Vanguard Managed Solutions

Vanguard Applications Ware
Multi-Service Feature Protocols

Frame Data Compressor

Notice

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To comment on this manual, please send e-mail to LGEN031@vanguardms.com

Overview

Introduction

This manual describes how to configure and use the Frame Data Compressor™ (FDC). This feature lets you compress data prior to transfer and decompress data upon receipt to improve throughput across a WAN link and reduce overall WAN bandwidth usage.

In This Manual

Glossary of Terms

The following terms appear throughout this manual.

- DC DSP SIMM - Data Compression Digital Signal Processor Single In-line Memory Module
- DCC SIMM - Data Compression Chip Single In-line Memory Module

Frame Data Compressor

What is the Frame Data Compressor?

The Frame Data Compressor is a Network Services feature that improves throughput across a WAN link and reduces overall WAN bandwidth usage. When you configure data compression for any virtual circuit between two Vanguard 6400 Series, 6520, 6560, 300/305/310/320/34x endpoints, frames are compressed prior to transfer and decompressed upon receipt. The Frame Data Compressor operates on the payload portion of each frame. Payload refers to everything excluding the X.25 or Frame Relay header.

Note

X.25 and Frame Relay switching can be performed at intermediate nodes, without having to decompress the frame. This helps minimize packet latency. Also, while both endpoints must be nodes supported by the Frame Data Compressor, intermediate nodes can be any Vanguard node.

WAN Environment

The Frame Data Compressor can improve throughput and reduce bandwidth requirements regardless of WAN service offerings. Data- and bandwidth-intensive applications such as client-server, e-mail, relational database queries, and bulk file transfers can all benefit from data compression.

Mixed Environments

The bandwidth-optimizing effects of data compression are also important in mixed SNA/LAN branch environments. Data compression shrinks the WAN bandwidth requirements of the LAN traffic, freeing enough bandwidth for SNA and/or other legacy protocol sessions to remain stable and responsive.

Three Types of Frame Data Compressor

We offer three versions of the Frame Data Compressor. They are distinguished by the number of data compression channels supported and by the hardware or software method used to process the compression. The three versions are:

- DC DSP SIMM Hardware-driven
- DCC SIMM Hardware-driven
- Operating Software Hardware-driven

DC DSP SIMM Hardware-Driven

Data compression (DC) processing occurs internally using a dedicated DC DSP SIMM processor. The standard Vanguard 6400 Series, 6520, 6560, 300 or 305 hardware configuration currently allows up to 15 active virtual circuits supporting data compression. This version is generally used to support branch sites.

Note

The original Vanguard 6520 motherboard (G01) has the DC DSP SIMM built in. It does not require installation. You can identify your motherboard version via the Node statistics.

DCC SIMM Hardware-Driven

Data compression processing occurs internally using a dedicated DCC SIMM processor. The older Vanguard 6520 and 6560 hardware configuration allows up to 75 active virtual circuits (channels) without the CSK option and 508 active virtual circuits with the CSK option enabled to support data compression functionality.

The current style DCC SIMM allows 15 active virtual circuits (channels) and you can upgrade to 100 using a CSK, and 500 with another CSK. (Contact your Customer Service representative about obtaining a CSK.)

Note

The actual number of DC channels supported is a configurable value.

Vanguard Operating Software-Driven

Vanguard 310 nodes have data compression capability built into the operating software and require no SIMM hardware. This version allows 15 active virtual circuits supporting data compression.

If you install an DCE SIMM into a Vanguard 6560, you may see a FLASH Checksum warning when the node is running system software. The warning is in the following form:

"FLASH CHECKSUM ERROR, CURRENT BANK [Expected/Calculated]"

where [Expected/Calculated] are four-digit hexadecimal numbers indicating the expected and the calculated checksums.

This may occur on DCE SIMMs purchased under these product codes:

- 65727 (encryption SIMM)
- 65728 (DCC SIMM)

Though the appearance of this warning should not effect the operation of the 6560, it can be eliminated by upgrading the unit's motherboard to revision W (or higher).

Using Vanguard DCC SIMMs

In certain cases, Revision-A of the DCC Data Compression/Encryption SIMM caused node resets and lockups on the Vanguard 6435 and 6455 platforms. If you are experiencing these problems and have a Revision-A DCC Compression/Encryption SIMM installed, please consult a Customer Service representative for an upgrade to the Revision-B SIMM.

When to Use Data Compression

Data compression is useful in networks where:

- Greater throughput is desired over low-speed lines.
- Data traffic is growing in scope due to the addition of local area networks (LANs) and associated data-intensive, bursty traffic.
- LAN and legacy traffic is vying for the same limited bandwidth.
- Reducing the number of 56/64K lines is desirable to reduce operational costs.
- Freeing data DS0s to reduce cost or increase bandwidth for voice traffic is desirable. DS0s are 56/64K chunks of bandwidth on T1 or E1 lines.
- Lowering your Committed Information Rate (CIR) for Frame Relay Services or sending fewer packets over an X.25 network results in substantial cost savings.

Why Use Data Compression

Data compression increases the efficiency of information transfer across networks where users and applications are pushing bandwidth requirements to the limits. The greatest immediate cost savings results at branch sites where there are often more lines with more limited bandwidth than in other locations on the network. Data compression can extend the life of 56/64 kbps leased lines, thereby avoiding the need for more costly fractional T1 lines or Nx64 services at branch locations.

Data compression provides additional benefits when using Public Frame Relay services. Compression reduces the cost of high-speed ports and allows for a smaller Committed Information Rate (CIR) from a service provider. Lower CIR translates into lower costs for network operation. The same benefit applies to a Public Data Network (PDN) that charges on a per packet basis, since data compression reduces the number of packets.

How Data Compression Works

In most cases, you configure data compression per call (virtual circuit) via the Network Services Features Table. When both ends of a supported connection are configured with one of the options described below, the Frame Data Compressor encodes or decodes compression for the payload portion of each frame. You should always configure both ends of the connection with the same option.

For X.25 external devices using Access Protocols, you configure data compression using the X.25 Enable facility. The X.25 Enable facility is discussed beginning on page 25.

Data Compression Configuration Options

These options define data compression and its effect on the virtual circuit connection:

Option	*Description*
Force On	Establishes the connection and forces allocation of a data compression channel, regardless of which compression option is configured at the other end of the virtual circuit. No negotiation occurs between nodes. If the receiving node uses any option other than Force On, data can be lost and DC channel and summary statistics fields are incremented reflecting the failure. Statistics are discussed beginning on page 38. Use Force On for PVC or X.25 virtual circuits that do not pass facilities.
Required	Requires that data compression be configured at both ends of a virtual circuit in order to establish the connection. Use Required for fast, one-time connections passing non time-critical data such as off-hour, low-rate file transfers over switched lines.

Option	Description
Negotiate	Allocates a data compression channel and activates the connection if Negotiate or Required is configured at the other end of the virtual circuit. The call is established only if a data compression channel can be allocated. This option compresses data whenever possible. The Negotiate option is recommended since available resources at the remote node may be unknown at call time.
Disable	Passes data without compression. Use Disable when compression is temporarily not desired, for example: • Passing of non-compressible data, such as data that is encrypted or already compressed • When factors such as link speed and frame size are affecting performance

Recommended Uses

In most cases, the *negotiate* data compression option is recommended at both ends of the connection since the status and availability of remote resources at call time may not be known or within your control.

X.25 Private and/or Public Data Networks (PDNs) may or may not support the passing of facilities, which the negotiate option requires. If you are using negotiate in an X.25 PDN and the call cannot be established or data passes without compression, you must reconfigure the circuit using the Force On option.

Frame Relay Permanent Virtual Circuits (PVCs) require use of the Force On option.

Anti-Expansion Mode

Performing compression on certain types of data can actually result in expansion of the data. This occurs, for example, with encrypted data or data that has been previously compressed. The Frame Data Compressor (FDC) automatically detects this condition and ceases compression activity on the next frame. Each subsequent frame is checked until the FDC determines that compression will once again result in size reduction. Data compression automatically restarts with the next frame.

Support

Introduction

This section describes Frame Data Compressor support.

Platform and Node Position

The Frame Data Compressor supports platforms and node positions within the network as follows:

- Vanguard 6520/6560 used as the end node of a virtual circuit
- Vanguard 300/305/310/320/34x used as the end node of a virtual circuit

Note

Vanguard 310/320 nodes feature data compression capability without the purchase or installation of the DC DSP or DCC SIMM. Data compression functionality is built into the operating software, eliminating the need for additional hardware. Data compression between these and other platform nodes is completely compatible. The Vanguard 310/320 version of the Frame Data Compressor is known as Soft DC.

Vanguard 7300 Series and 6435/6455 ATM compression over an AAM station (connecting via PVC to LCON station) is supported using Release 6.3 or greater software. For more information reference the *6435/6455 Installation Manual* (Part Number T0166) or the *Vanguard 7300 Installation Manual* (Part Number T0185).

The Frame Data Compressor *does not* support:

- 65xx, except as an intermediate node
- Vanguard 100/200, except as an intermediate node

Virtual Circuit Types

The Frame Data Compressor supports the following circuit types:

- Switched Virtual Circuits (SVCs)
- Permanent Virtual Circuits (PVCs)

All existing restrictions on circuit types apply. Refer to the Vanguard Applications Ware main documentation set.

Network Protocols

You can use the Frame Data Compressor with:

- Frame Relay Annex G and Bypass
- X.25
- MX.25

Access Protocols

These access protocols are supported by the Frame Data Compressor:

- LAN Protocols
- Frame Relay DCE
- X.25 Access Protocol
- Transparent Character-Oriented Protocol (TCOP)
- Transparent Bit-Oriented Protocol (TBOP)
- Synchronous Data Link Control (SDLC)
- SDLC to LLC LAN Conversion (SLAC)

Traffic Types Over WAN Links

The following table shows the combination of traffic types and data compression supported over X25, Frame Relay, and PPP links.

If your LCON is configured with this Traffic Type...	*And DC is...*	*X25 or FR Annex-G is...*	*FR (Bypass) is...*	*PPP is...*
Bridging only or Routing IP & IPX, while Bridging others	Off	Supported LCON: Encap = Codex Auto Call, Tries = 0 Net. Serv.->DC Level = Disable	Not Supported Bridging not supported by RFC1294 Encapsulation needed by FR links	Not Supported
Bridging only or Routing IP & IPX, while Bridging others	On	Supported LCON: Encap = Codex, Auto Call, Tries = 0 Net. Serv.->DC Level = Negotiate	Not Supported Bridging not supported by RFC1294 Encapsulation needed by FR links	Supported LCON: Encap = Codex PVC: Net. Serv.->DC Level = Force On PPP Comp = Prop.
IP and/or IPX Routing Only	Off	Supported LCON: Encap = Codex Auto Call, Tries = 0 Net. Serv.->DC Level = Disable	Supported LCON: Encap = RFC1294 PVC: Net. Serv.-> DC Level = Disable	Supported LCON: Encap = RFC1294 PVC: Net. Serv.->DC Level = Disable PPP port: Comp = None Network Protocol = IP+IPX
IP and/or IPX Routing Only	On	Supported LCON: Encap = Codex, Auto Call, Tries = 0 Net. Serv.->DC Level = Negotiate	Supported LCON: Encap = RFC1294 PVC Net. Serv.->DC Level = Force On	Supported LCON: Encap = RFC1294 PVC: Net. Serv.->DC Level = Force On PPP port: Comp = Prop Network Protocol = IP+IPX

SNMP Management Releases 4.80 and greater support SNMP management of the Frame Data Compressor. Refer to “Network Management” section on page 49.

Hardware Requirements for the Frame Data Compressor

Introduction

A Single In-line Memory Module (SIMM) is required for the Frame Data Compressor. This can take the form of either the DC DSP SIMM (Data Compression Digital Signal Processor) or DCC SIMM (Data Compression Chip). Depending on your order, the SIMM can come factory installed on your motherboard or as a module that you must install. You can determine if the SIMM is installed in either of the following ways:

- Remove the cover and examine the motherboard. Refer to the appropriate platform operator's manual. SIMM location on the various motherboards is described beginning on page 12 in this manual.
- Load the appropriate release software and examine the Data Compression General Statistics screen Data Compression Hardware Status and DC Function fields. Statistics screens are discussed beginning on page 38. DC-specific software versions are as follows:
  - Vanguard 6520 DC DSP SIMM - Use Release 4.40 or greater software.
  - Vanguard 6560 DC DSP SIMM - Use Release 4.70 or greater software.
  - Vanguard 6520, 6560 DCC SIMM - Use Release 4.90 or greater software.
  - Vanguard 300/305 - Use Release 4.50 or greater software.
  - Vanguard 310 - Use Release 4.55 or greater software.
  - Vanguard 320 - Use Release 5.0 or greater software.
  - Vanguard 340 - Use Release 5.5.P01 or greater software.
  - Vanguard 340 Enhanced - Use Release 6.4 or greater software.
  - Vanguard 342 - Use Release 6.2 or greater software.

6520 FDC Readiness

While we currently ship only the Vanguard 6520 G03 motherboard, your 6520 may have one of two earlier motherboards. These motherboards come in various states of readiness for using the Frame Data Compressor. They are described as follows:

- G01 - Frame Data Compressor ready
- G02 - Cannot be upgraded for the Frame Data Compressor
- G03 - Equipped with a SIMM socket that can accept a DC DSP or DCC SIMM. If you have this motherboard, the unit may or may not have the SIMM factory installed. Methods for determining this motherboard's SIMM support are discussed following the sections on FDC readiness.

6560 FDC Readiness

Vanguard 6560 motherboards are equipped with a SIMM socket supporting the DC DSP or DCC SIMM. The DC DSP and DCC SIMMs are orderable options that may or may not be factory installed depending on your purchase.

Vanguard 300/305 FDC Readiness

Vanguard 300/305 motherboards are equipped with a SIMM socket supporting the DC DSP or DCC SIMM. The DC DSP and DCC SIMMs are orderable options that may or may not be factory installed depending on your purchase.

Vanguard 310 FDC Readiness

The Vanguard 310 implements data compression using a software technique where the Frame Data Compressor software is built into every image of the Vanguard 310 software bundle. You do not need to install or check for the DC DSP or DCC SIMMs. Vanguard 310 data compression is completely compatible with Vanguard 6520 DC and Vanguard 300/305 and has the same configuration options and statistics screens.

Note

The DCC SIMM is not supported on the Vanguard family of products.

Determining SIMM Support

By Viewing Data Compression General Statistics

To determine if your motherboard contains a SIMM without removing the cover to view the motherboard, perform the following steps to view the DC General Statistics screen Data Compression Hardware Status and Data Compression Function parameters.

Viewing Statistics

To view DC General Statistics:

Note

Refer to the Statistics section beginning on page 38 for detailed information on this screen.

Step	*Action*	*Result*
1	Load the DC-specific software release appropriate to the platform. Refer to page 9.	Frame Data Compressor functionality becomes available to the node, including DC Statistics screens.
2	Select **Network Services Stats** from the CTP Status/Statistics menu	The Network Services Statistics screen appears, as shown in Figure 23.
3	Select **DC General Statistics** from the Network Services Statistics menu	The DC General Statistics screen appears, as shown in Figure 24.
4	Examine Data Compression Hardware Status and Data Compression Function fields. These are the first and second fields on the DC General Statistics screen.	Data Compression Hardware status: • **UP** - The DC DSP or DCC SIMM is installed and functional. • **MISSING** - The DC DSP or DCC SIMM is not installed. • **DOWN** - The DC DSP or DCC SIMM is not working. Data Compression Function: • **DSP** - Node using the DC DSP SIMM. • **DCC** - Node using DCC SIMM. • **Soft DC** - Node using DC via Vanguard 310 operating software. • **Unknown** - Node using a SIMM other than DSP or DCC.

By Examining Your 6520 Motherboard

Figure 1 indicates where the DC DSP or DCC SIMM can be found on the Vanguard 6520 motherboard. Refer to the *Vanguard 6520/6560 Installation Manual* (Part Number T0126) for instructions on removing your Vanguard 6520 motherboard.

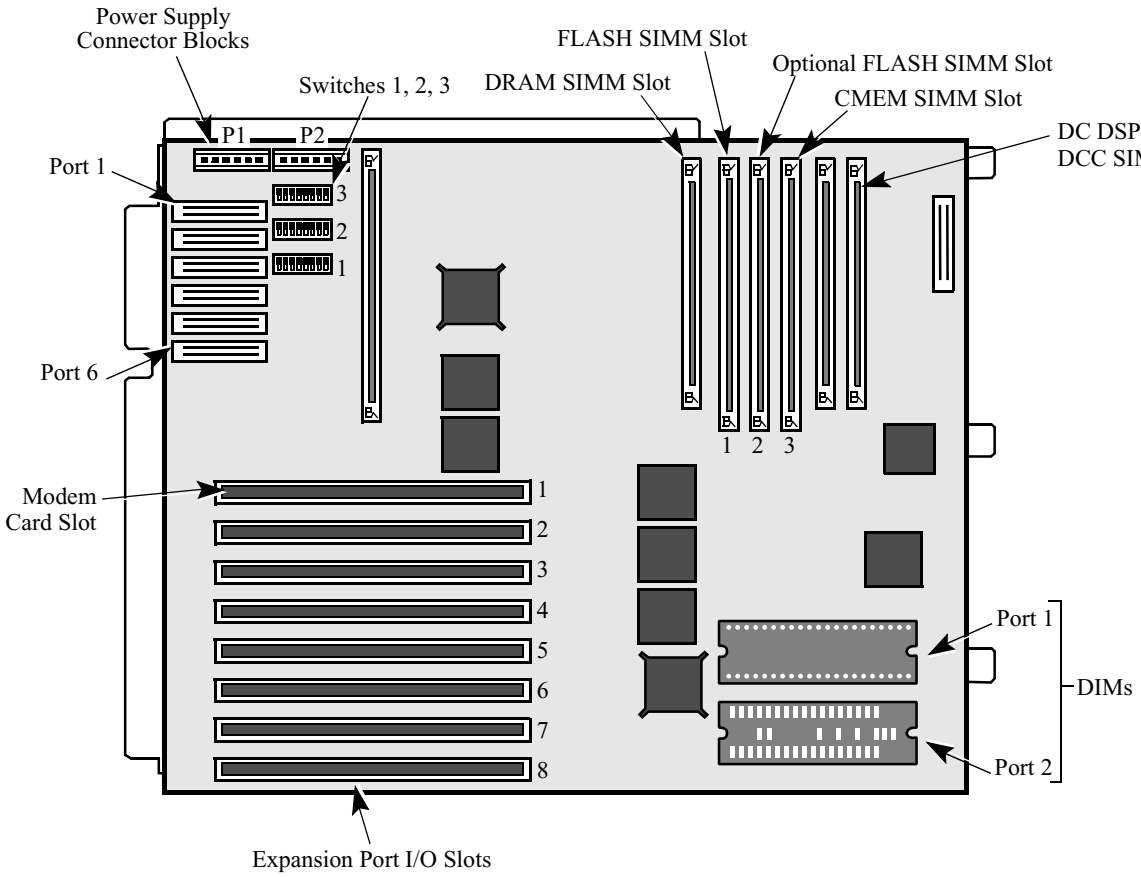

Figure 1. Vanguard 6520 Motherboard SIMM Location

By Examining Your 6560 Motherboard

Figure 2 indicates where the DC DSP or DCC SIMM can be found on the Vanguard 6560 motherboard. Refer to the *Vanguard 6520/6560 Installation Manual* (Part Number T0126) for instructions on removing your Vanguard 6560 motherboard.

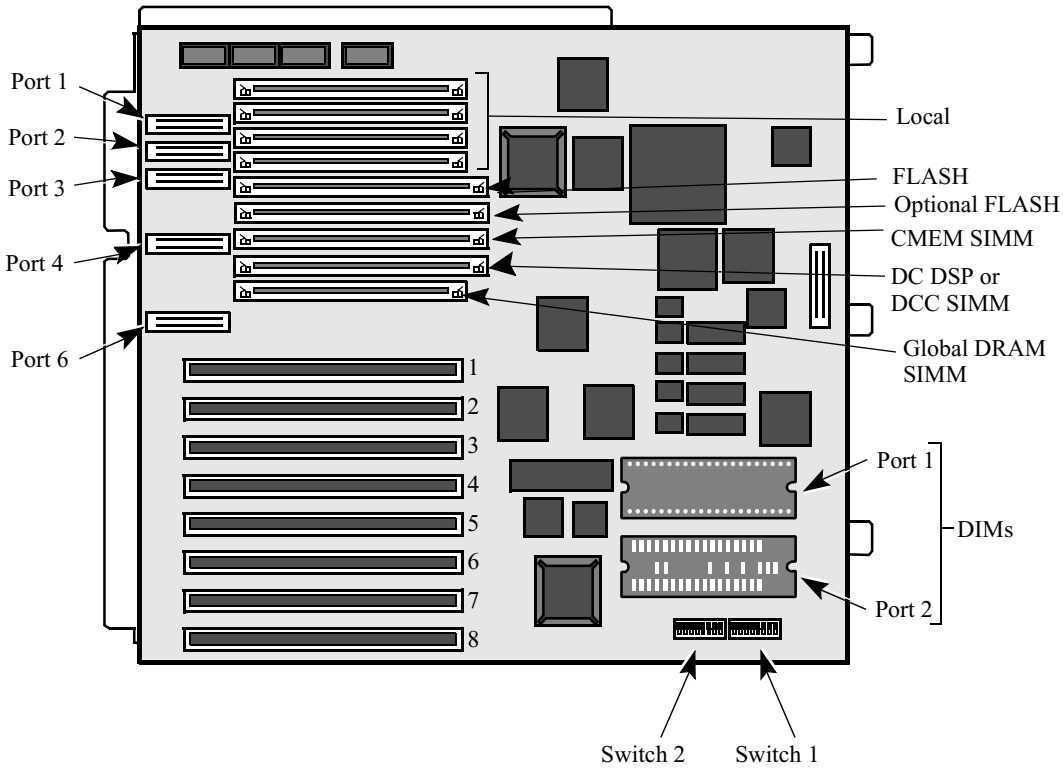

Figure 2. Vanguard 6560 Motherboard SIMM Location

By Examining Your Vanguard 300/305 Motherboard

Figure 3 indicates where the SIMM can be found on the Vanguard 300/305 motherboard. The SIMM must be in socket U69. Refer to the *Vanguard 300/305 Installation Manual* for instructions on removing your Vanguard 300/305 motherboard.

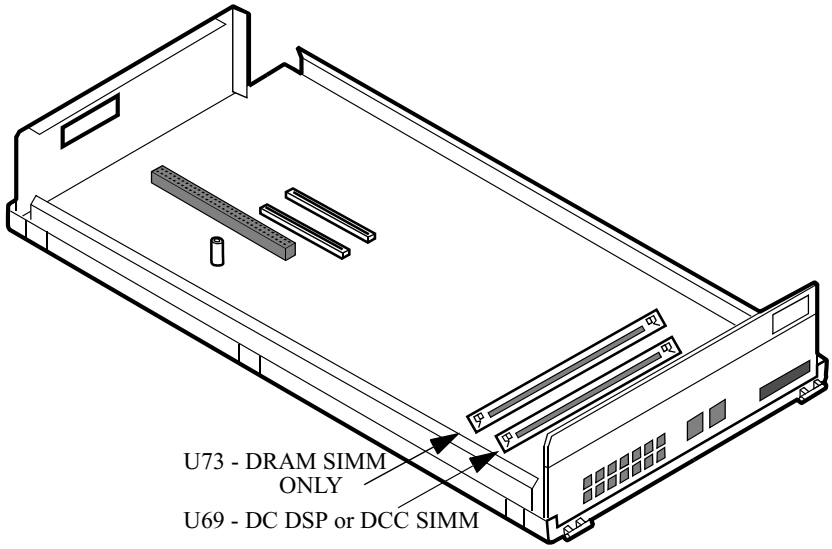

Figure 3. Vanguard 300/305 Motherboard DC DSP or DCC SIMM Location

Note

U73 and U69 are marked on the surface of the motherboard, just below the SIMM slots. Optional SIMMs for data compression and DRAM increases are of different sizes, so you cannot install the SIMMs in the incorrect slots.

SIMM Considerations

Introduction

Consider the following when using the DC DSP or DCC SIMM to run the Frame Data Compressor.

Ordering the DC DSP or DCC SIMM

If no DC DSP or DCC SIMM is installed on the motherboard, you must order one to use the Frame Data Compressor. Contact your Customer Service representative.

DC DSP or DCC SIMM Installation

If your motherboard requires installation of a DC DSP or DCC SIMM to run the Frame Data Compressor, refer to the appropriate manual, located in the Vanguard documentation set.

Note

Install the DC DSP or DCC SIMM using the same procedure described for replacing FLASH and CMEM.

DC DSP SIMM Memory Considerations

The standard DC DSP SIMM offers 64K of static RAM to support 15 data compression channels.

DCC SIMM Memory Considerations

The standard DCC SIMM offers 1 MB of static RAM to support 75 data compression channels without the CSK and 508 data compression channels when using the CSK.

DRAM SIMM Memory Considerations

If you run data compression with other data- and bandwidth-intensive applications, you are likely to run out of DRAM on your node. You will receive the message **LOCAL DRAM EXHAUSTED**. The node then uses shared memory for storage, which is slower to access than local memory. If this occurs, add expansion DRAM SIMMs to your node to free up memory space.

Once your system has adequate DRAM and the appropriate SIMM installed, you can run Frame Data Compressor software to perform data compression.

Performance

Introduction

Data compression can significantly impact overall router and network performance. Link speed, frame size, and compression ratio each play a role in determining the results that data compression will yield. Since compression ratios are very data dependent, testing in the actual network environment provides the most accurate information. This table identifies several general guidelines.

Note

Combinations are listed in the order of least desirable to most desirable.

Quality	*Combination*
Poor	Small frames / High-speed links / Low compression ratio
	Small frames / Low-speed links / Low compression ratio
Good	Large frames / High-speed links / High compression ratio
	Large frames / Low-speed links / Low compression ratio
	Large frames / Low-speed links / High compression ratio
Terminology: a) Small frames: Frame sizes of 64 bytes, for example, may be considered small. b) High speed links: Link speeds of 256K, for example, may be considered high. c) Low compression ratio: Less than 1: 1. d) High compression ratio: 1.5: 1 or better.	

Expected Compression Rates

The maximum range possible for the compression ratio is 0.72:1 to 9.2:1. The actual compression ratio that can be attained is determined by the repetitiveness of the data. Typical text data compresses in the range of 2:1 to 4:1. Graphical data can be more compressible and yield compression ratios in the range of 5:1 to 6:1. Since compression ratio is data dependent, it is difficult to accurately predict. Actual runtime tests are suggested.

Compression ratios below 1:1 actually expand the data. The FDC detects this expansion quickly, minimizing the chance of expanding, rather than reducing, bandwidth usage.

Note

Compression ratios will be slightly less when using Vanguard 310 nodes. The exception is when interconnecting nodes with the point-to-point protocol (PPP), which requires data to be compressed and decompressed on an individual link basis.

Calculating the Data Compression Ratio

The data compression ratio provided on the DC Channel Statistics screen is a snapshot of compression activity, calculated every 60 seconds. The character count for frames in and frames out of the Encoder/Decoder is also provided. Dividing characters for frames in by frames out to calculate the data compression ratio does not return the same ratio as a regular snapshot of activity due to the variable nature of activity at any given time. Compression and decompression of data occurs at different rates depending on the type of data. The ratio calculated for statistics reflects compression activity at the time of the snapshot and does not represent a cumulative ratio.

Perform these steps to calculate the cumulative compression ratio after a file transfer:

Step	*Action*
1	Reset the statistics for the data compression channel used in the transfer.
2	Perform the file transfer.
3	Once the file transfer is complete, compute the cumulative compression ratio for that file using the following formula: Cumulative Compression Ratio equals the number of characters in the Encoder divided by the number of characters out of the Encoder. **Note** Use the numbers from the node that transmitted the file.

Throughput

The following is a comparison of throughput limits with the various hardware configurations. Throughput limits are measured in bits per second.

DC DSP SIMM	15 Channel	400 - 800 kbps
DCC SIMM	75 & 508 Channel	2 - 3 mbps

Configuring Data Compression

Introduction

You configure data compression per call at the end nodes of a virtual circuit. This is done via the Network Services Features Table. You configure both ends of the connection using the same data compression option. The *negotiate* DC option is recommended since the status and availability of remote resources at call time may be unknown or outside your control.

X.25 external devices using Access Protocols can be configured using an Enable facility instead of the Network Services Features Table. This option is discussed beginning on page 25.

Note

While the Frame Data Compressor endpoints can only be configured at Vanguard 6400 Series, Vanguard 6520, 6560, or 300/305/310/320/34x end nodes, intermediate nodes can be any Vanguard node.

Before You Begin

Before using the Frame Data Compressor, ensure that no other equipment in the network is running a compression algorithm.

Configuration Procedure

Perform the steps in the following table to configure data compression at both ends of the virtual circuit. Configuration is the same regardless of the port, station, or channel type.

Step	*Action*	*Result*
1	Select **Configure Network Services** from the CTP Configure menu	The Configure Network Services menu appears.
2	Select **Network Services Features Table** from the Configure Network Services menu.	The Network Services Features Table appears with the Entry Number for the virtual circuit you are configuring (see Figure 4).
3	Press Enter.	You are prompted for the Port/ Station Identifier. Press question mark (?) to view the valid ranges.
4	Supply the Port/Station Identifier of the virtual circuit.	You are prompted for the Data Compression Level.
5	Configure the Data Compression Level parameter using the appropriate value.	Data compression configuration is complete.
6	Return to the Configure Network Services menu and select **Data Compression Parameters.**	The Data Compression Parameters menu appears.
7	Configure the Maximum Number of Data Compression Channels parameter.	

Step	*Action (continued)*	*Result*
8	Boot the node to activate data compression.	Data compression goes into effect the next time the virtual circuit is established. Data passes compressed as configured.
9	Perform these same steps on the destination end node.	Data compression is enabled for this virtual circuit. **■Note** While data compression is enabled on the virtual circuit, the circuit itself is not enabled until the next time a call is established, following the table boot.

Network Services Features Table

Use the Configure Network Services menu, shown in Figure 4, to access Network Services functionality, such as the Network Services Features Table. The Configure Network Services menu is available from the main CTP Configure menu.

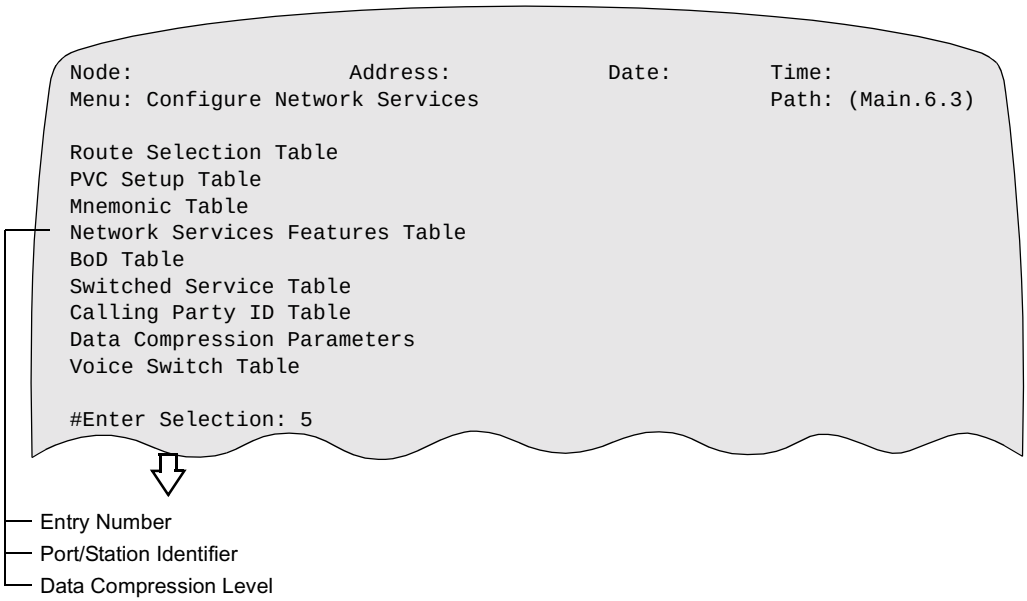

Figure 4. Network Services Features Table

Network Services Features Table Parameters

Use these parameters to configure data compression for each virtual circuit.

Port/Station Identifier:

Range:	0 to 31 alphanumeric characters. Use the spacebar to blank the field.
Default:	blank
Description:	Identifies the port and station on which the Network Services features will be enabled. You can use the wildcard character (an asterisk meaning “match anything”) to configure a range of virtual circuits. However, specific configuration of a virtual circuit takes precedence over its inclusion in a range by wildcard. TValid port types are: • X25- (For example, X25-1 (16) or X25-1*) • FRA- (For example, FRA-3S1 or FRA-3*) • LCON- (For example, LCON-1 or LCON-*) • TCOP (TCOP-1 or TCOP-*) • TBOP (TBOP-1 or TBOP-*) • SDLC (SDLC-2S1 or SDLC-2*) • SLAC – LSC-TR1 or LSC-TR* – LSC-ET1 or LSC-ET* – LSC-FR1 or LSC-FR* **Note** The hyphen character is required and no leading spaces are allowed.

Data Compression Level:

Range:	Force On, Required, Negotiate, Disable
Default:	Disable
Description:	• **Force On:** Establishes the connection and forces data compression regardless of which compression option is configured at a connection's other end. No negotiation occurs between nodes. If the receiving node uses any other option, data can be lost. A Bad Frame statistic is incremented for each non DC frame detected by the Decoder for the channel. Use Force On for PVC or X.25 connections that cannot pass facilities. • **Required:** Requires that data compression be configured at both ends of a virtual circuit and that DC resources be allocated during Call setup in order to establish a connection. Use Required for fast, one-time connections passing non-time-critical data such as off-hour, low-rate transfers, or file transfers over switched lines. • **Negotiate:** Establishes the connection regardless of what is configured at the other end of the virtual circuit and compresses data whenever possible. The Negotiate option is recommended since resource availability at the remote node may be unknown at call time. • **Disable:** Passes data without compression. Use Disabled for non-compressible data, such as data that is encrypted or that has been previously compressed, or when factors such as link speed, frame size, and compression ratio affect performance.
Boot Type:	A table boot is required to effect changes to the data compression level. The changes will not take effect until the next call is established. For PVCs, a node boot is required.

Caution

If you configure a connection as Force On at one end, you must configure Force On at the opposite end to avoid possible data loss.

Data Compression Parameters

You use the Configure Network Services menu, shown in Figure 5, to access Data Compression Parameters. The Configure Network Services menu is available from the main CTP Configure menu.

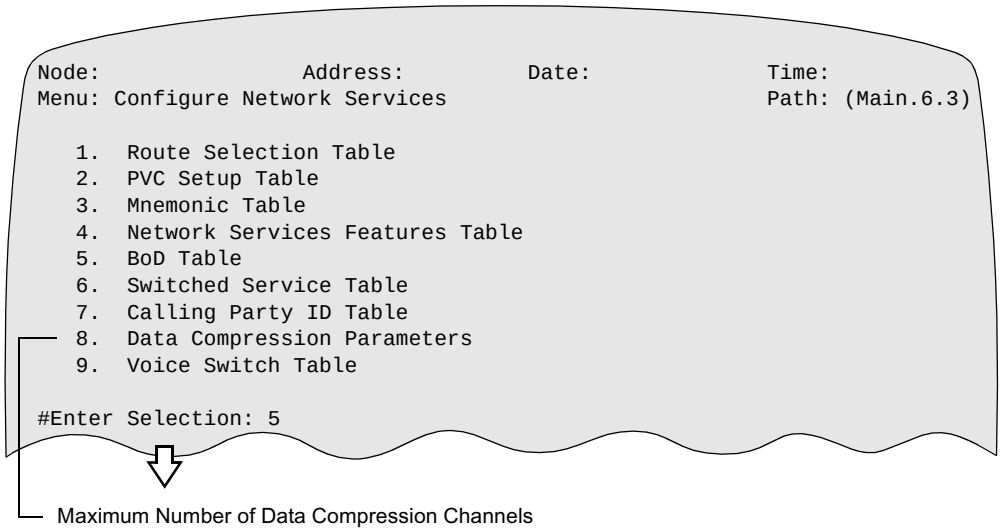

Figure 5. Data Compression Parameters Menu

Data Compression Parameters

You use the Maximum Number of Data Compression Channels parameter to configure the number of DC channels used.

Number of Data Compression Channels:

Range:	• DSP: 1 - 15 • Soft DC: 1 -15 • DCC (No CSK): 1 - 75 • DCC (CSK): 1 - 508
Default:	• DSP: 15 • Soft DC: 15 • DCC (No CSK): 75 • DCC (CSK): 508
Description:	Maximum number of Data Compression channels needed. This parameter is used to control the amount of RAM allocated for data compression during node initialization.
Boot Type:	A Node boot is required to implement changes to this parameter.

Configuration Examples

Sample Data Compression Configurations

This section provides two sample configurations using data compression.

Figure 6 shows a sample LCON configuration using data compression. The connection between the nodes is X.25. Port 1 on both nodes provides the connection to the X.25 network. In this example, node 100 initiates the autocall to node 200.

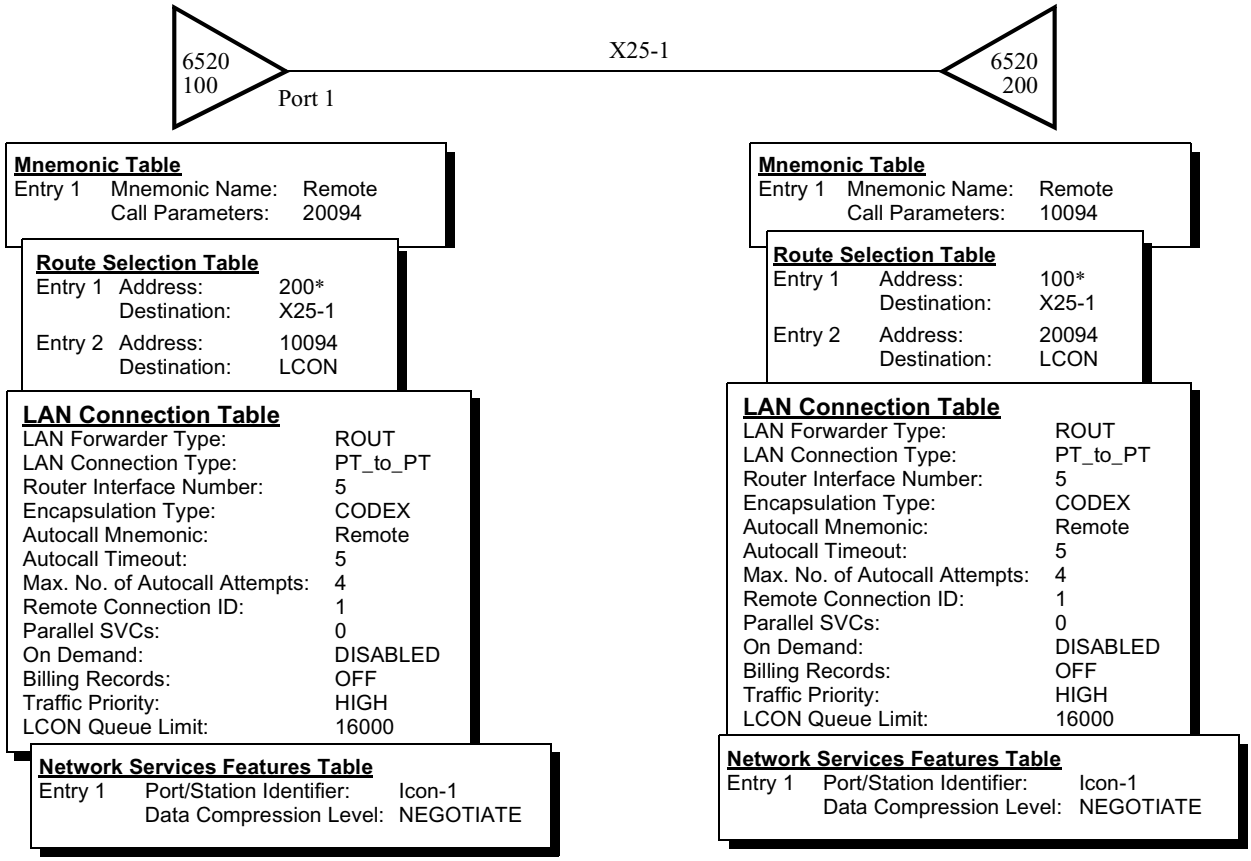

Figure 6. Sample X.25 LCON Configuration with Data Compression

Figure 7 shows an LCON configuration using data compression. The connection between the nodes is Frame Relay. Port 1 on both nodes provides the connection to the Frame Relay network. Port 13 on both nodes provides the connection to the LANs. For this example, IP routing will be passed between the routers. In this example, node 100 initiates the autocall to node 200.

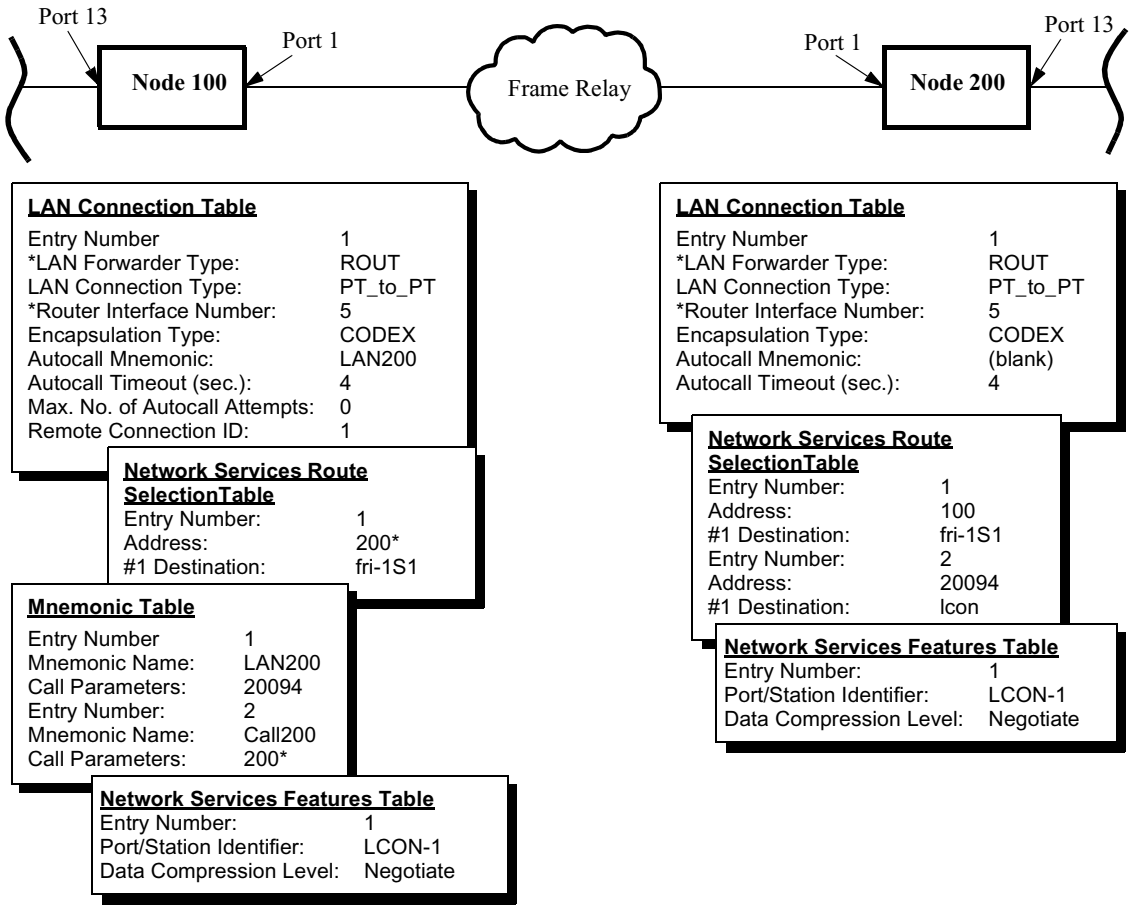

Figure 7. Sample Frame Relay LCON Configuration with Data Compression

Data Compression for X.25 External Devices

Introduction

For X.25 external devices connected to X.25 Access Protocol ports, you can request data compression for a call by using the X.25 Enable facility, rather than using the Network Services Features Table. The Enable facility is a configurable parameter in the Node record that allows you to selectively request DC for a specific Logical Channel Number (LCN).

Why Use the X.25 Enable Facility?

Because there is no way to specify the LCN used when an X.25 call is made, defining DC channels for an X.25 SVC without the Enable facility, requires use of a wildcard character to cover the range of possible LCNs on an X.25 AP port. Since the Frame Data Compressor supports only 15 DC channels, wildcard characters are inappropriate, as DC resources will be used up quickly.

By configuring specific Enable Facility ID and Data Compression Level bytes in your X.25 device's Call Request and Call Accept packets, you can manage DC resources. The Enable facility parameter in the Node record works in conjunction with the Call Request/Call Accept packet bytes to perform data compression on a per call basis.

In most cases, you use the default facility code for the Enable facility parameter in the Node Record and Call Request/Call Accept packets, configuring only the DC level in the packets.

Note

Access Protocols are configured using the X.25 Options parameter on the X.25 Port record.

How the X.25 Enable Facility Works

Figure 8 shows a sample DC operation using the X.25 Enable facility with Access Protocols (APs). In this example, two nodes are connected using Port 1. Each node is also connected to an external X.25 device using the X.25 APs and Port 2. This example shows the Data Compression Level specified in the Call Request and Call Accept packets as *Required*. All Data Compression Level options supported for standard data compression are also supported for DC via the X.25 Enable facility. When you configure the external X.25 device to send the Enable facility in its Call Request/Call Accept packets, data compression handling occurs as described in the following figure and table.

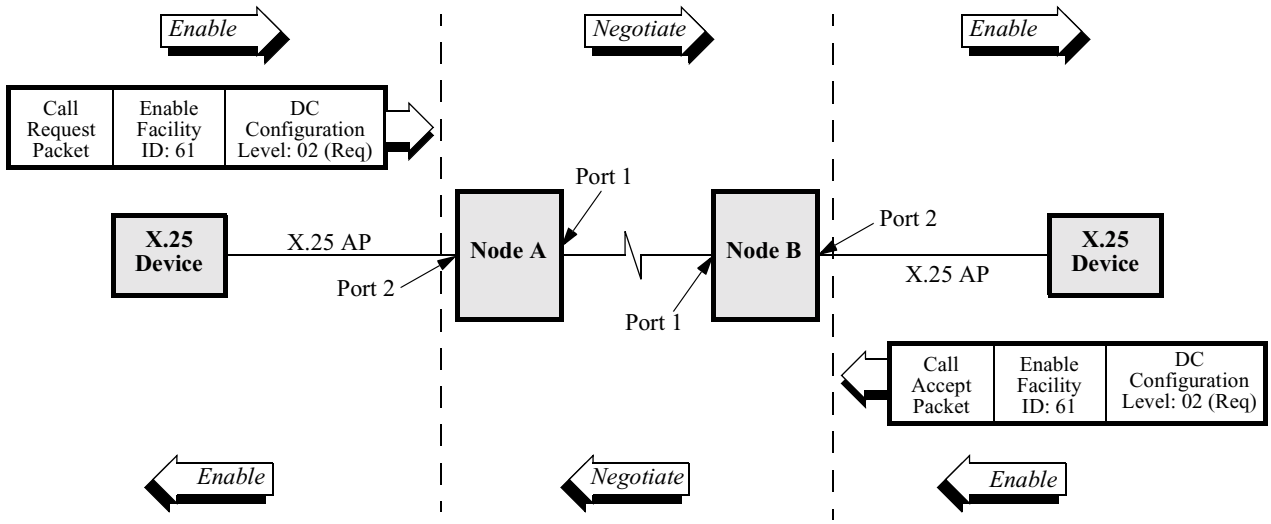

Figure 8. Sample DC Processing Using the Enable Facility

X.25 Enable Facility DC Processing

This table describes the DC processing depicted in Figure 8:

Step	*Action*	*Result/Description*
1	An external X.25 device sends a Call Request packet to the Source node (Node A).	The Call Request packet includes the Enable facility ID and Data Compression Level.
2	The Source node (Node A) allocates a DC channel and converts the Enable facility specified by the X.25 external device to a Negotiate facility.	The packet is sent to the Destination node (Node B).
3	The Destination node (Node B) converts the Negotiate facility back to an Enable facility.	The packet is sent to the Destination X.25 external device.

Step	***Action*** *(continued)*	***Result/Description***
4	The Destination X.25 external device sends a Call Accept packet back to the Destination node (Node B).	The Call Accept packet also includes the Enable facility ID and a Data Compression Level.
5	Node B negotiates the Required configuration using the DC configuration requested in the Call Accept packet. Node B converts the Enable facility back to a Negotiate facility.	The Call Accept packet is sent to the original Source node (Node A).
6	The Source node (Node A) has now established the call and allocated a DC channel for it. The negotiate facility in the Call Accept packet is converted to an Enable facility.	The Call Accept packet is forwarded to the original Source X.25 external device.

Configuring the X.25 Enable Facility

Introduction

This section describes the procedure and parameters you use to configure data compression with the X.25 Enable facility for an X.25 external device that uses Access Protocols.

Configuration Procedure

Perform the steps in the following table to configure data compression for the X.25 Enable facility on external devices using APs:

Step	*Action*	*Description*
1	Configure X.25 external devices as usual and supply the Enable Facility ID and Data Compression Level bytes in Call Request and Call Accept packets.	The Enable Facility ID default is 61. Data Compression Level codes are as follows: • Disable = 0 • Negotiate = 1 • Required = 2 • Force On = 3
2	Do nothing with the Node record unless you are changing the default Enable Facility ID facility number.	Changing the default Enable facility code is not recommended, but can be done, for example, to support a private network for which the facility number is taken. X.25 facility numbers currently stop at 10.

Configure Node Record

Figure 9 shows the Configure Node Record, including the DC Enable and DC Negotiate facility parameters. The parameters are discussed following the figure.

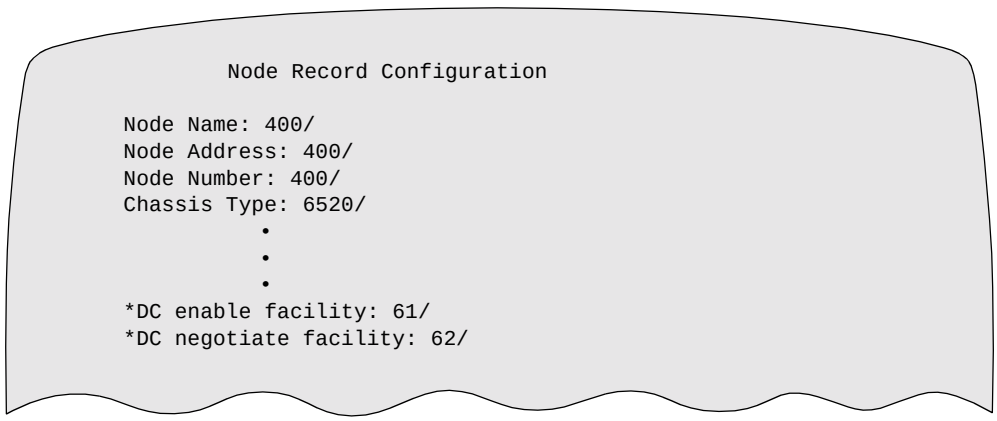

Figure 9. Configure Node Record

Configure Node Record Parameters

The Node Record parameters that define use of the Enable facility for an X.25 external device using APs are described in the following tables. In most cases, there should be no reason to change these parameters.

Note

A Node boot is required for any changes to these parameters to take affect.

DC enable facility:

Range:	10 to 61
Default:	61
Description:	This facility number specifies use of the X.25 DC Enable facility. Changing the default facility number is not recommended.

DC negotiate facility:

Range:	10 to 62
Default:	62
Description:	This facility number specifies use of the X.25 DC Negotiate facility between the nodes connected to the X.25 external devices. Changing the default facility number is not recommended.

Typical Applications

Introduction

The following examples depict where data compression occurs for various configurations.

Example 1

Example 1 in Figure 10 shows that data compression is done on top of the access protocol stack for each virtual circuit that uses an X.25 network port. Data compression is applied to each channel before the channels are multiplexed over the X.25 port. Data compression is performed only at the endpoints of a connection.

The device connected to an X.25 access port signals the use of the Frame Data Compressor via an Enable facility in the call setup. The Vanguard 6520 cannot support data compression for a PVC on an X.25 access port, Frame Relay access port, or LAN connection.

With only the user data being compressed, the virtual circuit can use a public X.25 network. These virtual circuits can also traverse intermediate nodes that do not support data compression.

Multiplexing occurs at the X.253 layer of the network protocol stack. Both compressed and uncompressed virtual circuits can be multiplexed over a single X.25 port.

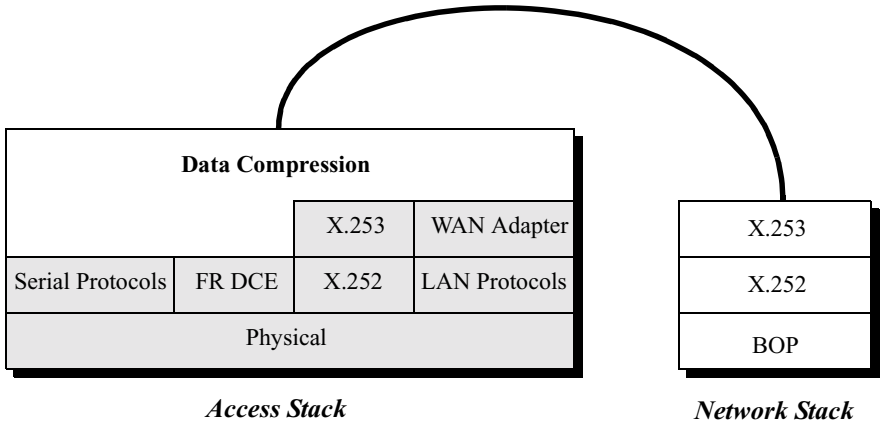

Figure 10. X.25 Network Port

Example 2

In Example 2 shown in Figure 11, data compression is done at the top of the access protocol stack for each virtual circuit that uses an MX.25 network port. Data compression is performed only at the endpoints of a connection.

The device connected to an X.25 access port signals the use of the Frame Data Compressor via an Enable facility in the call setup. Data compression for a PVC on an X.25 access port, Frame Relay access port, or LAN connection is not supported.

Multiplexing occurs at the X.253 layer of the network protocol stack. Both compressed and uncompressed virtual circuits can be multiplexed over a single X.25 port.

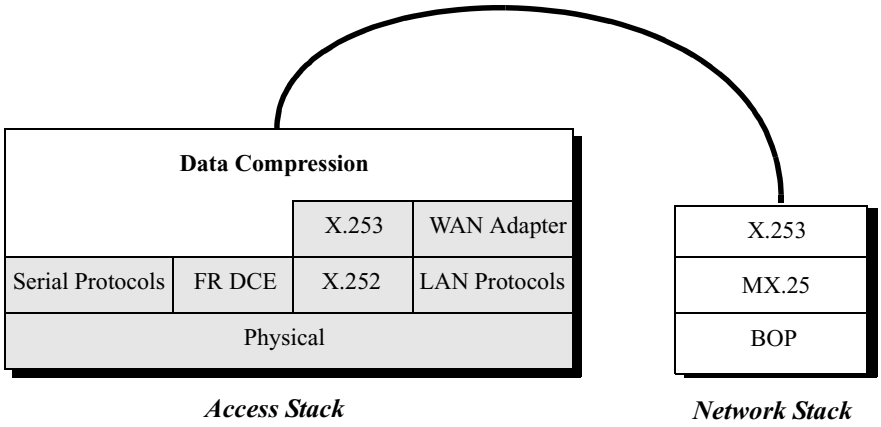

Figure 11. MX.25 Network Port

Example 3

In Example 3 shown in Figure 12, data compression is done at the top of the access protocol stack for each virtual circuit that uses a Frame Relay Annex G network port. Data compression is applied to each channel before the channels are multiplexed over the Frame Relay port.

You can enable or disable the Frame Data Compressor for each PVC or SVC that can normally use a Frame Relay Annex G network port. Data compression is performed only at the endpoints of a connection. The device connected to a Frame Relay Annex G Network port signals the use of the Frame Data Compressor via an Enable facility in the call setup. Data compression for a PVC on an X.25 access port, Frame Relay access port, or LAN connection is not supported.

With only user data being compressed, virtual circuits can use public Frame Relay networks. Virtual circuits can also traverse intermediate nodes that do not support the Frame Data Compressor by using Frame Relay Annex G.

Multiplexing can occur at two points over a Frame Relay port. Virtual circuits can be multiplexed at the X.253 layer and the FR DTE layer. There can be multiple Frame Relay DLCIs per Frame Relay port. Some of the DLCIs can be Annex G and some can be Bypass. Both compressed and uncompressed virtual circuits can be multiplexed over a single Frame Relay port at the X.253 and FR DTE layers.

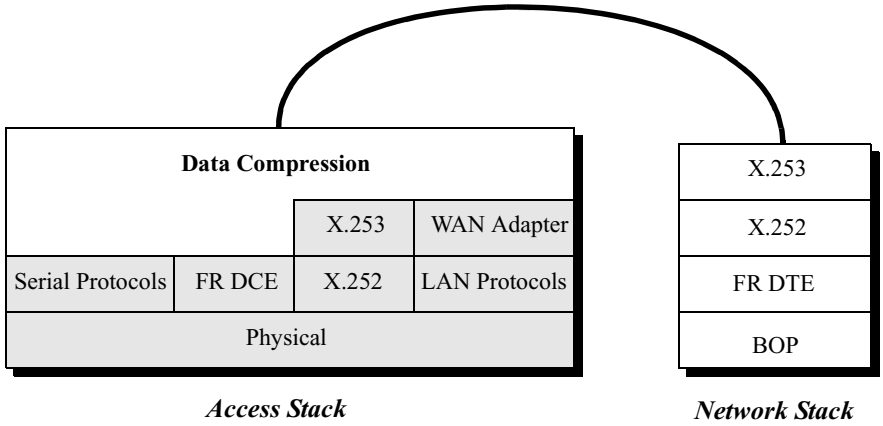

Figure 12. Frame Relay Annex G Network Port

Example 4

In Example 4 shown in Figure 13, data compression is done at the top of the access protocol stack for each virtual circuit that uses a Frame Relay Bypass network port. Data compression is applied to each virtual circuit before it is multiplexed over the Frame Relay port.

You can enable or disable the Frame Data Compressor for each PVC. Data compression is performed only at the endpoints of a connection.

With only user data being compressed, virtual circuits can use public Frame Relay networks. Virtual circuits can also traverse intermediate nodes that do not support the Frame Data Compressor by using Frame Relay Bypass.

Multiplexing occurs at the FR DTE layer of the Frame Relay Bypass protocol stack. Both compressed and uncompressed virtual circuits can be multiplexed over a single Frame Relay port using multiple Frame Relay Bypass stations.

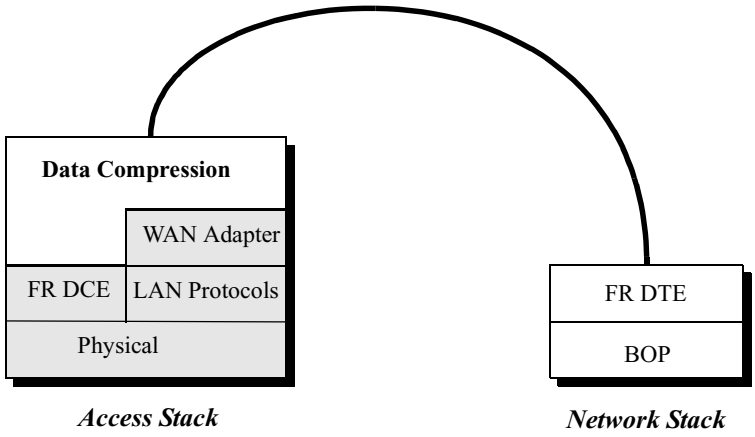

Figure 13. Frame Relay Bypass Network Port

Example 5

In Example 5 shown in Figure 14, data compression is configured for the serial port (or station depending on port type) in the Network Services Features Table of the Vanguard 6520s that terminate the connection. When the serial data protocol is X.25, the attached X.25 host must request data compression in the call setup message using an Enable facility. The connection can be a PVC (except when the serial data is Frame Relay DCE) or SVC.

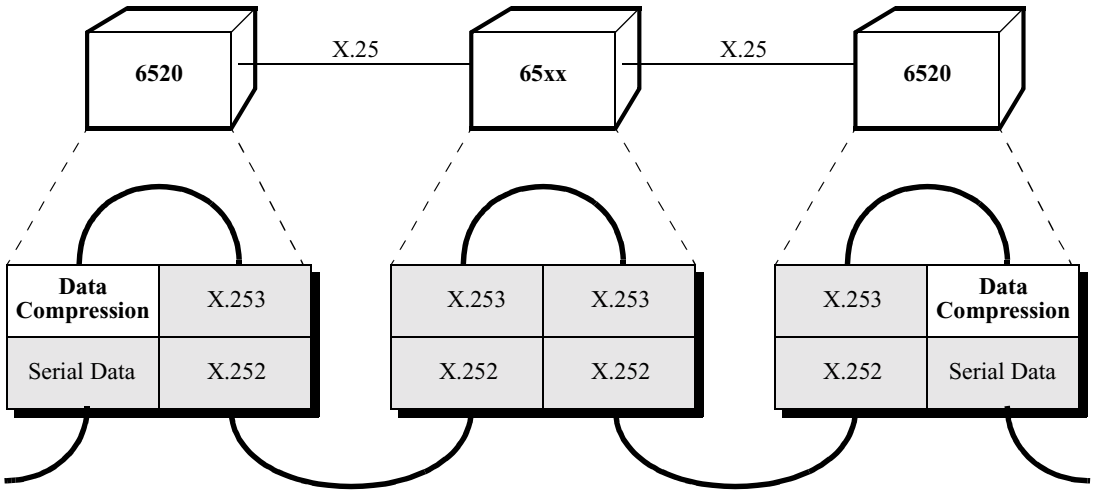

Figure 14. Serial Port/Station Records in an X.25 Network

Example 6

In Example 6 shown in Figure 15, data compression is configured for the serial port (or station depending on port type) in the Network Services Features Table of the Vanguard 6520s that terminate the connection. When the serial data protocol is X.25, the attached X.25 host must request data compression in the call setup message using an Enable facility. The connection can be a PVC (except when the serial data is Frame Relay DCE) or SVC.

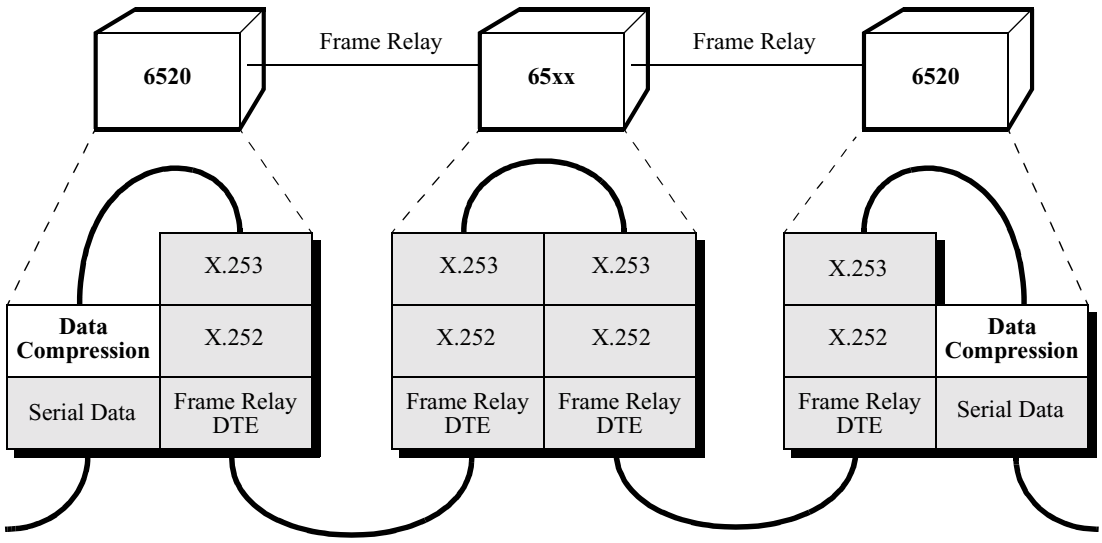

Figure 15. Serial Port/Station Records in a Frame Relay Annex G Network

Example 7

In Example 7 shown in Figure 16, data compression is configured for the Frame Relay station DCE records in the Network Services Features Table for the ports attached to the external routers. The connection must be a PVC. Other serial data protocols cannot use Frame Relay Bypass.

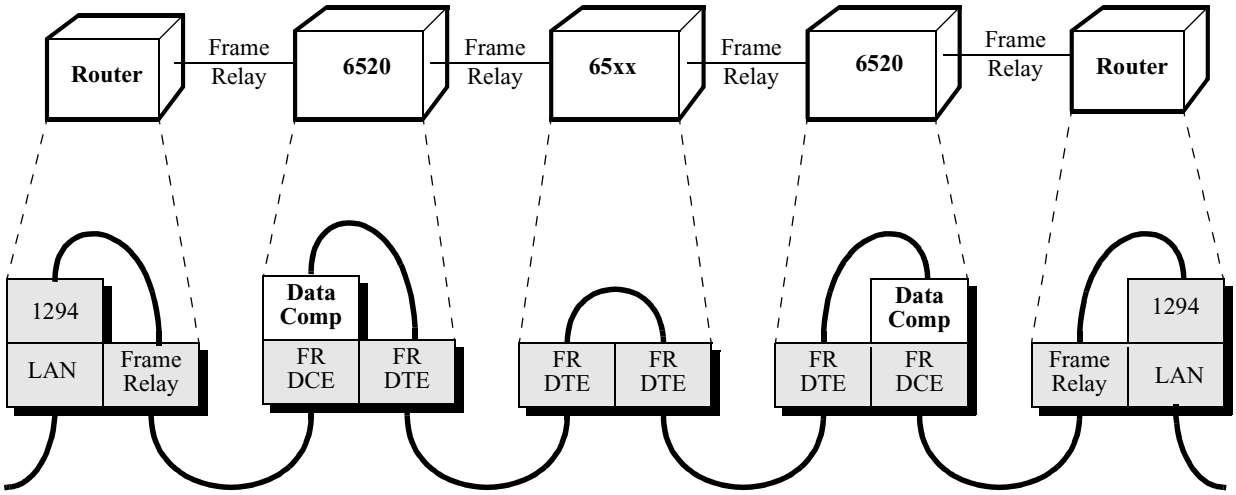

Figure 16. Frame Relay Station DCE Record on External Router Ports

Example 8

In Example 8 shown in Figure 17, data compression is configured for the LAN Connection records of the Vanguard 6520s that terminate the connection. The connection must be an SVC.

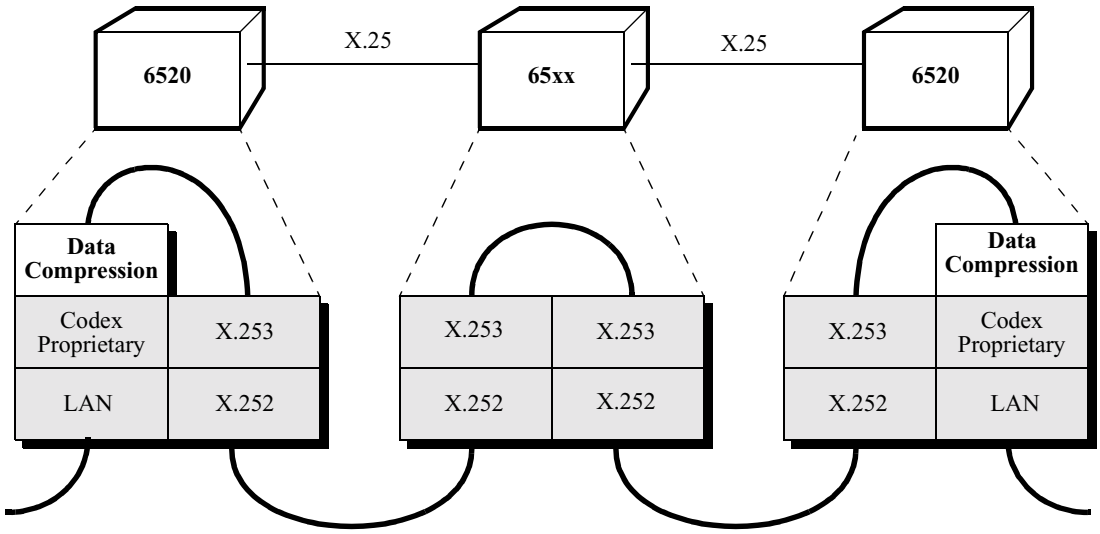

Figure 17. LAN Connection Record in an X.25 Network

Example 9

In Example 9 shown in Figure 18, data compression is configured for the LAN Connection records of the Vanguard 6520s that terminate the connection. The connection must be an SVC.

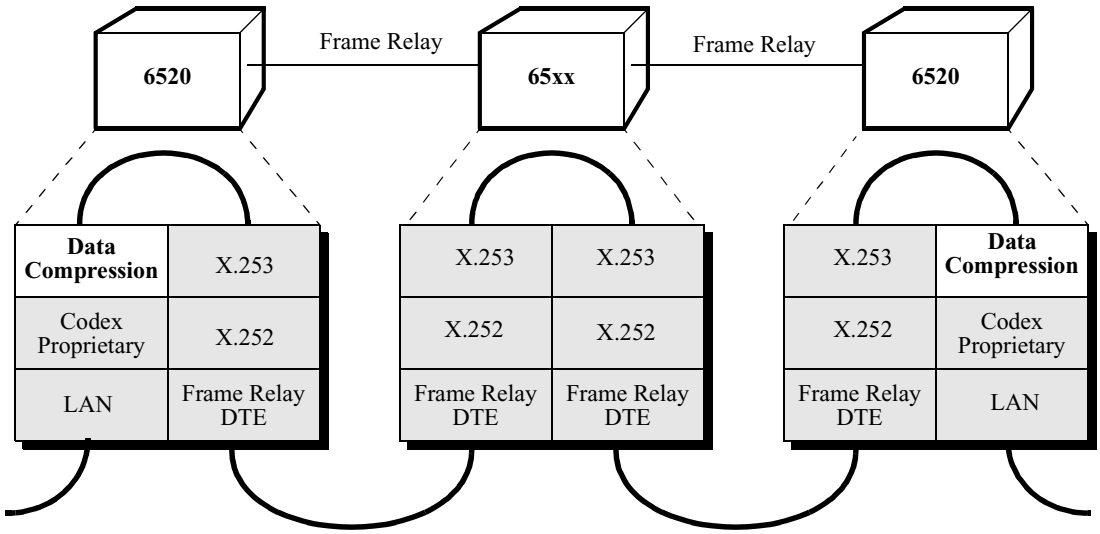

Figure 18. LAN Connection Record in a Frame Relay Annex G Network

Example 10

In Example 10 shown in Figure 19, data compression is configured for the LAN Connection records of the Vanguard 6520s that terminate the connection. The connection must be a PVC.

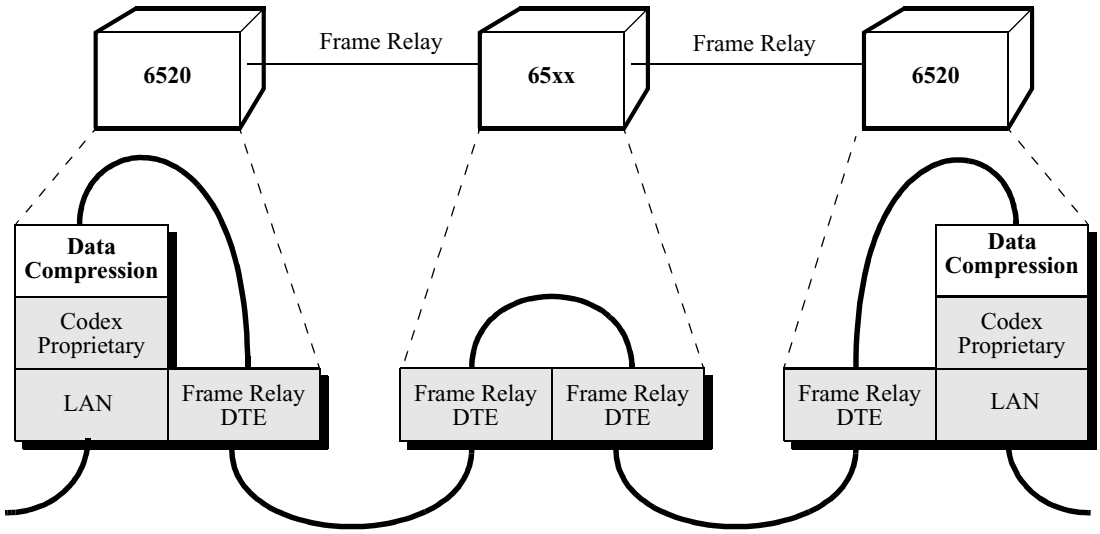

Figure 19. LAN Connection Record in a Frame Relay Bypass Network

Example 11

In Example 11 shown in Figure 20, data compression is configured for the LAN Connection record of the Vanguard 6520 with the integral router and the Frame Relay DCE station record of the Frame Relay port attached to the external router. The connection must be an SVC.

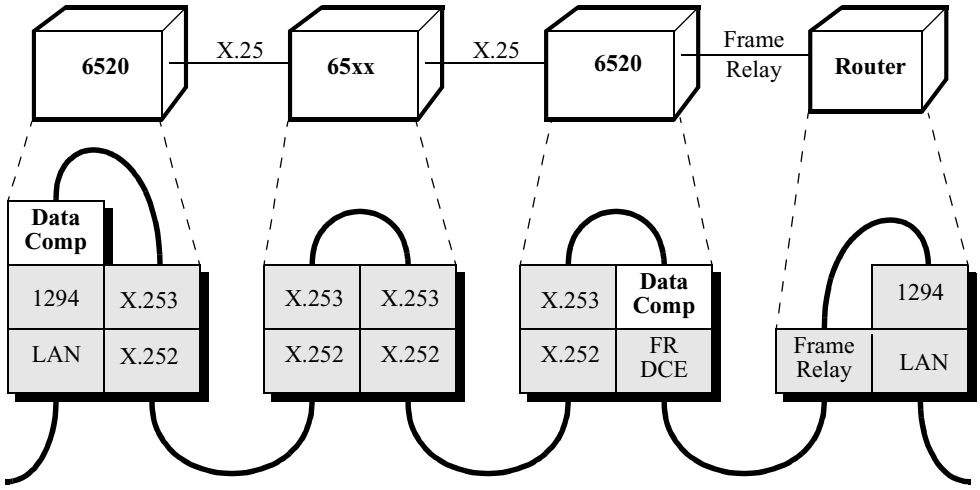

Figure 20. LAN Connection Record/Frame Relay DCE Station Record Connection for a Router

Example 12

In Example 12 shown in Figure 21, data compression is configured for the LAN Connection record at the Vanguard 6520 with the integral router and the Frame Relay DCE station record of the Frame Relay port attached to the external router. The connection must be an SVC.

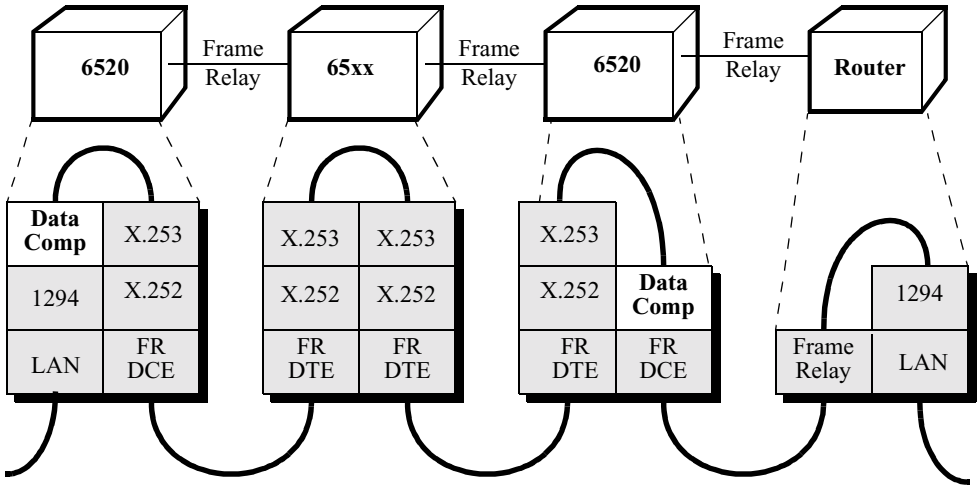

Figure 21. Frame Relay DCE Station Record/LAN Connection Record Connected by a Router

Example 13

In Example 13 shown in Figure 22, data compression is configured for the LAN Connection record of the Vanguard 6520 with the integral router and the Frame Relay DCE station record of the Frame Relay port attached to the external router. The connection must be a PVC.

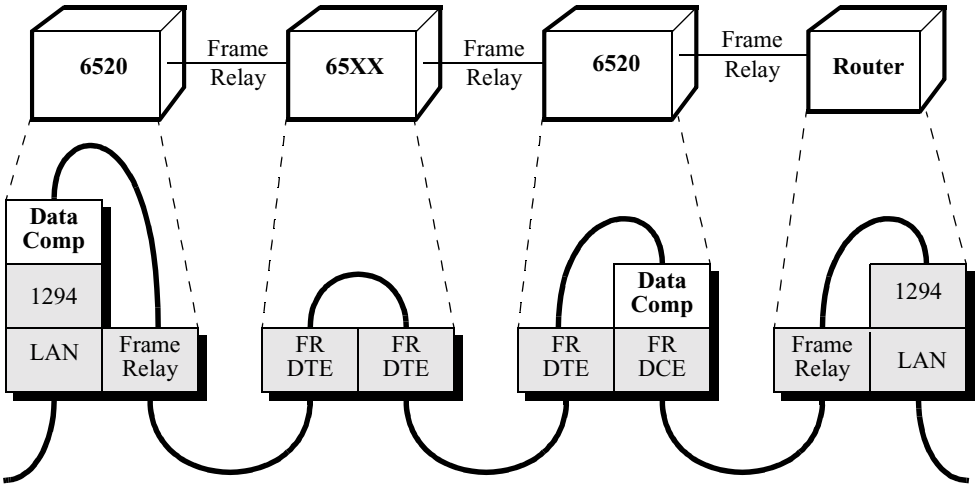

Figure 22. Frame Relay DCE Station/LAN Connection Record Connected by a Router

Statistics

Introduction

This section describes the Frame Data Compressor statistics. Four statistics screens apply to the Frame Data Compressor:

- Network Services Statistics menu
- Data Compression General Statistics screen
- Data Compression Channel Statistics screen
- Data Compression Summary Statistics screen

The Network Services Statistics menu, shown in Figure 23, is available from the CTP Status/Statistics menu. You use the Network Services Statistics menu to access the Data Compression statistics screens, as well as DC reset options. Data compression statistics screens are discussed in this section. Statistics reset options available from this and other menus are discussed beginning on page 46.

Figures 23 through 26 show the statistics screens. Statistics terms are described following the figures.

Network Services Statistics Menu

Figure 23 shows the Network Services Stats menu.

Figure 23. Network Services Stats Menu

Description of Terms

This table describes several options on the Network Services Statistics menu.

Menu...	*Provides...*
Data Compression General Statistics	General statistics on hardware and channel status.
Data Compression Channel Statistics	Detailed data compression statistics on a per channel basis.
Data Compression Summary Statistics	A summary of statistics for compression activity on all channels.

Menu...	Provides... (continued)
Reset DC Channel Statistics	A reset of all resettable data compression statistics for a single Frame Data Compressor channel. Refer to "Using Reset Statistics" beginning on page 46.
Reset All DC Statistics	A reset of all resettable data compression statistics and Frame Data Compressor channels. Refer to "Using Reset Statistics" beginning on page 46.

Note

Options 1 through 3 on this menu do not apply to data compression. Refer to the *Vanguard Basics Manual* (Part Number T0113).

Data Compression General Statistics

The Data Compression General Statistics screen, shown in Figure 24, provides detailed information regarding the status of the SIMM, number of channels in use, total compression ratio for all channels, and information on Encoder and Decoder queue depth.

```
Node:              Address:           Date:          Time:
Menu: Data Compression General Statistics             Page: 1 of 1

Data Compression Hardware Status:       UP
Data Compression Function:              DCC
DC Handler Software Revision:           2
DC Function Software Revision:          3

Max No. of DC Channels Node Supports:   508
Channels Configured for Use:            100
Channels in Use:                        2

Max. Simultaneous use of DC Channel(s): 90
Connections rejected due to Unavailable DC Channels: 0

Aggregate Compression Ratio:            3.3
Current Encoder Queue Depth:            0
Maximum Encoder Queue Depth:            9 at (date) Time:

Current Decoder Queue Depth:            0
Maximum Decoder Queue Depth:            9 at (date) Time:
```

Figure 24. Data Compression General Statistics Screen

Description of Terms

Data Compression General statistics are described in this table:

Term	Description
Data Compression Hardware Status	Displays the current status/existence of the DC DSP SIMM or DCC SIMM on the motherboard. • UP indicates that the SIMM is installed and operational. • DOWN indicates that the SIMM is in the motherboard, but is nonfunctional. • MISSING indicates that no SIMM is installed on the motherboard.
Data Compression Function	Displays the type of data compression hardware implementation (that is, DSP or DCC).
DC Handler Software Revision	Indicates the data compression software handler revision number.
DC Function Software Revision	Indicates the data compression DSP or DCC software revision number.
Maximum Channels	Shows the maximum number of data compression channels supported by the DSP or DCC SIMMs.
Channels in use	Displays the number of data compression channels in use.
Maximum Simultaneous use of DSP Channel(s)	Displays the maximum number of calls that have used a data compression channel since the last node boot or reset of all node statistics. This statistics parameter is reset only when all stats are reset for the node or during a node boot. It *is not* reset by the "reset Data Compression statistics" command or upon clearing a call
Connection Rejected due to unavailable DC Channels	Indicates the number of call requests for data compression that were attempted and rejected due to the unavailability of data compression channels.
Aggregate Compression ratio	Indicates the total number of characters in, divided by the total number of characters out, for all data compression channels.
Current Encoder Queue Depth	Indicates the current number of frames waiting to be compressed. Frames in this queue are heading into the WAN.
Maximum Encoder Queue Depth	Indicates the maximum number of frames that were on the Encoder queue waiting to be compressed.

Term	Description *(continued)*
Current Decoder Queue Depth	Indicates the current number of frames waiting to be decompressed. Packets on this queue arrived from the WAN.
Maximum Decoder Queue Depth	Indicates the maximum number of frames that were on the Decoder queue waiting to be decompressed.

Data Compression Channel Statistics

The Data Compression Channel Statistics screen, shown in Figure 25, provides detailed data compression statistics on a per channel basis.

```
Node:              Address:           Date:            Time:
Detailed Data Compression Channel Statistics: Channel 1   Page: 1 of 2

 Last Statistics Reset:

 Channel State: DATA PASSING

 Source Channel:      FRA-19S3
 Destination Channel: X25-1(1)

 Transmit Compression Ratio (60 Sec. Snapshot): 2.3 :1

 Encoder Data Statistics:
  Number of Encoder Frames:                  774
  Number of Characters Into the Encoder:     32549
  Number of Characters Out of the Encoder:   13772

 Decoder Data Statistics:
  Number of Decoder Frames:                  776
  Number of Characters Into the Decoder:     516768
  Number of Characters Out of the Decoder:   819867
```

```
Encoder Anti-Expansion Statistics:

  Anti-Expansion Transition Count:     8
  Anti-Expansion Frame Count:          4
  Anti-Expansion Mode Status:          OFF

 Decoder Anti-Expansion Statistics:

  Anti-Expansion Transition Count:2
  Anti-Expansion Frame Count:          1
  Anti-Expansion Mode Status:          OFF

 Discard Statistics:

  Discarded packets with bad frames:   1
  Discarded packets with bad headers:  1
  Discarded packets due to reset or congestion: 0

 Press any key to continue ( ESC to exit ) ...
```

Figure 25. Data Compression Channel Statistics Screen

Description of Terms

This table describes the Data Compression Channel statistics.

Term	Description
Last Statistics Reset	Indicates the time of the last statistics reset or node restart.
Channel State	Indicates the activity state of the data compression channel. These include: • DSP DOWN - SIMM is not functioning. • IDLE - Channel is idle. • NEGOTIATING - Channel is in negotiating state. • DATA PASSING - Channel is in data passing state. • AP: CLEARING - Channel is processing a Clear Request from the Access Protocol. This request arrived prior to a Clear Request that requires transmission before clearing the call. • NP: CLEARING - Channel is processing a Clear Request from the Network Protocol stack. There is data that arrived prior to the Clear Request that needs to be transmitted. • CLEARING CALL - Call for this channel is being cleared because the channel has received a Clear Request from the Access and Network Protocol stacks. • CLEARING - Channel has completed all call clearing processing. Channel is waiting for Network Services to resend the Clear Request, at which time the call is cleared. • FLUSHING DATA - Channel is flushing data due to X.25 Reset handling or due to a buffer depletion condition. • FLUSHING DC RING - Channel is flushing data due to X.25 Reset handling or due to a buffer depletion condition. Channel is waiting to flush data given to the DSP or DCC for processing.
Source Channel	Identifies the Access Protocol's identify string.
Destination Channel	Identifies the Network Protocol's identify string.

Term	Description (continued)
Transmit Compression Ratio	Displays the Encoder compression ratio, which is a 60-second snapshot computation. It is based on a delta of the number of characters into the Encoder divided by a delta of the number of characters out of the Encoder. The delta is based on the numbers from the previous 60 second sample.
Number of Encoder Frames	Indicates the number of frames received from the Access Protocol to be compressed. This is a cumulative statistic that is updated every 60 seconds.
Number of Characters Into the Encoder	Indicates the number of bytes pushed into the Encoder. This is a cumulative statistic, which is updated every 60 seconds.
Number of Characters Out of the Encoder	Indicates the resulting number of characters produced by the Encoder for this channel.
Number of Decoder Frames	Indicates the number of frames that have been processed by the Decoder for this channel. This value does not include bad frames or frames with bad headers.
Number of Characters Into the Decoder	Indicates the total number of characters that have been processed by the Decoder for this channel.
Number of Characters Out of the Decoder	Indicates the resulting number of characters produced by the Decoder for this channel.
Anti-Expansion Transition Count	Indicates the number of times the FDC enters Anti-Expansion mode. This applies to both Encoder and Decoder frames.
Anti-Expansion Frame Count	Indicates the number of frames transmitted while Anti-Expansion mode is enabled. This applies to both Encoder and Decoder frames.
Anti-Expansion Mode Status	Identifies the enabled/disabled state of Anti-Expansion mode. ON indicates Anti-Expansion mode is enabled. OFF indicates Anti-Expansion mode is disabled. This applies to both Encoder and Decoder frames.
Discarded packets with bad frames	Indicates the number of decoded frames that the Decoder detects as corrupted. These frames were discarded.
Discarded packets with bad headers	Indicates the number of decoded frames that the Decoder detects with a bad header. These frames were discarded. Repeated bad headers indicates that the destination is not configured for data compression.

Term	Description (continued)
Discarded packets due to reset or congestion	Indicates the number of packets discarded for this data compression channel while processing an X.25 Reset. This number also includes the number of packets flushed while the node is in a buffer depletion state (i.e., less than 100 buffers left in the DBuffer pool.)

Note

Statistics that are updated every 60 seconds can be updated immediately using the Control + R key combination.

Data Compression Summary Statistics

The Data Compression Summary Statistics screen, shown in Figure 26, provides a summary of data compression activity on a per channel basis.

```
Node:               Address:           Date:          Time:
Data Compression Channel Summary Stat                 Page: 1 of 1

Chan Channel        Source      Destination  Compr. Anti-Exp.   Bad
ID   State          Channel     Channel      Ratio  Frame Cnt.  Frames
==== ============   =========   ==========   ====  ========== ========
 1   DATA PASSING   FRA-19S3     X25-1(1)     2.3       10        1
 2   DATA PASSING   FRA-19S4     X25-1(2)     3.0       0         0
 3   DATA PASSING   FRA-19S5     X25-1(3)     2.1       0         0
 4   DATA PASSING   FRA-19S6     X25-1(4)     3.4       4         0
 5   DATA PASSING   FRA-19S7     X25-1(5)     4.2       6         0
 6   DATA PASSING   FRA-19S8     X25-1(6)     1.7       12        2
 7   DATA PASSING   FRA-19S9     X25-1(7)     3.3       0         0
 8   DATA PASSING   FRA-19S10    X25-1(8)     2.8       0         0
 9   DATA PASSING   FRA-19S11    X25-1(9)     2.2       1         0
 10  DATA PASSING   FRA-19S12    X25-1(10)    3.0       0         0
 11  DATA PASSING   FRA-19S13    X25-1(11)    3.1       0         0
 12  DATA PASSING   LCON-2       FRI-2S2(1)   3.9       2         0
 13  DATA PASSING   LCON-1       X25-1(31)    2.6       0         0
 14  DATA PASSING   LCON-3       FRI-2S2(2)   3.8       5         0

Press any key to continue ( ESC to exit ) ...
```

Figure 26. Data Compression Summary Statistics Screen

Description of Terms

This table describes the statistics shown on the Data Compression Summary Statistics screen.

Term	Description
Chan ID	Identifies the port, station, or channel on which data compression is configured.
Channel State	Refer to the preceding description of Data Compression Channel Statistics.
Source Channel	Refer to the preceding description of Data Compression Channel Statistics.
Destination Channel	Refer to the preceding description of Data Compression Channel Statistics.
Compr Ratio	Refer to the preceding description of Data Compression Channel Statistics.
Anti-Exp. Frame Cnt.	Indicates the total number of frames sent by the Encoder or received by the Decoder while Anti-Expansion mode is enabled.
Bad Frames	Indicates the total number of bad frames found by the Decoder. This number includes bad headers.

Using Reset Statistics

Resettable Frame Data Compressor Statistics

All Frame Data Compressor statistics with numeric values are resettable. You can reset these statistics using the Reset DC Channel Statistics or Reset All DC Statistics options, as appropriate. Resettable statistics also get reset when a connection is terminated for the data compression channel in use.

Reset DC Channel Statistics

The Reset Channel statistics option resets all resettable data compression statistics for a single Frame Data Compressor channel.

When you select Reset DC Channel Statistics from the Network Services Statistics menu, you are prompted to specify the channel to reset. You can determine which channels map to which virtual circuit connections via the Data Compression Summary Statistics screen, shown in Figure 26. The Network Services Statistics menu is shown in Figure 23.

Reset All DC Statistics

The Reset All DC Statistics option resets to zero all counters for resettable data compression statistics and all Frame Data Compressor channels. You select Reset All DC Statistics from the Network Services Statistics menu.

Enabling Reset DC Vocabulary

The Reset DC Vocabulary option resets the vocabulary/history buffer for a specified data compression channel. The Reset DC Vocabulary option is available from the Port/Station/Channel Control menu, shown in Figure 27. To enable Reset DC Vocabulary:

Step	*Action*	*Result*
1	Select **Port/Station/Channel Control**. from the CTP Main menu.	The Port/Station/Channel Control menu appears.
2	Select **Network Services Control** from the Port/Station/Channel Control menu.	The Network Services Control menu appears.
3	Select **Reset DC Vocabulary**. from the Network Services Control menu.	A prompt requests you to specify the data compression channel to reset. You can determine which data compression channel maps to a virtual circuit connection using the Data Compression Summary Statistics screen (Figure 26).
4	Enter the channel number to reset and press ENTER.	The vocabulary/history buffer for the specified data compression channel is reset.

Port/Station/ Channel Control Menu

Figure 27 shows the Port/Station/Channel Control menu from which you select the Reset DC Vocabulary option.

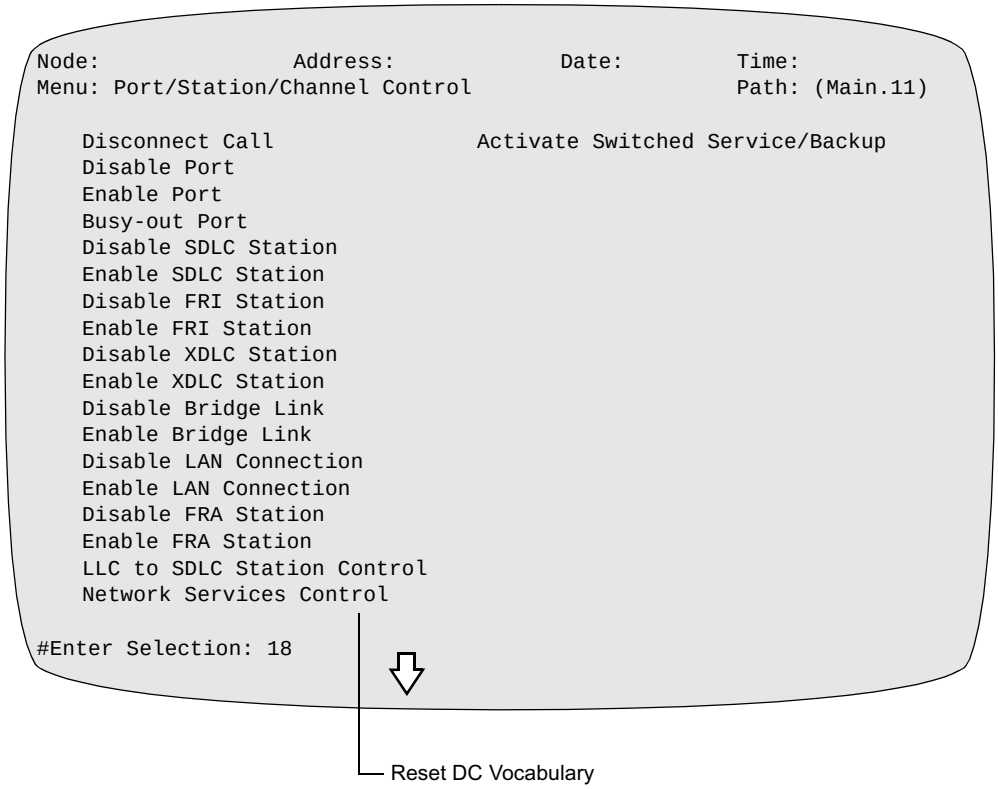

Figure 27. Port/Station/Channel Control Menu

Reset All Stats for Node

You can reset all node statistics, in addition to those specific to data compression, using the Reset All Stats option. The Reset All Stats option is available from the CTP Status/Statistics menu. Refer to the *Vanguard Basics Manual* (Part Number T0113).

Limitations

Introduction

The following limitations apply to the Frame Data Compressor:

- The Frame Data Compressor does not support the Data & Connection Protection (DCP) protocol.
- The Frame Data Compressor does not support Vanguard 6520 Broadcast functionality.

Network Management

Introduction

The Frame Data Compressor supports SNMP management. This section describes MIB objects for data compression and network services. Each of the MIB object tables is titled with the suggested starting point, which can be found in the Network Access Products MIB Group hierarchy diagram shown in Figure 28.

Network Access Products MIB Group Hierarchy

Figure 28 shows the hierarchy of MIB objects used with the Network Access Products. This represents the path a manager takes to the DC and NS objects outlined in the tables that follow.

Refer to the *Simple Network Management Protocol Manual*, found in the *Vanguard Basic Protocols Manual*, for further details.

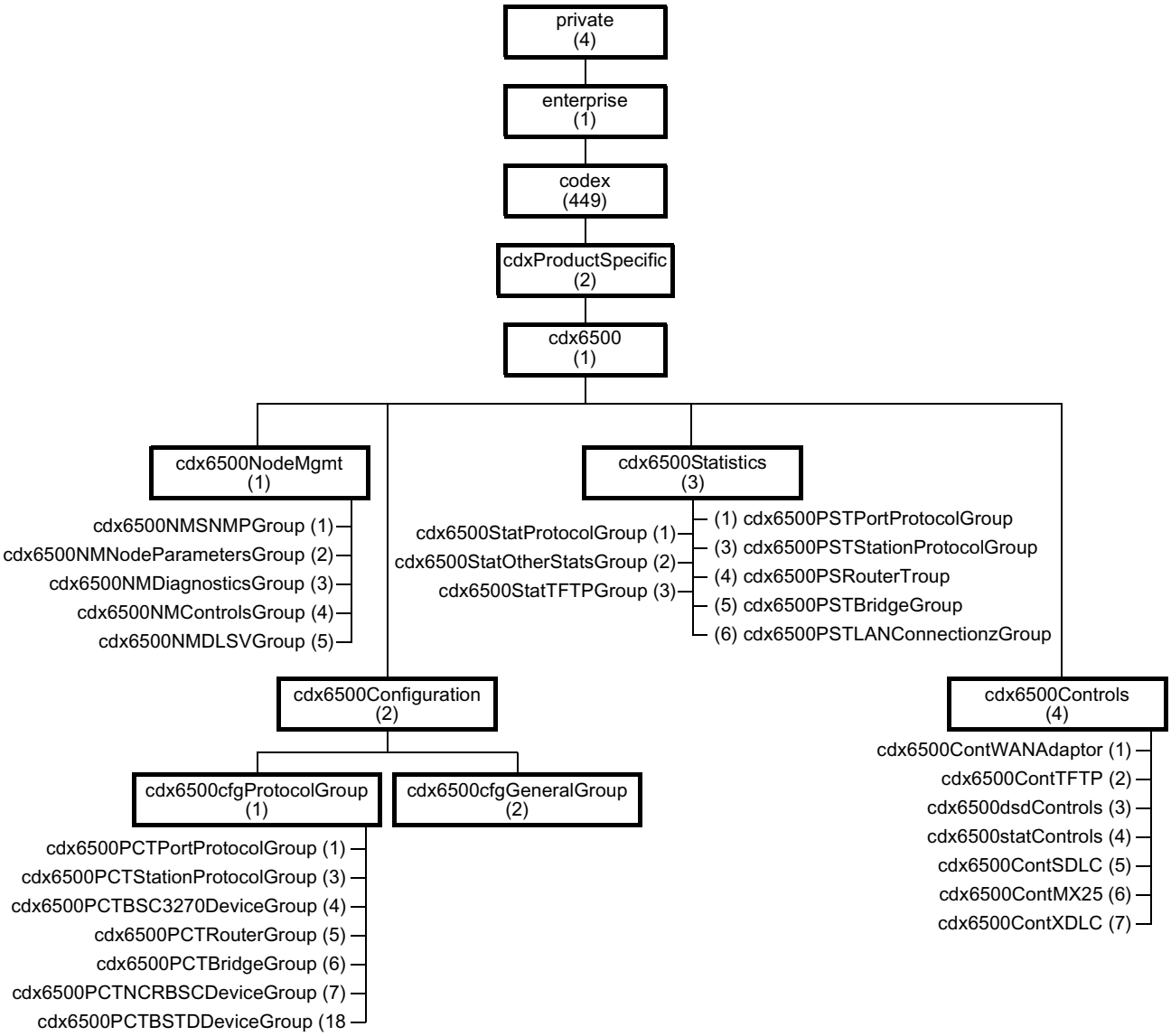

Figure 28. Network Access Products MIB Group Hierarchy

Data Compression General Statistics

This table lists the MIB objects that apply to the DC General Statistics screen.

MIB Objects Starting From cdx6500StatOtherStatsGroup 10

Syntax	Description	Access	Status
Cdx6500DCGenStatTable	DC General Statistics Table	No access	Mandatory
Cdx6500DCGenStatTableEntry	Entry number indicating each entry in this table pertains to the DC General statistics.	No access	Mandatory
cdx6500DCGenStat_DSPStatus	Data Compression Hardware Status	Read only	Mandatory
cdx6500DCGenStat_HndlrSWRev	DC Handler Software Revision	Read only	Mandatory
cdx6500DCGenStat_FnctnSWRev	DC Function Software Revision	Read only	Mandatory
cdx6500DCGenStat_MaxChannels	Maximum Channels	Read only	Mandatory
cdx6500DCGenStat_ChanInUse	Channels in use	Read only	Mandatory
cdx6500DCGenStat_MaxSmltChanUse	Maximum Simultaneous use of Channel(s)	Read only	Mandatory
cdx6500DCGenStat_RejectConn	Connection Rejected due to unavailable DC Channels	Read only	Mandatory
cdx6500DCGenStat_AggCRatio	Aggregate Compression ratio	Read only	Mandatory
cdx6500DCGenStat_CurrEncQDepth	Current Encoder Queue Depth	Read only	Mandatory
cdx6500DCGenStat_MaxEncQDepth	Maximum Encoder Queue Depth	Read only	Mandatory
cdx6500DCGenStat_TmOfMaxEncQDepth	Time of Maximum Encoder Queue Depth	Read only	Mandatory
cdx6500DCGenStat_CurrDecQDepth	Current Decoder Queue Depth	Read only	Mandatory
cdx6500DCGenStat_MaxDecQDepth	Maximum Decoder Queue Depth	Read only	Mandatory
cdx6500DCGenStat_TmOfMaxDecQDepth	Time of Maximum Decoder Queue Depth	Read only	Mandatory

DC Channel and Channel Summary Statistics

This table lists the MIB objects that apply to the DC Channel and Channel Summary statistics screens.

MIB Objects Starting From cdx6500StatOtherStatsGroup 10

Syntax	Description	Access	Status
cdx6500DCChanStatTable	DC Channel Statistics Table	No access	Mandatory
Cdx6500DCChanStatTableEntry	Entry number indicating each entry in this table pertains to the DC Channel statistics.	No access	Mandatory
cdx6500DCChanStat_ChanNum	Channel Number	Read only	Mandatory
cdx6500DCChanStat_TmOfLastStatRst	Last Statistics Reset	Read only	Mandatory
cdx6500DCChanStat_ChanState	Channel State	Read only	Mandatory
cdx6500DCChanStat_SourceChan	Source Channel	Read only	Mandatory
cdx6500DCChanStat_DestChan	Destination Channel	Read only	Mandatory
cdx6500DCChanStat_XmitCRatio	Transmit Compression Ratio	Read only	Mandatory
cdx6500DCChanStat_NumOfEncFrames	Number of Encoder Frames	Read only	Mandatory
cdx6500DCChanStat_NumOfCharInToEnc	Number of Characters Into the Encoder	Read only	Mandatory
cdx6500DCChanStat_NumOfCharOutOfEnc	Number of Characters Out of the Encoder	Read only	Mandatory
cdx6500DCChanStat_NumOfDecFrames	Number of Decoder Frames	Read only	Mandatory
cdx6500DCChanStat_NumOfCharInToDec	Number of Characters Into the Decoder	Read only	Mandatory
cdx6500DCChanStat_NumOfCharOutOfDec	Number of Characters Out of the Decoder	Read only	Mandatory
cdx6500DCChanStat_EncAETrnstnCnt	Anti-Expansion Transition Count (Encoder)	Read only	Mandatory
cdx6500DCChanStat_EncAEFrameCnt	Anti-Expansion Frame Count (Encoder)	Read only	Mandatory
cdx6500DCChanStat_EncAEModeStatus	Anti-Expansion Mode Status (Encoder)	Read only	Mandatory
cdx6500DCChanStat_DecAETrnstnCnt	Anti-Expansion Transition Count (Decoder)	Read only	Mandatory
cdx6500DCChanStat_DecAEFrameCnt	Anti-Expansion Frame Count (Decoder)	Read only	Mandatory
cdx6500DCChanStat_DecAEModeStatus	Anti-Expansion Mode Status (Decoder)	Read only	Mandatory
cdx6500DCChanStat_DSWithBadFrames	Discarded packets with bad frames	Read only	Mandatory

MIB Objects Starting From cdx6500StatOtherStatsGroup 10

Syntax (continued)	*Description*	*Access*	*Status*
cdx6500DCChanStat_DSWithBadHeaders	Discarded packets with bad headers	Read only	Mandatory
cdx6500DCChanStat_DSDueToRstOrCng	Discarded packets due to reset or congestion	Read only	Mandatory

Data Compression Control

This table lists the MIB objects that apply to the DC Control options.

MIB Objects Starting From cdx6500Controls 9

Syntax	*Description*	*Access*	*Status*
cdx6500ContResetAllDCStats	Reset All DC Statistics	Write only	Mandatory
Cdx6500ContDCTableEntry	Entry number indicating each entry represents a control parameter used to reset Channel Statistics or Channel Vocabulary. These resets require the channel number as the index.	No access	Mandatory
cdx6500ContDCChanNum	Channel number used as the index	Read only	Mandatory
cdx6500ContResetDCChanStats	Reset DC Channel Statistics	Write only	Mandatory
cdx6500ContResetDCChanVocab	Reset DC Vocabulary	Write only	Mandatory

Network Services Configuration

This table lists the configuration MIB objects associated with Network Services options.

MIB Objects Starting From cdx6500CfgGeneralGroup 20

Syntax	*Description*	*Access*	*Status*
cdx6500NetServCfgTable	This table contains all the configuration objects for the Network Service features.	No access	Mandatory
Cdx6500NetServCfgTableEntry	Entry number indicating each entry represents a configuration parameter in the Network Services Features Table. This is not a configurable parameter.	Read only	Mandatory
cdx6500NetServCfgPortAndStnId	Port/Station Identifier	Read only	Mandatory
cdx6500NetServCfgFeaturesLevel	Data Compression Level	Read only	Mandatory

Network Services Statistics

This table lists the statistics MIB objects associated with Network Services options.

MIB Objects Starting From cdx6500StatOtherStatsGroup 11

Syntax	*Description*	*Access*	*Status*
cdx6500NetServStatTableEntry	Each entry in this table pertains to a Network Services NS Channel Statistic.	No access	Mandatory
cdx6500NetServStatUsedChannels	Number of NS Channels in use	Read only	Mandatory
cdx6500NetServStatMaxChannels	Maximum number of NS Channels used	Read only	Mandatory
cdx6500NetServStatUnavailChannels	Number of NS Channels not available for allocation	Read only	Mandatory

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