multiframe alignment signal is received. The Loss Of Multiframe failure can only be declared for E1 links operating with G.732 [18] framing (sometimes called *Channel Associated Signalling* mode).

Far End Loss Of Multiframe Failure

The Far End Loss Of Multiframe failure is declared when bit 2 of TS16 of frame 0 is received set to one on two consecutive occasions. The Far End Loss Of Multiframe failure is cleared when bit 2 of TS16 of frame 0 is received set to zero. The Far End Loss Of Multiframe failure can only be declared for E1 links operating in *Channel Associated Signalling* mode.

SNMP MIB definition

The SNMP MIB is defined as follows:

dsx1LineStatus OBJECT-TYPE

SYNTAX INTEGER (1..8191)

ACCESS read-only

STATUS mandatory

DESCRIPTION: This variable indicates the Line Status of the interface. It contains loopback, failure, received 'alarm' and transmitted 'alarm' information.

The dsx1LineStatus is a bit map represented as a sum, therefore, it can represent multiple failures (alarms) and a LoopbackState simultaneously

dsx1NoAlarm should be set if and only if no other flag is set.

If the dsx1LoopbackState bit is set, the loopback in effect can be determined from the dsx1LoopbackConfig object.

The various bit positions are:

1	dsx1NoAlarm	No Alarm Present
2	dsx1RcvFarEndLOF	Far end LOF (a.k.a., Yellow Alarm)
4	dsx1XmtFarEndLOF	Near end sending LOF Indication
8	dsx1RcvAIS	Far end sending AIS
16	dsx1XmtAIS	Near end sending AIS
32	dsx1LossOfFrame	Near end LOF (a.k.a., Red Alarm)
64	dsx1LossOfSignal	Near end Loss Of Signal
128	dsx1LoopbackState	Near end is looped
256	dsx1T16AIS	E1 TS16 AIS
512	dsx1RcvFarEndLOMF	Far End Sending TS16 LOMF
1024	dsx1XmtFarEndLOMF	Near End Sending TS16 LOMF
2048	dsx1RcvTestCode	Near End detects a test code
4096	dsx1OtherFailure	any line status not defined here"
::=	{ dsx1ConfigEntry 10 }	

Line Status—Configuration

Clicking on the Line Status—Configuration link in the T1/E1 Link Activity window displays the WAN Circuit Configuration window. This window contains general information about the DS1 interface, including the type of line (D4 Superframe or Extended Superframe), and kind of line coding (B8ZS or AMI). To modify the WAN circuit configuration, click on the Modify… link. For more information about modifying WAN circuit settings, refer to "WAN Circuit Configuration—Modify" on page 253.

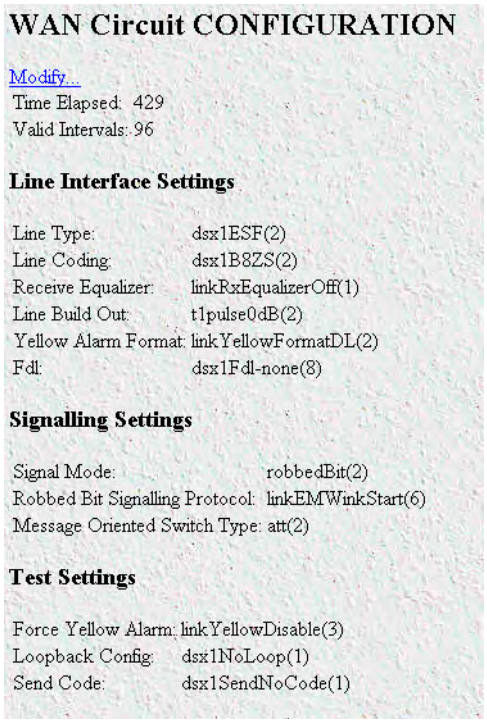


Figure 87. WAN Circuit Configuration window

Note Use the DAX menu to view clock source for the Model LRA2900A Series access servers.

The WAN Circuit Configuration window also displays the amount of time that has passed and the number of intervals passed during which valid data was collected.

Time Elapsed (dsx1TimeElapsed)

The number of seconds that have elapsed since the beginning of the current error-measurement period.

Valid Intervals (dsx1ValidIntervals)

The number of previous intervals for which valid data was collected. The value will be 96 unless the interface was brought on-line within the last 24-hours, in which case the value will be the number of complete 15-minute intervals since the interface has been online.

WAN Circuit Configuration—Modify

Clicking on the Configuration link in the T1/E1 Link Activity window displays the WAN Circuit Configuration—Modify window. From this window, you can change line interface settings, signalling settings, test settings, and change the T1/E1 pulse shapes.

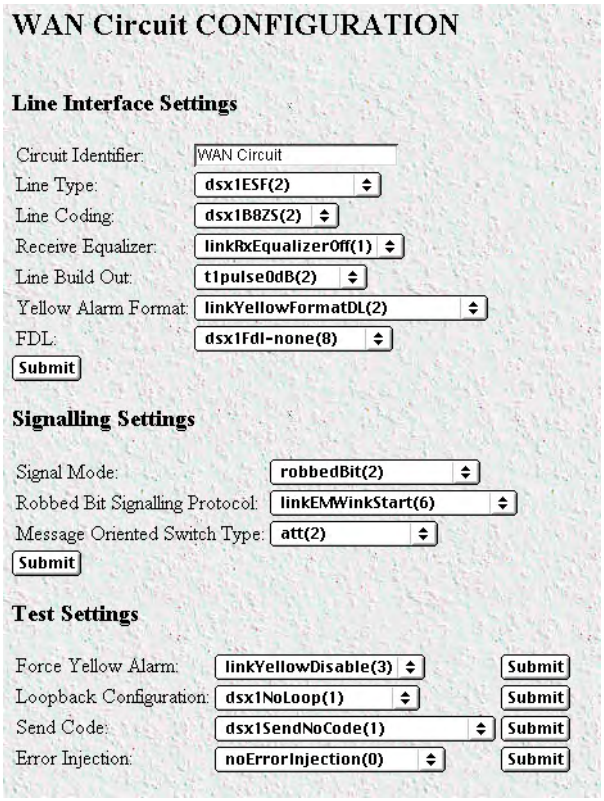


Figure 88. WAN Circuit Configuration—Modify window

Note Use the DAX menu to view clock source for the Model 29XX series access servers.

Line Interface Settings

This portion of the WAN Circuit Configuration window contains information described in the following sections.

Circuit ID (dsx1CircuitIdentifier)

This variable contains the transmission vendor's circuit identifier, for the purpose of facilitating troubleshooting.

Line Type (dsx1LineType)

This variable indicates the type of DS1 Line implemented on this circuit. The type of circuit affects the number of bits per second that the circuit can reasonably carry, as well as the interpretation of the usage and error statistics. The values, in sequence, are:

- other(1) —Link is disabled
- dsx1ESF(2)—Extended Superframe DS1
- dsx1D4(3)—AT&T D4 format DS1
- dsx1E1(4)—Based on CCITT/ITU G.704 without CRC
- dsx1E1-CRC(5)—Based on CCITT/ITU G.704 with CRC
- dsx1E1-MF(6)—Based on CCITT/ITU G.704 with TS16 multiframing, without CRC
- dsx1E1-CRC-MF(7)—Based on CCITT/ITU G.704 with TS16 multiframing, with CRC

Line Coding (dsx1LineCoding)

This variable describes the type of Zero Code Suppression used on the link, which in turn affects a number of its characteristics.

- dsx1JBZS(1)—Jammed Bit Zero Suppression, in which the AT&T specification of at least one pulse every 8 bit periods is literally implemented by forcing a pulse in bit 8 of each channel. Thus, only seven bits per channel, or 1.344 Mbps, is available for data. This feature is not currently implemented.
- dsx1B8ZS (2)—The use of a specified pattern of normal bits and bipolar violations which are used to replace a sequence of eight zero bits.
- dsx1HDB3(3)—High Density Bipolar Order 3. It is based on AMI but extends this by inserting violation codes whenever there is a run of 4 or more 0s.
- dsx1ZBTSI(4)—May use dsx1ZBTSI, or Zero Byte Time Slot Interchange. This feature is not currently implemented.
- dsx1AMI(5)—Alternate Mark Inversion. Refers to a mode wherein no zero code suppression is present and the line encoding does not solve the problem directly. In this application, the higher layer must provide data which meets or exceeds the pulse density requirements, such as inverting HDLC data.
- other(6)—This feature is not currently supported.

Receive Equalizer (linkRxEqualizer)

This variable determines the equalization used on the received signal. Long haul signals should have the equalization set for more. Short haul signals require less equalization.

- linkRxEqualizerOff(1)
- linkRxEqualizerOn(2)

Line Build Out (linkLineBuildOut)

This variable is used in T1 applications to adjust the T1 pulse shape at the cross connect point. Select the pulse strength needed to minimize distortion at the remote T1 receiver end. The default is t1pulse0dB, which should be adequate for most situations.

- triState(0)
- e1pulse(1)
- t1pulse0dB(2)—Strong pulse shape.

- t1pulse-7dB(3)—Medium pulse shape.
- t1pulse-15dB(4)—Weak pulse shape.

Yellow Alarm Format (linkYellowFormat)

This variable identifies which standard will be used to transmit and identify the Yellow Alarm.

- link YellowFormatBit2(1)—Bit-2 equal zero in every channel
- YellowFormatDL(2)—FF00 pattern in the Data Link
- YellowFormatFrame12FS(3)—FS bit of frame 12

FDL (dsx1FDL)

This bit map describes the use of the facilities data link, and is the sum of the capabilities:

- other(1)—Indicates that a protocol other than one following is used.
- dsx1Ansi-T1-403(2)—Refers to the FDL exchange recommended by ANSI.
- dsx1Att-54016(3)—Refers to ESF FDL exchanges.
- dsx1Fdl-none(4)—Indicates that the device does not use the FDL.

Note This is valid for T1 only.

Signalling Settings

This portion of the WAN Circuit Configuration window contains information described in the following sections.

Signal Mode (dsx1SignalMode)

- none(1)—Indicates that no bits are reserved for signaling on this channel.
- robbedBit(2)—Indicates that T1 Robbed Bit Signaling is in use.
- bitOriented(3)—Indicates that E1 Channel Associated Signaling is in use.
- messageOriented(4)—Indicates that Common Channel Signaling is in use either on channel 16 of an E1 link or channel 24 of a T1.

Robbed-Bit Signalling Protocol (linkSignalling)

This variable determines which robbed bit signalling technique is used. The techniques designated OFFICE are used to simulate the central office site. These allow back to back connection of access servers. This is set only when the signal mode is robbedBit(2)

- linkGroundStart(1)
- linkLoopStart(2)
- linkOfficeGroundStart(3)
- linkOfficeLoopStart(4)
- linkEMWinkStart(6)
- linkEMImmediateStart(7)

- linkTaiwanR1(8)

Message-Oriented Switch Type (linkIsdnSwitchType)

This object allows the selection of the ISDN variations on the ISDN protocol, depending on the brand of switch to which the access server is connected. This only needs to be set when messageOriented is chosen for signalling protocol.

- ni1(0)—National ISDN-1
- dms(1)—Northern Telecom
- att(2)—AT&T Lucent
- ctr4(3)—E1 ISDN
- ts014(4)—Australia AUSTEL
- ins1500(5)—Japan

Test Settings

This portion of the WAN Circuit Configuration window contains information described in the following sections.

Force Yellow Alarm (linkYellowForce)

This variable identifies which standard will be used to transmit and identify the Yellow Alarm.

- linkYellowAuto—Do *not* force the transmission of a yellow alarm. But, yellow alarm may be automatically transmitted.
- linkYellowOn—Force the transmission of a yellow alarm even if the received signal is in frame.
- linkYellowDisable—Do NOT transmit a yellow alarm even if the received signal is out of frame.

Loopback Config (dsx1LoopbackConfig)

This variable represents the loopback configuration of the DS1 interface. Agents supporting read/write access should return badValue in response to a requested loopback state that the interface does not support. The values mean:

- dsx1NoLoop—Not in the loopback state. A device that is not capable of performing a loopback on the interface shall always return this as it's value.
- dsx1PayloadLoop—The received signal at this interface is looped through the device. Typically the received signal is looped back for retransmission after it has passed through the device's framing function.
- dsx1LineLoop—The received signal at this interface does not go through the device (minimum penetration) but is looped back out.
- dsx1OtherLoop—Loopbacks that are not defined here.

Send Code (dsx1SendCode)

This variable indicates what type of code is being sent across the DS1 interface by the device. The values mean:

- dsx1SendNoCode—Sending looped or normal data

- dsx1SendLineCode—Sending a request for a line loopback
- dsx1SendPayloadCode—Sending a request for a payload loopback
- dsx1SendResetCode—Sending a loopback termination request
- dsx1SendQRS—Sending a Quasi-Random Signal (QRS) test pattern
- dsx1Send511Pattern—Sending a 511 bit fixed test pattern
- dsx1Send3in24Pattern—Sending a fixed test pattern of 3 bits set in 24
- dsx1SendOtherTestPattern—Sending a test pattern other than those described by this object.

Error Injection (linkInjectError)
Force an output error to see if the other end detects it

- noErrorInjection(0)
- injectCRCerrorBurst(1)
- injectLineErrorBurst(2)

Line Status—Channel Assignment

Clicking on the Line Status—Channel Assignment link in the T1/E1 Link Activity window displays the WAN Circuit Channel Assignment window (see figure 89). T1/E1 lines are segmented into twenty-four (T1) or thirty (E1) individual channels or time slots.

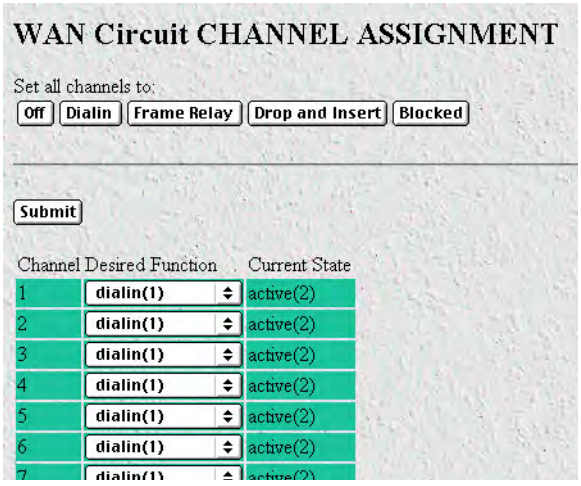


Figure 89. WAN Circuit Channel Assignment

Channel(slotIndex)

This object is the identifier of an entry in the slot table.

Desired Function(slotfunction)

This variable defines how the connection is made to each of the 24 or 30 T1/E1 time slots.

- off(0)—Do not signal on this channel in response to the central office. The access server will generate an idle signal.
- dialin(1)—Used for dial-in.
- frameRelay(3)—64 k frame relay connection
- blocked(8)—Signals the central office that the access server will not accept any signals on this channel.
- clear(9)—Intended for robbed-bit signalling protocols, the access server will not add bits to the signal.

CurrentState(ChannelState)

- off(0)—Do not signal on this channel in response to the central office. The access server will generate an idle signal.
- idle(1)—Channel not in use
- active(2)—Channel in use
- frameRelay(3)—Channel configured for frame relay
- clear(4)—Intended for robbed bit signaling protocols, the access server will not add bits to the signal
- adminBlocked(10)—Administrator has blocked the channel
- resourceBlocked(11)—Channel is blocked due to lack of DSPs to answer the inbound call
- telcoBlocked(12)—The telco is blocking the channel because the channel is not active on the telco side
- dChannel(13)—The D channel for ISDN

Near End Line Statistics—Current

Click on Near End Line Statistics—Current to display line statistics for the current 15-minute interval (see figure 90).

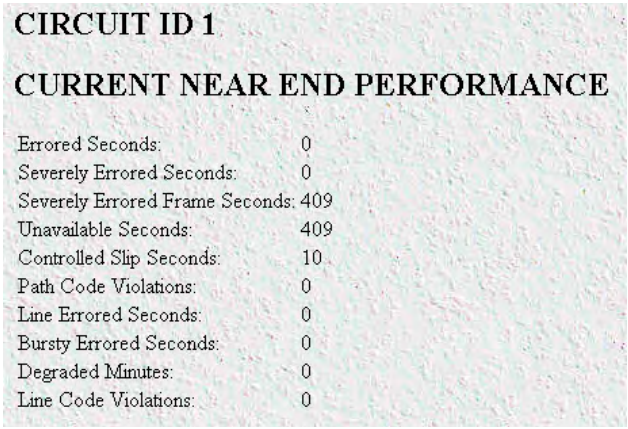


Figure 90. Current Near End Performance window

Errored Seconds (dsx1CurrentESs)
The number of errored seconds, encountered by a DS1 interface in the current 15-minute interval.

Severely Errored Seconds (dsx1CurrentSESs)
The number of severely errored seconds encountered by a DS1 interface in the current 15-minute interval.

Severely Errored Frame Seconds (dsx1CurrentSEFSs)
The number of severely errored framing seconds encountered by a DS1 interface in the current 15-minute interval.

Unavailable Seconds (dsx1CurrentUASs)
The number of unavailable seconds encountered by a DS1 interface in the current 15-minute interval.

Controlled Slip Seconds (dsx1CurrentCSSs)
The number of Controlled Slip Seconds encountered by a DS1 interface in the current 15-minute interval.

Path Code Violations (dsx1CurrentPCVs)
The number of path coding violations encountered by a DS1 interface in the current 15-minute interval.

Line Errored Seconds (dsx1CurrentLESs)
The number of line errored seconds encountered by a DS1 interface in the current 15-minute interval.

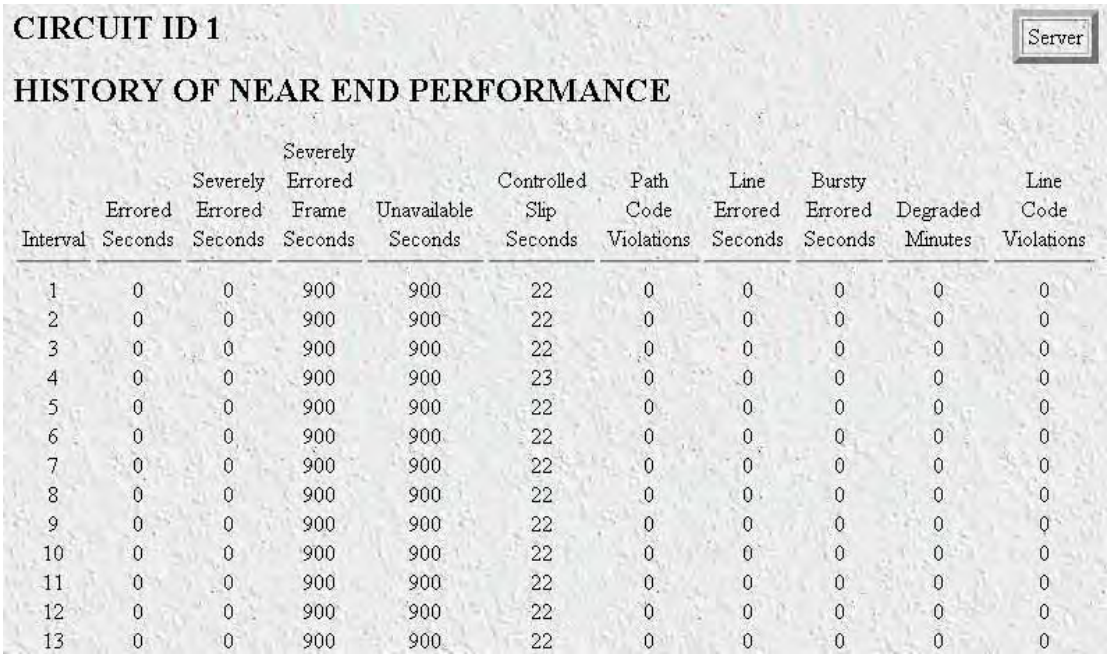
Bursty ErroredSeconds (dsx1CurrentBESs)
The number of bursty errored seconds (BESs) encountered by a DS1 interface in the current 15-minute interval.

Degraded Minutes (dsx1CurrentDMs)
The number of degraded minutes (DMs) encountered by a DS1 interface in the current 15-minute interval.

Line Code Violations (dsx1CurrentLCVs)
The number of line code violations (LCVs) encountered by a DS1 interface in the current 15-minute interval.

Near End Line Statistics—History

Click on Near End Line Statistics—History to display line statistics for previous 15-minute intervals (96 previous intervals will be shown unless the remote access server has been reinitialized in the last 24 hours). See figure 91.



CIRCUIT ID 1

Server

HISTORY OF NEAR END PERFORMANCE

Interval	Errored Seconds	Severely Errored Seconds	Severely Errored Frame Seconds	Unavailable Seconds	Controlled Slip Seconds	Path Code Violations	Line Errored Seconds	Bursty Errored Seconds	Degraded Minutes	Line Code Violations
1	0	0	900	900	22	0	0	0	0	0
2	0	0	900	900	22	0	0	0	0	0
3	0	0	900	900	22	0	0	0	0	0
4	0	0	900	900	23	0	0	0	0	0
5	0	0	900	900	22	0	0	0	0	0
6	0	0	900	900	22	0	0	0	0	0
7	0	0	900	900	22	0	0	0	0	0
8	0	0	900	900	22	0	0	0	0	0
9	0	0	900	900	22	0	0	0	0	0
10	0	0	900	900	22	0	0	0	0	0
11	0	0	900	900	22	0	0	0	0	0
12	0	0	900	900	22	0	0	0	0	0
13	0	0	900	900	22	0	0	0	0	0

Figure 91. History of Near End Performance window

Interval (dsx1IntervalNumber)

A number between 1 and 96, where 1 is the most recently completed 15-minute interval and 96 is the least recently completed 15-minutes interval (assuming that all 96 intervals are valid).

Errored Seconds (dsx1intervaless)

The number of errored Seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Severely Errored Seconds (dsx1IntervalSESs)

The number of severely errored seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Severely Errored Frame Seconds (dsx1IntervalSEFSs)

The number of severely errored framing seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Unavailable Seconds (dsx1IntervalUASs)

The number of unavailable seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Controlled Slip Seconds (dsx1IntervalCSSs)
The number of controlled slip seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Path Code Violations (dsx1IntervalPCVs)
The number of path coding violations encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Line Errored Seconds (dsx1IntervalLESs)
The number of line errored seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Bursty ErroredSeconds (dsx1IntervalBESs)
The number of bursty errored seconds (BESs) encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Degraded Minutes (dsx1IntervalDMs)
The number of degraded minutes (DMs) encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Line Code Violations (dsx1IntervalLCVs)
The number of line code violations (LCVs) encountered by a DS1 interface in the current 15-minute interval.

Near End Line Statistics—Totals
Click on Near End Line Statistics—Totals to display the total statistics of errors that occurred during the previous 24-hour period (see figure 92).

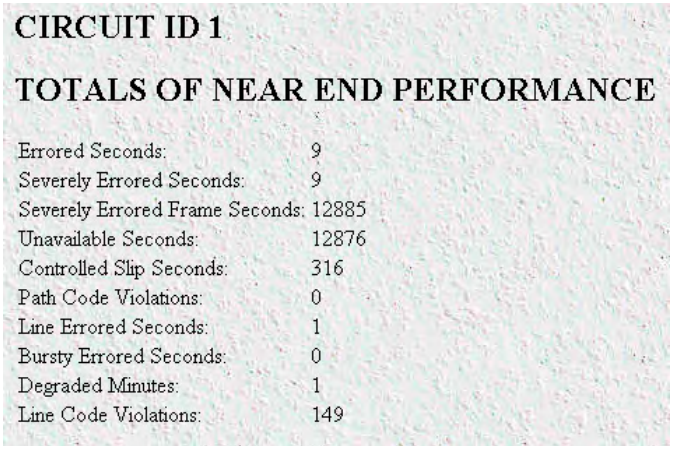


Figure 92. Totals of Near End Performance window

Errored Seconds (dsx1TotalESs)
The number of errored seconds encountered by a DS1 interface in the previous 24-hour interval.

Severely Errored Seconds (dsx1TotalSESs)
The number of severely errored seconds encountered by a DS1 interface in the previous 24-hour interval.

Severely Errored Frame Seconds (dsx1TotalSEFSs)
The number of severely errored framing seconds encountered by a DS1 interface in the previous 24-hour interval.

Unavailable Seconds (dsx1TotalUASs)
The number of unavailable seconds encountered by a DS1 interface in the previous 24-hour interval.

Controlled Slip Seconds (dsx1TotalCSSs)
The number of controlled slip seconds encountered by a DS1 interface in the previous 24-hour interval.

Path Code Violations (dsx1TotalPCVs)
The number of path coding violations encountered by a DS1 interface in the previous 24-hour interval.

Line Errored Seconds (dsx1TotalLESs)
The number of line errored seconds encountered by a DS1 interface in the previous 24-hour interval.

Bursty ErroredSeconds (dsx1TotalBESs)
The number of bursty errored seconds (BESs) encountered by a DS1 interface in the previous 24-hour interval.

Degraded Minutes (dsx1TotalDMs)
The number of degraded minutes (DMs) encountered by a DS1 interface in the previous 24-hour interval.

Line Code Violations (dsx1TotalLCVs)
The number of line code violations (LCVs) encountered by a DS1 interface in the previous 15-minute interval.

Far End Line Statistics—Current

Click on Near End Line Statistics—Current to display far-end statistics for the current 15-minute interval (96 previous intervals will be shown unless the remote access server has been reinitialized in the last 24 hours). See figure 93).

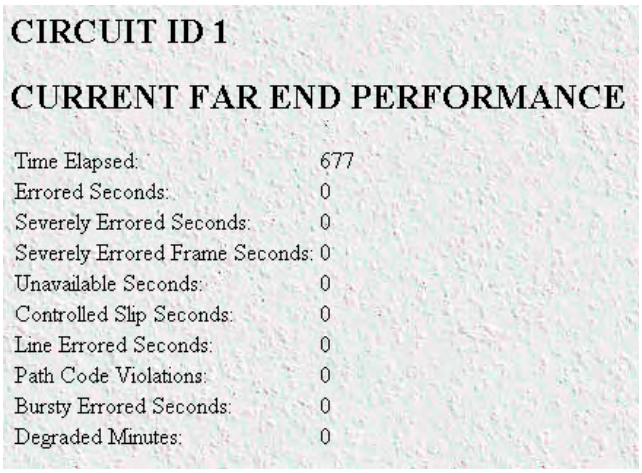


Figure 93. Current Far End Performance window

Time Elapsed (dsx1FarEndTimeElapsed)

The number of seconds that have elapsed since the beginning of the far-end current error-measurement period.

Errored Seconds (dsx1FarEndCurrentESs)

The number of far-end errored seconds encountered by a DS1 interface in the current 15-minute interval.

Severely Errored Seconds (dsx1FarEnd CurrentSESs)

The number of far-end severely errored seconds encountered by a DS1 interface in the current 15-minute interval.

Severely Errored Frame Seconds (dsx1FarEndCurrentSEFSs)

The number of far-end severely errored framing seconds encountered by a DS1 interface in the current 15-minute interval.

Unavailable Seconds (dsx1FarEndCurrentUASs)

The number of far-end unavailable seconds encountered by a DS1 interface in the current 15-minute interval.

Controlled Slip Seconds (dsx1FarEndCurrentCSSs)

The number of far-end controlled slip seconds encountered by a DS1 interface in the current 15-minute interval.

Line Errored Seconds (dsx1FarEndCurrentLESs)

The number of far-end line errored seconds encountered by a DS1 interface in the current 15-minute interval

Path Code Violations (dsx1FarEndCurrentPCVs)
The number of far-end path coding violations reported via the far-end block error count encountered by a DS1 interface in the current 15-minute interval.

Bursty Errored Seconds (dsx1FarEndCurrentBESs)
The number of far-end bursty errored seconds (BESs) encountered by a DS1 interface in the current 15-minute interval.

Degraded Minutes (dsx1FarEndCurrentDMs)
The number of far-end degraded minutes (DMs) encountered by a DS1 interface in the current 15-minute interval.

Far End Line Statistics—History

Click on Far End Line Statistics—History to display far-end statistics for previously completed 15-minute intervals (see figure 94).

CIRCUIT ID 1

Server

HISTORY OF FAR END PERFORMANCE

Interval	Errored Seconds	Severely Errored Seconds	Severely Errored Frame Seconds	Unavailable Seconds	Controlled Slip Seconds	Line Errored Seconds	Path Code Violations	Bursty Errored Seconds	Degraded Minutes
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0

Figure 94. History of Far End Performance window

Far End Interval (dsx1FarEndIntervalNumber)
A number between 1 and 96, where 1 is the most recently completed 15-minute interval and 96 is the least recently completed 15-minutes interval (assuming that all 96 intervals are valid).

Errored Seconds (dsx1FarEndIntervalESs)
The number of far-end errored seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Severely Errored Seconds (dsx1FarEndIntervalSESs)
The number of far-end severely errored seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Severely Errored Frame Seconds (dsx1FarEndIntervalSEFSs)
The number of far-end severely errored framing seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Unavailable Seconds (dsx1FarEndIntervalUASs)
The number of far-end unavailable seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Controlled Slip Seconds (dsx1FarEndIntervalCSSs)
The number of far-end controlled slip seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Path Code Violations (dsx1FarEndIntervalPCVs)
The number of far-end path coding violations encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Line Errored Seconds (dsx1FarEndIntervalLESs)
The number of far-end line errored seconds encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Bursty Errored Seconds (dsx1FarEndIntervalBESs)
The number of far-end bursty errored seconds (BESs) encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Degraded Minutes (dsx1FarEndIntervalDMs)
The number of far-end degraded minutes (DMs) encountered by a DS1 interface in one of the previous 96, individual 15-minute, intervals.

Line Code Violations (dsx1FarEndIntervalLCVs)
The number of far-end line code violations (LCVs) encountered by a DS1 interface in the current 15-minute interval.

Far End Line Statistics—Totals

Click on Far End Line Statistics—Totals to display the total statistics of errors that occurred during the previous 24-hour period (see figure 95).

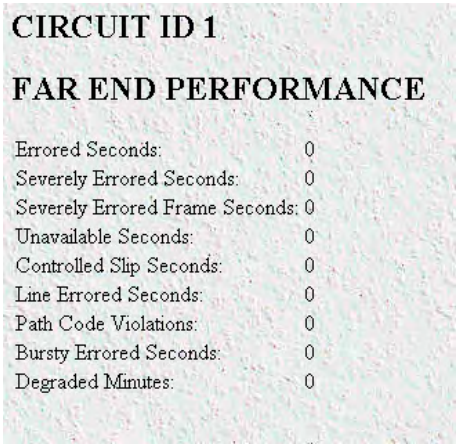


Figure 95. Far End Performance window

Errored Seconds (dsx1FarEndTotalESs)

The number of far-end errored seconds encountered by a DS1 interface in the previous 24-hour interval.

Severely Errored Seconds (dsx1FarEndTotalSESs)

The number of far-end severely errored seconds encountered by a DS1 interface in the previous 24-hour interval.

Severely Errored Frame Seconds (dsx1FarEndTotalSEFSs)

The number of far-end severely errored framing seconds encountered by a DS1 interface in the previous 24-hour interval.

Unavailable Seconds (dsx1FarEndTotalUASs)

The number of far-end unavailable seconds encountered by a DS1 interface in the previous 24-hour in-24-hour interval.

Controlled Slip Seconds (dsx1FarEndTotalCSSs)

The number of far-end controlled slip seconds encountered by a DS1 interface in the previous 24-hour interval.

Line Errored Seconds (dsx1FarEndTotalLESs)

The number of far-end line errored seconds encountered by a DS1 interface in the previous 24-hour interval.

Path Code Violations (dsx1FarEndTotalPCVs)

The number of far-end path coding violations reported via the far-end block error count encountered by a DS1 interface in the previous 24-hour interval.

Bursty Errored Seconds (dsx1FarEndTotalBESs)

The number of far-end bursty errored seconds (BESs) encountered by a DS1 interface in the previous 24-hour interval.

Degraded Minutes (dsx1FarEndTotalDMs)

The number of far-end degraded minutes (DMs) encountered by a DS1 interface in the previous 24-hour interval.

Chapter 22 About

Chapter contents

Introduction

The About link displays Black Box contact information (see "Black Box contact information"). Click on About under the Configuration Menu to display the About main window (see figure 96).

Figure 96. About window

Black Box contact information

Black Box Corporation
1000 Park Drive
Lawrence, PA 15055-1018

Phone: **724-746-5500**

Fax: **724-746-0746**

E-mail: **info@blackbox.com**

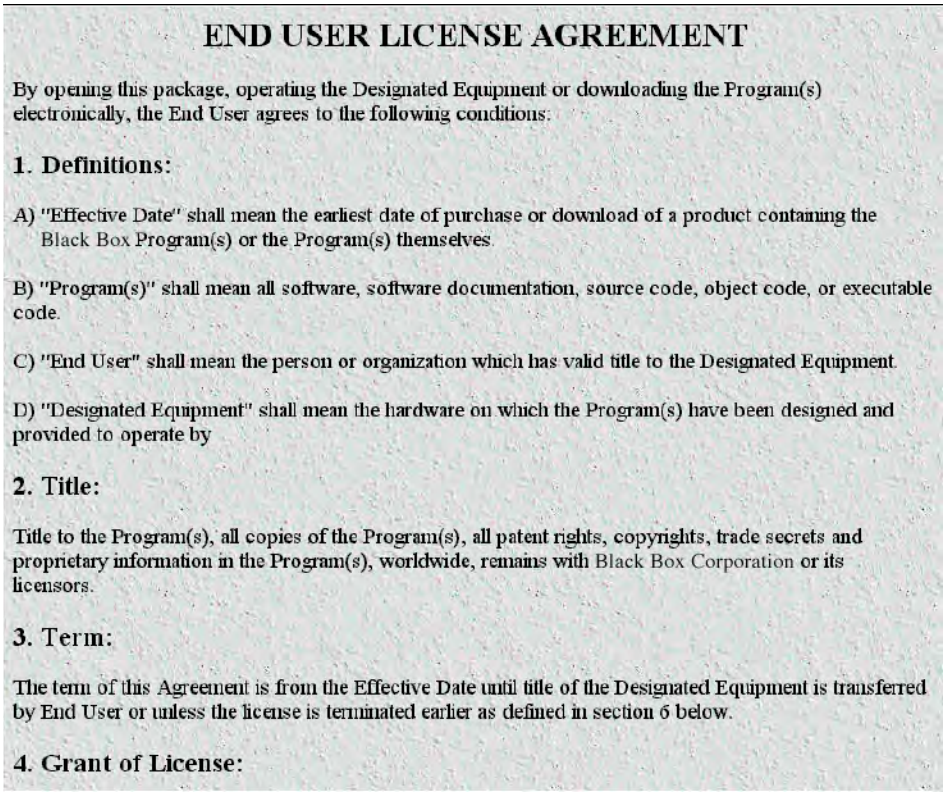
Web site: **www.blackbox.com**

Chapter 23 License

Chapter contents

Introduction

The License link presents the End User License Agreement for the access server software. Click on License under the Configuration Menu to display the License main window (see figure 97).



END USER LICENSE AGREEMENT

By opening this package, operating the Designated Equipment or downloading the Program(s) electronically, the End User agrees to the following conditions:

1. Definitions:

A) "Effective Date" shall mean the earliest date of purchase or download of a product containing the Black Box Program(s) or the Program(s) themselves.

B) "Program(s)" shall mean all software, software documentation, source code, object code, or executable code.

C) "End User" shall mean the person or organization which has valid title to the Designated Equipment.

D) "Designated Equipment" shall mean the hardware on which the Program(s) have been designed and provided to operate by

2. Title:

Title to the Program(s), all copies of the Program(s), all patent rights, copyrights, trade secrets and proprietary information in the Program(s), worldwide, remains with Black Box Corporation or its licensors.

3. Term:

The term of this Agreement is from the Effective Date until title of the Designated Equipment is transferred by End User or unless the license is terminated earlier as defined in section 6 below.

4. Grant of License:

Figure 97. License window

By opening the access server, operating the Designated Equipment or downloading the Program(s) electronically, the End User agrees to the conditions in the "End User License Agreement" below.

End User License Agreement

By opening this package, operating the Designated Equipment or downloading the Program(s) electronically, the End User agrees to the following conditions:

1. Definitions:

A) "Effective Date" shall mean the earliest date of purchase or download of a product containing the Black Box Corporation Program(s) or the Program(s) themselves.

B) "Program(s)" shall mean all software, software documentation, source code, object code, or executable code.

C) "End User" shall mean the person or organization which has valid title to the Designated Equipment.

D) "Designated Equipment" shall mean the hardware on which the Program(s) have been designed and provided to operate by

2. Title:

Title to the Program(s), all copies of the Program(s), all patent rights, copyrights, trade secrets and proprietary information in the Program(s), worldwide, remains with Black Box Corporation or its licensors.

3. Term:

The term of this Agreement is from the Effective Date until title of the Designated Equipment is transferred by End User or unless the license is terminated earlier as defined in "6. Termination:" below.

4. Grant of License:

A) During the term of this Agreement, Black Box Corporation grants a personal, non-transferable, non-assignable and non-exclusive license to the End User to use the Program(s) only with the Designated Equipment at a site owned or leased by the End User.

B) The End User may copy licensed Program(s) as necessary for backup purposes only for use with the Designated Equipment that was first purchased or used or its temporary or permanent replacement.

C) The End User is prohibited from disassembling; decompiling, reverse-engineering or otherwise attempting to discover or disclose the Program(s), source code, methods or concepts embodied in the Program(s) or having the same done by another party.

D) Should End User transfer title of the Designated Equipment to a third party after entering into this license agreement, End User is obligated to inform the third party in writing that a separate End User License Agreement from Black Box Corporation is required to operate the Designated Equipment.

5. Warranty:

The Program(s) are provided "as is" without warranty of any kind. Black Box Corporation and its licensors disclaim all warranties, either express or implied, including but not limited to the implied warranties of merchantability, fitness for a particular purpose or non-infringement. In no event shall Black Box Corporation or its licensors be liable for any damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or other pecuniary loss) arising out of the use of or inability to use the Program(s), even if Black Box Corporation has been advised of the possibility of such damages. Because some states do not allow the exclusion or limitation of liability for consequential or incidental damages, the above limitation may not apply to you.

If the Program(s) are acquired by or on behalf of a unit or agency of the United States Government, the Government agrees that such Program(s) are "commercial computer software" or "computer software documentation" and that, absent a written agreement to the contrary, the Government's rights with respect to such Program(s) are limited by the terms of this Agreement, pursuant to Federal Acquisition Regulations 12.212(a) and/or DEARS 227.7202-1(a) and/or sub-paragraphs (a) through (d) of the "Commercial Computer Software—Restricted Rights" clause at 48 C.F.R. 52.227-19 of the Federal Acquisition Regulations as applicable.

6. Termination:

A) The End User may terminate this agreement by returning the Designated Equipment and destroying all copies of the licensed Program(s).

B) Black Box Corporation may terminate this Agreement should End User violate any of the provisions of "4. Grant of License:" above.

C) Upon termination for A or B above or the end of the Term, End User is required to destroy all copies of the licensed Program(s)

Appendix A **Supported RADIUS Attributes**

Chapter contents

Access-Accept Attributes

Username	1
Service-Type	6
Framed-Protocol	7
Framed-IP-Address	8
Framed-Netmask	9
Framed-Route	10
Filter-Id	11
Framed-MTU	12
Framed-Compression	13
Login-IP-Host	14
Login-Service	15
Login-Port	16
Reply-Message	18
Callback-Number	19
State	24
Class	25
Session-Timeout	27
Idle-Timeout	28
Termination-Action	29
Port-Limit	62
Force-Next-Hop	209

Access-Request Attributes

User-Password	2
CHAP-Password	3
NAS-IP-Address	4
NAS-Port	5
Service-Type	6
Framed-Protocol	7
State	24
Called-Station-Id	30
Calling-Station-Id	31
NAS-Identifier	32
CHAP-Challenge	60
NAS-Port-Type	61

Access-Challenge Attributes

State	24
Session-Timeout	27
Idle-Timeout	28

Accounting-Start Attributes

User-Name	1
NAS-IP-Address	4
NAS-Port	5
Service-Type	6
Framed-Protocol	7
Framed-IP-Address	8
Class	25
Called-Station-Id	30
Calling-Station-Id	31
NAS-Identifier	32
Account-Status-Type	40
Account-Delay-Time	41
Account-Session-Id	44
Account-Authentic	45
Account-Multiple-Session-Id	50
NAS-Port-Type	61
Data-Rate(RX)	197
Xmit-Rate(TX)	255

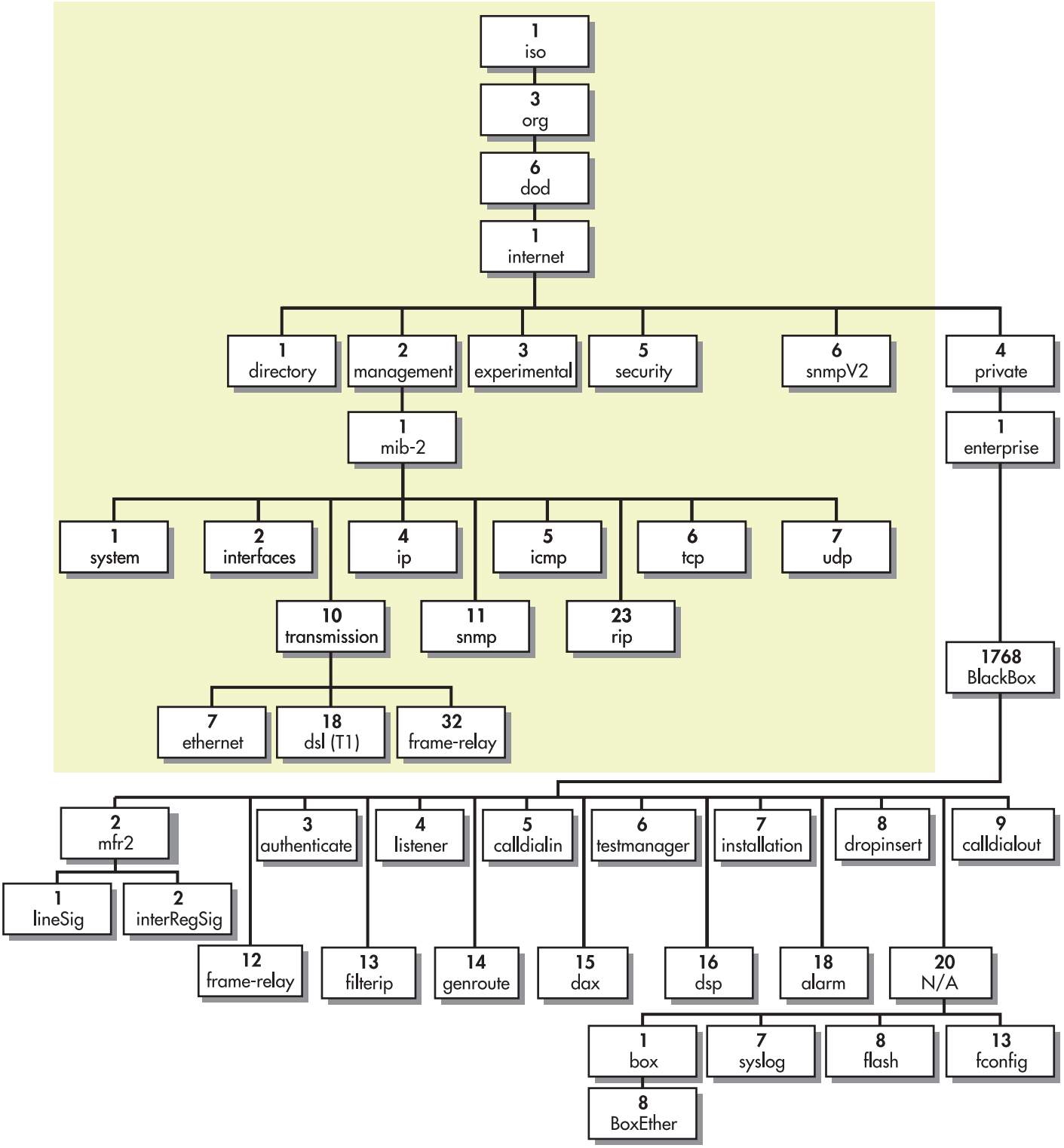
Accounting-Stop Attributes

User-Name	1
NAS-IP-Address	4
NAS-Port	5
Service-Type	6
Framed-Protocol	7
Framed-IP-Address	8
Class	25
Called-Station-Id	30
Calling-Station-Id	31
NAS-Identifier	32
Account-Status-Type	40
Account-Delay-Time	41
Account-Input-Octets	42
Account-Output-Octets	43
Account-Session-Id	44
Account-Authentic	45
Account-Session-Time	46
Account-Input-Packets	47
Account-Output-Packets	48
Account-Terminate-Cause	49
Account-Multiple-Session-Id	50
NAS-Port-Type	61
Data-Rate(RX)	197
Xmit-Rate(TX)	255

Appendix B **MIB trees**

Chapter contents

Model LRA 2900 MIB Tree Structure



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