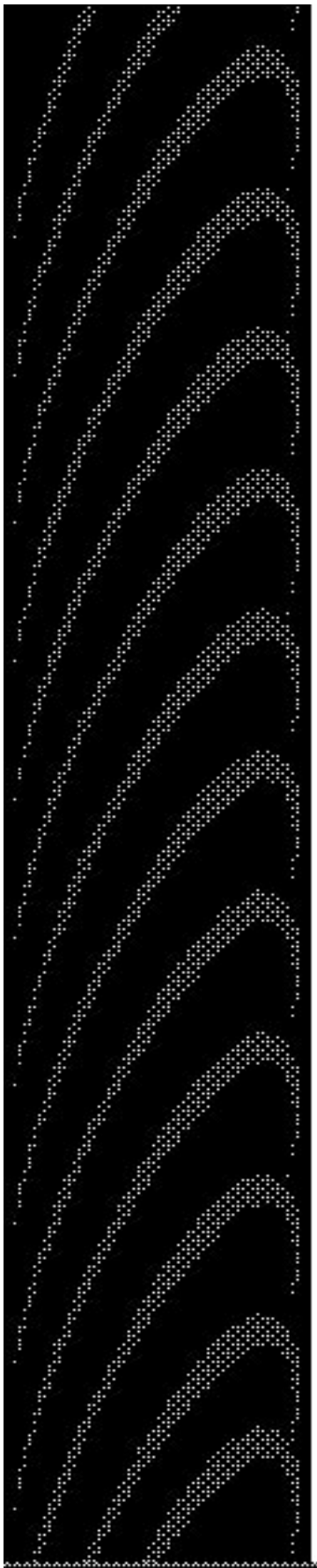
AREA CODE CHANGE

Please note that the area code for Paradyne Corporation in Largo, Florida has changed from 813 to 727.

For any Paradyne telephone number that appears in this manual with an 813 area code, dial 727 instead.



9028 Compression Unit

Installation & Users Manual

Document No. 4-691070

Final Draft

PARADYNE

Document No. 4-691070

Notice

Mandatory Customer Information

FCC Requirements

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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

To users of Digital Apparatus in Canada:

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

Warranty, Sales and Service Information

Contact your sales or service representative directly for any help needed. For additional information concerning warranty, sales, service, repair, installation, documentation, or training, use one of the following methods:

- Via the Internet: Visit the Paradyne World Wide Web site at http://www.paradyne.com
- Via Telephone: Call our automated call system to receive current information via fax or to speak with a company representative.
    - Within the U.S.A., call 1-800-870-2221
    - International, call 813-530-2340

Trademarks

All products and services mentioned herein are the trademarks, service marks, registered trademarks or registered service marks of their respective owners.

EMI Warnings

WARNING:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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

WARNING:

To Users of Digital Apparatus in Canada:

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

Cet appareil numerique de la classe A respecte toutes les exigences du reglement sur le material brouilleur du Canada.

Table of Contents

Chapter 1

Unpacking the 9028 Compression Unit

The 9028 Compression Unit is packaged in a carton that complies with industrial standards to protect the equipment from the normal shocks and vibrations that may occur during shipping.

Please inspect the shipment

- All sides of the shipping carton should be inspected for damage. If the carton appears to be damaged, it is advisable to reject the shipment.
- If the shipping carton is undamaged, remove the 9028 Compression Unit and inspect all sides of the unit.
- If the units have been damaged, report the damage to your distributor.

Before Installing the 9028 Compression Unit

For each unit ordered, your shipment should contain:

☐ One (1) 9028 Compression Unit

☐ One (1) Console port cable - RJ11 to DB25 (RS-232C)

☐ One (1) Installation and Users Manual

☐ One (1) Manufacturers warranty card

☐ One (1) IEC-320 Power Chord

☐ One (1) Pair of rack mounting brackets

☐ One (1) DCE Cable (EIA-530A)

☐ One (1) V.35 Router to 9028 cable (DTE)

☐ One (1) Training Information card

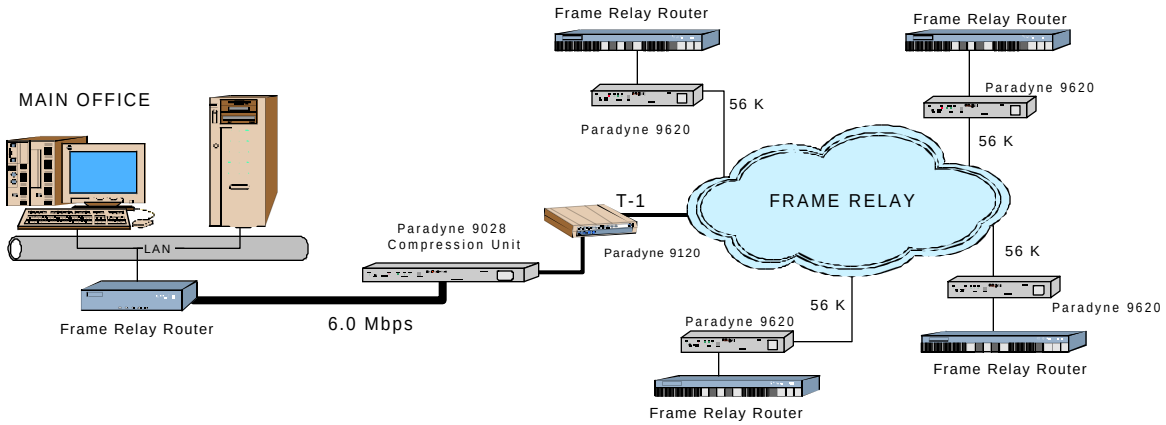
Chapter 2

Introduction

Corporate competitiveness has put pressure for greater integration of a company's resources causing networks to carry ever-increasing amounts of information at a faster rate.

Many organizations are turning to Frame Relay switched services as the basis for their wide area network (WAN). Frame Relay offers connectivity and bandwidth flexibility for corporate network growth.

The 9028 Compression Unit has been developed to help organizations improve the performance, reliability and cost-effectiveness of their Frame Relay connections. The 9028 Compression Unit can be integrated into existing data networks effortlessly. It incorporates sophisticated data compression algorithms to provide high throughput solutions for congested Frame Relay connections. This means lower connectivity,



CIR, and burst charges.

Figure 2.1

Figure 2.1 illustrates an example application of the 9028 Compression Unit. The 9028 Compression Unit provides high bandwidth solutions ideally suited for the higher throughput needs for large central offices.

Chapter 3

Compression Unit Overview

Industry-leading Microprocessor Technology

To assure optimum transmission rates and interoperability the Compression Unit incorporates the Motorola MC68EC360 quad integrated communication controller (QUICC) microprocessor with the STAC 9706™ LZS data compression coprocessor.

The Motorola MC68EC360 (QUICC) is especially suitable to applications in the communications industry. Utilizing leading edge dual microprocessor Reduced Instruction Set Computer (RISC) technology, the Motorola MC68EC360 sustains higher performance in all areas of device operation when compared to conventional microprocessors.

Stac Technology has been an industry leader in the standards arena. Standards organizations that have selected or are considering the Stac algorithm in their standards for interoperability include ANSI, IETF, ITU and the Frame Relay Forum.

By using this technology, the Compression Unit maintains interoperability standards for sending compressed data over popular carrier services such as Frame Relay.

Frame Relay Forum (FRF.9) Communications Protocol

The Compression Unit uses the FRF.9 protocol to provide encapsulation for the compressed data and a means for both ends of the PVC to remain synchronized.

For more information on the FRF.9 communications protocol refer to the following URL:

http://www.frforum.com/5000/5001-approved.html

The Compression Unit supports up to 64 simultaneous compressed, as well as unlimited uncompressed permanent virtual circuits (PVC), each with its own Data Link Connection Identifier (DLCI). Each PVC will have its own dedicated dictionary, updated and synchronized using FRF.9 Communications Protocol.

The FRF.9 protocol allows uncompressed PVC's to bypass the data compression engine. Simultaneous connectivity can be maintained with any combination of compressed and uncompressed PVCs. Utilizing the FRF.9 protocol reduces discarded Frame Relay packets and improves line utilization.

SNMP Network Management and TCP/IP Support

SNMP Network Management

The Simple Network Management Protocol (SNMP) is a widely supported open standard for network management. It provides a means of access to set the configuration or the runtime parameters of the Compression Unit.

SNMP defines a set of functions that may be used to monitor and control network elements. It is configured on a global basis only: it cannot be specified for individual interfaces.

TCP/IP Support

TCP/IP is the protocol suite used on the Internet as well as many private networks. The Compression Unit supports TCP/IP for the following:

Telnet

Telnet gives the ability for network users to connect to the menus from other machines on the network, as if they were directly connected to the console port. Because the console port is always active, a Telnet session will be given priority. The Telnet session times out after 5 minutes of inactivity and returns control to the console port.

Source Address Filtering

Two sets of IP addresses and masks can be set to limit the number of other network devices you want to have access the Compression Unit. If no addresses or masks are set, the Compression Unit accepts connection from any address.

Ping

The Compression Unit allows the user to initiate a ping to any known IP address on the network via the console port or Telnet.

Traceroute

The Compression Unit allows the user to initiate a Traceroute to any known IP address on the network via console port or Telnet. This feature returns a series of IP addresses and is especially useful for network troubleshooting.

Trivial File Transfer Protocol (TFTP)

TFTP is enabled in the IP Configuration Table (Chapter 4, SNMP Configuration). This allows the user to connect up to the Compression Unit and download flash into memory over a TCP/IP network (Chapter 6, Downloading Code).

When you have completed downloading your new flash image, the TFTP option should be disabled for security reasons.

Flash Memory

Flash Memory is a non-volatile storage device that can be electrically erased while still in the circuit and then reprogrammed by down-loading and electrically burning a software image back into its memory. The Compression Unit can run its software from EPROM or from Flash, thus, software upgrades are implemented simply by loading a new image to Flash. New images can be loaded into flash using the XMODEM protocol through the console port, or, in the case of a TCP/IP network, via Trivial File Transfer Protocol (TFTP) over the network.

For more information on downloading Flash Images, refer to Chapter 6.

Secure Console Port

For added security, the console port utilizes password protection to guard against unauthorized access to the Compression Unit configuration. You must login into the Compression Unit before you can view or modify the settings.

Versatility

The Compression Unit further enhances connectivity with the following features:

Interface Adaptability

The Compression Unit has three *smart* serial interfaces that can be configured as either DTE or DCE. Physical connectivity is supported for V.35 & EIA-530A interfaces with the appropriate *smart* cable.

The intelligence of the *smart* interface eliminates the need for internal jumper configuration of the serial interfaces. The Compression Unit automatically senses which *smart* cable type is connected and configures itself for the appropriate operation.

The mix and match capabilities of the Compression Unit serial interface allows for connectivity between equipment with dissimilar interfaces (e.g. An RS-530 CSU/DSU attached to a V.35 Bridge). These features help preserve your investment in existing technology as your network grows, and eases cost of migrating to newer technologies.

Timing

The Compression Unit supports "Terminal Timing" in addition to conventional timing. If the installation requires the use of long cables, or if the required port 1 speed is greater than 1.536 Mbps (T-1), Terminal Timing **must be used** in order to cancel the clock-to-data delays introduced by the cable. (The DTE equipment must have the capability to turn the send-timing around to the Terminal Timing Lead.)

The user can select "external TT" under the Interfaces/ Port Configuration Menu. For more information refer to the Samples Installation section under "Setting Up Terminal Timings" section in chapter 4.

Bypass Circuitry and Error Recovery

In the event of a software or hardware failure, the Compression Unit utilizes bypass circuitry to maintain connectivity over the link.

The bypass circuit can be set via the bypass slide switch located on the front panel when attempting to troubleshoot problems. When the bypass circuit is enabled, the Compression Unit will not compress any PVCs and will just pass the incoming PVC frames to the outgoing port. When the hardware bypass circuit is enabled, it logically removes the Compression Unit from the link without actual physical removal.

Real-Time Clock and Error Logging

The Real Time Clock in the Compression Unit will give the user actual time in hours, minutes, and seconds. An advantage of a real time clock is that when the system logs an error, it will inform the user to the exact time that the incident occurred, aiding in many troubleshooting procedures. The time can be set / reset using the menus.

Easy Installation

The Compression Unit is fully transparent to the attached DTE and DCE equipment. You might think it as an extremely intelligent CSU / DSU cable. The unit will automatically self-enable upon completion of it's power-on/reset sequence.

A user friendly interface and straight forward defaults further enhance the ease of installation.

Chapter 4

Compression Unit Installation

Please read and follow all warning notices and instructions included in this manual.

Environment

- The Compression Unit requires a clean, dry and static free environment typical to any computing system operation.
- The Compression Unit should not operate on any heat generating surface and should have adequate air circulation on all sides.
- The Compression Unit is small enough to fit on a desktop or shelf. With the included brackets the unit is also rack mountable.

Power Supply

The Compression Unit is intended for use with a 3-wire grounding plug. To ensure safe and reliable operation equipment grounding is essential.

The power supply is rated for 120 VAC at 60 Hz or 240 VAC at 50 Hz. Power is applied to the rear of the unit from the AC receptacle by an IEC power chord.

Power-Up and Reset Mode

Upon power-up or reset, the Compression Unit automatically initiates self diagnostic routines (self test). A reset can be initiated by either pressing the hardware reset button (front panel), or by issuing the hard or soft reset commands located in the diagnostics sub-menu.

Smart Cables

The Compression Unit is typically installed between a WAN port of a router and a CSU / DSU (DCE) in the position usually occupied by a CSU / DSU cable.

Configuration of the serial interface ports is accomplished through the *smart* serial cable. Plug in the desired cable for the appropriate interface (eg. V.35) and the Compression Unit will automatically sense which *smart* cable type is connected and will configure itself for appropriate operation.

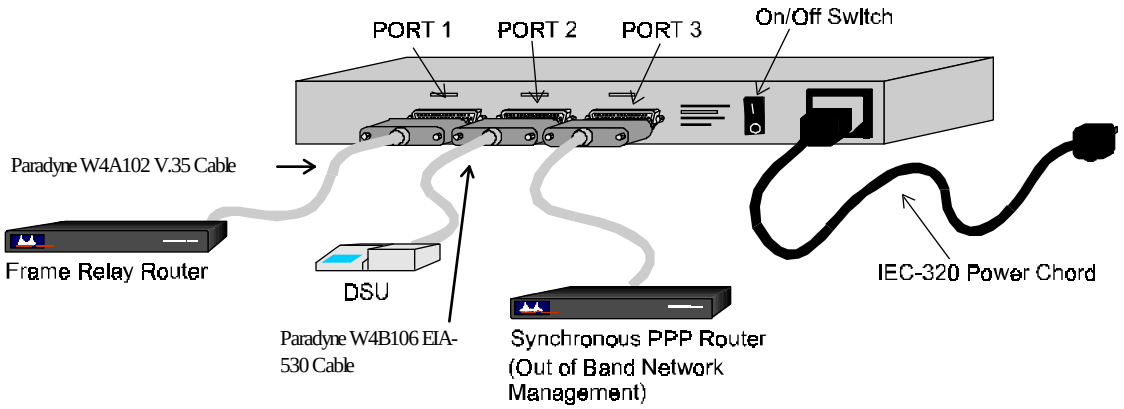
Use of any other serial cable other than an approved serial cable can damage the smart serial interface and void the warranty.

Network Hardware Configuration

Please ensure you have the following documentation / hardware prior to installation:

- One (1) Compression Unit
- One (1) IEC Power Cord
- One (1) Console Port Cable- RJ11 to RS232
- One (1) Small Flathead or Phillips Screwdriver
- One (1) Easily Accessible AC Power Receptacle
- Suitable Location
- Appropriate Interface Cables (Port 1/2/3)

Installation Procedure



Step 1: *Connecting into your network*

a) Connect PORT 1 of the Compression Unit to your Frame Relay Router using the supplied cable (part number W4A102).

b) Connect PORT 2 of Compression Unit to the CSU / DSU using the supplied I/O cable (part number W4B106).

c) If you are using Out of Band Network Management, connect the SNMP router to PORT 3 using an appropriate interface cable.

Step 2: *Power up testing*

a) Plug the IEC power chord into the back of the Compression Unit and power on the unit.

b) Connect a terminal to the console port, located on the front of the unit, with the supplied DB25 to RJ11 adapter cable running in VT100 emulation at 9600 baud, 8,N,1. This will allow you to see the results of the Power On Self Test (POST) sequence.

c) The unit will come up to the password prompt, enter your password to access the Main Menu. *The Compression Unit is shipped with a default password of* ***Compression.***

Step 3: *Configuration*

If the Compression Unit communication parameters have not been preset for your equipment, configure the Compression Unit for your environment.

Note: 1 If a long cable is used between port 1 and the router, or if the port 1 speed is greater than 1.536 Mbps, "Terminal Timing" must be configured. (See page 5).

Note: 2 The DSU should be configured for "external" or "Terminal" timing on the port which connects to the 9028.

Sample Installation

Task:

Your office was just set up on a T-1 Frame Relay network, your local DLCI number is 600 and your remote site in Edmonton is assigned DLCI 605. The IP address of your WAN port for your local router is 192.168.69.1, and 192.168.69.2 for the remote router.

Your routers will accept a maximum clock speed of 204800 bps, and you are to set up a compressed link between the two offices on a pair of Compression Units. And have them set up to support SNMP.

The following pages illustrates the steps and menu screens used for setting up a simple network connection of 2 Compression Units. Included below is a sample of the configuration worksheets to show the relationship between the worksheet and the link.

LOCAL

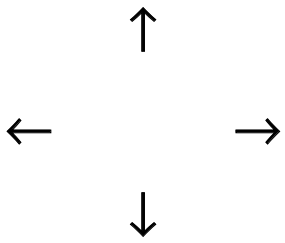
INTERFACE	CONFIGURATION OPTION	RANGE	DEFAULT SETTINGS	ACTUAL SETTINGS
Port 1	Speed	9.6 to 6.0 Mbps	1500000	204800
	DLCI Type			O_LMI
	DLCI Compression	Enable / Disable	Disable	Enable
Port 2	Speed	9.6 to 6.0 Mbps	1500000	1536000
Port 3	Speed	9.6 to 6.0 Mbps	57692	57692
	Transport Protocol	Sync PPP	Sync PPP	Sync PPP

REMOTE

INTERFACE	CONFIGURATION OPTION	RANGE	DEFAULT SETTINGS	ACTUAL SETTINGS
Port 1	Speed	9.6 to 6.0 Mbps	1500000	2048000
	DLCI Type			O_LMI
	DLCI Compression	Enable / Disable	Disable	Enable
Port 2	Speed	9.6 to 6.0 Mbps	1500000	1536000
Port 3	Speed	9.6 to 6.0 Mbps	57692	57692
	Transport Protocol	Sync PPP	Sync PPP	Sync PPP

Menu Tree Navigation Table

To move one screen/line, use the following keys



Other Navigation Keys

Main Menu:	**t**	Moves up one level:	**x**
Top left cell of table:	**O**	Refreshes current screen:	**r**
Set/ select a highlighted field:	**s/ enter**	Zero or Clear statistics in compression table:	**z**
Logoff:	**Ctrl-C**		

Followed by the Enter key.

Other Navigation Hints

- To move the cursor multiple characters/fields, enter a digit then the direction character (e.g. 5→ (moves five characters/ fields to the right), then press Enter.
- To move the cursor multiple characters/fields, enter the direction letter the number of characters you want to move (→→→ moves three right), then press the Enter key.
- You can combine navigation commands as follows: To move the cursor one down and two the right, enter ↓→→, then press Enter.
- Enter is used to set or select highlighted fields in the tables.

Login to Compression Unit

After you connect the Compression Unit to a VT-100 compatible terminal and powering the unit, the

Paradyne T1 Compressor; model:9028-A1-491 1997-01-07 14:29:01
S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8

first screen that you will see is the POST results, followed by a password prompt *(seen below).*

Not logged in | Password? | (CNSL) (NM PORT DOWN)

The default Read and Write passwords for units from the factory is "*Compression". A*fter you enter the password, the Main Menu screen will appear. (below)

Paradyne T1 Compressor; model:9028-A1-491 1997-01-07 14:29:01
S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8

WRITE enabled (CNSL) (NM PORT DOWN)

*** Main Menu ***

A) System
B) Interfaces
C) Frame Relay
D) Compression

F) Local Protocols
G) Network Mangement
H) Logging
I) Diagnostics
J) Logout

From here we can continue to configure the Compression Unit for your network requirements. To configure the interfaces to match those in the sample tables above, select option '***b***' to enter the Interfaces Menu.

*At anytime you can return to the top menu **'t'** or up one level with **'x'**.*

Paradyne T1 Compressor; model:9028-A1-491	1997-01-07 14:29:01

S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8

Configuration of Port Speeds

INTERFACES MENU

WRITE enabled (CNSL) (NM PORT DOWN)

*** Interfaces Menu ***

A) Number of Interfaces
B) MIB-II Interfaces Table
C) Port Configuration

Paradyne T1 Compressor; model:9028-A1-491	1997-01-07 14:29:01

S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8

From here we can view the number of physical interfaces, configure the interface speeds or check to see what types of cables are connected to the Compression Unit. To configure the interface speeds, select option '***b***' to enter the Configuration Table.

WRITE enabled (CNSL) (NM PORT DOWN)

***MIB-ll Interfaces Table ***

	if	Interface Description	Type	Mtu	Speed	PhysAddress
1	1	DTE	frame-relay	1534	1500000	none
2	2	Network	frame-relay	1534	1500000	none
3	3	Mgmt Port	ppp	1534	57692	none
4	4	Com Port	async	none	9600	none

When you enter the menu screen for the Interfaces Table the cursor will default to the ***if*** (interface) 1 position, move the cursor over to the ***Speed*** column with your right arrow key. The cursor will not move with every key depression, you must select the arrow key four times to move the cursor over to the speed column.

Paradyne T1 Compressor; model:9028-A1-491 1997-01-07 14:29:01
S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8

WRITE enabled (CNSL) (NM PORT DOWN)

***MIB-ll Interfaces Table ***

	if	Interface Description	Type	Mtu	Speed	PhysAddress
1	1	DTE	frame-relay	1534	1500000	none
2	2	Network	frame-relay	1534	1500000	none
3	3	Mgmt Port	ppp	1534	57692	none

Once you have highlighted the desired field to change, enter the letter '***s***' at the compressor prompt to allow you to 'set' the parameter. An options sub-table will appear informing you of the parameters legal range of values as well as its current setting.

Paradyne T1 Compressor; model:9028-A1-491 1997-01-07 14:29:01
S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8

WRITE enabled (CNSL) (NM PORT DOWN)

***MIB-ll Interfaces Table ***

	if	Interface Description	Type	Mtu	Speed	PhysAddress
1	1	DTE	frame-relay	1534	1500000	none
2	2	Network	frame-relay	1534	1500000	none

Clock speed: 9600 to 6000000 bps previous: 1500000 new:

3	3	Mgmt Port	ppp	1534	57692	none

Enter the desired clock rate for Port 1 at the prompt, for our example, set it to 2048000. After pressing the enter key, confirm the change. The <esc> key will exit without changes.

When you have finished setting the port speeds, select '***x'*** to go back one level. This will take you back to the Interfaces Menu. From there select "***c***" to go into Port Configuration.

Setting Up DTE Timing

Port Configuration

The Compression Unit supports "Terminal Timing" in addition to conventional timing. If the installation requires the use of long cables, or if the required port 1 speed is greater than 1.536 Mbps (T-1), Terminal Timing **must be used** in order to cancel the clock-to-data delays introduced by the cable. (The DTE equipment must have the capability to turn the send-timing around to the Terminal Timing Lead.)

```
Paradyne T1 Compressor; model:9028-A1-491          1997-01-07 14:29:01

S/W Release: 00.00.13; Serial Number: 0000; Checksum: D864
```

The user can select "external TT" from "DTE" under the Interfaces / Port Configuration Menu.

```
WRITE enabled (CNSL) (NM PORT DOWN)
```

*** Port Configuration Table ***

	Port	Description	Type	Cable Type	Send Timing clock source
1	1	DTE	frame-relay	V.35 DCE	TT from DTE
2	2	Network	frame-relay	V.35 DTE	ST from DCE
3	3	Management Port	ppp	NO_CABLE	TT from DTE
4	4	COM Port	rs232	UBL TEST DTE	asynchronous

```
Select ST Clock Source
1) external TT
2) Internal ST
3) Delayed internal ST
4) Invert Internal ST
```

Scroll over to the "Send Timing Clock Sources" and press "***enter***" or "***s***" to pull up the parameters dialog window a description of the four settings is outlined below:

1) External TT: The clock signal returned from the DTE is used to clock *Send Data* into Port 1.
2) Internal ST (default) : The clock signal generated on ST is used to clock send data into port 1.
3) Delayed ST: The clock signal which is sent to the DTE is used to clock *Send Data* into Port 1 after it has been delayed internally be ½ clock pulse.
4) Invert Internal ST: The clock signal which is sent to the DTE is inverted and used to clock *Send Data* into Port 1.

Note: *The Port 2, 3, and 4 clocking is not user configurable.*

When the DSU should also be configured for "External" or "Terminal" timing for the port which connects to the 9020, Timing configuration is complete. Enter the letter '***t***' to return to the top of

the menu tree. At this point you will be asked to either save your changes, to hold and save later, or disregard. Select '***1***' to save changes and return to the Main Menu.

Paradyne T1 Compressor; model:9028-A1-491 1997-01-07 14:29:01
S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8

Setting up DLCI Compression

WRITE enabled (CNSL) (NM PORT DOWN)

*** Main Menu ***

A) System
B) Interfaces
C) Frame Relay
D) Compression

F) Local Protocols
G) Network Mangement
H) Logging
I) Diagnostics
J) Logout

Once you have saved everything from setting up the port speed configuration, we are now ready

Paradyne T1 Compressor; model:9028-A1-491 1997-01-07 14:29:01
S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8

to set up a compression channel between the two DLCI's. Select option ***'d'*** to take you into the Compression Menu. In this submenu, select ***'b'*** to take you into the Frame Relay DLCI FRF.9 DCP Table.

WRITE enabled (CNSL) (NM PORT DOWN)

*** Frame Relay DLCI FRF.9 DCP Table ***

	DLCI	state	phase	SentFrames	SentOctets	SentOctComp	SendRatio
1							
2							
3							

As with the MIB-11 Interface Table, your cursor defaults to the top left hand corner of the table. This is the column in which the DLCI numbers are set.

To set the DLCI number, enter the letter ***"s"*** at the compressor prompt to allow you to '***set'*** the

Paradyne T1 Compressor; model:9028-A1-491 1997-01-07 14:29:01
S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8

parameter. An options sub-table will appear informing you of the parameters legal range of values as well as its current setting.

WRITE enabled (CNSL) (NM PORT DOWN)

*** Frame Relay DLCI FRF.9 DCP Table ***

	DLCI	state	phase	SentFrames	SentOctets	SentOctComp	SendRatio
1							
2							
3							

Enter a DLCI number: 0 - 1023
previous: 0
new:

Enter the DLCI number for the unit at the prompt, for our example, set it to 600. When you hit the enter key it will ask you to confirm the change. The <esc> key will exit without changes.

Once you have set the DLCI number for the local unit, repeat the process to set up the remote unit. Once both units have been configured, the DLCI table will show the local DLCI number for the unit and the state of the compression channel.

	DLCI	state	phase	SentFrames	SentOctets	SentOctComp	SendRatio
1	600	0x01	Idle	0	0	0	0
2	*601*	*0x0D*	*Initializing*				
3	*602*	*0x0F*	*Operational*				

The other 2 DLCI numbers are used to represent the different states that your compression link can have:

a) ***Idle*** *No Communications between the 2 units (no mode 1 handshaking).*

b) ***Initializing*** *Units are doing mode 1 negotiations.*

c) ***Operational*** *Units have completed mode 1 negotiation and established a compressed channel.*

When you have finished setting the DLCI number, select '***t'*** to go back to the top. You will be given three options: Save your changes, Discard, Hold and Save later.

Select option '***1***' to save changes and return to the Main Menu.

Paradyne T1 Compressor; model:9028-A1-491	97-01-07 14:29:01
S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8	

SNMP Configuration

WRITE enabled (CNSL) (NM PORT DOWN)

*** Main Menu ***

A) System
B) Interfaces
C) Frame Relay
D) Compression

F) Local Protocols

H) Logging
I) Diagnostics
J) Logout

Paradyne T1 Compressor; model:9028-A1-491	1997-01-07 14:29:01
S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8	

Now that we have established the compression channel and configured the port speeds, we will need to set up the SNMP parameters. Select option '***f***' to take you into the Local Protocols Menu.

WRITE enabled (CNSL) (NM PORT DOWN)

*** Local Protocols Menu ***

A) IP Configuration
B) IP
C) ICMP
D) TCP
E) UDP
F) SNMP

At the command prompt, enter '***a***' to take you into the IP Configuration submenu, and then '***a***' again to go to the Compressor IP Configuration Table.

Paradyne T1 Compressor; model:9028-A1-491	97-01-07 14:29:01
S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8	MENU 22

WRITE enabled (CNSL) (NM PORT DOWN)

*** Compressor IP Configuration Table ***

	Object	Value
1	ip address	none
2	MTU	none
3	primary nameserver	none
4	secondary nameserver	none
5	domain	
6	filter address 1	none
7	filter mask 1	none
8	filter address 2	none
9	filter mask 2	none
10	management port protocol	none
11	management port mode	none
12	management port speed	none
13	SNMP Trap Address	0.0.0.0

As with the two previous tables, the cursor appears at the top left hand corner of the table. To set the IP address, move the cursor over to the value field by hitting the right arrow key and then enter to highlight the correct field.

	Object	Value
1	ip address	none
2	MTU	none
3	primary nameserver	none
4	secondary nameserver	none
5	domain	
6	filter address 1	none
7	filter mask 1	none
8	filter address 2	none
9	filter mask 2	none
10	management port protocol	none
11	management port mode	none
12	management port speed	none
13	SNMP Trap Address	0.0.0.0

To select the field for editing changes, again type the letter **'s'** at the command prompt to bring up the IP address dialog box.

Paradyne T1 Compressor; model:9028-A1-491	1997-01-07 14:29:01
S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8	

WRITE enabled (CNSL) (NM PORT DOWN)

*** Compressor IP Configuration Table ***

	Object	Value
1	ip address	192.168.69.3
2	MTU	1500
3	primary nameserver	none
4	secondary nameserver	none
5	domain	
6	filter address 1	none
7	filter mask 1	none
8	filter address 2	none
9	filter mask 2	none
10	management port protocol	Sync PPP
11	management port mode	NO_CABLE
12	management port speed	57692
13	SNMP Trap Address	0.0.0.0

IP Address
none: 0.0.0.0
previous: 0.0.0.0

Enter the IP address for the unit at the prompt, for our example, set it to 192.168.69.3 (notice that it is on the same subnet as the serial port of the routers, you also will need to place a static route into the routers giving them the address of the Compression Unit). When you press the enter key, it will ask you to confirm the change. The <esc> key will exit without changes.

The following step is for Inband Network Management only. If inapplicable, proceed to the next section.

Once you have set the IP address for the unit, we must set the DLCI number used to transport the Management Data. Remain in this table and proceed to IP Management DLCI field. Enter

S/W Release: 01.00.00; Serial Number: 0000; Checksum: CBA8

Paradyne T1 Compressor; model:9028-A1-491 1997-01-07 14:29:01

's' to bring up the dialog box. Enter the DLCI number that will transport your management data.

WRITE enabled (CNSL) (NM PORT DOWN)

*** Compressor IP Configuration Table ***

	Object	Value
1	ip address	192.168.69.3
2	MTU	1500
3	primary nameserver	none
4	secondary nameserver	none
5	domain	
6	filter address 1	none
7	filter mask 1	none
8	filter address 2	none
9	filter mask 2	none
10	management port protocol	Sync PPP
11	management port mode	NO_CABLE
12	management port speed	57692
13	snmp community 1 name	public
14	snmp community 1 rights	read
15	snmp community 2 name	netman
16	snmp community 2 rights	read/write
15	ip management DLCI	601

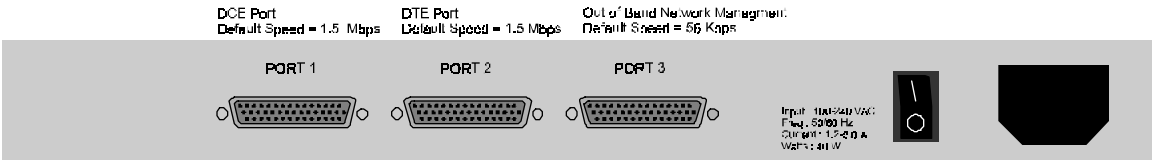
IP management DLCI
previous: 0
new: 601

16	snmp trap address	0.0.0.0

When you save the parameters for the Compressor IP Configuration Table, the unit will reboot and load the TCP/IP daemons. You will return to the password prompt.

Passwords can be changed in the Systems Menu.

Physical Interfaces



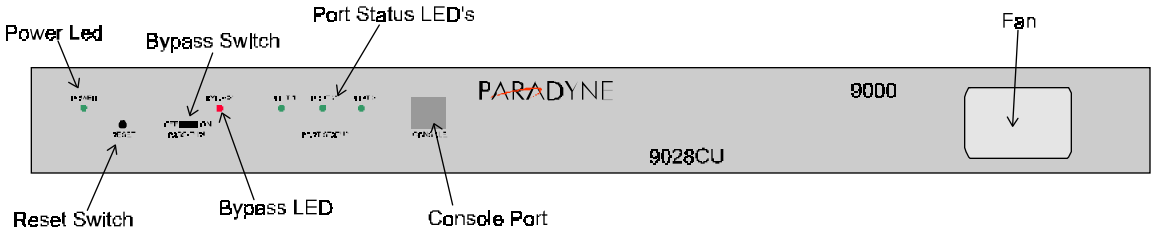
Serial Interfaces:

The Compression Unit is equipped with three serial ports that can be configured to either a DTE or DCE.

Port Specifications:

Port 1 = DCE	DTE connection (eg. A router or bridge)	6.6 Mbps max.
Port 2 = DTE	DCE connection, (eg. A CSU / DSU)	2.048 Mbps max.
Port 3 = DCE	Out-Of-Band Network Management Port	64 Kbps max.
Port 4 = DTE	Console Port	38.4 Kbps max.

Front Panel Specifications



LED Definitions:

Power	A solid GREEEN LED indicates that power is connected to the unit and the switch is turned on at the back of the Compression Unit.
Bypass	A solid RED LED indicates that the unit is in a hardware bypass state initiated by the slider switch located on the front of the Compression Unit.

Port Status	A flickering GREEN LED on any port indicates that the port is active and passing data.

Chapter 5

Compression Unit Menu Tree

Below is a breakdown of the menu structure for the Compression Unit, we will go into greater detail of the sub menus in this chapter.

A. **System (Table 1-1)**	A. MIB II System Group (SNMP Contact Information) B. Custom System Configuration (Not active in this platform) C. Set Date / Time D. Load New Software via XMODEM E. Change Password (Change either the Read or Write password) F. Console Configuration (10 second delay before speed change takes effect) G. Display Flash Check Sum
B. **Interfaces (Table 2-1)**	A. Number Of Interfaces B. MIB-II Interfaces Table (Statistics and Interface configuration table) C. Port Configuration Table (Cable type)
C. **Frame Relay (Table 3-1)**	A. DLCMI Table (DLCI Management Interface) B. Circuit Table (Displays Active DLCI's) C. Global FrTrapState Enable/ Disable D. Custom Frame Relay Configuration E. Interface Throughput Table F. Channel Throughput Table
D. **Compression (Table 4-1)**	A. Frame Relay DLCI Compression Table B. Compression Channel Table
F. **Local Protocols (Table 5-1)**	A. IP Configuration (Configures IP Parameters) B. IP C. ICMP D. TCP E. UDP F. SNMP
G. **Network Management (Table 6-1)**	A. Ping B. Traceroute C. Telnet D. TFTP
H. **Logging (Table 7-1)**	A. View Log B. Dump Log to Console Port C. View Recent Log D. Add Manual Log Entry E. Clear Log F. Acknowledge "CHECK LOG"
I. **Diagnostics (Table 8-1)**	A. Core Functionality B. Interface Tests C. Restore Default Parameters D. Restore Only Default IP Routing E. Bypass Data F. Hard Reset G. Soft Reset H. Compression Channel Test
J. **Logout**	

Sub-Menus

Table 1-1: System Menu

In this section you will find contact information and system identification.

A. MIB II System Group	**Refer to Appendix 'E', Table 1-1 for a further description of this menu item.**
B. Custom System Configuration	This menu item is not currently active in this version of software.
C. Set Date / Time	This allows the user to set the Time and Date for the Real Time Clock that is onboard the Compression Unit and aids in easier log interpretation.
D. Load New Software via XMODEM	This allows you to download new ROM images into FLASH memory via any communication package that supports XMODEM file transfers. Refer to the downloading flash section of your manual for a complete description of the steps used to download new ROM images into FLASH memory.
E. Change Password	A. Change READ Password B. Change WRITE Password * See (E) below *
F. Console Configuration	* See (F) below *
G. Display Flash Check Sum	Displays the current software version currently loaded in Flash.

(E) Password Dialog Box

A. Change READ Password	Enter 23 character alphanumeric password again.
B. Change WRITE Password	Enter 23 character alphanumeric password again.

(F) Console Configuration Table

A. Newline Padding	This is the number of ASCII NUL characters to be sent after each line.
B. Console Speed	This item allows the user to change the speed of the Console port, by default the speed is set at **9600** baud, but can go up to 38400.

Table 2-1: Interfaces Menu

1. Number Of Interfaces	Displays the number of Physical and Logical Ports on the Compression Unit.
2. MIB II Interface Table	**Refer to Appendix 'E', Table 1-2 for a further description of this menu item.**
3. Port Configuration Table	The Compression Unit takes advantage of a 'Smart Cable' Interface. It will recognize the type of cable attached and will display the information along with port type (DCE or DTE) in the Port Configuration Table.

Table 3-1: Frame Relay Menu

A. DLCMI Table	**Refer to Appendix 'F', Table 2-1 for a further description of this menu item.**
B. Circuit Table	**Refer to Appendix 'F', Table 2-2 for a further description of this menu item.**
C. Global FrTrapState Enable/ Disable	Allows users to enable or disable Frame Relay Trap States
D. Custom Frame Relay Configuration	Allows the user to set the Link Management message set parameters.
E. Interface Throughput Table	Displays the Port throughput in bps. **Refer to Appendix "F", Table 2-3.**
F. Channel Throughput Table	Displays throughput on a per PVC basis in bps. **Refer to Appendix "F", Table 2-4.**

Table 4-1: Compression Menu

A. Frame Relay DLCI Compression Table	Not available at this time.
B. Compression Channel Table	This option will show all active compression channels in the Compression Unit and will allow the user to assign/ de-assign DLCI numbers to the compression channels. **Refer to Appendix 'G', Table 3-1**

Table 5-1: Local Protocols Menu

A. IP Configuration *** See (A) Below	A. Compressor IP Parameter Table. B. Compressor IP Routing Table. C. Compressor TFTP Parameter Table.
B. IP (Group Table)	**Refer to Appendix 'H', Table 4-1 for a further description of this menu item.**
C. ICMP (Group Table)	**Refer to Appendix '*H*', Table 4-2 for a further description of this menu item.**
D. TCP (Group Table)	**Refer to Appendix '*H*', Table 4-3 for a further description of this menu item.**
E. UDP (Group Table)	**Refer to Appendix '*H*', Table 4-4 for a further description of this menu item.**
F. SNMP (Group Table)	**Refer to Appendix '*H*', Table 4-5 for a further description of this menu item.**

(A) IP Configuration Menu

A. Compressor IP Parameter Table	Allows configuration of the Compression Unit's IP parameters for network management purposes.
B. Compressor IP Routing Table	Allows configuration of the internal routing tables of the Compression Unit. This is required if the end user wishes to generate a ping, telnet, or Traceroute from the Compression Unit.
C. Compressor TFTP Parameter Table	Allows the user to enable/ disable the TFTP server for downloading flash to the unit.

Table 6-1: Network Management Menu

A. Ping	While connected to the Console Port, this menu Item will allow the user to initiate a ping to any known IP address on the network.

B. Traceroute	While connected to the Console Port, this menu Item will allow the user to initiate a Traceroute to any known IP address on the network.
C. Telnet	While connected to the Console Port, this menu Item will allow the user to initiate a Telnet session to any known IP address on the network.
D. TFTP	While connected to the Console Port, this menu Item will allow the user to initiate a TFTP Session that can be utilized to download a new ROM image into FLASH memory.

Table 7-1: Logging Menu

A. View Log	This prints out the entire log to the screen of the VT-100 or Communications Terminal connected to the units Console Port.
B. Dump Log to Console Port	This will allow you to capture the Compression Unit log to disk using a capture utility in your communications package.
C. View Recent Log	This will show only a snapshot of the Compression Unit log to the user.
D. Add Manual Log Entry	Allows the user to enter one line of text (70 characters maximum) and identifies with a time stamp and user identification tag.
E. Clear Log	Clears the Log from Memory.
F. Acknowledge "CHECK LOG"	Clears the check log indicator.

Table 8-1: Diagnostics Menu

A. Core Functionality	Not available with configuration.
B. Interface Tests	Not available with configuration.
C. Restore Default Parameters	This will restore the Default Parameters of the Hardware Configuration only and has no effect on any of the DLCI information.
D. Restore Only Default IP Routing	Restores default routing.
E. Bypass Data	This sets the unit into a state of Software Bypass, the micro and serial interface receives the data but does not process it. A hardware Bypass (physically connecting the ports together internally) is accomplished by the slider switch on the front of the unit.
F. Hard Reset	Re-initializes the hardware and reloads flash. This is the same as turning the box off then on.
G. Soft Reset	Re-starts the box without re-initializing the hardware & software.
H. Compression Channel Test	Not available in current configuration.

Chapter 6

Special Operations

Downloading Flash into your Compression Unit

Via Console Port

To update your Compression Unit with the latest version of software offered by Compression Communications Corp. you must apply, via e-mail, for a User Authentication code. You will be then given a user ID number and password. This user ID and password are required to download the latest version of software from the Compression Communications Corp. Internet web site located at **http://www.compression.com**.

Once there, go to the Technical Support area. You will need to enter your user Authentication ID and Password to gain access to the new FLASH images. When you have entered the Software Library, select the FLASH image that you require and when the prompt comes up select Save to Disk, this will FTP the new FLASH image to you.

Once you have received the new FLASH image you can load it into FLASH memory on the Compression Unit via XMODEM (9600, N,8,1) using the following procedure.

Step 1	Using your communications program on you PC, connect to the Compression Unit via the console port.
Step 2	Restart the unit by pressing the reset button. When the unit restarts the Power On Self Test (POST), then press the space bar to enter the BOOT ROM menus when prompted.
Step 3	Select Option 4 “Change Console Speed”. Change your console speed to the highest rate supported by your communications package. The Compression Unit will wait for 10 seconds before changing its communications speed, allowing you to change the speed of your communications package.
Step 4	Select Option 3 “Load New Flash Image.” You will be then prompted to begin your XMODEM file transfer. Using the XMODEM procedure of your communications package, download the new ROM image into the Compression Unit.
Step 5	Select option 2 “Execute Flash Image” to restart the unit, and change your console speed back to 9.6 Kbps.

When downloading Flash using this method, you will need to have access to the console port of both the local and remote Compression Units. This makes using this method for loading Flash into remote sites cumbersome. For a better method to deal with remote Flash downloads, refer to the next page, **Downloading via TFTP**.

Via TFTP over TCP/IP Networks

Step 1 From your Unix workstation, telnet into the Compression Unit that you wish to load the new Flash. Once there access the Compressor TFTP Configuration Table under Local Protocols / IP Configuration (f,a,c could be used as a shortcut).

Refer to pg. 21 of the manual for the local protocols or IP parameter selection process.

Step 2 Using the same method for setting the IP address, move over to the tftp option and enable the setting. After the tftp option has been set, save the changes. The unit will restart and drop the telnet connection.

Step 3 Initiate your tftp by entering the following command: ***tftp <ip address of unit>.*** This will set up a connection between your Unix station and the Compression Unit.

Step 4 At the tftp prompt, enter the commands required for a binary mode file transfer and a timeout of 20 minutes. For a Linux or BSDI platform, the commands are as follows: ***Bin*** <cr> and ***Timeout*** 1200 <cr> *(refer to your Unix O/S operating manual).*

Step 5 We are now ready to download the file to the Compression Unit. At the tftp prompt enter : ***put <filename>*** <cr>.

Step 6 When the transfer has completed, exit out of your tftp. Wait for a couple of minutes in order for the image to be validated. Telnet into the unit, and go to the Diagnostics Menu. Enter the option to initiate a hard reset. This will cause the unit to execute the new flash version and drop your telnet session.

Step 7 After the new Flash has been executed you should go back into each unit and disable the tftp option for security reasons.

Chapter 7

Troubleshooting

Setup Problems

The most common problems with the Compression Unit is improper settings. The Compression Unit is compatible with a wide variety of data communications equipment therefore it is important that it is setup to match the configuration of the connected equipment. The most important recommendation for users is that they are totally familiar with the device to which they are connecting the Compression Unit. The key parameters of the connecting equipment that should be known are:

- Baud Rate
- PVC circuit numbers
- DLCI numbers

Self Diagnostics & Error Messages

The Compression Unit has built-in facilities for testing its own internal circuitry to the component level. In addition, Self-testing of SRAM and DRAM can be initiated via a menu command entered through the console port.

On Power up the unit will automatically check for a valid Boot ROM and Flash Checksum. Any error reported by any of the self-test features should be immediately reported to your service representative.

Appendix A

Configuration Worksheets

Unit Configuration Worksheet

Below are is a table that can be used to aid in setting up your Frame Relay Circuit. This sheet should be duplicated and kept at the location of your Frame Relay Equipment.

INTERFACE	CONFIGURATION OPTION	RANGE	DEFAULT SETTINGS	ACTUAL SETTINGS
Port 1	Speed	9.6 to 6000 Kbps	1500000	
	DLCI Type			
	DLCI Compression	Enable / Disable	Disable	
Port 2	Speed	9.6 to 6000 Kbps	1500000	
Port 3	Speed	9.6 to 6000 Kbps	57692	
	Transport Protocol	Sync PPP	Sync PPP	

Also included is a PVC management worksheet that aids the network manager to track of up to 64 PVC's along with their end location.

PVC Connection Worksheet

Up to 64 Compressed PVC connections can be configured.

ID	Local DLCI	CIR (Bps)	Burst Size (Bits)	Remote DLCI	Location
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

PVC Connection Worksheet *(con't)*

ID	Local DLCI	CIR (Bps)	Burst Size (Bits)	Remote DLCI	Location
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					

PVC Connection Worksheet *(con't)*

ID	Local DLCI	CIR (Bps)	Burst Size (Bits)	Remote DLCI	Location
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					

Appendix B

Compression Unit Cables

V.35 DTE

The information contained within this appendix is to be used for interface testing only. Use of any other serial cable other than an approved serial cable can damage the smart serial interface and void the warranty.

Name	*Description*	*M.34 Male*	*DTE. DCE*	*DB-44 Male*
FG	Frame Ground	A	—	1
SG	Signal Ground	B	—	7
SD(A)	Transmit Data	P	→	11
SD(B)	Transmit Data	S	→	26
RS	Request to Send	C	→	33
TT(A)	Transmit Timing (DTE)	U	→	39
TT(B)	Transmit Timing (DTE)	W	→	10
TR	Data Terminal Ready	H	→	17
RD(A)	Receive Data	R	←	15
RD(B)	Receive Data	T	←	30
CS	Clear To Send	D	←	4
DM	DCE Ready	E	←	18
RR	Carrier Detect	F	←	32
ST(A)	Transmit Timing (DCE)	Y	←	27
ST(B)	Transmit Timing (DCE)	AA	←	42
RT(A)	Receive Timing	V	←	41
RT(B)	Receive Timing	X	←	12
LT	Local Test	K	→	36
Mode 0	Smart Cable Selector	—	—	20,7
Mode 1	Smart Cable Selector	—	—	21,7
Mode 2	Smart Cable Selector	—	—	NC
Mode 3	Smart Cable Selector	—	—	NC
Mode 4	Smart Cable Selector	—	—	NC

EIA-530A DCE

Name	*Description*	*DB-25 Female*	*DTE - DCE*	*DB-44 Male*
FG	Frame Ground	1	—	1
SG	Signal Ground	7,23	—	7
TD(A)	Transmit Data	2	←	15
TD(B)	Transmit Data	14	←	30
RS(A)	Request to Send	4	←	13
RS(B)	Request to Send	19	←	28
TT(A)	Transmit Timing (DTE)	24	←	27
TT(B)	Transmit Timing (DTE)	11	←	42
DTR	Data Terminal Ready	20	←	4
RD(A)	Receive Data	3	→	11
RD(B)	Receive Data	16	→	26
CS(A)	Clear To Send	5	→	38
CS(B)	Clear To Send	13	→	9
DSR	Data Set Ready	6	→	3
RR(A)	Receiver Ready	8	→	25
RR(B)	Receiver Ready	10	→	40
ST(A)	Send Timing	15	→	39
ST(B)	Send Timing	12	→	10
RT(A)	Receive Timing	17	→	37
RT(B)	Receive Timing	9	→	8
TM	Test Indicator	25	→	36
RL	Loopback/Maintenance	21	←	16
LL	Local Loopback	18	←	2
Mode 0	Smart Cable Selector	—	—	20,7
Mode 1	Smart Cable Selector	—	—	NC
Mode 2	Smart Cable Selector	—	—	22,7
Mode 3	Smart Cable Selector	—	—	23,7
Mode 4	Smart Cable Selector	—	—	NC

EIA-530A DTE

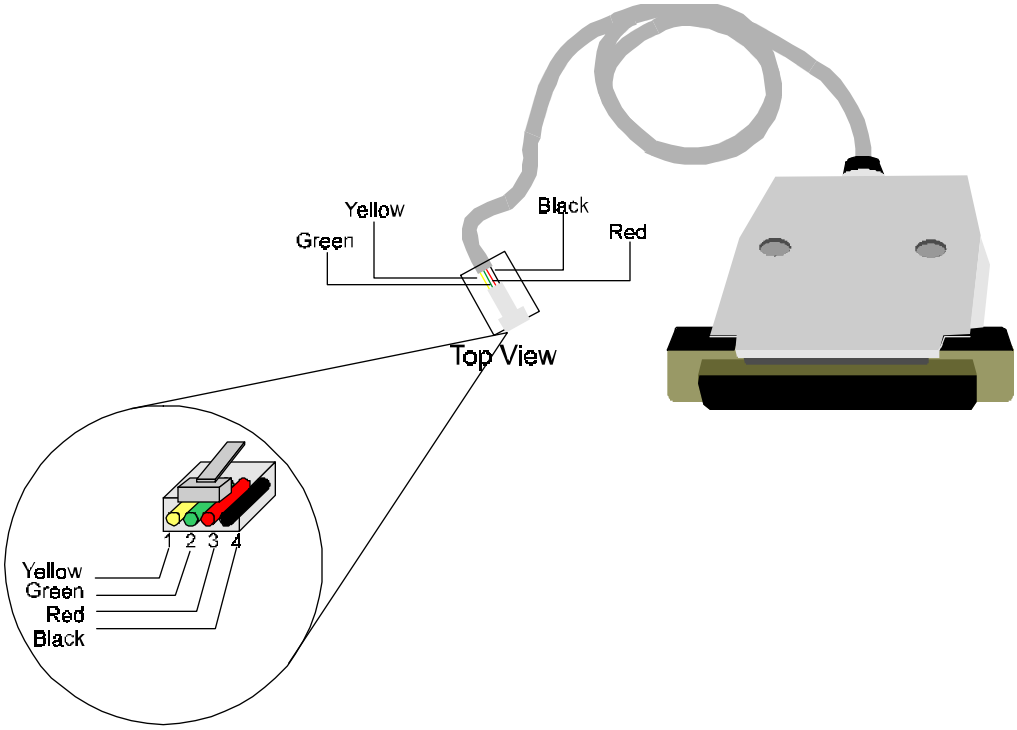
Name	*Description*	*DB-25 Male*	*DTE - DCE*	*DB-44 Male*
FG	Frame Ground	1	—	1
TD(A)	Transmit Data	2	→	11
TD(B)	Transmit Data	14	→	26
RS(A)	Request to Send	4	→	25
RS(B)	Request to Send	19	→	40
TT(A)	Transmit Timing (DTE)	24	→	39
TT(B)	Transmit Timing (DTE)	11	→	10
DTR	Data Terminal Ready	20	→	17
RD(A)	Receive Data	3	←	15
RD(B)	Receive Data	16	←	30
CS(A)	Clear To Send	5	←	29
CS(B)	Clear To Send	13	←	44
DSR	Data Set Ready	6	←	18
RR(A)	Receiver Ready	8	←	13
RR(B)	Receiver Ready	10	←	28
ST(A)	Send Timing	15	←	27
ST(B)	Send Timing	12	←	42
RT(A)	Receive Timing	17	←	41
RT(B)	Receive Timing	9	←	12
TM	Test Indicator	25	←	36
RL	Loopback/Maintenance	21	→	16
LL	Local Loopback	18	→	2
Mode 0	Smart Cable Selector	—	—	20,7
Mode 1	Smart Cable Selector	—	—	NC
Mode 2	Smart Cable Selector	—	—	22,7
Mode 3	Smart Cable Selector	—	—	NC
Mode 4	Smart Cable Selector	—	—	NC

Console Port

DB25 Female	*RJ-11*	*Color*
2	1	Yellow
3	2	Green
7	3	Red
—	4	
4 → 5	—	—
6 → 8	—	—
8 → 20	—	—

In the DB25 connector for the console port, pins 4 & 5 are looped together, along with pins 6, 8, & 20

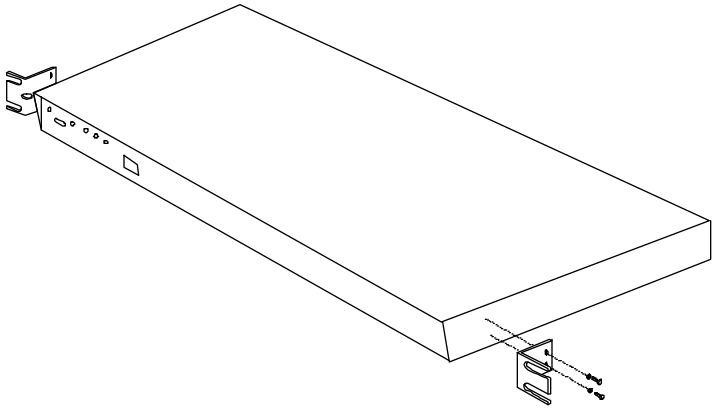
Console Port Wiring Illustration



Appendix C

Rack Mount Installation

The height of the Compression Unit corresponds to 1U or 1.75” for easy rack mount compatibility.



Once you have attached the brackets to the sides of the Compression Unit, the unit is ready to be placed into a standard 19” rack using 4 screws (two on either side).

Appendix D

Specifications

General Specifications	
Certifications	FCC Class A, CSA, UL 950
Compression Ratio	Average 2:1 or more (Dependent upon data.)
DLCI Support	64 Compressed DLCIs *(Supports unlimited uncompressed DLCIs)*
Ports	3 configurable ports (Port 1,2,3) as either DTE or DCE 1 Console port for administration.

Interfaces	DCE / DTE
Console Port	RS-232C (RJ11)
Port 1, Port 2, Port 3	V.35, EIA-530

Speeds	
Console Port	up to 38.4 Kbps Max.
Port 1	up to 6.6 Mbps Max.
Port 2	up to 2.048 Mbps Max.
Port 3	up to 64.0 Kbps Max.

Physical	
Dimensions	17”x1.75”x9” (432x45x229mm)
Weight	10 lbs (4.5 Kg)

Environmental	
Operating Temperature	2° to 50° C
Humidity	5% to 85%, non condensing

Power	
Required	85 to 264 VAC @ 50 to 60 Hz
Type	Autosensing
Consumption	7 Watts, 24 BTU per Hour at 115 volts

Product Support	
Warranty	24 Months

Appendix E

MIB II System / Interface Table Description

The SNMP Systems Group Table

Table 1-1

Heading	Access	Description
sysDescr	read-only	A textual description of the Compression Unit.
SysObjectID	read-only	The ASN.1 identification of the network management subsystem contained in the Compression Unit.
sysUpTime	read-only	The time (in hundredths of a second) since the network management portion of the system was last re-initialized.
sysContact	read-write	The textual identification of the contact person for this managed node, together with Information on how to contact this person.
sysName	read-write	An administratively-assigned name for this managed node. By convention, this is the node's fully-qualified domain name.
sysLocation	read-write	The physical location of this node (e.g. telephone closet, 3rd floor').
sysServices	read-only	A value which indicates the protocol layers at which the Compression Unit primarily offers services. For the Compression Unit, the value is 7, indicating services on protocol levels 1 (physical), 2 (logical link), and 3 (network).

The MIB-II Interfaces Table

Table 1-2

Heading	Access	Description
Type	read-only	The type of interface: frame-relay for ports 1 and 2, PPP or slip for port 3.
Mtu	read-only	The size of the largest datagram which can be sent/received on the interface, specified in octets. For interfaces that are used for transmitting network datagrams, this is 1534.
Speed	read-write	The clock rate of the physical interface.
PhysAddress	read-only	Does not apply to the Compression Unit.
AdminStatus	read-write	The desired state of the interface. 1) up 2) down 3) testing The testing(3) state indicates that no operational packets can be passed.
OperStatus	read-only	The current operational state of the interface.
LastChange	read-only	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 contains a zero value.
InOctets	read-only	The total number of octets received on the interface, including framing characters.
InUcastPkts	read-only	The number of subnetwork-unicast packets delivered to a higher-layer protocol.
InNUcastPkts	read-only	The number of non-unicast (i.e., subnetwork- broadcast or subnetwork-multicast) packet delivered to a higher-layer protocol.
InDiscards	read-only	The number of inbound packets which were chosen to be discarded because the receive queue was full.

Heading	Access	Description
InErrors	read-only	The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
InUnknownProtos	read-only	The number of packets received via the interface which were discarded because of an unknown or unsupported protocol.
OutOctets	read-only	The total number of octets transmitted out of the interface, including framing characters.
OutUcastPkts	read-only	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.
OutNUcastPkts	read-only	The total number of packets that higher-level protocols requested be transmitted to a non-unicast (i.e., a subnetwork-broadcast or sub-network - multicast) address, including those that were discarded or not sent.
OutDiscards	read-only	The number of outbound packets which were chosen to be discarded because the output queue was full.
OutErrors	read-only	The number of outbound packets that could not be transmitted because of errors.
OutQLen	read-only	The length of the output packet queue (In packets).
ifSpecific	read-only	Not used in the Compression Unit.

Appendix F

Frame Relay Table Descriptions

The Data Link Connection Management Interface (DLCMI) Table

Table 2-1

Heading	Access	Description
LMItypeAddress (Message Set)	Read-only	Address format used. 10-bit DLCI Final Standard
AddressLen	Read-only	Address length in octets. 2-octet form usually picked. For Q922 format, length includes both address and control portions.
PollIntvl	Read-write	Number of seconds between status enquiry messages. (Typically 5 - 30 seconds).
EnqrIntrvl	Read-write	Number of status enquiry intervals before issuance of a full status enquiry message. (Default 6)
ErrorThresh	Read-write	Maximum number of unanswered Status Enquiries allowed (during a time period specified in next variable) before declaring the interface down.
MonitoredEvents	Read-write	Number of intervals making up the period for counting the number of unanswered status messages. If the *frDLCmiErrorThreshold* is exceeded, the interface is assumed to be down.
MaxVCs	Read-write	Maximum number of virtual circuits allowed for this interface is limited to 99.
Multicast	Read-only	Indicates whether the interface uses a multicast service.

Circuit Table Definition

A Frame Relay service is a multiplexing service. Data Link Connection Identifiers enumerate virtual circuits (permanent or dynamic) which are layered onto the underlying circuit, represented by ifEntry. Therefore, each of the entries in the Standard MIB's Interface Table with an IfType of Frame Relay represents a Q.922 interface. Zero or more virtual circuits are layered onto this interface and provide interconnection with various remote destinations. Each such virtual circuit is represented by an entry in the Circuit Table.

Table 2-2

Heading	Access	Description
IfIndex	read-only	The 9028 Interface that the Frame Relay DLCI is on.
DLCI	read-only	The Data Link Connection Identifier for this virtual circuit.
State	read-only	Indicates whether the particular virtual circuit is operational. In the absence of a Data Link Connection Management Interface, virtual circuit entries (rows) may be created by setting virtual circuit state to 'active', or deleted by changing Circuit state to 'invalid'. Whether or not the row actually disappears is left to the implementation, so this object may actually read as 'invalid' for some arbitrary length of time. It is also legal to set the state of a virtual circuit to 'inactive' to temporarily disable a given circuit.
ReceivedFECN	read-only	Number of frames received from the network indicating forward congestion since the virtual circuit was created.
ReceivedBECN	read-only	Number of frames received from the network indicating backward congestion since the virtual circuit was created.
SentFrames	read-only	The number of frames sent from this virtual circuit since it was created.
SentOctets	read-only	The number of octets sent from this virtual circuit since it was created.
RecdFrames	read-only	Number of frames received over this virtual circuit since it was created.
RecdOctets	read-only	Number of octets received over this virtual circuit since it was created.

Heading	Access	Description
CreationTime	read-only	The value of sysUpTime when the virtual circuit was created, whether by the Data Link Connection Management Interface or by a SetRequest.
LastTimeChange	read-only	The value of sysUpTime when last there was a change in the virtual circuit state.
CommittedBurst	read-only	This variable indicates the maximum amount of data, in bits, that the network agrees to transfer under normal conditions, during the measurement interval.
ExcessBurst	read-only	This variable indicates the maximum amount of uncommitted data bits that the network will attempt to deliver over the measurement interval. By default, if not configured when creating the entry, the Excess Information Burst Size is set to the value of ifSpeed.
Throughput	read-only	Throughput is the average number of 'Frame Relay Information Field' bits transferred per second across a user network interface in one direction, measured over the measurement interval. If the configured committed burst rate and throughput are both non-zero, the measurement interval T=frCircuitCommittedBurst/frCircuitThroughput. If the configured committed burst rate and throughput are both zero, the measurement interval. T=frCircuitExcessBurst/ifSpeed.

Interface Throughput Table

The Interface Throughput Table displays the channel Statistics on a port by port basis. The two ports are User Port (the interface port that is connected to your LAN), and Network Port (the interface port that is connected to your Frame Relay cloud).

Table 2-3

Heading	Access	Description
Interface Name	read-only	Name of the 9028 Interface, either User or Network.
LMI Packets to Network	read-only	Number of packets sent to the network on the Link Management DLCI
LMI Bytes to Network	read-only	Number of bytes sent to the network on the Link Management DLCI
LMI Packets From Network	read-only	Number of packets received from the network on the Link Management DLCI
LMI Bytes From Network	read-only	Number of bytes received from the network on the Link Management DLCI
NM Packets to Network	read-only	Number of packets sent from the 9028 to the network on an in-band management DLCI
NM Bytes to Network	read-only	Number of bytes sent from the 9028 to the network on an in-band management DLCI
NM Packets From Network	read-only	Number of packets received by the 9028 from the network on an in-band management DLCI
NM Bytes From Network	read-only	Number of packets received by the 9028 from the network on an in-band management DLCI
Payload Packets To Network	read-only	The number of packets of user data sent to the Frame Relay cloud.
Payload Bytes To Network	read-only	The number of bytes of user data sent to the Frame Relay cloud.
Payload Packets From Network	read-only	The number of packets of user data received from the Frame Relay cloud.

Heading	Access	Description
Payload Bytes From Network	read-only	The number of bytes of user data received from the Frame Relay cloud.
5 Sec. Payload Throughput To Network	read-only	The average over 5 seconds of user data (in Bits / Second) sent to the Frame Relay cloud.
5 Sec. Payload Throughput From Network	read-only	The average over 5 seconds of user data (in Bits / Second) received from the Frame Relay cloud.
1 Min. Payload Throughput To Network	read-only	The average over 1 minute of user data (in Bits / Second) sent to the Frame Relay cloud.
1 Min. Payload Throughput From Network	read-only	The average over 1 minute of user data (in Bits / Second) received from the Frame Relay cloud.
5 Min. Payload Throughput To Network	read-only	The average over 5 minute of user data (in Bits / Second) sent to the Frame Relay cloud.
5 Min. Payload Throughput From Network	read-only	The average over 5 minute of user data (in Bits / Second) received from the Frame Relay cloud.
5 Sec. Total Throughput To Network	read-only	The average over 5 seconds of user and management data (in Bits / Second) sent to the Frame Relay cloud.
5 Sec. Total Throughput From Network	read-only	The average over 5 seconds of user and management data (in Bits / Second) received from the Frame Relay cloud.
1 Min. Total Throughput To Network	read-only	The average over 1 minute of user and management data (in Bits / Second) sent to the Frame Relay cloud.
1 Min. Total Throughput From Network	read-only	The average over 1 minute of user and management data (in Bits / Second) received from the Frame Relay cloud.
5 Min. Total Throughput To Network	read-only	The average over 5 minute of user and management data (in Bits / Second) sent to the Frame Relay cloud.
5 Min. Total Throughput From Network	read-only	The average over 5 minute of user and management data (in Bits / Second) received from the Frame Relay cloud.

Channel Throughput Table

The Channel Throughput Table allows you to view the statistics on a PVC by PVC basis.

Table 2-4

Heading	Access	Description
DCLI	read-only	DLCI number that the statistics are for.
Usage	read-only	
Packets to Network	read-only	The number of packets comprised of both user and management data sent to the Frame Relay cloud.
Bytes to Network	read-only	The number of byte comprised of both user and management data sent to the Frame Relay cloud.
Packets From Network	read-only	The number of packets comprised of both user and management data received from the Frame Relay cloud.
Bytes From Network	read-only	The number of bytes comprised of both user and management data received from the Frame Relay cloud.
5 Sec. Throughput To Network	read-only	The average over 5 seconds of user and management data(in Bits / Second) sent to the Frame Relay cloud.
5 Sec. Throughput From Network	read-only	The average over 5 seconds of user and management data(in Bits / Second) received from the Frame Relay cloud.
1 Min. Throughput To Network	read-only	The average over 1 minute of user and management data(in Bits / Second) sent to the Frame Relay cloud.
1 Min. Throughput From Network	read-only	The average over 1 minute of user and management data(in Bits / Second) received from the Frame Relay cloud.
5 Min. Throughput To Network	read-only	The average over 5 minute of user and management data(in Bits / Second) sent to the Frame Relay cloud.
5 Min. Throughput From Network	read-only	The average over 5 minute of user and management data(in Bits / Second) received from the Frame Relay cloud.

Appendix G

Compression Channel Table

Table 3-1

Heading	Access	Description
DLCI	Read/Write	DLCI to be compressed
state	Read Only	A hex number indicating the status of the Mode 1 negotiation.
phase	Read Only	A text description of the status of the Mode 1 negotiation.
SentFrames	Read Only	Number of frames sent on this DLCI
SentOctets	Read Only	Number of octets sent before compression
SentOctComp	Read Only	Number of octets sent after compression
SendRatio	Read Only	Ratio of SentOctets to SentOctComp
RecdFrames	Read Only	Number of frames received on this DLCI
RecdOctets	Read Only	Number of octets received after decompression
RecdOctComp	Read Only	Number of octets received compressed
RecvRatio	Read Only	Ratio of RecdOctets to RecdOctComp
SentResets	Read Only	Total number of FRF.9 receive errors observed and frames discarded
RecdResets	Read Only	Number of reset requests received from unit at the other end of this channel
Out of Seq	Read Only	Number of frames received out of sequence
LCB Errors	Read Only	Number of frames received in which an error was detected using the Longitudinal Check Byte

Appendix H

Network Management Description Tables

NOTE: This Appendix only applies to the management traffic and is independent of the user data stream.

The IP Group Table

The setting contained in 'Appendix G' are applicable only to the management data.

Table 4-1

Heading	Access	Description
ipForwarding	read-write	Does not apply to the Compression Unit, as its IP protocol handler will see ONLY IP packets addressed to its own network management entity.
ipDefaultTTL	read-write	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.
ipInReceives	read-only	The total number of input datagrams received from interfaces, including those received in error.
ipInHdrErrors	read-only	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, etc.
ipInAddrErrors	read-only	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.
ipForwDatagrams	read-only	The number of input datagrams for which this entity was not their final IP destination. Should remain 0 for the Compression Unit's network management entity, as all IP addressed to it was pre-filtered.

Heading	Access	Description
ipInUnknownProtos	read-only	The number of locally-addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.
ipInDiscards	read-only	The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded because a receive queue was full.
ipInDelivers	read-only	The total number of input datagrams successfully delivered to IP user-protocols (including ICMP).
ipOutRequests	read-only	The total number of IP datagrams which local IP user-protocols (including ICMP) supplied to IP in requests for transmission. Note that this counter does not include any datagrams counted in ipForwDatagrams.
ipOutDiscards	read-only	The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded because the output queue was full.
ipOutNoRoutes	read-only	The number of IP datagrams discarded because no route could be found to transmit them to their destination.
ipReasmTimeout	read-only	The maximum number of seconds which received fragments are held while they are awaiting reassembly at this entity.
ipReasmReqds	read-only	The number of IP fragments received which needed to be re-assembled at this entity.
ipReasmOKs	read-only	The number of IP datagrams successfully re-assembled.
ipReasmFails	read-only	The number of failures detected by the IP re-assembly algorithm (for whatever reason: timed out, errors, etc). Note that this is not necessarily a count of discarded IP fragments since some can lose track of the number of fragments by combining them as they are received.
ipFragOKs	read-only	The number of IP datagrams that have been successfully fragmented at this entity.
ipFragFails	read-only	The number of IP datagrams that have been discarded because they needed to be fragmented at this entity but could not be, e.g., because their Don't Fragment flag was set.
ipFragCreates	read-only	The number of IP datagram fragments that have been generated as a result of fragmentation at this entity.

The ICMP Group Table

Table 4.2

Heading	Access	Description
ipIcmpInMsgs	read-only	The total number of ICMP messages which the entity received. Note that this counter includes all those counted by icmpInErrors.
ipIcmpInErrors	read-only	The number of ICMP messages which the entity received but determined as having ICMP-specific errors (bad ICMP checksums, bad length, etc.).
ipIcmpInDestUnreachs	read-only	The number of ICMP Destination Unreachable messages received.
ipIcmpInTimeExcds	read-only	The number of ICMP Time Exceeded messages received.
ipIcmpInParmProbs	read-only	The number of ICMP Parameter Problem messages received.
ipIcmpInSrcQuenchs	read-only	The number of ICMP Source Quench messages received.
ipIcmpInRedirects	read-only	The number of ICMP Redirect messages received.
ipIcmpInEchos	read-only	The number of ICMP Echo (request) messages received).
ipIcmpInEchoReps	read-only	The number of ICMP Echo Reply messages received.
ipIcmpInTimestamps	read-only	The number of ICMP Timestamp (request) messages received.
ipIcmpInTimestampReps	read-only	The number of ICMP Timestamp Reply messages received.
ipIcmpInAddrMasks	read-only	The number of ICMP Address Mask Request messages received.
ipIcmpInAddrMaskReps	read-only	The number of ICMP Address Mask Reply messages received.
ipIcmpOutMsgs	read-only	The total number of ICMP messages which this entity attempted to send. Note that this counter includes all those counted by icmpOutErrors.
ipIcmpOutErrors	read-only	The number of ICMP messages which this entity did not send due to problems discovered within ICMP such as a lack of buffers.
ipIcmpOutDestUnreachs	read-only	The number of ICMP Destination Unreachable messages sent.
ipIcmpOutTimeExcds	read-only	The number of ICMP Time Exceeded messages sent.

Heading	Access	Description
ipIcmpOutParmProbs	read-only	The number of ICMP Parameter Problem messages sent.
ipIcmpOutSrcQuenchs	read-only	The number of ICMP Source Quench messages sent.
ipIcmpOutRedirects	read-only	The number of ICMP Redirect messages sent. For the Compression Unit, this object will always be zero, since hosts do not send redirects.
ipIcmpOutEchos	read-only	The number of ICMP Echo (request) messages sent.
ipIcmpOutEchoReps	read-only	The number of ICMP Echo Reply messages sent.
ipIcmpOutTimestamps	read-only	The number of ICMP Timestamp (request) messages sent.
ipIcmpOutTimestampReps	read-only	The number of ICMP Timestamp Reply messages sent.
ipIcmpOutAddrMasks	read-only	The number of ICMP Address Mask Request messages sent.
ipIcmpOutAddrMaskReps	read-only	The number of ICMP Address Mask Reply messages sent.

The TCP Group Table

Table 4-3

Heading	Access	Description
tcpRtoAlgorithm	read-only	The algorithm used to determine the timeout value used for retransmitting unacknowledged octets.
tcpRtoMin	read-only	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.

Heading	Access	Description
tcpRtoMax	read-only	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.
tcpMaxConn	read-only	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.
tcpActiveOpens	read-only	The number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.
tcpPassiveOpens	read-only	The number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state.
tcpAttemptFails	read-only	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.
tcpEstabResets	read-only	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.
tcpCurrEstab	read-only	The number of TCP connections for which the current state is either ESTABLISHED or CLOSE- WAIT.
tcpInSegs	read-only	The total number of segments received, including those received in error. This count includes segments received on currently established connections.
tcpOutSegs	read-only	The total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.
tcpRetransSegs	read-only	The total number of segments retransmitted - that is, the number of TCP segments transmitted containing one or more previously transmitted octets.

The UDP Group Table

Table 4-4

Heading	Access	Description
udpInDatagrams	read-only	The total number of UDP datagrams delivered to UDP users.
udpNoPorts	read-only	The total number of received UDP datagrams for which there was no application at the destination port.
udpInErrors	read-only	The number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port.
udpOutDatagrams		The total number of UDP datagrams sent from this entity.

SNMP Group Table

Table 4-5

Heading	Access	Description
snmpInPkts	read-only	Total number of incoming SNMP messages delivered by the transport service.
snmpOutPkts	read-only	Total number of outgoing SNMP messages delivered by the transport service.
snmpInBadVersions	read-only	Number of incoming messages with an unsupported version.
snmpInBadCommunityNames	read-only	Number of incoming messages with an unknown community name.
snmpInBadCommunityUses	read-only	Number of incoming messages requesting an operation not supported for the community name.
snmpInASNParseErrs	read-only	Number of times message decoding failed.
snmpInTooBigs	read-only	Number of incoming messages with an error-status field of “too big.” This means that the response would not fit into the largest permissible message allowed by the Compression Unit.

Heading	Access	Description
snmpInNoSuchNames	read-only	Number of incoming messages with an error-status field of "noSuchName." This means that a requested object is not supported by the Compression Unit.
snmpInBadValues	read-only	Number of incoming messages with an error-status field of "badValue." This means that a value in a corresponding outgoing set-request had a bad data type, incorrect length, or inappropriate value.
snmpInReadOnlys	read-only	Number of incoming messages with an error-status field of "readOnly." This signals that there is a local implementation error because an inappropriate set-request was sent.
snmpInGenErrs	read-only	Number os incoming messages with an error-status field of "genErr," which means an error different from those listed above.
snmpInTotalReqVars	read-only	The total number of local MIB objects that have been retrieved successfully as a result of incoming get-requests and get-next-requests.
snmpInTotalSetVars	read-only	The total number of local MIB objectives that have been updated successfully as a result of incoming set-requests.
snmpInGetRequests	read-only	Number of incoming get-requests accepted and processed.
snmpInGetNexts	read-only	Number of incoming get-next-requests accepted and processed.
snmpInSetRequests	read-only	Number of incoming set-requests accepted and processed.
snmpInGetResponses	read-only	Number of incoming get-responses accepted and processed.
snmpInTraps	read-only	Number of incoming traps accepted and processed.
snmpOutTooBigs	read-only	Number of outgoing messages sent with the error-status field set to "tooBig."
snmpOutNoSuchNames	read-only	Number of outgoing messages sent with the error-status field set to "noSuchName."

Heading	Access	Description
snmpOutBadValues	read-only	Number of outgoing messages sent with the error-status field set to “badValue.”
snmpOutGenErrs	read-only	Number of outgoing messages sent with error-status field set “genErr.”
snmpOutGetRequests	read-only	Number of outgoing get-next requests generated.
snmpOutGetNexts	read-only	Number of outgoing get-next requests generated.
snmpOutSetRequests	read-only	Number of outgoing set-requests generated.
snmpOutGetResponses	read-only	Number of outgoing get-responses generated.
snmpOutTraps	read-only	Number of outgoing traps generated.
snmpEnableAuthenTraps	read-write	Indicates whether the SNMP agent process is permitted to generate authentication failure traps. The value of this object overrides any configuration information provides a means whereby all authentication failure traps may be disabled.

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