# Managing the Xyplex X.25 Gateway

**X.25 Gateway Software**
**Version 1.3**

**February 1994**
**Xyplex, Incorporated**
**295 Foster Street**
**Littleton, MA 01460**

**451-0010B**

## Effective Pages

**This guide 149 contains  pages, including the following:**

**Issues: Original** **Date: February 1994**

| Pages | Issue |
|---|---|
| i through xi | Original |
| 1-1 through 1-11 | Original |
| 2-1 through 2-22 | Original |
| 3-1 through 3-22 | Original |
| 4-1 through 4-29 | Original |
| 5-1 through 5-30 | Original |
| 6-1 through 6-10 | Original |
| A-1 through A-2 | Original |
| B-1 | Original |
| C-1 through C-3 | Original |
| D-1 through D-2 | Original |
| Index-1 through Index-6 | Original |

### Caution

**This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.**

**Shielded cables should be used with this unit to insure compliance with the Class A unit.**

**The hardware and software described in this document are subject to change without notice.**

**The information in this document is subject to change without notice and should not be construed as a commitment by Xyplex. Xyplex reserves the right to revise this publication without obligation to provide notification of such revisions. While reasonable precautions have been taken, Xyplex assumes no responsibility for errors that may appear in this document.**

# Table of Contents

## Chapter 3 - Sending and Receiving Calls



## Chapter 4 - X.3 PAD Parameters and Profiles

## Chapter 5 - Using the X.28 PAD Commands



## Chapter 6 - Basic Problem Solving

# Table of Figures

**Figure**

# Table of Tables

**Table**

# Preface

**This manual describes how to manage and use the Xyplex X.25 Gateway. It explains how to specify the basic X.25 Gateway characteristics and parameters, how to send and receive virtual calls, and how to use the X.25 gateway PAD. This manual is for network managers who are responsible for installing and managing network software.**

**While this manual explains how the Xyplex X.25 Gateway supports the CCITT X.25 standards, it does not describe the standards in full detail. Refer to the CCITT standards documentation for complete information about X.25 Standards.**

## Organization

**This manual contains the following chapters:**

**Chapter 1** **Describes the X.25 Gateway and how it supports both the X.25 standards and the features of a Xyplex Communications Server. This chapter also contains some introductory information about X.25 networks and packet-switching technology.**

**Chapter 2** **Describes how to set the minimum number of characteristics on the X.25 Gateway to make a calls to the PSN and establish a virtual circuit.**

**Chapter 3** **Explains how to make calls to devices on the PSN from the X.25 Gateway through LAT and Telnet services, and how to configure X.25 Gateway ports to receive calls from the PSN with X.25 services.**

**Chapter 4** **Describes the CCITT standard X.3 PAD profiles and parameters that the X.25 Gateway supports.**

**Chapter 5** **Describes the CCITT standard X.28 PAD commands that the X25 Gateway supports.**

**Chapter 6** **Describes some common problems, their symptoms, and possible solutions.**

**Appendix A** **X.25 Gateway Error Messages.**

**Appendix B** **ASCII Table for International Alphabet Number 5 (IA5).**

**Appendix C** **Blank PAD parameter tables.**

**Appendix D** **TCP/IP-LAT V5.1 Communications Server features not supported on the X.25 Gateway V1.3.**

## Conventions

**Throughout this manual, the word "Enter" means type something and then press the New Line key, Carriage Return key, or Enter key; for example, "Enter the CONNECT command" means type the word "CONNECT" and then press the New Line, Carriage Return, or Enter key.**

**This manual also uses the following conventions:**

**COMMAND KEYWORD *variable***

| Where | Means |
|---|---|
| **COMMAND** | **You must enter the command, or its accepted abbreviation, as shown.** |
| **KEYWORD** | **You must enter a keyword, or its accepted abbreviation, as shown.** |
| ***variable*** | **You must enter a variable such as a host name, file name, or character string.** |

**Sometimes the manual shows this:**

**[COMMAND | COMMAND] or [KEYWORD | KEYWORD] or [*variable* | *variable*]**

**You must enter one of the commands, keywords or variables. Do not enter the braces; they simply show the choices. The bar | separates the choices.**

**Additionally, this manual uses certain symbols in special ways:**

| Symbol | Means |
|---|---|
| ↵ | **Press the New Line, Carriage Return <CR>, or Enter key on your terminal's keyboard.** |
| `Xyplex>` | **This is the Xyplex MAXserver prompt at Secure and Nonprivileged ports on the X.25 Gateway.** |
| `Xyplex>>` | **This is the Xyplex MAXserver prompt at Privileged ports on the X.25 Gateway.** |
| ***** | **This is the default PAD prompt on the Xyplex X.25 Gateway.** |

**In examples, this manual uses**

`This typeface to show your entry and X.25 Gateway responses.`

## Related Documentation

***The Xyplex X.25 Gateway Commands Reference Guide***

**This is a companion manual to *Managing the Xyplex X.25 Gateway*. It includes all the DEFINE/SET X25 commands, as well as the DEFINE/SET SERVICE commands that create local services.**

**V1.3 of the X.25 Gateway incorporates V5.1 of TCP/IP-LAT software. If you do not have the V5.1 TCP/IP-LAT documentation set, Xyplex recommends that you obtain a copy of this documentation. It describes the many features in V5.1 that are not described in the V4.0 documentation set, including the Point-to-Point protocol (PPP), Verbose Accounting, the UNIX daemons, the UNIX-Like Interface (ULI), and Nested Menus. To order a copy of the V5.1 TCP/IP-LAT documentation set, call your Xyplex sales representative.**

**The following manuals provide information about the V5.1 TCP/IP-LAT Communications Server:**

**The *Xyplex TCP/IP-LAT Software Management Guide***

**This manual describes the configuration, setup, and management of the TCP/IP LAT Communications Server package, supplied by Xyplex, Inc. This manual is written for network managers, and terminal server, UNIX®, and VAX system managers.**

**The *TCP/IP-LAT Commands Reference Guide***

**This manual includes all of the Xyplex TCP/IP-LAT Communications Server commands.**

**Xyplex includes the following documentation with X.25 Gateway Hardware. These manuals explain how to unpack, set-up, and load software onto an X.25 Gateway**

***Getting Started with the MAXserver 6025 X.25 Gateway***

***Getting Started with the MAXserver 6625 X.25 Gateway***

***Getting Started with the MAXserver 6800 Remote Router Card***

***Getting Started with the Network 9000 WAN Processor 6800***

## If you have questions about this product...

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**United States Mail:** **Xyplex, Inc.**
**295 Foster Street**

**Littleton, MA 01460**
**Attn: Manager, Customer Support**

## If you have comments about this guide...

**To help us in our effort to improve the quality, usefulness, and technical accuracy of the product documentation you receive, Xyplex is interested in any comments or suggestions that you have about this guide, or any technical corrections that you believe should be made. At your convenience, please forward these to Xyplex at the following addresses:**

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**United States Mail:** **Xyplex, Inc.**
**295 Foster Street**
**Littleton, MA 01460**

**Attn: Manager, Technical Documentation**

## Software Upgrade Information

**For information on software upgrades contact your local representative, or call Xyplex directly at**

| | |
|---|---|
| **In the United States:** | **(800) 338-5316** |
| **In Europe:** | **+44 81 759-1633** |
| **In Asia:** | **+65 336-0431** |

**End of Preface**

# Chapter 1

# Introduction to the X.25 Gateway

**The Xyplex ® X.25 Gateway links devices on anEthernet™ local area network (LAN) to a packet-switched network (PSN). The X.25 Gateway converts data from a TCP/IP, LAT® , SLIP, PPP, or TN3270 session into X.25 packets and converts X.25 packets into data for the LAN protocol. With the X.25 Gateway, LAN users can gain access to remote X.25 resources such as terminals, printers, hosts, and databases, and X.25 network users can gain access to LAN resources such as terminals, printers, UNIX® hosts, VAX™ hosts, and IBM hosts.**

**Figure 1-1 shows a sample X.25 network with two X.25 Gateway cards in a chassis connecting devices on the LAN to the PSN.**

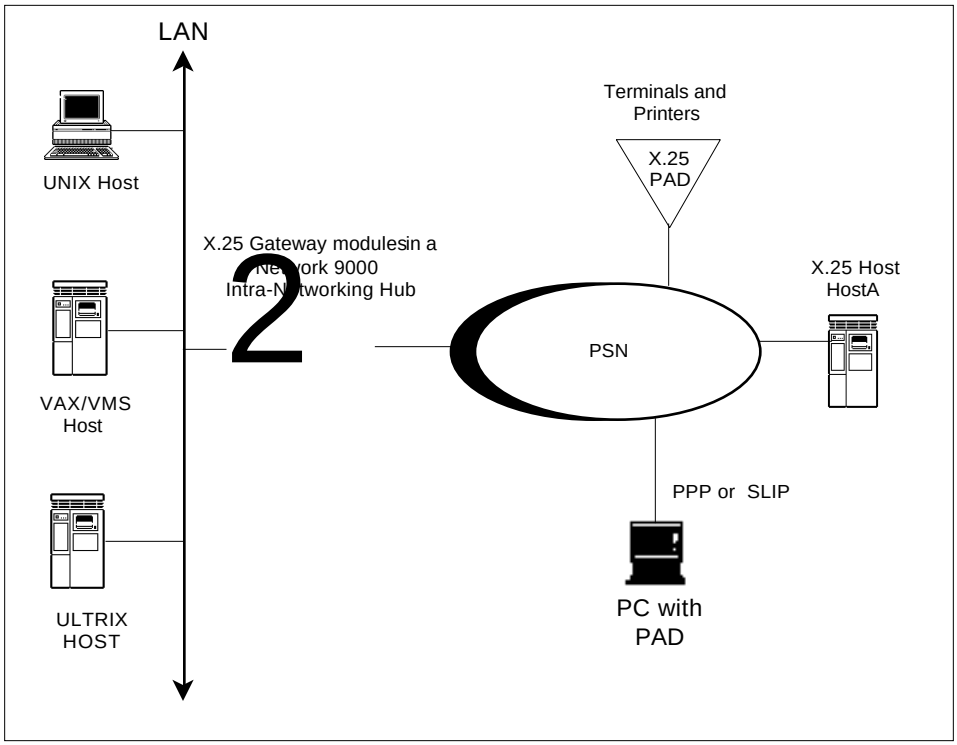


**Figure 1-1. An X.25 Network**

**From the LAN, a user on the ULTRIX host in Figure 1-1 can call HostA, and print a document from a printer on HostA. A user on the VAX/VMS host can exchange electronic mail through the X.25 Gateway with a user on HostB, another X.25 compatible host on the network.**

**The X.25 Gateway supports X.25 standards for communication across a PSN, and offers the features of a Xyplex terminal server for communication on the LAN. This chapter gives an overview of PSNs, and describes how the X.25 Gateway supports both LAN connections and the X.25 protocol for PSNs. This chapter includes these topics:**

- **About Packet Switched Networks (PSNs)**
- **About the X.25 Standards**
- **X.25 Gateway Support for X.25 Features**
- **X.25 Gateway Support for Communications Server Features**
- **X.25 Gateway Hardware**

## About Packet Switched Networks (PSNs)

**A packet-switched network (PSN) transfers information from one destination to another in discrete entities called packets. A typical PSN consists of Data Circuit Equipment (DCEs) and Packet Switching Exchanges (PSEs). The DCEs provide the interface between the user and the network. The PSEs forward the packets around the network to the DCEs. The packets can contain user data, such as files, and control information, such as the destination address.**

**A PSN can route many packets from different users over shared transmission facilities to different addresses on the network. These transmission facilities may vary among PSNs, but the differences are transparent to end-users. Users are mainly concerned that the data they send and receive is timely, error-free, and arrives in the correct order. PSNs do share some common characteristics, however, regardless of the nature of their facilities.**

## About the X.25 Standards

**One characteristic that is common to all PSNs is the requirement for an interface between the user's equipment and the network. The CCITT, an international standards organization, has defined standards for the user/network interface in a PSN called Recommendation X.25. The X.25 standards are internationally recognized, and different vendors whose products conform to them can use a PSN as a common carrier.**

## The DTE/DCE Interface

**In the X.25 standard, the user/network interface is called the DTE/DCE interface. The Data Terminal Equipment (DTE) is the user's system, and the Data Circuit Equipment (DCE) is the port into the network. Figure 1-2 represents a PSN with several DTE/DCE interfaces.**

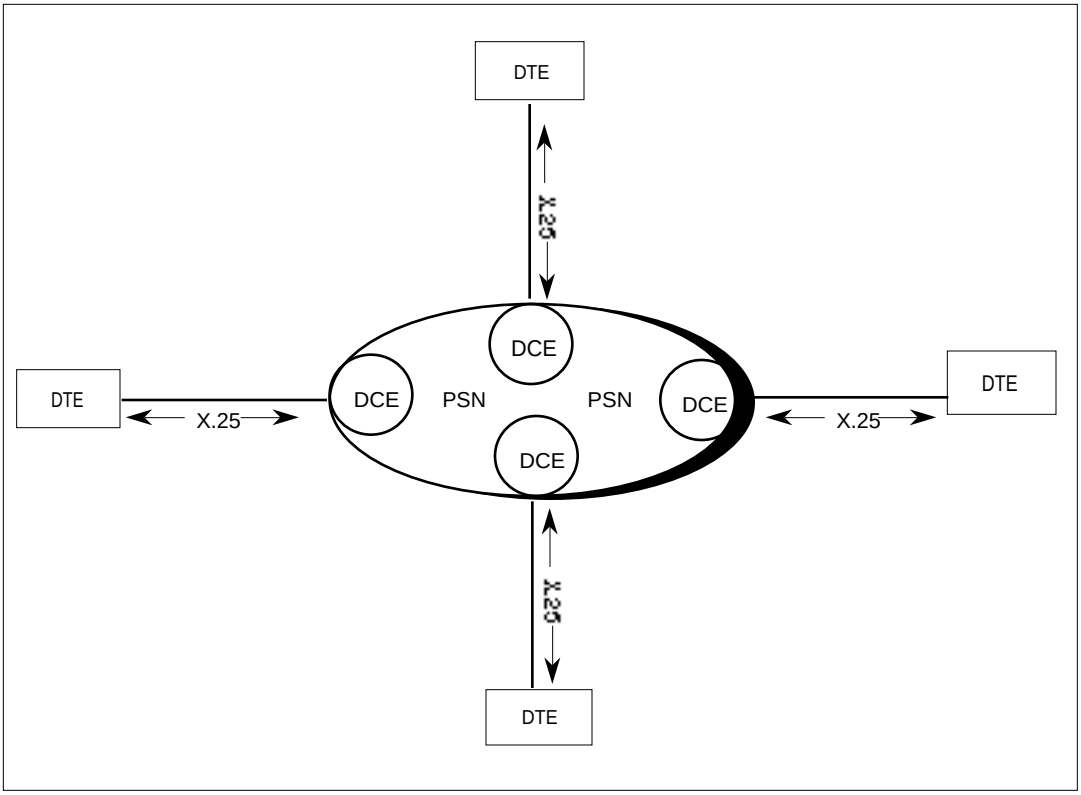


**Figure 1-2. The X.25 Standard for the DTE/DCE Interface**

**Two types of data terminal equipment exist: packet-mode DTEs and start-stop mode DTEs. Packet-mode DTEs are host computer systems that have implemented software that supports the X.25 standard and can send and receive packets. Start-stop mode DTEs are asynchronous devices such as terminals and printers that send and receive asynchronous characters.**

**A computer or an asynchronous device connected to a PSN acts as a DTE because a DCE is a component of the network itself. If you have a private network, however, you may have some computers acting as DTEs and some acting as DCEs. The X.25 Gateway link can emulate a DTE or a DCE, although most implementations require that the X.25 Gateway link emulate a DTE.**

### The X.25 Levels of Procedure

**Recommendation X.25 defines the interaction between a DTE and a DCE in three separate levels of procedure. The X.25 Gateway supports each of these levels:**

**Level 1**

**Level 1, the physical layer, defines the mechanical protocol to establish, maintain, and terminate the electrical network connections. These connections transmit digitized signals between network nodes. The unit of data transferred at this level is a bit.**

**Level 2**

**Level 2, the frame layer, provides an error detection and correction mechanism over the physical layer. The unit of data transferred at this level is a frame.**

**Level 3**

**Level 3, the packet layer, defines packet formats and manages the exchange of packets, containing control information and user data, between the DTE and the DCE. The unit of data transferred at this level is a packet.**

**Each of these levels provides services to the level above, interfaces with the level below, and conducts peer protocol with its opposite DTE/DCE interface across the PSN. In addition, the three X.25 levels form the first three layers of the international standards organization (ISO) model for open systems interconnection (OSI).**

## X.25 Gateway Support for X.25 Features

**The X.25 standard defines several user features at Level 3, the packet layer, where users gain access to X.25 though upper-level processes. The X.25 Gateway supports these features, described in the following sections: Virtual Circuits, PAD functionality, and User Facilities.**

### Virtual Circuits

**A virtual circuit is a logical association between two DTEs. It does not represent a physical connection, but rather a logical communication path across the PSN. Figure 1-3 represents a virtual circuit between a Xyplex X.25 Gateway and an X.25 host.**

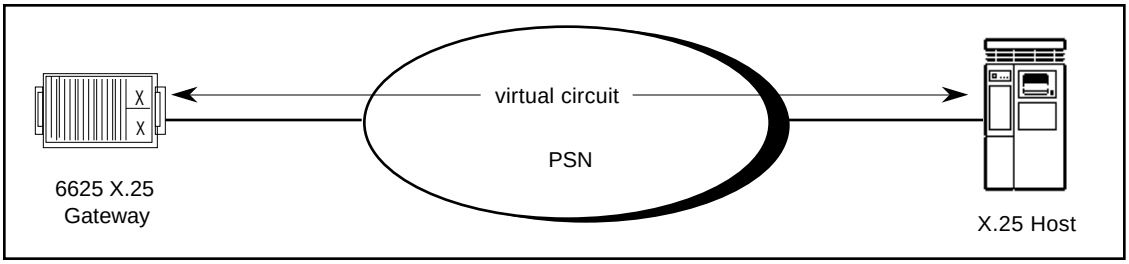


**Figure 1-3. A Representation of a Virtual Circuit**

**The X.25 Gateway supports the two CCITT standard types of virtual circuits: permanent virtual circuits (PVCs) and switched virtual circuits (SVCs). You can establish up to 80 virtual circuits, in any combination of PVCs and SVCs, on the X.25 Gateway.**

**A permanent virtual circuit is a permanent association between two DTEs that you establish when you subscribe to the PSN. The PSN administration allocates certain resources to this type of virtual circuit for an agreed upon period of time. A PVC is similar to a private telephone line, as it does not require a user to set up or clear calls. The connection is always active and ready to transfer data.**

**A switched virtual circuit is a temporary association between two DTEs that you establish by sending a call request packet to the PSN through the DTE. The calling DTE receives a response which indicates whether or not the called DTE can accept the call. If the called DTE agrees, the PSN establishes a virtual circuit between them. Either DTE can clear the SVC, after which it no longer exists. An SVC is similar to a dial-up telephone line, as a user must set up and clear calls. The connection is only active when both sides agree to take the call, and only then can you transfer data across the connection.**

## PAD Functionality

**Start-stop mode DTEs such as terminals and printers that do not support the X.25 protocol require software modules called packet assemblers/disassemblers or PADs. A PAD provides an interface between the start-stop mode DTE and the PSN. The PAD converts the asynchronous data to X.25 packets that can travel through the links in a PSN. The PAD can also convert the X.25 packets back into asynchronous data for the start-stop mode DTE. The X.25 Gateway provides PAD functionality, and supports the CCITT recommendations that apply to PADs:**

**X.28 PAD commands**

**X.3 PAD parameters**

**X.29 PAD service signals**

**Chapter 4, PAD Profiles and Parameters, describes the X.25 Gateway support for the PAD in detail. Chapter 5, PAD Commands and Service Signals, describes the PAD commands in detail.**

### User Facilities

**X.25 standard user facilities allow you to customize the PSN connection. They include reverse charging, fast select acceptance, and nondefault sizes for packets and frames. The X.25 Gateway supports many of these facilities.**

**You select user facilities at subscription time, so that the PSN administration can allocate resources for them and charge for them. The X.25 Gateway supports user facilities for all ports or on a per-port basis for individual calls. Not all PSNs support all X.25 standard facilities. Chapter 2 lists the X.25 user facilities that the X.25 Gateway supports.**

## Communications Server Features

**The X.25 Gateway supports many of the features and protocols of a Xyplex TCP/IP-LAT Communications Server. These include the LAT, Telnet, TN3270, SLIP, CSLIP, and Point-to-Point (PPP) protocols, as well as local services, and security features including Kerberos. See version 5.1 of the *TCP/IP-LAT Software Management Guide* for complete descriptions of these features. (See Appendix D of this manual for information about the V5.1 TCP/IP-LAT features that do not apply to the X.25 Gateway.)**

### Virtual ports

**Virtual ports provide the interface between the LAN and the PSN. The X.25 Gateway provides 80 virtual ports where you can make connections to and from the PSN. You make connections to X.25 Gateway virtual ports through local services on the terminal server.**

### Local Services

**Local services provide access to virtual ports for calls from the LAN and calls from the PSN. Virtual ports can share local services, and a local service can apply to a range of virtual ports. LAT and Telnet services provide connections from the LAN to the X.25 Gateway PAD, and X.25 services provide connections from the PSN to the X.25 Gateway command interface. Chapter 3, Sending and Receiving Calls, describes how to create local services.**

**The X.25 Gateway can support up to 80 local services. Figure 1-4 represents a LAT and a Telnet service, which direct outbound calls to destinations on the PSN. Figure 1-5 represents an X.25 service, which directs inbound calls to destinations on the LAN.**

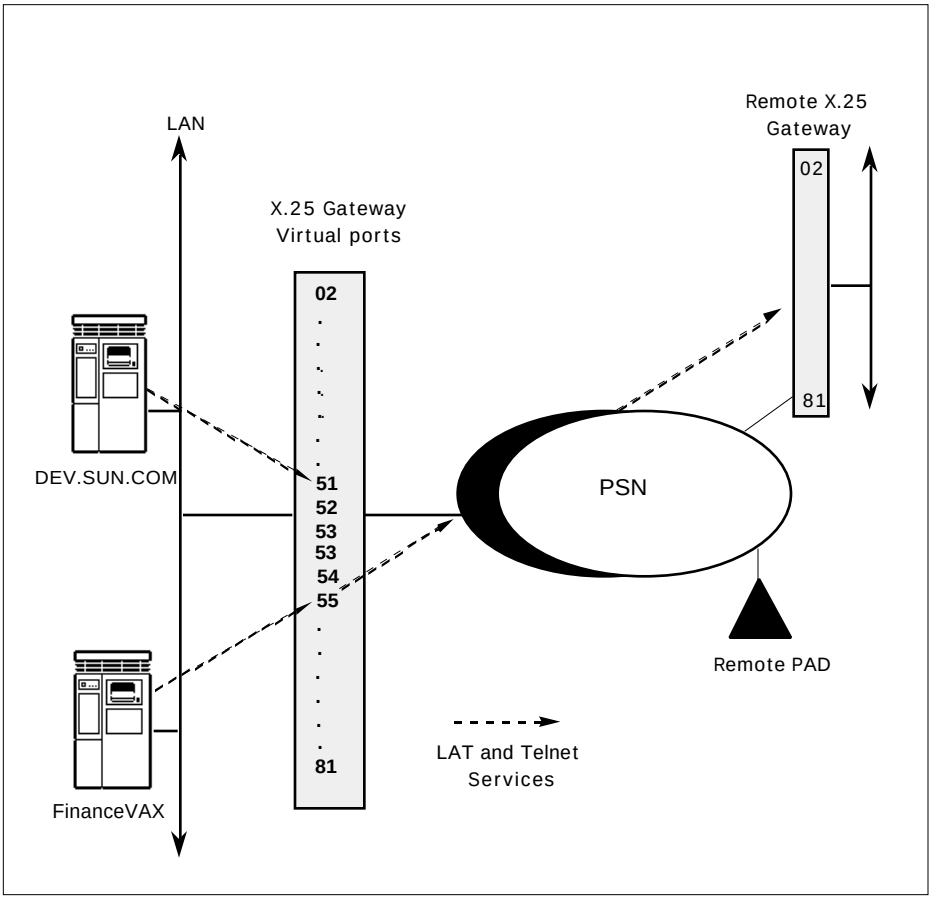


**Figure 1-4. LAT and Telnet Services**

**In Figure 1-4, a Telnet service directs a call from DEV.SUN.COM to the X.25 Gateway PAD at virtual port 51, and a LAT service directs a call from FinanceVAX to another X.25 Gateway on the PSN through virtual port 55.**

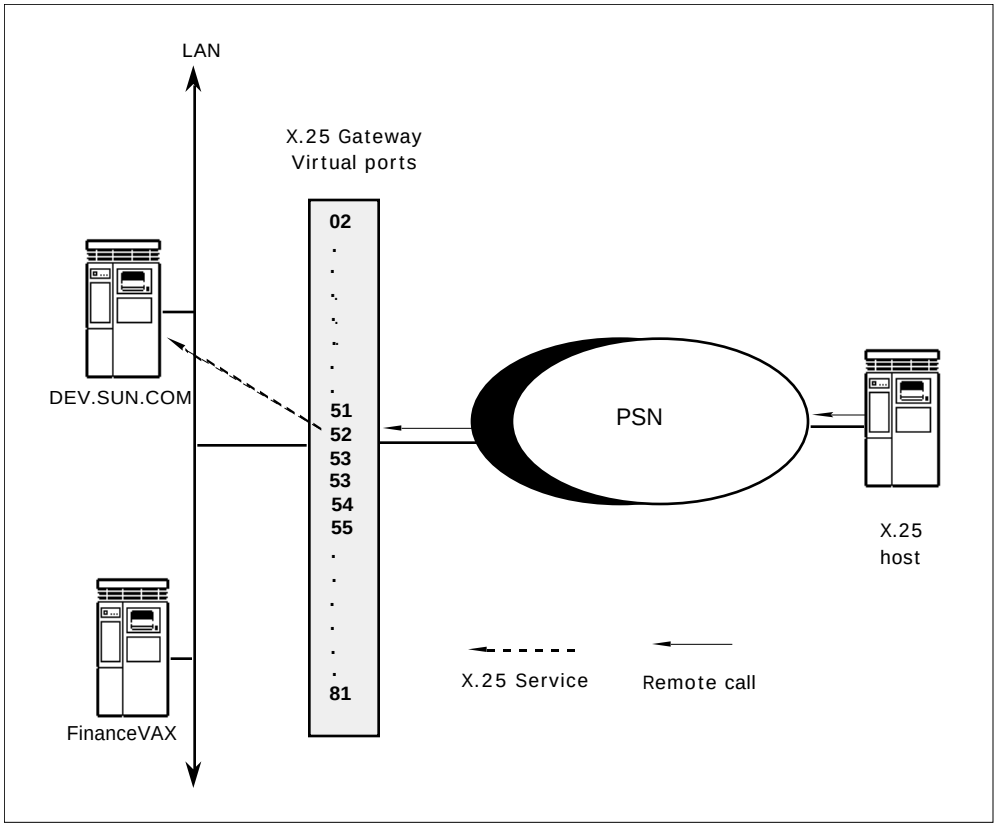


**Figure 1-5. An X.25 Service**

**In Figure 1-5, a call from an X.25 host on the PSN arrives at X.25 Gateway virtual port 52. An X.25 service directs the call to the LAN host DEV.SUN.COM.**

## Point-to-Point Protocol Support

**The Xyplex implementation of the point-to-point protocol (PPP) allows a personal computer (PC), a terminal server, or a dialup router to gain access to the Internet through an X.25 Gateway virtual port. PPP devices establish a virtual circuit on an X.25 Gateway, enable PPP on the virtual port, then begin sending data to or receiving data from the TCP/IP host on the remote LAN across the X.25 network. Figure 1-6 shows a personal computer with a PAD gaining access to an X.25 Gateway on the X.25 network and enabling PPP.**

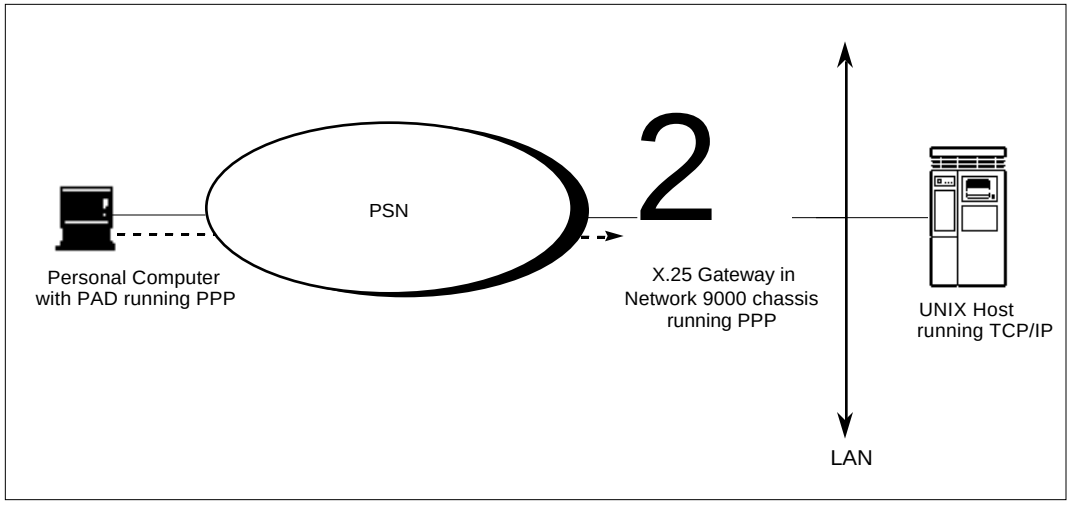


**Figure 1-6. A PPP Connection on the X.25 Gateway**

**Figure 1-6 shows a PC making a connection to a virtual port on an X.25 Gateway over the PSN. The user on the PC logs on to the Xyplex command interface on the X.25 Gateway and enables PPP. The user can then return to the command interface on the PC and begin sending data over PPP to the UNIX host on the remote network through the X.25 Gateway.**

## X.25 Gateway Hardware

**The X.25 Gateway software runs on the MAXserver 6625 card, the MAXserver 6025 standalone unit, and the 6800 card. You can mount the 6625 card in a model 4500, 5000, or 5500 MAXserver chassis, or as a Type 1 option with an adapter card in a Network 9000 Intra-Networking Hub. Refer to the manual *Getting Started with the MAXserver 6625 Gateway* for technical specifications and additional information about the MAXserver 6625 card. Refer to the manual *Getting Started with the MAXserver 6025 X.25 Gateway* for technical specifications and additional information about the 6025 standalone unit.**

**You can mount the 6800 card in a MAXserver chassis or as a Type 1 option in a Network 9000 Intra-Networking Hub. The manual *Getting Started with the MAXserver WAN processor 6800* describes how to install the 6800 in a MAXserver chassis. The manual *Getting Started with the Network 9000 WAN Processor 6800* explains how to install the 6800 in a Network 9000 Intra-Networking Hub.**

### LAN and X.25 Interfaces

**The X.25 Gateways provide the following LAN and X.25 interfaces:**

| Hardware Type | Lan Interface | X.25 Interfaces |
|---|---|---|
| 6625 Card | Interface to Ethernet 1 Segment A of the Network 9000 Intra-Networking Hub<br>*or*<br>Connection to the LANbus of the MAXserver chassis | One synchronous V.35, RS422, RS423, RS232, RS530, or X.21 WAN link |
| 6025 Standalone Unit | AUI port for interface to the LAN | One synchronous V.35 or RS423 WAN link<br>*or*<br>One synchronous V.35 or RS232 WAN link<br>*or*<br>One synchronous V.35 or X.21 WAN link |
| 6800 Card | Interface to Ethernet 1 Segment A of the Network 9000 Intra-Networking Hub<br>*or*<br>Connection to the LANbus of the MAXserver chassis | One synchronous V.35, RS422, RS423, RS232, RS530, or X.21 WAN link |

**You can attach the X.25 interfaces to a communications device or directly to an X.25 host or packet switch. The communications devices include the following:**

- **A modem**
- **A DSU/CSU**
- **A synchronous modem eliminator**

**If you attach the card or standalone unit to a communications device, use Xyplex standard straight-through cables. If you attach the card or standalone unit to an X.25 host or a packet switch, you probably need to use a cross-over cable if the device is a physical DTE interface, because the default configuration for the X.25 Gateway is also a DTE.**

## The External Clock

**The X.25 Gateway requires an external clock. If you attach the gateway to a communications device, this device must supply the clock. If you attach the Gateway directly to a host or packet switch, the host or switch must supply the clock.**

**End of Chapter**

# Chapter 2

# Configuring the X.25 Gateway for Basic Use

**This chapter describes how to define the minimum number of characteristics on the X.25 Gateway to establish a virtual circuit on the PSN. It assumes that you have installed the hardware and loaded an X.25 Gateway load image and parameter file.**

**This chapter also describes the X.25 Gateway default settings for subscription time parameters and facilities. You may need to reset these defaults to establish a virtual circuit, depending on the requirements of the PSN.**

**To configure the X.25 Gateway for basic use, follow these procedures, described in this chapter:**

- **Establish a Connection to the X.25 Gateway**
- **Specify Communications Server Features**
- **Specify X.25 Characteristics**
- **Initialize the X.25 Gateway**

## Establish a Connection to the X.25 Gateway

**The X.25 Gateway has 1 asynchronous port where you can connect a terminal or modem. This is port 1, the management port. It also supports a logical port where you make remote connections from a host or other device on the LAN. This is port 0, the console port. You can log on to the X.25 Gateway through port 0 or port 1. Figure 2-1 shows how different devices make connections through these ports.**

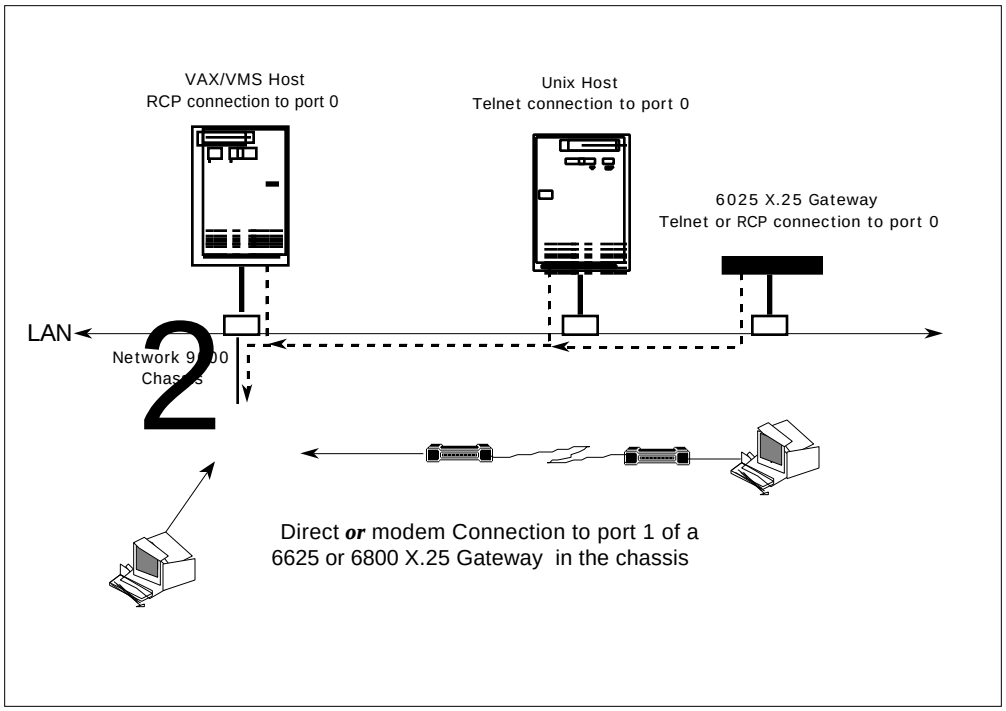


**Figure 2-1. Logging On To the X.25 Gateway**

**Figure 2-1 shows that you can connect to port 1, the asynchronous management port, either with a terminal or through a modem. You can connect to port 0, the console port, from a remote device through RCP or Telnet. (Each port can support only one connection.)**

**To log on to the Xyplex command interface, use one of the following procedures, depending on the type of connection.**

**Direct connection: If your terminal is directly connected to port 1, press the <New Line> or <Return> key until one of the Xyplex login prompts in Table 2-1 appears on the screen.**

**Connection from a Modem: If you are dialing in through a modem to port 1, use the same procedure as the direct connection. After dialing in, press the <New Line> or <Return> key until one of the Xyplex login prompts in Table 2-1 appears on the screen.**

**Connection from the Network: If your terminal is connected to another Xyplex product on the network, use the Xyplex TELNET CONSOLE, TELNET CONNECT, or REMOTE CONSOLE commands to connect to port 0. Press the <New Line> or <Return> key until one of the Xyplex prompts in Table 2-1 appears on the screen. The *TCP/IP-LAT Commands Reference Guide* describes these commands in detail.**

**If your terminal is connected to a UNIX host, you can connect to port 0 through Telnet with the host-specific Telnet command. If your terminal is connected to a VAX/VMS host, you can connect to port 0 through RCP with a host-specific CONNECT command. Press the <New Line> or <Return> key until one of the Xyplex prompts in Table 2-1 appears on the screen. Consult the host documentation for information about these commands.**

**Table 2-1. Xyplex Prompts**

| Prompt | Action |
|---|---|
| # | **Enter your login password. The default password is** access**, but you can define a different password. When you enter the correct password, the** Enter username> **prompt appears.** |
| Enter username> | **Enter a username. You can enter any username between 1 and 16 characters, or enter <CTRL><Z> to automatically assign the username Port_*x* at this port, where *x* is the port number. When you enter the username correctly, the** Xyplex> **prompt appears.** |
| Xyplex> | **This is the default Xyplex command prompt, and it means that you are logged on to a port. You can now enter Xyplex commands.** |

**Most X.25 Xyplex commands are Privileged, so enter the SET PRIVILEGE command at the** Xyplex> **prompt.**

```
Xyplex> set privilege
```

**Enter the privilege password at the** `Password>` **prompt, which is** `system` **by default. The password does not echo on the screen when you enter it:**

```
Password>xxxxx
```

**When you enter the correct password, the privileged prompt appears. The double caret indicates the port is in privileged mode:**

```
Xyplex>>
```

**You can now enter all the commands to configure the X.25 Gateway for basic use.**

**Once you log on, you can use the SHOW SERVER command to check the version of software running on the X.25 Gateway. Figure 2-2 is a typical Show Server display.**

```
Xyplex>> show server
```

```
MAXx25 V1.3   ROM 450000 HW 00.02.00 Lat Protocol V5.2 Uptime:  00 00:09:06
Address:                      Name:   CORP-SERIAL-8          Number:     0

Identification:  Xyplex X25 Gateway
Welcome:         Welcome to the X.25 PAD/Gateway

Circuit Timer:            80          Password Limit:            3
Console Port:              0          Queue Limit:              24
Inactivity Timer:         30          Retransmit Limit:          8
Keepalive Timer:          20          Session Limit:           160
Multicast Timer:          30          Software:         XYP_X25GATE
Node Limit:              150          Identification Size:      63
Textpool Size:         16000          Timezone:              00:00
Accounting Entries:        0

Service Groups: 0

Enabled Characteristics:

Announcements, Broadcast, Dump, Lock Parameter Polling
```

**Figure 2-2. A Typical Show Server Display at System Initialization Time**

**This display includes the version of Xyplex software on the X.25 Gateway, as well as the ROM and hardware versions. When the software is up and running, connect the X.25 Gateway card or standalone unit to the PSN or host system if you have not already done so.**

## Specify Communications Server Features

**The Xyplex X.25 Gateway includes the functionality of a Xyplex Communications Server as well as a PAD. This functionality supports many optional features and protocols that you may want to enable when you initially configure the X.25 Gateway. See the *TCP/IP-LAT Software Management Guide* for more information about how to enable and modify communications server features and protocols.**

**While you can enable most features and protocols at any time, this section lists those features and protocols that you may want to specify or enable when you first set up the X.25 Gateway. See Appendix D for a list of Communications Server features and protocols that the X.25 Gateway does not support.**

### Viewing and Changing the X.25 Gateway Databases

**The X.25 Gateway maintains two databases that contain information you specify in Xyplex commands. One is the *operational* database and other is the *permanent* database. The SET command changes information in the operational database. The DEFINE command changes information in the permanent database.**

**Information in the operational database is temporary, and remains current only until you initialize the X.25 Gateway. While it is current, it overrides the information in the permanent database. Information in the permanent database is constant, but only takes effect after you initialize the X.25 Gateway. See *The Xyplex X.25 Gateway Commands Reference Guide* for more information about entering Xyplex commands.**

### Enable the X.25 Protocol on the 6800 X.25 Gateway

**If you have a 6800 X.25 Gateway, and you have loaded the X.25 Gateway load image for the first time or have upgraded to a V1.3 load image from an earlier version, you must enable the X.25 protocol. It is not enabled by default on the 6800 as it is on the 6025 and 6625 platforms.**

**You need a software password or "key" to enable the X.25 protocol on the 6800 X.25 Gateway. Contact your Xyplex sales representative if you do not have a key. The following command enables the X.25 protocol:**

```
Xyplex>> define server protocol x25 enabled ↵
X25 Password>> xxxx ↵
```

**After you enable the protocol, and the parameter file has been updated, initialize the X.25 Gateway for the change to take effect.**

## Enable The Point-to-Point Protocol at PPP Sites

**If you want to use the Point-to-Point Protocol (PPP), enable it on the X.25 Gateway at this time. You must also enable it on the virtual ports where you will send PPP data, but you cannot enable the protocol on a virtual port if you do not enable it on the X.25 Gateway. The command that enables PPP is the following:**

```
Xyplex>> define server protocol PPP enabled
```

**PPP Port Characteristics**

**You can enable PPP port characteristics at this time, including VJ Compression and IP Broadcasts, and specify such characteristics as the Failure Limit, the Configure Limit, and the Restart Timer. You can also assign Local and Remote PPP addresses to ports where you will enable PPP, if your network topology requires them.**

## Specify Internet Characteristics for Telnet Implementations

**If you are using the Telnet protocol, specify an Internet address for the X.25 Gateway and any nondefault Internet characteristics that you will use. The default Internet address is 0.0.0.0. The following example shows the commands which assign an Internet address:**

```
Xyplex>> define server internet address 128.113.0.100 ↵
Xyplex>> set server internet address 128.113.0.100 ↵
```

**When you assign an Internet address, the X.25 Gateway automatically assigns an Internet subnet mask, based on the class of the Internet address. For a class B Internet address, for example, the X.25 Gateway assigns** `255.255.0.0` **as the subnet mask. To assign a different subnet mask, disable the SUBNET MASK AUTOCONFIGURE characteristic, and assign a new subnet mask.**

**The *TCP/IP-LAT Software Management Guide* describes how to specify other Internet characteristics that you might need at your site.**

## Enable Accounting Features to Log X.25 Session Information

**The X.25 Gateway supports several Communications Server Accounting features that you can enable at this time. The Accounting feature and the Verbose Accounting feature record information about X.25 sessions in an Account Log. The** `syslogd` **UNIX daemon records accounting information to a UNIX host as well as on the X.25 Gateway.**

**Enabling the Accounting Feature**

**The X.25 Gateway logs information about X.25 sessions in an account log if you allocate space for entries in the log. If you want to log this information, use a command such as the following which allocates space for 500 entries:**

```
Xyplex>> define server accounting entries 500
```

**Enabling the Verbose Accounting Feature**

**With the Verbose Accounting feature enabled, the X.25 Gateway can log detailed information about virtual circuits in addition to the session information in the standard account log. This information includes the address of the caller who established the virtual circuit, the address of the caller who terminated the virtual circuit, and the type of service that established it. You must allocate space for the account log before you can enable the Verbose Accounting feature.**

**The following command enables the Verbose Accounting feature:**

```
Xyplex>> define server verbose accounting enabled
```

**You must also specify an X.25 address for the X.25 Gateway and enable the X.25 Calling address feature to record addresses in the Verbose Accounting log. The section on X.25 Gateway Server Management Characteristics, later in this chapter, describes how to do this.**

**Enabling the** `syslogd` **Daemon**

**The syslogd UNIX daemon requires that you allocate space for Accounting entries and enable the Verbose Accounting feature. When you enable the** `syslogd` **daemon, you also specify the Internet address of the UNIX host which will record the accounting information. Use a command such as the following to enable the** `syslogd` **daemon:**

```
Xyplex>> define server daemon syslogd enabled 140.179.248.81
```

**With the Accounting features enabled, the X.25 Gateway can begin logging information about X.25 sessions beginning with the first virtual call.**

## Specify X.25 Characteristics

**You can modify many X.25 characteristics on the X.25 Gateway, although the defaults for most may be adequate for your implementation. Some characteristics, such as X.25 Level 2 and Level 3 parameters, require that you make changes in accordance with the rules of the PSN. The next sections describe the X.25 characteristics, their default values, and the possible values for each:**

**X.25 Gateway Server Management Characteristics**

**Level 2 Parameters and Facilities**

**Level 3 Parameters and Facilities**

**See the Chapter 6 for more information about the commands that specify these characteristics and facilities.**

**At a minimum, you must define these characteristics to establish a virtual circuit:**

| | |
|---|---|
| **The X.25 Address** | **This is an X.25 Gateway server management characteristic. You obtain the X.25 address from the PSN administration, unless you are connected to an X.25 port on a host.** |
| **The range of logical channel numbers for virtual circuits** | **These are Level 3 characteristics. You and the PSN administration agree on the highest and lowest logical channel numbers for the permanent and switched virtual circuits on the X.25 Gateway.** |
| **The Opmode** | **This is a level 3 parameter. The Opmode determines whether the X.25 Gateway emulates a DTE or a DCE. The default is a DTE, which is appropriate in most cases.** |

**You define these values in the permanent database of the X.25 Gateway, and you must initialize the Gateway for them to take effect. The section Initialize the Gateway, later in this chapter, explains how to do this.**

### X.25 Gateway Server Management Characteristics

**The server management characteristics include the X.25 address, and several other settings, including those that manage virtual ports and change PAD profiles and parameters. Except for the X.25 Address, the default values for these characteristics do not affect basic configuration.**

### Defining the X.25 address

**The X.25 address identifies the X.25 Gateway to other devices on the PSN. Usually, the PSN administration assigns an X.25 address to each device in the network at subscription time, and you will receive an address for the X.25 Gateway. This address is a CCITT standard International Data Number (IDN) for PSNs, and conforms to the X.121 standard for addresses.**

**If you connect the X.25 Gateway to an X.25 host or another remote X.25 Gateway, however, you can use an arbitrary address as long as it is different from any other address already in use. The default address is 1.**

**Figure 2-3 shows this address in an X.25 Characteristics display.**

```
Xyplex>> show x25 characteristics
```

```
Address:   08-00-87-00-2D-44   Name:   X002D44              Number:     0

 Buffer Reserve:        20
 Hysteresis:            8
 Small Buffer Size:     81
 Small Buffer Pool:     566
 Large Buffer Size:     128
 Large Buffer Pool:     1890
 Address:           1
 Welcome:

 Available Profiles:

 HOST, CRT, CRT_NOE, CC_SSP, CC_TSP, HARDCOPY, XYPLEX7, XYPLEX8,
 XYPLEX9, XYPLEX10, XYPLEX11, XYPLEX12, XYPLEX13, XYPLEX14, XYPLEX15,
 XYPLEX16, XYPLEX17, XYPLEX18, XYPLEX19, XYPLEX20, XYPLEX21, XYPLEX22,
 XYPLEX23, XYPLEX24, XYPLEX25, XYPLEX26, XYPLEX27, XYPLEX28, XYPLEX29,
 XYPLEX30, XYPLEX31, XYPLEX32, XYPLEX33, XYPLEX34, XYPLEX35, XYPLEX36,
 XYPLEX37, XYPLEX38, XYPLEX39, XYPLEX40

Enabled Characteristics:
X25
```

**Figure 2-3. An X.25 Characteristics Display**

**This example changes the X.25 address to 21046004322105:**

```
Xyplex>> define x25 address "21046004322105"

Xyplex>>
```

**Enclose the address in quotes. The address can include from 1 to 15 ASCII digits. The X25 Characteristics display lists the new address after you initialize the X.25 Gateway.**

**The X.25 address you assign to the X.25 Gateway is the "master" address for the unit. The subaddress for each virtual port on the unit is a two digit number, based on the virtual port number. The 80 virtual ports on the X.25 Gateway are numbered from 02 to 81. For example, the subaddress for virtual port 5 is 05.**

**Enabling the X.25 Calling Address Feature**

**When the X.25 Calling Address feature is enabled, call request packets from the X.25 Gateway include its X.25 address. You may want to enable the X.25 Gateway Calling Address feature at this time, although it is not always necessary to send and receive calls across the network. Some hosts may require that call request packets include the address of the caller so that they can accept or reject the call based on the calling address. If you are using verbose accounting, this feature enables the account log to record who initiated or terminated a call.**

**The following command enables the X.25 Gateway Calling Address feature:**

```
Xyplex>> define x25 calling address enabled
Xyplex>>
```

## Level 2 Parameters and Facilities

**Level 2, the link layer, manages the exchange of data between the DTE and the DCE. This level provides error checking for the data from the physical layer, and presents error-free data to the next level above, the packet layer. Level 2 also provides flow control through a series of timers that regulate the speed and density of the data.**

**The default values for the Level 2 characteristics on the X.25 Gateway are compatible with the requirements of many PSNs. These include timer values, the Extended Frame Sequence Numbering facility, and the window size. Check with the PSN administration to be sure these values are correct. The X25 Level_2 Characteristics display, shown in Figure 2-4, lists the Level 2 characteristics. This display shows the characteristics set to the default values.**

```
Xyplex>> show x25 level_2 characteristics
```

```
Address:   08-00-87-00-2D-44   Name:   X002D44              Number:     0

Protocol:                LAPB
Opmode:                  DTE
Window Size:             7
T1:                      3 SECONDS
T2:                      2 SECONDS
T3:                      0 SECONDS
N2 Counter:              20

X.2 Facilities Enabled:
```

**Figure 2-4. Default Settings for Level 2 Characteristics**

**While the Level 2 Characteristics display shows the Opmode of the X.25 Gateway, you change this characteristic at Level 3. Table 2-2 lists the Level 2 options.**

**Table 2-2. Level 2 Options and Default Settings**

| Level 2 Option | Default Value | Function |
|---|---|---|
| Extended Frame Sequence Numbering | DISABLED | Determines whether the X.25 Gateway uses modulo 8 or modulo 128 frame sequence numbering. |
| N2 | 20 | A frame retransmission counter. |
| T1 | 3000 milliseconds | Specifies how long the X.25 Gateway can wait for an acknowledgment of a transmitted frame before it retransmits the frame. |
| T2 | 2000 milliseconds | Specifies how long the X.25 Gateway can wait to acknowledge the receipt of a message. |
| T3 | 0 milliseconds | Specifies how long a channel can be idle before the X.25 Gateway resets the link. |
| Window Size | 7 | Specifies the number of frames that can remain unacknowledged between the DTE and the DCE. |

**The command that enables or disables the Level 2 options are:**

**DEFINE X25 LEVEL_2 *option option-value***

**Where *option* is one of the Level 2 options in Table 2-1, and *option-value* is a value other than the default.**

## Level 3 Parameters and Facilities

**Level 3, the packet layer, establishes virtual circuits and manages the flow of data across them. Packet formats are defined to initiate and clear calls, to transfer data, and to execute special functions, including the management of diagnostic packets. In addition, Layer 3 manages the use of X.2 facilities.**

**Defining the Range of Virtual Circuits**

**Recall that a virtual circuit is the logical association between two DTEs on a PSN. The PSN identifies virtual circuits with logical channel numbers. Among the Level 3 parameters are those that set the highest and lowest logical channel numbers for virtual circuits. To send and receive data packets you and the network administration must agree on the range and mix of virtual circuits.**

**By default, the X.25 Gateway supports 80 two-way switched virtual circuits, with the logical channels numbers 1 through 80. You can assign PVCs, and three categories of CCITT standard SVCs in accordance with the PSN:**

| SVC | Function |
|---|---|
| One-Way Incoming | These circuits can receive calls but not initiate them. |
| One-Way Outgoing | These circuits can initiate calls but not receive them. |
| Two-Way | These circuits can both initiate and receive calls. This is the default for all VCs on the X.25 Gateway. |

**One-way SVCs only affect how the call is established; once the two DTEs establish an SVC, the communication between them is full duplex no matter what rules governed how the call was initiated or received.**

**The X.25 Gateway also supports Permanent Switched Virtual Circuits (PSVCs). PSVCs are a feature of the Xyplex X.25 Gateway, and not a CCITT standard. PSVCs function like Two-Way SVCs, but do not disconnect the X.25 session when you terminate the LAN session. You assign PSVCs to specific ports after you assign the ranges of virtual circuits. See the *Xyplex X.25 Gateway Commands Reference Guide* for more information about how to set up PSVCs.**

**In the Xyplex X.25 Gateway implementation, PVCs have direction. The PVC acquires its direction from the source of the first data it receives: either from the LAN or from the PSN. As long as the LAN connection remains up, the direction of the PVC does not affect whether or not you can send or receive data on the PVC.**

**If the LAN connection is terminated, however, the direction of the PVC determines whether it will accept data from the LAN or receive data from the PSN. If the direction of the PVC is LAN-to-X.25, the PVC will discard data it receives from the PSN bound for the LAN until the LAN session is reestablished. If the direction of the PVC is X.25-to-LAN, the PVC will accept data it receives from the PSN, but it will be inaccessible for local LAN connections. The X.25 Gateway maintains the direction of the PVC until you bring down the link.**

**Figure 2-5 is a sample Show Server X25 Level_3 Characteristics display with the default settings for virtual circuits:**

```
Xyplex>> show x25 level_3 characteristics
```

```
MAXx25 V1.3   Rom 450000 HW 02.00.00 Lat Protocol V5.2 Uptime:  00 00:09:06
Address: 08-00-87-00-A6-9E Name: X00A69E         Number:     0

Default Throughput Class: 9600/9600
Default Packet Size:      128                T10:   0
Default Window Size:      2                  T11:   0
Max Window Size:          7                  T12:   0
Max Packet Size:          128                T13:   0
Opmode:                   DTE                T20:   180
Lowest PVC:               0                  T21:   200
Highest PVC:              0                  T22:   180
Lowest Incoming SVC:      0                  T23:   180
Highest Incoming SVC:     0                  T28:   300
Lowest SVC:               1                  R20:   255
Highest SVC:              80                 R22:   1
Lowest Outgoing SVC:      0                  R23:   1
Lowest Outgoing SVC:      0                  R28:   1
X.2 Facilities Enabled:
```

**Figure 2-5. Default Settings for Virtual Circuits**

**The Highest SVC and Lowest SVC settings in Figure 2-5 refer to two-way switched virtual circuits.**

**The DCE or DTE cannot set up virtual circuits without the correct range of logical channel numbers. As you make calls, the DTE assigns logical channel numbers to virtual circuits from the highest to the lowest values of the specified ranges, and the DCE assigns values from the lowest to the highest values of the specified ranges. If, for example, the DCE supports only 30 logical channels, and you do not define this range on an X.25 Gateway configured as a DTE, the Gateway assigns LCN 80 to the first outgoing call. The call fails because the DCE cannot interpret the value.**

**The logical channel numbers for each range of virtual circuit need not be contiguous. However, the difference between the highest and lowest values in a range must not exceed 80. If you specify a value in one variable that creates a difference in excess of this range, the Gateway automatically adjusts the other variable upward or downward to fit within the range.**

**The following commands are examples of how to set the LCN ranges for different types of virtual circuits.**

### Assigning Permanent Virtual Circuits (PVCs)

**The first set of commands assigns the LCN range for PVCs:**

```
Xyplex>> define x25 level_3 lowest pvc 1 ↵
Xyplex>> define x25 level_3 highest pvc 10 ↵
```

**Because PVCs are a permanent association between two DTEs, you must assign a logical channel number within the range you specify to each virtual port that supports a PVC. For example, this command assigns LCN 5 to virtual port 10:**

```
Xyplex>>define x25 port 10 pvc lcn 5 ↵
```

**Repeat this command to assign an LCN number to each of the virtual ports that supports a PVC.**

**Assigning Switched Virtual Circuits (SVCs)**

**Now assign the SVCs. Remember that you can use two-way SVCs only; you need not use all three types at your site. SVCs do not require dedicated LCNs, because SVCs are not permanent and the their LCNs are reused.**

```
Xyplex>> define x25 level_3 lowest incoming svc 256 ↵
Xyplex>> define x25 level_3 highest incoming svc 265 ↵

Xyplex>> define x25 level_3 lowest svc 1000 ↵
Xyplex>> define x25 level_3 highest svc 1049 ↵

Xyplex>> define x25 level_3 lowest outgoing svc 2000 ↵
Xyplex>> define x25 level_3 highest outgoing svc 2009 ↵
```

**The total number of PVCs and SVCs in this example is 80. The X25 Level_3 Characteristics display reflects the new LCNs after you initialize the X.25 Gateway.**

**Setting the Opmode**

**The Opmode determines whether the X.25 Gateway emulates a DTE or a DCE. In most implementations, the gateway emulates a DTE, and this is the default setting for the OPMODE characteristic. Because the Gateway and the device attached to it must be complimentary however, you must change the default if the attached device is a DTE. The command that changes the Opmode is the following:**

**DEFINE X25 LEVEL_3 OPMODE DTE | DCE**

**The Level_3 Characteristics Display, shown in Figures 2-5 and 2-7, includes the Opmode.**

**Other LEVEL_3 options**

**Other Level 3 options include the X.2 user facilities, error-recovery timers, and packet-retry counters. Check with the PSN administration to determine if the default settings on the X.25 Gateway are appropriate. The default settings for these facilities and parameters are listed in this section.**

**User Facilities**

**The X.2 user facilities allow you to customize the user interface to the network with features such as Reverse Charging and Fast Select Acceptance. The PSN administration may or may not support these facilities, and the PSN charges for them if you subscribe to them. Some facilities apply to all ports for a fixed period of time, and some apply to individual ports on a per-call basis. In either case, the**

**facilities you enable must agree with those used by the DCE or you may not be able to establish virtual circuits.**

**While facilities are a subscription time option, you can enable or disable them on the X.25 Gateway at any time. All facilities are disabled by default. Table 2-3 lists the fixed facilities and Table 2-4 lists the per-call facilities that the X.25 Gateway supports.**

**Table 2-3. User Facilities**

| Fixed Facilities | Effect when Enabled |
|---|---|
| Dbit Modification | Indicates that the local DTE expects the remote DTE to acknowledge that it received a call set-up packet or a data packet. |
| Extended Packet Sequence Numbering | Uses modulo 128 to number packets sent across the X.25 link. |
| Fast Select Acceptance | Allows the local DTE to accept a call set-up or call clear packet with up to 128 bytes of user data in it. It also allows the local DTE to transmit up to 128 bytes of data in a call-accepted packet. |
| Flow Control Parameter Negotiation | Permits negotiation on a per-call basis of the packet size and window size flow control parameters. |
| Incoming Calls Barred | Allows the DCE to prevent incoming calls to the DTE. |
| Local Charge Prevention | Prevents the DCE from accepting calls that require the local DTE to pay for them. |
| Default Packet Size | Allows you to change the default packet size. |
| Default Window Size | Allows you to change the default window size. (You must use a window size that the PSN supports.) |
| NUI | Allows the DTE to provide network user identification (NUI) information to the PSN for billing, security, or network management. |
| Outgoing Calls Barred | Prevents the DCE from accepting outgoing calls from the DTE. |
| One-way Logical Channel | Restricts logical channels to either incoming or outgoing calls. |
| Packet Retransmission | Allows the X.25 Gateway to issue reject packets. |
| Reverse Charging Acceptance | Allows the X.25 Gateway to accept charges for calls from the PSN with Reverse Charging enabled. |
| RPOA | Allows the DTE to use a Registered Private Operating Agency to route calls to a destination in another country. |
| Throughput Class Negotiation | Permits the X.25 Gateway to negotiate the throughput classes for calls in both directions on a per-call basis. |

**Table 2-4. Per-Call Facilities**

| Per-Call Facilities | Effect when Used |
|---|---|
| Fast Select | Allows the local DTE to send a call set-up or call clear packet with up to 128 bytes of user data in it from the ports you specify. |
| NUI | Specifies a network user identification (NUI) number to the PSN, which can use it for billing, security, or network management. |
| Packet Size | Determines the maximum packet size that the local X.25 Gateway can attempt to negotiate for calls that originate at the ports you specify. |
| RPOA Select | Specifies a transit network owned by a registered private operating agency (RPOA) that the X.25 Gateway can use to route international calls from the ports you specify. |
| Throughput Class | Specifies a throughput class for the calling and called DTEs at the ports you specify. |
| Window Size | Specifies the maximum number of packets that can remain unacknowledged between the calling and called DTEs at the ports you specify. |
| Reverse Charging | Allows the X.25 Gateway to request reverse charging for calls that originate at the ports you specify. |

**The following is the syntax for the command that enables or disables the user facilities for all ports on the X.25 Gateway:**

**DEFINE X25 LEVEL_3 *facility* ENABLED|DISABLED**

**Where *facility* is one of the user facilities in Table 2-3. For the possible values of the user facilities, see the commands that define each of them in *The Xyplex X.25 Gateway Commands Reference Guide.***

**The following is the syntax for the command that enables or disables the facilities for individual ports on a per-call basis:**

**DEFINE/SET [SERVER] X25 PORT *facility facility-value***

**Where *facility* is one of the facilities in Table 2-4. For the possible values of the per-call facilities, see *The Xyplex X.25 Gateway Commands Reference Guide.***

### Level 3 Timeouts

**The timeout values defined at Level 3 ensure that packet exchanges occur within a specified period of time. Two categories of timeouts apply to Level 3 procedures: DCE timeouts and DTE timeouts. The X.25 Gateway default values for these timeouts are adequate in most implementations. Table 2-5 lists the DCE timeouts and their default values. Table 2-6 lists the DTE timeouts and their default values.**

**Table 2-5. DCE Timeouts**

| Timer Number | Default in Seconds | Starts When | Ends When |
|---|---|---|---|
| T10 | 60 | DCE sends a Restart Indication packet | DCE receives a Restart Confirmation packet |
| T11 | 180 | DCE sends an Incoming Call packet | DCE receives a Call Accepted or a Clear Request packet |
| T12 | 60 | DCE sends a Reset Indication packet | DCE receives a Reset Confirmation packet |
| T13 | 60 | DCE sends a Clear Indication packet | DCE receives a Clear Confirmation packet |

**Table 2-6. DTE Timeouts**

| Timer Number | Default in Seconds | Starts when | Ends When |
|---|---|---|---|
| T20 | 180 | DTE sends a Restart Request packet | DTE receives a Restart Confirmation packet |
| T21 | 200 | DTE sends a Call Request packet | DTE receives a Call Connected or an Incoming Call packet (collision) |
| T22 | 180 | DTE sends a Reset Request packet | DTE receives a Reset Confirmation packet |
| T23 | 180 | DTE sends a Clear Request packet | DTE receives a Clear Confirmation packet |
| T28 | 300 | DTE sends a Registration Request packet | DTE receives a Registration Confirmation packet |

**The command that changes the DTE and DCE timer values has the following syntax:**

**DEFINE X25 LEVEL_3 T*xx timer-value***

**Where T*xx* is one of the timeouts listed in tables 2-5 and 2-6.**

### Level 3 Retry Counters

**The Level 3 retry counters determine the maximum number of times the DTE sends certain request packets after the specified time limits have expired and the DTE has not received an appropriate confirmation packet. (The time limits in Table 2-6 determine how long the DTE will wait before reissuing the packet.) The X.25 Gateway provides default values for these retry counters, and these defaults are adequate in most situations. Table 2-7 lists the retry counters and their default values.**

**Table 2-7. Level 3 Retry Counters**

| Retry Counter | Default Value | Packet Type |
|---|---|---|
| R20 | 255 | Restart Request |
| R22 | 1 | Reset Request |
| R23 | 1 | Clear Request |
| R28 | 1 | Registration Request |

**The command that changes these retry counter values has the following syntax:**

**DEFINE X25 LEVEL_3 R*xx retry-counter-value***

**Where R*x x* is one of the retry counters in Table 2-7.**

## Initialize the X.25 Gateway

**You must initialize the X.25 Gateway after you define parameters and facilities, including the X.25 address, the ranges of logical channel numbers, and the Opmode:**

```
Xyplex>> initialize ↵
```

**While the initialization is taking place, the command interface briefly becomes inoperative. After you initialize the X.25 Gateway, the software makes the changes in the permanent database.**

**To determine whether or not the X.25 Gateway is actively connected to the X.25 network, use the SHOW X25 STATUS command to view a display such as the one shown in Figure 2-6. The display indicates whether or not each of the three X.25 layers is "Up" or "Down."**

```
Xyplex>> show x25 status ↵
```

```
MAXx25 V1.3   Rom 4B0000 HW 00.00.00 Lat Protocol V5.1 Uptime:  00 00:09:06

Address: 08-00-87-00-A6-9E Name: X00A69E         Number:     0

Large Buffers Available:                1624
Large Buffers in Use:                   266
Large Buffers Total:                    1890
Large Buffer Allocation Failure:        0
Small Buffers Available:                565
Small Buffers in Use:                   1
Small Buffers Total:                    566
Small Buffer Allocation Failures:       0

State:             Line Up/ Frame Up/ Packet Up
```

**Figure 2-6. The Show X.25 Status Display**

**The** `State:` **line shows the status of the three X.25 Layers: Line (level 1), Frame (level 2), and Packet (level 3). In this display, all three layers are "Up," which indicates that they are ready to send and receive packets.**

**If a problem existed at any of these layers, the status on the display would be "Down." For example, if the physical layer is actively connected to the network, but the data link and packet layers are not functioning properly, the state display looks like this:**

**State: Line Up/ Frame Down/ Packet Down**

**If this happens at the Frame or Packet layer, check the settings of the characteristics for that layer on the appropriate displays. If the Line is down, check the hardware configuration. See Chapter 6, Basic Troubleshooting, for more information about how to determine specific problems in each layer.**

**Figure 2-7 shows the settings for the LCN ranges that were defined in the examples earlier in this chapter.**

```
Xyplex>> show x25 level_3 characteristics
```

```
MAXx25 V1.3   Rom 4B0000 HW 00.00.00 Lat Protocol V5.1 Uptime:  00 00:09:06

Address: 08-00-87-00-A6-9E Name: X00A69E         Number:     0

Default Throughput Class  9600/9600
Default Packet Size:      128                    T10:    0
Default Window Size:      2                      T11:    0
Max Window Size:          7                      T12:    0
Max Packet Size           128                    T13:    0
Opmode:                   DTE                    T20:    180
Lowest PVC:               1                      T21     200
Highest PVC               10                     T22:    180
Lowest Incoming SVC       256                    T23:    180
Highest Incoming SVC      265                    T28:    300
Lowest SVC:               1000                   R20     255
Highest SVC               1049                   R22     1
Lowest Outgoing SVC       2000                   R23     1
Lowest Outgoing SVC       2009                   R28     1
X.2 Facilities Enabled
```

**Figure 2-7. Sample LCN Ranges for Virtual Circuits**

**This display shows the new logical channel numbers, the default timer values, and no X.2 facilities enabled.**

**You can now attempt to establish virtual circuits. Chapter 3, Sending and Receiving Calls, explains how to do this.**

**End of Chapter**

# Chapter 3

# Sending and Receiving Calls

**The process of a local DTE establishing a virtual circuit a with a remote DTE is known as "making a call." On the X.25 Gateway, you make calls to X.25 addresses and remote users make calls to the X.25 Gateway through virtual ports. The X.25 Gateway supports 80 virtual ports, numbered 02 through 81, where you can send and receive calls.**

**Most of the time, you gain access to virtual ports with local services. The X.25 Gateway supports three types of local services: LAT services, Telnet services, and X.25 services. LAT and Telnet services provide access to virtual ports for LAN users. X.25 services provide access to virtual ports for callers from the X.25 network. The X.25 Gateway can support up to 80 local services, and each virtual port can support up to 80 local services.**

**This chapter includes these sections which describe how to send and receive calls:**

- **Making Calls to the PSN**
- **Receiving Calls from the PSN**
- **Using Remote Profiles in Local Services**
- **Making Calls to a Remote Printer**

**A local service can change the default inbound or outbound PAD profile on a virtual port as well as send a remote PAD profile across the PSN to another PAD. This chapter describes how to include default profiles and remote profiles in local services. For more information about PAD profiles and parameters, see Chapter 4.**

## Making Calls to the PSN

**To make calls from the LAN to a device on the X.25 network, you can create a LAT or Telnet service, or assign an X.25 address to one or more virtual ports with a port connect action. LAT and Telnet services establish sessions between a LAN device, and an X.25 Gateway virtual port at the PAD interface. Either you or the service calls the X.25 address. If you use a port connect action, you simply call the virtual port from a remote device with its node name or port number, and the connect action automatically calls the X.25 address.**

## Creating a LAT or Telnet Service

**A LAT or Telnet service can include several characteristics which determine how the service makes a connection. Local services are LAT by default. You must explicitly specify Telnet if you want a Telnet service, and you must explicitly disable LAT if you want a Telnet only service.**

**You can assign a LAT or a Telnet service to one or more virtual ports. When a user requests the service, the Gateway assigns it to a port in the range that is not busy, and proceeds with whatever activity is specified in the service.**

**The following is the command syntax which creates a LAT or Telnet service:**

**DEFINE/SET SERVICE *service-name* [LAT|TELNET] ENABLED|DISABLED [PORT *port-list* | ALL] [CONNECT ACTION "*action-string*"] [REMOTE CLEAR ENABLED|DISABLED] [X25 PROFILE "*profile-name*"] [X25 REMOTE PROFILE "*profile-name*" ]**

**Connecting to the PAD Prompt**

**To create a simple LAT service that connects to the PAD prompt, specify a service name and one or more virtual ports in the DEFINE/SET SERVICE command line. This service has the name PADCONNECT for virtual ports 50-55:**

```
Xyplex>> set service padconnect ports 50-55 enabled
```

**When a user enters the service name, the Gateway makes a connection to the first port in the range that is not busy:**

```
Xyplex>> connect padconnect

Xyplex-010-
Session 1 to PADCONNECT on node X00A69 established
*
```

**The default PAD prompt on the X.25 Gateway is an asterisk *. You can change this with the DEFINE/SET SERVER X25 PROMPT commands. Figure 3-1 represents a connection from a terminal on the LAN host FinanceVAX to the X.25 Gateway PAD through the service PADCONNECT.**

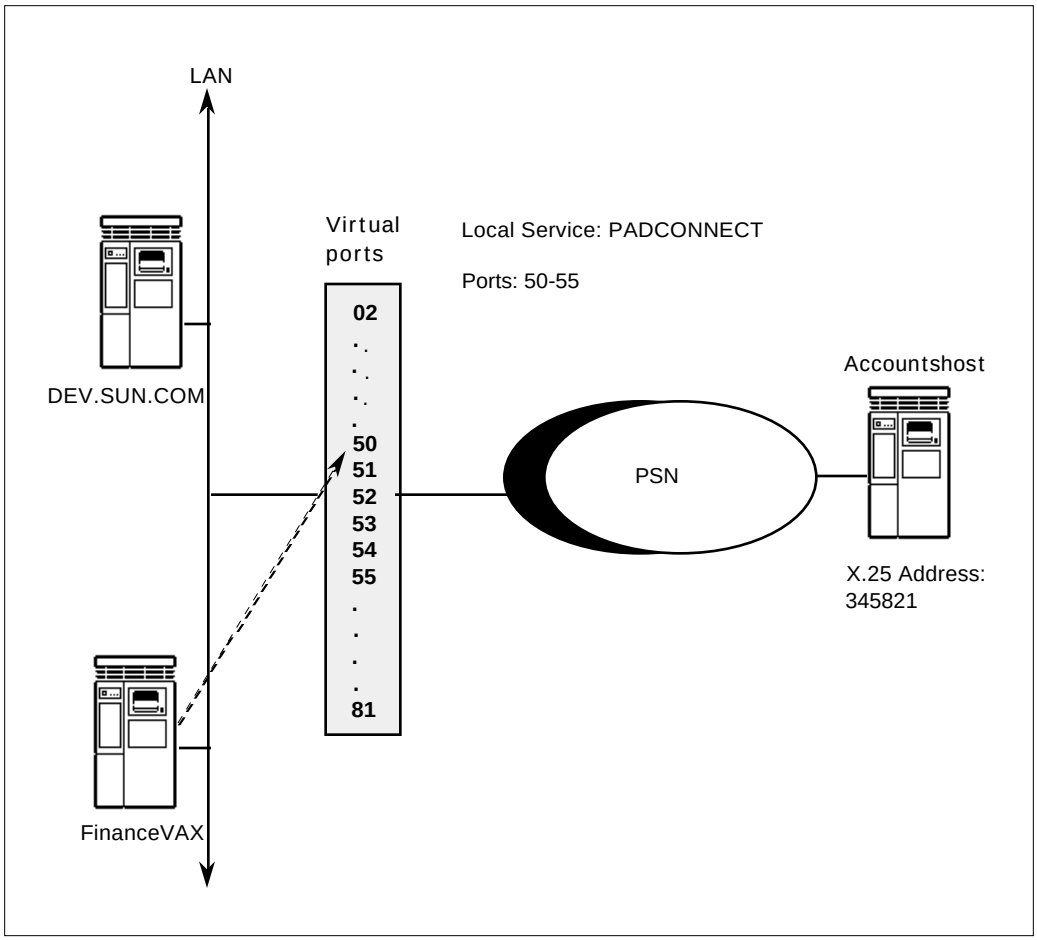


**Figure 3-1. A LAT Service that Returns the PAD Prompt**

### Calling the X.25 Address from the PAD Prompt

**When the PAD prompt appears, you can enter PAD commands, including the CALL command. To call an X.25 address, you can either enter the CALL command with the address, or simply enter the address. This example uses the CALL command and the X.25 address 345821:**

```
* CALL 345821
OUTGOING CALL TO: 345821
*
CALL CONNECTED.  YOU CAN NOW SEND AND RECEIVE DATA
Username>
```

**When the remote DTE accepts the call, the PSN establishes a virtual circuit between the X.25 Gateway and the remote DTE. Both the local and the remote PAD are then in data transfer state and the two DTEs can send and receive data. At some ports, you can enter a default recall character, such as @, to recall the PAD to command state. When you do this, the PAD prompt appears and you can enter PAD commands.**

**You can issue many commands other than the CALL command from the PAD prompt. For an online list of these commands, enter HELP from the PAD prompt. Chapter 5 of this manual describes PAD commands in detail.**

## Creating a Local Service that Calls an X.25 Address

**To call an X.25 address in a LAT or Telnet service, include the X.25 address of the remote PAD or host as the connect action in the service. (Enclose the X.25 address in quotes.) The following command creates a Telnet service with an Internet address of 128.20.2.30 with a connect action that calls the X.25 address 345821:**

```
Xyplex>> set service accountshost telnet enabled connect action
"345821" internet address 128.20.2.30 ports 60-65 ↵
```

**From the Xyplex prompt, a user enters the CONNECT command with the service name, or the TELNET CONNECT command with the service Internet address. The X.25 Gateway makes the connection to the host at the X.25 address 345821. The connection appears to be directly from the terminal server port to the host on the network. The following example uses the CONNECT command and the service name:**

```
Xyplex>> connect accountshost ↵
CALL CONNECTED.  YOU CAN NOW SEND AND RECEIVE DATA
Welcome to Accounts Host.  Please Log On
Username:
```

**You can also enter** `telnet connect 128.20.2.30` **to make the connection.**

**Figure 3-2 shows a call from a user on the LAN host DEV.SUN.COM to the X.25 address 345821 with the local service ACCOUNTSHOST.**

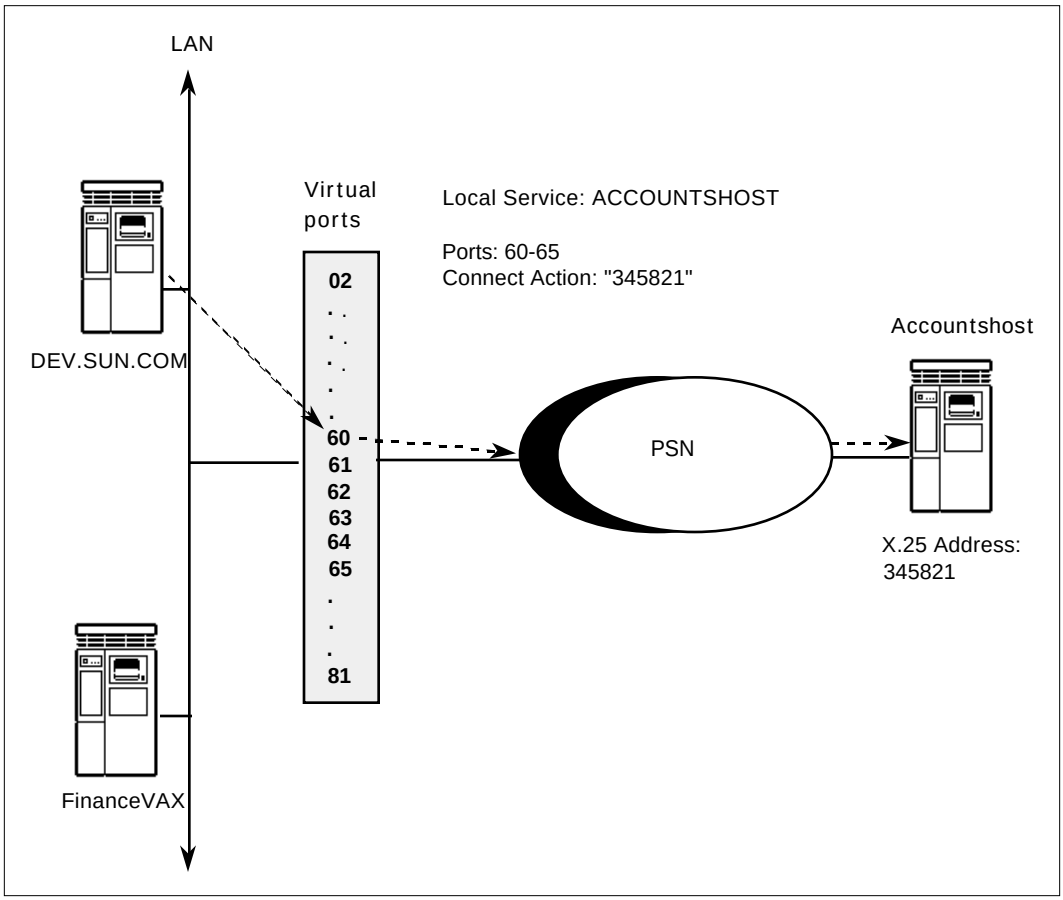


**Figure 3-2. A Telnet Service that Calls an X.25 Address**

**Figure 3-2 shows that the local service has associated the call with virtual port 60. If this port had been busy, the service would have attempted to make a connection with the next port in the range. In this case, the next port is 61.**

## Assigning an X.25 Address to a Virtual Port

**When you assign an X.25 address to a virtual port with a port connect action, the X.25 Gateway calls that address whenever anyone logs on to the port through the LAT or Telnet protocol. If you made the call from a Xyplex terminal server, for example, you could use the TELNET CONNECT or LAT CONNECT commands. This method of calling an X.25 address from the LAN eliminates the need for a local service.**

**The following commands assign an X.25 address to a virtual port:**

**DEFINE/SET [SERVER] X25 PORT *port-list* CONNECT ACTION "*address**D*userdata*"**

**The *address* is an X.25 address. *D*u*serdata* field is optional, and can include up to 12 characters. The following command assigns the address 7654 to ports 10-20:**

```
Xyplex>> set x25 port 10-20 connect action "7654"
```

**Users can now use LAT or Telnet to call virtual ports 10-20 to connect the X.25 address 7654. The following command uses LAT to connect to port 10 on the X.25 Gateway from an X.25 Terminal Server:**

```
Xyplex>> lat connect node 6625 port 10
CALL CONNECTED.  YOU CAN NOW SEND AND RECEIVE DATA
Welcome to Remote X.25 Host.  Please Log On
Username:
```

**You can call X.25 Gateway virtual ports from other hosts on the network. See the host-specific documentation about the commands you can use to do this.**

## Changing the Outbound PAD Profile

**Some LAT and Telnet services, such as those that make calls to remote printers, may require a change in the outbound profile for the range of virtual ports in the service. The service need not have a connect action associated with it. The following example defines a LAT service with an outbound profile:**

```
Xyplex>> set service padconnect port 12-14 x25 profile "hardcopy"
```

**While the service** `padconnect` **is active, the outbound profile for ports 12-14 is Hardcopy. At other times, the outbound profile for these ports is either the X.25 Gateway default, or the profile for another service that is in use at these ports.**

## Viewing LAT and Telnet Services

**The Show Service Local Summary display lists the LAT, Telnet, and X.25 services on the X.25 Gateway. Figure 3-3 shows a sample display:**

```
Service Name            Status              Identification

padconnect              Available           Connection to PAD

accountshost            Available           X.25 to accountshost
```

**Figure 3-3. A Sample Show Service Local Summary Display**

**This display includes the service name, the status of the service, and a text string which identifies the service. The Show Service *service-name* Characteristics display lists the details of the service you specify. See *The Xyplex X.25 Gateway Commands Reference Guide* for more information about these displays.**

## Calling the LAN from the PSN

**The X.25 Gateway can follow one of several procedures when it receives a call from the PSN. Which one it follows depends on two characteristics that apply to virtual ports: the listen address and the X.25 port connect action.**

**You can create X.25 services which include a listen address as well as other service characteristics. The syntax for X.25 services is the following:**

**DEFINE/SET SERVICE *service-name* X25 ENABLED | DISABLED [PORT *port-list* | ALL] [CONNECT ACTION "*action-string*"] [X25 ADDRESS "*listen-address*"] [REMOTE CLEAR ENABLED | DISABLED] [X25 PROFILE "*profile-name*"] [X25 REMOTE PROFILE "*profile-name*"]**

### About the Listen Address

**When a user calls an X.25 Gateway virtual port, the calling address includes the X.25 address (IDN) of the X.25 Gateway and a *listen address* for one or more virtual ports. The default listen address for each virtual port is its two-digit port number: the default listen address for port 38, for example, is 38. The default listen address for port 5 is 05. The listen address for a virtual port appears in the X.25 Port Alternate Characteristics display, as shown in Figure 3-4 for port 38.**

```
Virtual Port:      38                                10 Feb 1994  21:41:16
Listen Address: 38

Send Carriage Return:       Disabled
Disconnect:                 Enabled
Remote Clear:               Disabled
```

**Figure 3-4. A Default Listen Address**

**Changing the Default Listen Address**

**You can change the listen address of a virtual port with an X.25 service. The listen address in the service can include part or all of the X.25 Gateway IDN number, plus the two-digit extension that identifies the port. Like an X.25 address, a listen address can include up to 15 digits. You and the PSN administration agree at subscription time on the addressing scheme to use for the X.25 Gateway. If the X.25 Gateway is connected to another X.25 Gateway or an X.25 host, the listen addresses can be any number up to 15 digits**

**The first time you define a listen address that is different from the default, the default listen address no longer exists. Only the listen addresses you specify in**

**X.25 services are valid for that port. If you clear or purge all services associated with a port, the listen address reverts to the default.**

**When a call arrives at the X.25 Gateway, the Gateway compares the calling address with the listen address of each virtual port, starting with port 02. The comparison begins with the least significant digits of the calling address. The X.25 Gateway establishes the connection with the a virtual port at a matching listen address that is not busy. Figure 3-5 shows several nondefault listen addresses corresponding to virtual ports on an X.25 Gateway:**

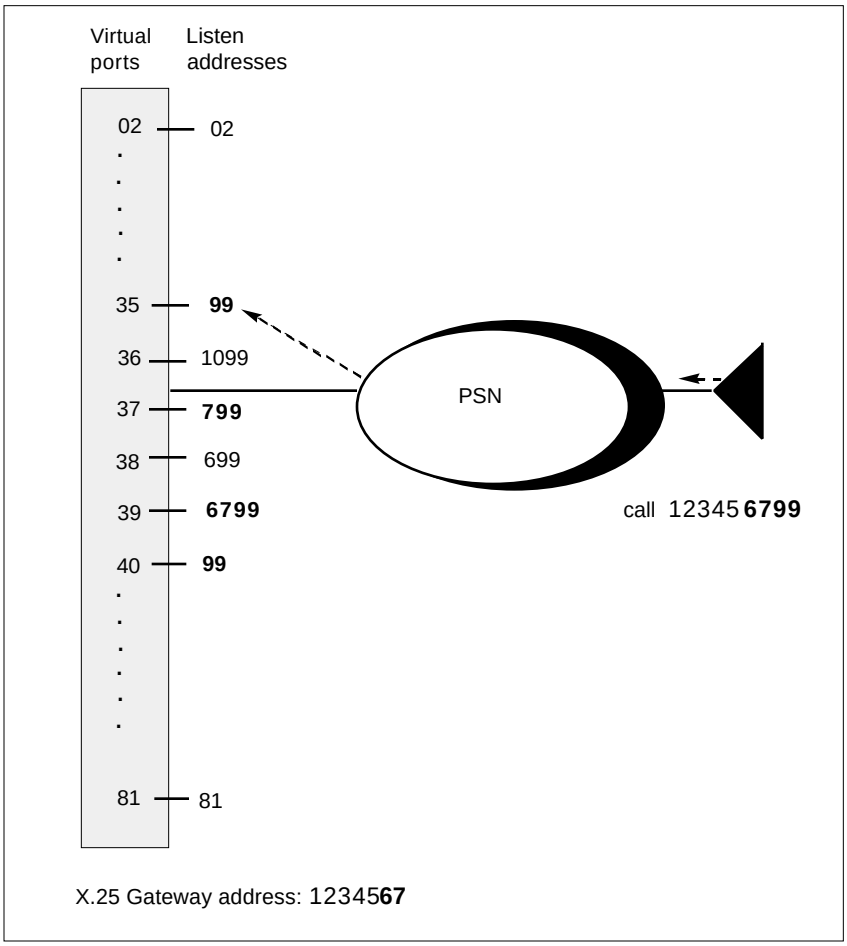


**Figure 3-5. Listen Addresses on an X.25 Gateway**

**When the calling address 123456799 arrives at the X.25 Gateway, the X.25 Gateway matches the listen address 99 with virtual port 35. Other virtual ports with matching listen addresses are 37, 39, and 40.**

**You can associate a listen address with one virtual port or a range of virtual ports. The listen address for the range may be the subaddress of one of the ports in the range, or the IDN number for the Gateway that the PSN administration assigns to it. When a user calls the listen address, the X.25 Gateway associates the call with a port in the range that is not busy. A range can include all 80 virtual ports on the X.25 Gateway.**

**Each virtual port can support up to 80 listen addresses, because 80 is the maximum number of local services the X.25 Gateway can support. Figure 3-6 represents a range of virtual ports with different listen addresses assigned to them.**

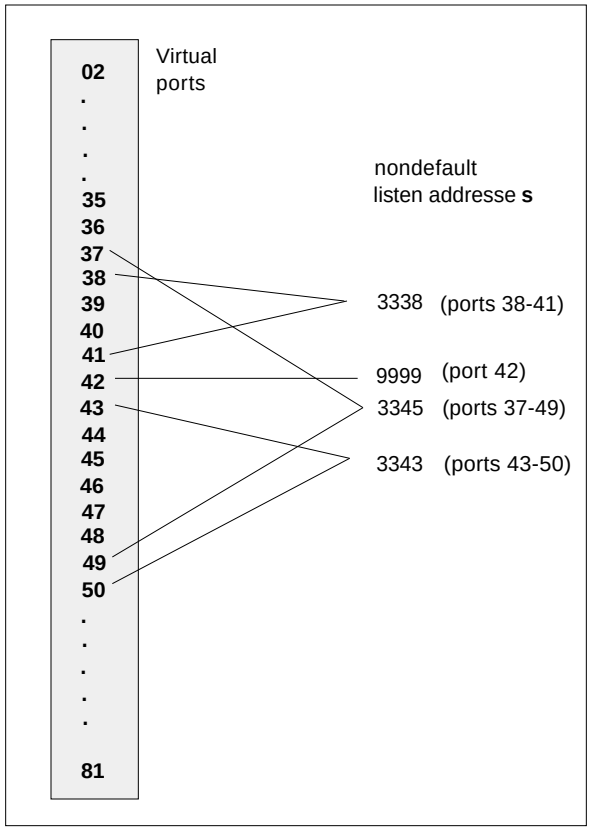


**Figure 3-6. Multiple Listen Addresses**

**In Figure 3-6, port number 38 has the listen addresses 3338 and 3345. Port number 48 has the listen addresses 3345 and 3343. Ports 35 and 36 have default listen addresses. Port 42 has the listen address 9999.**

**Figure 3-7 is an X.25 Port Alternate Characteristics display for port 38, showing the nondefault listen addresses represented in Figure 3-6.**

```
Virtual Port:      38                                10 Feb 1994  21:41:16
Listen Address:   3338, 3345

Send Carriage Return:       Disabled
Disconnect:                 Enabled
Remote Clear:               Disabled
```

**Figure 3-7. Two Nondefault Listen Addresses**

**The syntax for the command that specifies a nondefault listen address for one or more virtual ports is the following:**

**DEFINE/SET SERVICE *servicename* X25 ENABLED X25 ADDRESS "listen address" PORT *port-list***

## About the X.25 Port Connect Action Type

**When a call arrives at a virtual port, the X.25 Gateway directs it to either the Xyplex command interface or a LAN destination, based on the *connect action type* of the virtual port. (Connect action types are separate from the local connect actions in the X.25 services.) Three X.25 connect action types are available: None, Autoconnect, and Userdata.**

| | |
|---|---|
| **None** | **This connect action type returns the Xyplex command interface to callers from the PSN. This is the default connect action type for all virtual ports.** |
| **Autoconnect** | **This connect action type depends on the association of one or more virtual ports with an X.25 service. The service contains a Xyplex command that you specify, such as CONNECT, which can establish a session with a LAN destination.** |
| **Userdata** | **This connect action type interprets the information in the *D*ata* field of a PAD CALL command as the address of a LAN destination. The X.25 Gateway automatically issues a CONNECT command to establish a session at this LAN address.** |

**The connect action type for each virtual port on the X.25 Gateway appears in the Show/List Server X25 Port Characteristics display. Figure 3-8 is a sample display for virtual port 10, set to the default connect action type.**

```
Virtual Port:      10                              14 Jan 1994  18:29:16
Conn Action Type    :      NONE
Permanent SVC:             DISABLED
PVC LCN:                   N/A

Packet Size:               128 128
Window Size:               2 2
Throughput Class:          9600 9600
Reverse Charging:          DISABLED
Fast Select:               DISABLED
NUI:
RPOA Select:

Connect Action

Default Inbound Profile:  HOST
Default Outbound Profile: CRT_NOE

Call Facilities enabled:
```

**Figure 3-8. A Default Connect Action Type**

**The syntax for the command that specifies an X.25 port connect action type is this:**

**DEFINE/SET [SERVER] X25 PORT *port-list* CONNECT ACTION TYPE**
**NONE**
**AUTOCONNECT**
**USERDATA**

**Connect Action Type: None**

**When the connect action type at a virtual port is None, a caller from the PSN establishes a session with the Xyplex command interface. After the caller logs on to the interface, he or she can enter any Xyplex command from the** `Xyplex>` **prompt as long as the privilege level on the port is appropriate. For example, the caller can enter a CONNECT command or a DEFINE command such as DEFINE PORT PPP ENABLED. The caller must be familiar with the Xyplex command interface, which may not be true for all callers.**

**The default connect action type for all virtual ports is None. If you call an X.25 Gateway virtual port from the PSN using a default listen address, and the connect action type for that port is None, you can establish a session with the X.25 Gateway without using an X.25 service.**

**The services you create for virtual ports with connect action type None can define a listen address, a profile, and a remote profile, or enable the Remote Clear characteristic. These services cannot include a connect command to a LAN destination; a port must have an Autoconnect connect action type to support a service that does this. If a service includes a connect action for a virtual port with connect action type None, then X.25 Gateway ignores the connect action in the service.**

**This example assumes that the address on the X.25 Gateway is 99762. A remote user calls the virtual port with the listen address 22, which has the connect action type None. The call from the remote PAD looks like this:**

```
* call 9976222 ↵
CALL CONNECTED.  YOU CAN NOW SEND AND RECEIVE DATA
Welcome to the X.25 Gateway
```

**The caller can then log in to the Xyplex command interface, and enter Xyplex commands. To establish a session with the LAT host FinanceVAX, for example, the caller enters the CONNECT command after logging in to the X.25 Gateway virtual port:**

```
Enter username> lynne ↵
Xyplex>
Xyplex> connect financevax ↵
Welcome to FinanceVAX.  Please log on.
Username:
```

**Figure 3-9 represents the activity between the remote PAD and the X.25 Gateway when the caller issues a CALL command to a listen address for a port with the connect action type None.**

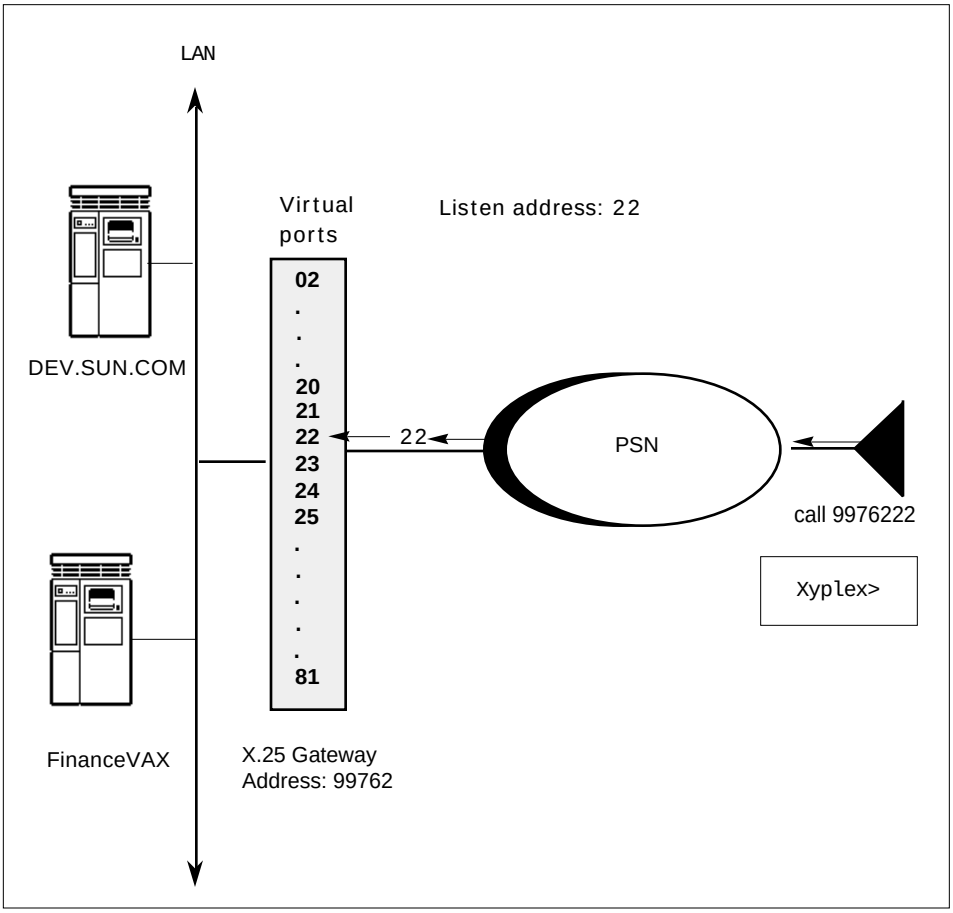


**Figure 3-9. Connect Action Type None**

**The example in Figure 3-9 shows a call to the default listen address for port 22 on an X.25 Gateway. In this example, no X.25 service exists for port 22.**

**Connect Action Type: Autoconnect**

**The Autoconnect connect action type associates one or more virtual ports with an X.25 service when a call arrives at one of the virtual ports. The connect action in the service issues a Xyplex command that you specify, such as CONNECT, which establishes a session with a LAT, Telnet, or TN3270 device on the LAN. Typical commands that you use in services for Autoconnect ports include these: CONNECT, LAT CONNECT, TELNET CONNECT, and RLOGIN.**

**This example assigns the Autoconnect connect action type to ports 11-15:**

```
Xyplex>> define x25 port 11-15 connect action type autoconnect
```

**This X.25 service, associated with ports 11-15, includes a LAT service name as the variable in the CONNECT command, and a listen address for ports 11-15:**

```
Xyplex>> define service dev.sun.com x25 enabled connect action
"connect dev.sun.com" x25 address "6215" ports 11-15
```

**When a caller on the PSN calls the listen address 6215, the X.25 Gateway associates the call with a virtual port in the range 11-15 that is not busy. The X.25 Gateway then issues the command** `connect dev.sun.com` **from the port. From the caller's screen, the call and response look like this:**

```
* call 9976215
CALL CONNECTED.  YOU CAN NOW SEND AND RECEIVE DATA
Welcome to DEV.SUN.COM    Please enter your username and password.
Username:
```

**Figure 3-10 represents the activity between the remote PAD and the X.25 Gateway when the user on the remote PAD executes the CALL command to listen address 6215.**

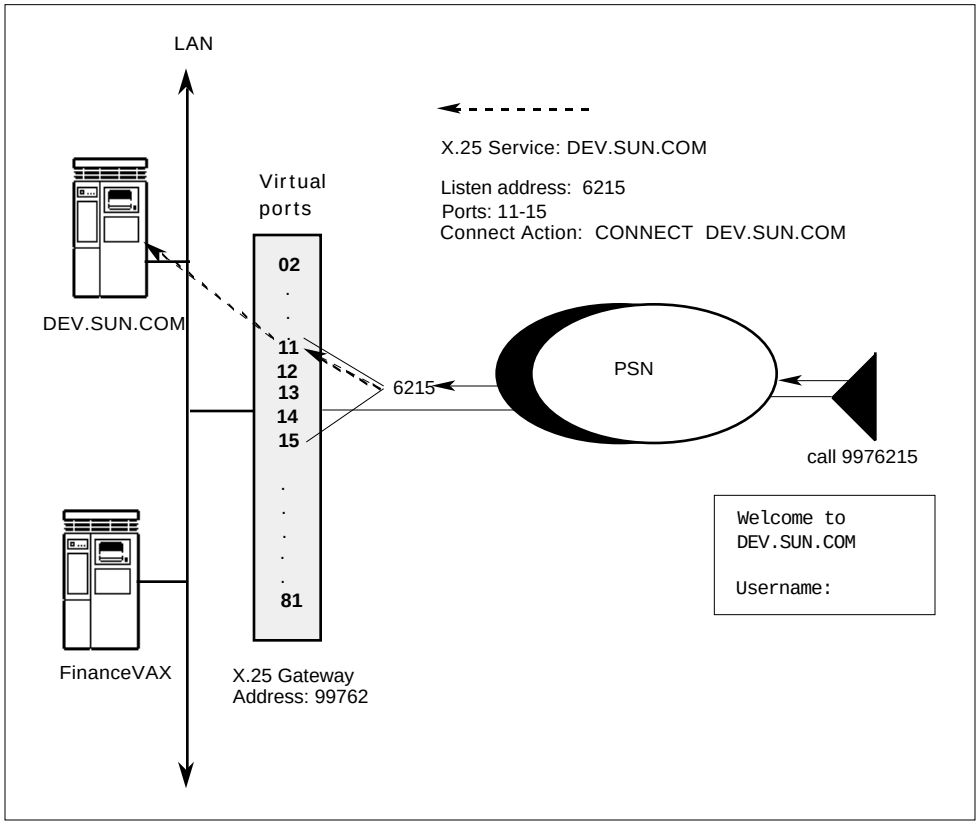


**Figure 3-10. Connect Action Type Autoconnect**

**In Figure 3-10, the call arrives at listen address 6215, which includes virtual ports 11-15 through the service DEV.SUN.COM. In this example, the service connects the call to virtual port 11, but if that port were busy, the service would attempt to connect the call to another port in the range. When the service finds a free virtual port, it issues the CONNECT command to DEV.SUN.COM.**

**Connect Action Type: Userdata**

**The Userdata connect action type require that you specify a LAN destination in the *D*_userdata_ field of the incoming call request packet. When a call arrives at a Userdata port, the X.25 Gateway automatically issues the CONNECT command using the LAN destination, and establishes a session with that destination. This type of connect action gives the caller the flexibility to choose among different LAN destinations from the remote PAD interface, rather than from the Xyplex command interface. You can create Userdata connections with or without a service that specifies a listen address, an inbound profile, and a remote profile for a range of virtual ports.**

**The *D*_userdata_ field is limited to 12 characters. Therefore, any LAN address you specify in this field must not exceed 12 characters. Do not include the CONNECT command in this field.**

**This example assigns the Userdata connect action type to ports 40-45.**

```
Xyplex>> set x25 ports 40-45 connect action type userdata
```

**The following X.25 service associates ports 40-45 with a listen address. The service does not include a connect action because this is already implied by the Userdata characteristic.**

```
Xyplex>> define service userlisten x25 enabled ports 40-45 x25 address
"4045"
```

**The call from the remote PAD to a listen address associated with a Userdata port looks like this:**

```
* call 9976244045d*Ddev.sun.com
CALL CONNECTED.  YOU CAN NOW SEND AND RECEIVE DATA
Welcome to DEV.SUN.COM    Please enter your username and password.
Username:
```

**Figure 3-11 represents the activity between the remote PAD and the X.25 Gateway when the user on the remote PAD executes the CALL command to listen address 4045:**

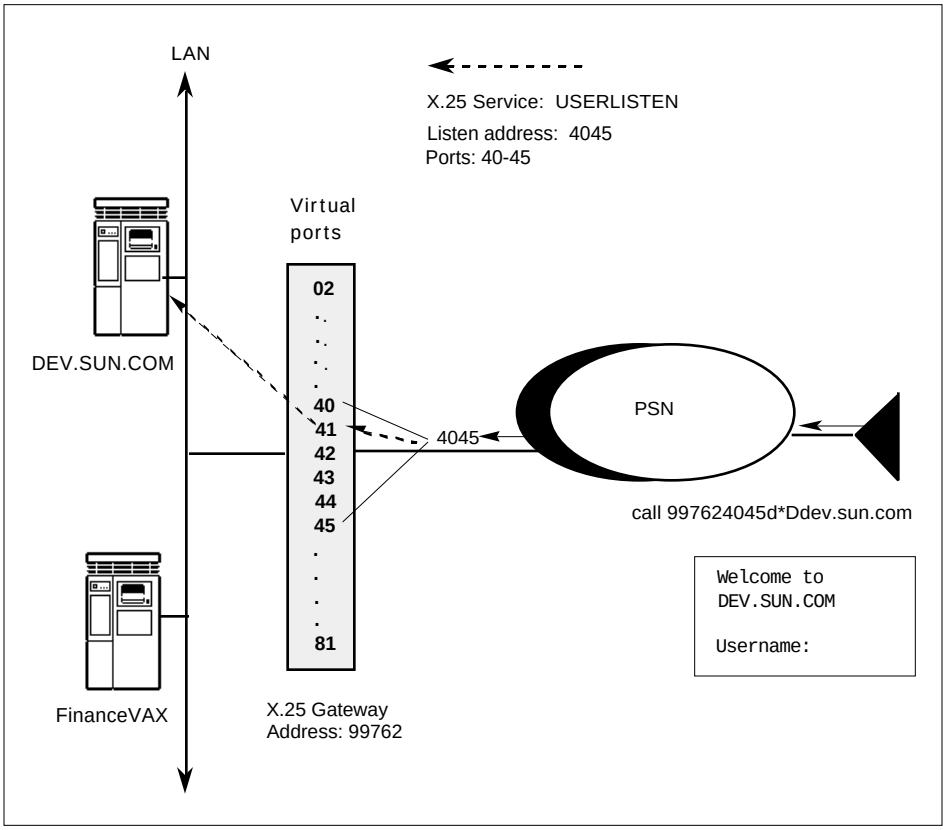


**Figure 3-11. Connect Action Type Userdata**

**In Figure 3-11, a call with the host name DEV.SUN.COM in the *Duserdata field of the call request packet arrives at listen address 4045. The X.25 Gateway determines that the first free port in the range at this listen address is 41, which has the Userdata connect action. The X.25 Gateway software issues the command CONNECT DEV.SUN.COM from virtual port 41.**

### Changing the Inbound PAD Profile in an X.25 Service

**Certain X.25 services, such as those that direct calls to a printer on the LAN, may require a change in the inbound profile for the range of virtual ports in the service. The service need not have a connect action associated with it. The following example defines an X.25 service with an inbound profile for ports with an Autoconnect connect action to a laser printer:**

```
Xyplex>> set service printerconnect x25 enabled connect action "connect
laser2" x25 profile "hardcopy" x25 address "3579" ports 16-18
```

**While the service** `printerconnect` **is active, the inbound profile for ports 16-18 is Hardcopy. At other times, the outbound profile for these ports is either the X.25 Gateway default, or the outbound profile for another service that is in use at these ports.**

### Viewing X.25 Services

**The Show Service Local X25 Summary display lists all local X.25 services on the X.25 Gateway. Figure 3-12 shows a sample display:**

```
MAXx25 V1.3   Rom 4C0000 HW 00.01.00 Lat Protocol V5.1 Uptime:  00 00:09:06

Service Name          Listen Address     Profile        Remote Profile

 dev.sun.com          1156               none           none
 userlisten           4045               none           none
 printerconnect       3579               hardcopy       none
```

**Figure 3-12. A Show Service Local X.25 Summary Display**

**The display includes the name of each service, the listen address in the service, the X.25 profile, and the X.25 remote profile.**

## Using Remote PAD Profiles in Local Services

**Some implementations may require that you change the parameter settings on a remote PAD when you send data to it or receive data from it. To do this, you send a remote profile to the PAD, which overwrites the default inbound or the default outbound profile on that PAD. For example, you might want to send a file to a printer on a remote PAD which has an inbound profile set to receive data for video terminals. You can change the profile on the remote PAD to one that supports printers for the duration of the call with a remote profile in a local service. (For more information about specific PAD parameters and profiles, see Chapter 4.)**

**You can also associate remote profiles directly with virtual ports, rather than through a service. If you do, however, any call that uses that port sends the remote profile. If you specify the remote profile in a service, only those calls that use the service send the remote profile. In addition, a remote profile in a service overrides a remote profile directly associated with a port.**

**The CLEAR X25 PROFILE command clears parameter settings within a profile, so that you can send only specific parameters to the remote PAD. See T*he Xyplex X.25 Gateway Commands Reference Guide* for more information about the CLEAR X25 PROFILE command.**

## Remote Profiles in LAT and Telnet Services

**A remote profile in a LAT or Telnet service overwrites the default inbound profile of the remote PAD when the call arrives at the PAD. For example, this command specifies the profile Hardcopy as the remote profile for ports 20-25 in a Telnet service:**

```
Xyplex>> set service accountshost telnet enabled connect action "345820"
internet address 128.10.2.30 ports 20-25 x25 remote profile "hardcopy"
```

**This service, which calls the X.25 address 345820 through virtual ports 20-25, overwrites the inbound PAD profile at 345820 and replaces it with the profile Hardcopy.**

## Remote Profiles in X.25 Services

**A remote profile in an X.25 service overwrites the default outbound profile of the remote PAD when a call arrives at the listen address in the X.25 service. When the call arrives at the listen address, the local service sends a packet containing the profile to the remote PAD. This command specifies the profile Hardcopy for ports 75-78 in an X.25 service.**

```
Xyplex>>set service remoteprint x25 enabled connect action
"connect LANprinter" x25 address "657275" x25 remote profile
"hardcopy" ports 75-78
```

**When a call arrives at the listen address 657275, the X.25 Gateway sends the profile Hardcopy to the calling PAD. This profile overwrites the outbound profile on this PAD.**

### Using Remote Profiles in a Large Network

**If you are designing a large network with several X.25 Gateways, and many local services, use remote profiles with care. If a local service with a remote profile calls a listen address on an X.25 Gateway which is associated with an X.25 service that also has a remote profile, the inbound and outbound profiles on both PADs will be overwritten. This can have a negative effect on the data being transferred. If you assign a remote profile to a port or include one in a local service, be sure to inform the other sites on the PSN that you have done so.**

## Making Calls to a Remote Printer

**To successfully print files across the PSN on a remote printer, you must set specific values for characteristics on the local service making the call and the virtual ports in the local service. If the remote printer is attached to another X.25 Gateway, you must also create a local service for the virtual port associated with the printer on the remote X.25 Gateway. A remote printer attached to a generic PAD does not need specific settings.**

### Setting Characteristics for Virtual Ports

**Define the ports associated with the local service as PVCs or PSVCs. This ensures that data bound for the remote printer does not get lost if the local LAN connection is terminated. The *X.25 Gateway Commands Reference Guide*, and Chapter 2 of this manual, explain how to define a virtual port as a PSVC or a PVC.**

### Creating the Local Service on the Local X.25 Gateway

**LAT or Telnet services that make calls to a remote printer on the PSN must have certain characteristics enabled, and include an X.25 profile set with certain parameter values. If the call is to a printer attached to a generic PAD, the service must include an X.25 profile to overwrite the default outbound profile on the local PAD. If the call is to a printer another X.25 Gateway, the service must include an X.25 profile and an X.25 remote profile to overwrite the default inbound profile on the remote PAD.**

**The LAT or Telnet service must have characteristics must be enabled: CONNECTIONS, QUEUE. These characteristics are enabled by default, so you do not have to change them unless they have been disabled. See the *TCP/IP LAT Commands Reference Guide* for more information about these service characteristics.**

**Set these PAD parameters to the following values in the X.25 profile and the X.25 remote profile:**

| Parameter | Value |
|---|---|
| 1 (PAD Recall) | 0 (PAD recall is not possible) |
| 2 (Echo) | 0 (Disabled) |
| 3 Data Forwarding | 0 (No Data Forwarding Character) |
| 4 Idle Timer | 2 (40 milliseconds) |
| 6 PAD Service Signals | 1 (send all service signals in the standard format) |

**You can use the CLEAR SERVER X25 PROFILE command to clear all parameters except those that you want to send to the remote PAD.**

## Creating the Local Service on the Remote X.25 Gateway

**The port associated with the printer on the remote X.25 Gateway must have an X.25 service designed to receive the call from the local X.25 Gateway. It must include an Autoconnect connect action to the printer on the LAN. Both the local port that sends the call and the remote port that receives the call must be defined as a PVC or a PSVC.**

## Example of a Call to a Remote Printer

**This example creates a local service to call a remote printer attached to another X.25 Gateway. The first step assigns PSVC support to port 2, the port in the service.**

```
Xyplex>> define x25 port 2 permanent svc enabled
Xyplex>>
```

**Initialize the X.25 Gateway for the DEFINE command to take effect.**

**The next step creates a Telnet service to call a remote printer at the listen address 9924. The X.25 profile in the service has the parameters set to the correct values, as does the X25 remote profile. The Internet address is the address associated with the service. The Xyplex print filter uses this address as its destination.**

```
Xyplex>> define service printsrv port 2 telnet enabled internet address
140.179.80.181 connect action "9924" x25 profile "print prof" x25 remote
profile "remoteprnt"
```

**On the remote X.25 Gateway, the virtual port where the call will arrive has Autoconnect as the port connect action type. It is also defined as a PSVC. In this example, the virtual port is 3:**

```
Xyplex>> define x25 port 3 connect action type autoconnect
```

**The final step creates an X.25 service on the remote X.25 Gateway which listens for the incoming call form the local X.25 Gateway through the listen address 9924. This service includes a connect action which automatically establishes a session with the printer. In this example, the connect action includes the name of the printer, but it could include the Internet address of the printer instead.**

```
Xyplex>> define service printconnect x25 enabled port 3 x25
address "9924" connect action "connect printer"
Xyplex>>
```

**The local X.25 Gateway can now send data to the remote printer when a user connects to the service** `printsrv`.

**End of Chapter**

# Chapter 4

# X.3 PAD Profiles and Parameters

**CCITT recommendation X.3 defines twenty-two PAD parameters which specify how the PAD sends data to and receives data from an asynchronous terminal device. Groups of parameters are combined into profiles that match the characteristics of the device connected to the PAD. The X.25 Gateway automatically uses one of these profiles when you establish a virtual circuit, based on the type of asynchronous device you are using and whether your X.25 connection is incoming or outgoing.**

**Each virtual port has a default inbound and outbound profile, but you can change these profiles to suit your configuration. The X.25 Gateway supports forty profiles that you can modify. You can also send a profile from the X.25 Gateway to a remote PAD. The remote profile overwrites the existing profile on the remote PAD.**

**This chapter describes the X.25 Gateway PAD profiles and how to change them. It includes a description of each PAD parameter and the values that apply to them. The following sections explain these topics:**

- **The X.25 Gateway profiles**
- **PAD Parameter Summary**
- **Changing Local Profiles and Parameters**
- **Changing Remote Profiles and Parameters**
- **PAD Parameter Descriptions**

**Although the X.25 Gateway PAD references virtual ports rather than physical ports, the PAD applies the parameter values to the virtual port whenever possible. Some parameters, however, such as binary speed, have no meaning to a virtual terminal port. The descriptions of each parameter at the end of this chapter indicate whether or not the parameter applies to virtual ports.**

## The X.25 Gateway PAD Profiles

Each of the X.25 Gateway profiles has a number and a name, or profile identifier, associated with it. You use the profile identifier to specify the profile in PAD commands and Xyplex commands. Table 4-1 lists each predefined profile on the X.25 Gateway and describes its purpose.

**Table 4-1. X.25 Gateway Profiles**

| Profile Identifier | Default? | Purpose |
|---|---|---|
| HOST | Yes | This is the default profile for incoming calls to video terminals. |
| CC_SSP | No | This is the CCITT standard "normal" profile, designed for the transfer of ASCII files. |
| CC_TSP | No | This is the CCITT standard "transparent" profile, designed to transfer binary data. |
| CRT | Yes | This is the default profile for outgoing calls from video terminals. This profile has Parameter 2 Echo enabled, so that characters appear on the screen when you enter them from the keyboard. |
| HARDCOPY | No | This profile has parameters set for printing terminals. You can use it for incoming or outgoing calls. |
| CRT_NOE | No | This is an optional profile for either inbound or outbound calls, with Parameter 2 Echo disabled. Characters that you enter from the keyboard do not appear on the screen. |
| Xyplex7 through Xyplex40 | No | These profiles have parameter values set to those of the HOST profile. You can rename and modify them for particular applications. |

**The Show/List Server X25 Characteristics display includes the profiles available on the X.25 Gateway. Figure 4-1 shows this display with the default profile names.**

```
Buffer Reserve:        20
Hysteresis:            8
Small Buffer Size:     81
Small Buffer Pool:     566
Large Buffer Size:     128
Large Buffer Pool:     1890
Address:               1
PAD Prompt:
Welcome:

Available Profiles:

HOST, CRT, CRT_NOE, CC_SSP, CC_TSP, HARDCOPY, XYPLEX7, XYPLEX8
XYPLEX9, XYPLEX10, XYPLEX11, XYPLEX12, XYPLEX13, XYPLEX14, XYPLEX15, XYPLEX16
XYPLEX17, XYPLEX18, XYPLEX19, XYPLEX20, XYPLEX21, XYPLEX22, XYPLEX23, XYPLEX24
XYPLEX25, XYPLEX26, XYPLEX27, XYPLEX28, XYPLEX29, XYPLEX30, XYPLEX31, XYPLEX32
XYPLEX33, XYPLEX34, XYPLEX35, XYPLEX36, XYPLEX37, XYPLEX38, XYPLEX39, XYPLEX40

Enabled Characteristics:

X25
```

**Figure 4-1 An X.25 Server Characteristics Display**

**The Show/List Server Port Characteristics display shows the default inbound and outbound profiles for the port you specify. Figure 4-2 shows the Xyplex defaults for these profiles.**

```
Listen Address:    12

Xyplex> show server x25 port 12 characteristics
Virtual Port:      12                                  17 Jan 1994  18:44:48
Connect Action:    NONE
Permanent SVC:     DISABLED
PVC LCN:           N/A

Packet Size:       128 128
Window Size:       2 2
Throughput Class:  9600 9600
Reverse Charging:  DISABLED
Fast Select:       DISABLED
NUI:
RPOA Select:

Default Inbound Profile:  HOST
Default Outbound Profile: CRT

Call Facilities enabled:
```

**Figure 4-2. An X.25 Port Characteristics Display**

## PAD Parameter Summary

**Each of the twenty-two parameters in a PAD profile has a number associated with it, assigned by the CCITT standard:**

**1 PAD Recall**
**2 Echo**
**3 Data Forwarding**
**4 Idle Timer**
**5 Ancillary Device Code**
**6 Control of PAD Service Signals**
**7 PAD Operation of Receipt of Break**
**8 PAD Discard**
**9 Padding after <CR>**
**10 Line Folding'**
**11 Binary Speed**
**12 Flow Control**
**13 Linefeed Insertion After CR**
**14 Linefeed Padding**
**15 PAD Editing**
**16 Character Delete**
**17 Line Delete**
**18 Line Display**
**19 Editing PAD Service Signals**
**20 Echo Mask**
**21 Parity Treatment**
**22 Page Wait**

**Table 4-2 lists the default parameter values, if they are set, for the X.25 Gateway profiles. Some parameters do not have a value set by default. If this is the case, the table shows** n/v **(no value), in place of a parameter value.**

**The parameters in the profiles XYPLEX7 through XYPLEX40 are set to the same values as the HOST profile. Later sections of this chapter explain how each parameter value affects the operation of the PAD. A table similar to Table 4-2, but without profile names or parameter values, appears in Appendix C. You can use this table to record new profile names and parameter values when you modify the existing ones.**

**Table 4-2. Default parameter values for the X.25 Gateway PAD profiles.**

| Parameters | Profiles | | | | | | |
|---|---|---|---|---|---|---|---|
| | HOST | CC_SSP | CC_TSP | CRT | HARD COPY | CRT_NOE | XYPLEX 7-40 |
| 1 PAD Recall | n/v | 1 | n/v | 64 | 64 | 64 | n/v |
| 2 Echo | n/v | n/v | n/v | 1 | 1 | n/v | n/v |
| 3 Data Forwarding | n/v | 2 | n/v | 127 | 2 | 127 | n/v |
| 4 Idle Timer | 1 | n/v | 2 | 2 | n/v | 2 | 1 |
| 5 Ancillary Device Code | n/v | n/v | n/v | n/v | 2 | n/v | n/v |
| 6 Control of PAD Service Signals | 5 | 5 | n/v | 5 | 5 | 5 | n/v |
| 7 PAD Operation of Receipt of Break | n/v | 21 | 21 | 2 | 21 | 2 | n/v |
| 8 PAD Discard | n/v | n/v | n/v | n/v | n/v | n/v | n/v |
| 9 Padding After <CR> | n/v | n/v | n/v | n/v | 5 | n/v | n/v |
| 10 Line Folding | n/v | n/v | n/v | n/v | 80 | n/v | n/v |
| 11 Binary Speed | 14 | 14 | 14 | 14 | n/v | 14 | 14 |
| 12 PAD Flow Control | n/v | n/v | n/v | 1 | 1 | 1 | n/v |
| 13 Linefeed Insert After <CR> | n/v | n/v | n/v | 4 | 4 | 4 | n/v |
| 14 Linefeed Padding | n/v | n/v | n/v | n/v | 5 | n/v | n/v |
| 15 PAD Editing | n/v | n/v | n/v | n/v | 1 | n/v | n/v |
| 16 Character Delete | n/v | 127 | n/v | 127 | 8 | 127 | n/v |
| 17 Line Delete | n/v | 24 | n/v | 24 | 24 | 24 | n/v |
| 18 Line Display | n/v | 18 | n/v | 18 | 18 | 18 | n/v |
| 19 Editing PAD Service Signals | n/v | 3 | 3 | 2 | 1 | 2 | n/v |
| 20 Echo Mask | n/v | n/v | n/v | n/v | n/v | n/v | n/v |
| 21 Parity Treatment | n/v | n/v | n/v | 3 | 3 | 3 | n/v |
| 22 Page Wait | n/v | n/v | n/v | n/v | n/v | n/v | n/v |

**The Show Server X25 Profile display shows the value of each parameter in the profile you specify. Figure 4-3 is the display for the profile HARDCOPY.**

```
Profile  6: HARDCOPY

PAD Recall(1):                      64     Echo(2):
Data Forwarding Character(s)(3):     2     Idle Timer Delay(4):
Ancillary Device Control(5):         2     PAD Service Signals Control(6):    5
Break Signal Operation(7):          21     Discard Output(8):
Padding after CR(9):                 5     Line Folding(10):                 80
Binary Speed(11):                          Flow Control of the PAD(12):       1
Linefeed Insertion after CR(13):     4     Linefeed Padding(14):              5
Editing(15):                         1     Character Delete(16):              8
Line Delete(17):                    24     Line Display(18):                 18
Editing PAD Service Signals(19):     1     Echo Mask(20):
Parity Treatment(21):                3     Page Wait(22):
```

**Figure 4-3. An X.25 Profile Display for the Profile HARDCOPY**

**The Show/List Server X25 Port Alternate Characteristics display includes the parameter values of the profile currently in use if a virtual circuit is active at the port you specify. Figure 4-4 is sample display for port 12.**

```
Virtual Port:      12                                17 Jan 1994  16:26:56
Listen Address:    12

Send Carriage Return:       Disabled
Disconnect:                 Enabled
Remote Clear:               Disabled

Current X.3 Parameters:

1:  64  2: 1  3: 2  4: 0 5: 0  6: 5  7: 21  8: 0  9: 5  10: 80 11: 14
12: 1  13: 4  14: 5  15: 1  16: 8  17: 24  18: 18  19: 1  20: 0  21: 3  22:0
```

**Figure 4-4. A Sample Alternate Characteristics Display for Port 12**

## Changing Local Profiles and Parameters

**The X.25 Gateway provides three methods for changing the inbound and outbound profiles associated with a virtual port: through PAD commands, through Xyplex commands, and through local services. This section describes each of these methods.**

## Using PAD Commands

**PAD commands can change local profiles, reset parameters within local profiles, and display local profiles and parameters. When you change a profile with a PAD command, the change takes precedence over any profile or parameter setting specified in a Xyplex command or a local service. The change remains in effect until you terminate the virtual circuit. After you terminate the virtual circuit, the profile reverts to the default with all the original parameter settings.**

**The PAD commands that effect profiles and parameters on the local X.25 Gateway PAD are these:**

| | |
|---|---|
| **PROF?** | **Display the profiles on the local PAD.** |
| **PROF** | **Change the outbound profile on the local PAD.** |
| **PAR?** | **Display one or all the parameters of the currently used profile on the local PAD. (The terminal must be in 132 column mode for all values to appear.)** |
| **SET?** | **Change a parameter in the local PAD profile and display the new value.** |
| **SET** | **Change a parameter in the local PAD profile and do not display the new value.** |

**See Chapter 5 for detailed information about each of these commands.**

## Using Xyplex Commands

**Xyplex commands can change the default inbound and outbound profiles at one or more virtual ports, reset parameter values, and rename profiles on the local PAD. When you use Xyplex DEFINE commands, the changes remain in effect until you reinitialize the system. When you use Xyplex SET commands, the changes take effect immediately, but remain in effect until you initialize the X.25 Gateway. *The X.25 Gateway Commands Reference Guide* describes each of these commands in detail.**

**The Xyplex commands that effect profiles and parameters on the local X.25 Gateway PAD are these:**

**DEFINE /SET [SERVER] X25 PORT *port-list* DEFAULT INBOUND PROFILE "*profile-name*"**

**This command changes the default inbound profile for the ports you specify on the X.25 Gateway. A remote profile in a LAT or Telnet service for specific ports from another X.25 Gateway, or a profile set on the PAD, takes precedence over the local X.25 Gateway default inbound profile**

**DEFINE | SET [SERVER] X25 PORT *port-list* DEFAULT OUTBOUND PROFILE "*profile-name*"**

**This command changes the default outbound profile for the ports you specify on the X.25 gateway. A profile in a local LAT or Telnet service for specific ports or a profile set on the PAD takes precedence or the X.25 Gateway default outbound profile.**

**DEFINE/SET [SERVER] X25 PROFILE ["*profile-name*" | *profile-number* ] "*new-profile-name* "**

**This command changes the name of the profile you specify.**

**DEFINE /SET [SERVER] X25 PROFILE ["*profile-name*" | *profile-number*] *parameter-number parameter-value***

**This command changes a parameter value in the profile you specify.**

## Using Local Services to Change Local PAD Profiles

**Local services can include a PAD profile for use at the virtual ports you specify while the service is active. When the service is no longer in use, the profile for those virtual ports reverts back to the default value. Chapter 3, Sending and Receiving Calls, describes how to create local services.**

**An X.25 profile in a LAT or Telnet service takes precedence over the X.25 Gateway default outbound profile. The following is an example of a LAT service with an X.25 profile:**

```
Xyplex> set service netlaser ports 10-20 connect action "987654321" x25
profile "hardcopy"
```

**While the LAT service** `netlaser` **is active, the default outbound profile for ports 10-20 is hardcopy.**

**An X.25 profile in an X.25 service takes precedence over the X.25 Gateway default inbound profile.**

```
Xyplex> set service lanprinter x25 enabled x25 address "123456999" ports
70-75 x25 profile "hardcopy"
```

**While the X.25 service lanprinter is active, the default inbound profile for ports 70-75 hardcopy.**

## Changing Remote Profiles and Parameters

**The X.25 Gateway provides three methods for changing the inbound and outbound profiles of a remote PAD through a local virtual port: through PAD commands, through Xyplex commands, and through local services. This section describes each of these methods.**

### Using PAD Commands

**PAD commands can change remote profiles, reset parameters within remote profiles, and display remote profiles and parameters. When you change a remote profile with a PAD command, the change takes precedence over any profile or parameter setting specified in a Xyplex command or a local service. The change remains in effect until you terminate the virtual circuit. After you terminate the virtual circuit, the profile reverts to the default with all the original parameter settings.**

**These PAD commands effect profiles and parameters on a remote PAD:**

| | |
|---|---|
| **RPROF?** | **Display the profiles on the remote PAD.** |
| **RPROF** | **Change the default outbound profile of the remote PAD.** |
| **RPAR?** | **Display the parameters of the current profile on the remote PAD.** |
| **RSET?** | **Change a parameter in the remote PAD profile and display the new value.** |
| **RSET** | **Change a parameter in the remote PAD profile and do not display the new value.** |

**See Chapter 5 for detailed information about each of these commands.**

### Using Xyplex Commands

**Xyplex commands can assign remote profiles to one or more local virtual ports. The X.25 Gateway sends the profile to the remote PAD when the PSN establishes a virtual circuit between the X.25 Gateway and a remote PAD. When you use DEFINE commands, the changes take effect after you initialize the X.25 Gateway. When you use SET commands, the changes take effect immediately and lasts until you log out the port or until you reinitialize the X.25 Gateway. *The Xyplex X.25 Gateway Commands Reference Guide* describes each of these commands in detail.**

**The following is the syntax for the Xyplex commands that assign a remote profile to one or more virtual ports.**

**DEFINE/SET [SERVER] X25 PORT [*port-list*] REMOTE PROFILE "*profile-name*"**

**This command assigns a remote profile to one or more virtual ports on the local X.25 Gateway. When a call from the LAN bound for an X.25 address arrives at a local port with a remote profile, the local X.25 Gateway overwrites the default inbound profile on the remote PAD with the profile you specify. When a call from the PSN arrives at a local port with a remote profile, the local X.25 Gateway overwrites the default outbound profile on the remote PAD with the profile you specify.**

**CLEAR [SERVER] X25 PROFILE ["*profile-name*" | *profile-number*] *parameter-number***

**This command clears the values of the parameters you specify in a profile. You can then send the profile to the remote PAD with only those parameters you want to change.**

## Using Local Services to Change Remote PAD Profiles

**Local services can include remote profiles. The type of service determines whether the remote profile overwrites the inbound or outbound profile on the remote PAD. A remote profile in a LAT or Telnet service overwrites the default inbound profile on the remote PAD while the service is active. A remote profile in an X.25 service overwrites the default outbound profile on the remote PAD while the service is active. When you include a remote profile in a service, use the keywords X25 REMOTE PROFILE.**

**Use the CLEAR SERVER X25 PROFILE command to clear parameters in the remote profile which have the same values as those that already exist on the remote PAD.**

**The following is an example of a LAT service with a remote profile:**

```
Xyplex>> set service accountshost connect action "5673248999"
ports 20-25 x25 remote profile "laserwriter3"
```

**The following is an example of an X.25 service with a remote profile.**

```
Xyplex>> set service remoteprinter2 x25 enabled connect action "connect
LANprinter2" x25 address "908674580" x25 remote profile "quemeprint"
ports 75-78
```

## Parameter 1 PAD Recall

**The PAD Recall parameter determines whether or not a terminal user can initiate an escape from the PAD data-transfer state or the connection-in-progress state with a special character. When a user enters the Recall character the PAD returns to command state, and the user can enter PAD commands.**

| Value | Means |
|---|---|
| **0** | **PAD recall is not possible.** |
| **1** | **PAD recall is possible using the data-link escape character ^P.** |
| **32-126** | **PAD recall is possible, using an ASCII character corresponding to the parameter value. Appendix B gives a table of ASCII values.** |

### Example

```
* set 1:1
*
```

**With the Recall parameter set to 1, recall is possible with the ^P character.**

## Parameter 2 Echo

**The Echo parameter specifies whether or not the PAD returns the characters that it receives from the terminal. If the device is a video terminal, the characters appear on the screen with the Echo parameter enabled. If the device is a printer, the characters print with the Echo parameter enabled.**

| Value | Means |
|---|---|
| **0** | **Disable echo** |
| **1** | **Enable echo** |

### Example

```
* set 2:1
*
```

**With the Echo parameter set to 1, the PAD returns characters that it receives from the terminal.**

## Parameter 3 Data Forwarding

**The Data Forwarding parameter specifies certain character sets that signal the PAD to assemble and forward a complete packet sequence as defined in the X.25 standard. The value 0 indicates no data forwarding character.**

| Value | Means |
|---|---|
| 0 | No data forwarding character. |
| 1 | Alphanumeric characters (A-Z, a-z, 0-9). |
| 2 | <CR> character. |
| 4 | <ESC>, <BEL>, <ENQ>, <ACK> characters. |
| 8 | <DEL>, <CAN>, <DC2> characters. |
| 16 | <ETX>, <EOT> characters. |
| 32 | <HT>, <LF>, <VT>, <FF> characters. |
| 64 | All other ASCII characters in columns 0 and 1 of International Alphabet Number 5 (IA5) not included in values 0 through 32. (Appendix B lists these ASCII characters.) |

**You can combine parameter values to create groups of data forwarding characters, including these:**

| Value | Means |
|---|---|
| 6 | Combined values 2+4: <CR>, <ESC>, <BEL>, <ENQ>, <ACK>. |
| 18 | Combined values 2+16: <CR>, <ETX>, <EOT>. |
| 126 | Combined values 2+4+8+16+32+64: all characters in columns 0 and 1 of the IA5, and the <DEL> character. |

**The CCITT requires support for values of 0, 2, and 126 in all networks. Values 6 and 18 are optional.**

### Example

```
* set 3:6
*
```

**With the Data Forwarding parameter set to 6, the PAD assembles and forwards packets upon receipt of the <CR>, <ESC>, <BEL>, <ENQ>, and <ACK> characters.**

## Parameter 4 Idle Timer

**The Idle Timer parameter specifies how long the PAD can wait for each successive character from the terminal before it assembles a packet and sends the packet to the X.25 network.**

**You specify values in intervals of one fiftieth (1/50) of a second, which is 20 milliseconds. Whatever value you select, however, can vary by one interval. For example, if you specify a value of 1 for this parameter (20 milliseconds) the actual time-out delay may vary between 20 and 40 milliseconds. The average time-out delay is usually around 30 milliseconds. If you specify a higher value, the variation is still 20 milliseconds.**

| Value | Means |
|---|---|
| **0** | **No data forwarding time-out is required.** |
| **1-255** | **A time-out delay, in fiftieths (1/50) of a second, defined by the number you specify as the value (1-255).** |

### Example

```
* set 4:1
*
```

**In this example, the idle timer is set to twenty milliseconds (1/50th of a second).**

## Parameter 5 Ancillary Device Code

**The Ancillary Device Code parameter determines whether or not the PAD can use certain ASCII control characters to regulate the flow of characters from the terminal. These characters, DC1 and DC2, indicate whether or not the PAD is ready to accept characters from the device. DC1 and DC2 are used to switch an ancillary transmitting device on and off.**

**The CCITT requires support for this parameter, but it has no effect on a virtual port. If you enable flow control by setting the parameter value to 1 or 2, the DC1 and DC3 characters can only control the local physical terminal interface, and only if that physical terminal supports flow control.**

| Value | Means |
|---|---|
| 0 | No use of X-ON (DC1) and X-OFF (DC3). |
| 1 | Use of X-ON and X-OFF in data-transfer state only. |
| 2 | Use of X-ON and XOFF in data-transfer state and in command state. |

**If the PAD Ancillary Device Code parameter is set to 1, and the PAD sends an X-OFF to a terminal which has no support for flow control, the PAD may be able to store some additional characters from the terminal. The PAD may not be able to process those characters, however, until flow control is enabled. While it is storing the extra characters, the PAD may not echo characters back to the terminal, even if parameter 2, Echo, is enabled.**

**If the terminal continues to send characters to the PAD after the PAD sends it an X-OFF character, the PAD may run out of storage space. When the PAD has no more storage space for extra characters, it discards any additional characters from the terminal, and sends the <BEL> character to the terminal whether parameter 2 Echo is enabled or not.**

### Example

```
* set 5:1
*
```

**In this example, the value of the Ancillary Device Code parameter is set to 1: allow the use of control characters to regulate the flow of data from the asynchronous device while the PAD is in data-transfer state.**

## Parameter 6 Control of PAD Service Signals

**The Control of PAD Service Signals parameter specifies the format of the service signals that the PAD sends to the terminal. The value 0 indicates that the PAD should not send any service signals to the device. Service signals include the PAD prompt, carriage returns, and Clear causes, and diagnostic codes. Chapter 5 describes the PAD service signals in detail.**

| Value | Means |
|---|---|
| **0** | **Do not send service signals to the device.** |
| **1** | **Send all service signals except the PAD prompt (*) service signal in the standard format.** |
| **4** | **Send the PAD prompt (*) service signal in the standard format.** |
| **8-15** | **Send the service signals in a network-dependent format.** |

**You can combine these parameter values in one PAD command. For example, 5 combines the values 1 and 4, and causes the PAD to send all service signals to the device, including the PAD prompt, in the standard format.**

### Example

```
* set 6:4
*
```

**With parameter 6 set to 4, the PAD prompt appears in standard format (*).**

## Parameter 7 PAD Operation on Receipt of Break

**The Operation of Receipt of Break parameter specifies how the PAD reacts after it receives a break signal from the terminal.**

| Value | Means |
|---|---|
| 0 | Do nothing. |
| 1 | Send an interrupt packet to a packet-mode DTE or another PAD. |
| 2 | Reset. |
| 4 | Send an "indication of break PAD" message to a packet-mode DTE or another PAD |
| 8 | Escape from data-transfer state. |
| 16 | Discard output to the asynchronous device. |

**You can combine these parameter values in one PAD command. For example, 5 combines the values 1 and 4, and indicates that the PAD should send an interrupt packet and an "indication of break PAD" message to a packet-mode DTE or another PAD.**

### Example

```
* set 7:4
*
```

**With parameter 7 set to 4, the local PAD sends a message to the remote PAD or X.25 compatible device, such as a packet-mode DTE, when it receives a break signal.**

## Parameter 8 PAD Discard

**The Discard parameter determines whether or not the PAD can reject the contents of user sequences in packets upon request. Normally, the PAD would disassemble the packets into data, and transmit the data to a destination on the LAN.**

| Value | Means |
|---|---|
| **0** | **Deliver the data to the terminal normally.** |
| **1** | **Discard the output to the terminal.** |

### Example

```
* set 8:1
*
```

**With parameter 8 set to 1, the PAD discards all incoming data from X.25 callers, so that the data does not reach the local asynchronous device.**

## Parameter 9 Padding after <CR>

**The Padding after <CR> parameter specifies the number of padding characters (nulls) that the PAD inserts after a carriage return <CR> in the character stream it sends to a printing terminal. This value affects the printing mechanism of the terminal; the appropriate value allows the printing mechanism to function correctly. Check the documentation for your particular terminal to determine the correct value for this parameter.**

| Value | Means |
|---|---|
| **0-255** | **The number of padding characters the PAD will send to the printing device after it sends a carriage return <CR>.** |

### Example

```
* set 9:5
*
```

**With parameter 9 set to 5, the PAD inserts 5 nulls into the character stream to the terminal after it sends a carriage return.**

## Parameter 10 Line Folding

**The Line Folding parameter specifies how often the PAD inserts carriage returns in the character stream that it transmits to the terminal. The value of this parameter specifies the number of graphic characters the PAD can send to the terminal before it inserts a carriage return.**

| Value | Means |
|---|---|
| **0** | **No carriage returns. With this parameter set to 0, the PAD does not insert carriage returns.** |
| **1-255** | **The number of graphic characters per line that the PAD will transmit to the asynchronous device without inserting a carriage return.** |

### Example

```
* set 10:80
*
```

**With parameter 10 set to 80,. the PAD transmits 80 characters to the terminal or printer before it inserts a carriage return.**

## Parameter 11 Binary Speed

**The Binary Speed parameter is a read-only parameter; you cannot change it. This parameter enables a packet-mode DTE to access the binary speed characteristic of the asynchronous device, which is known by the PAD.**

**From the perspective of each virtual port, the binary speed should be set to the data rate of the terminal or printer that is associated with it. You can only set this parameter when you initialize the association between the virtual terminal session with a physical terminal. You cannot change it during the association.**

**Any new physical device association with a virtual port should reinitialize this value to the current rate of the physical device. This will only happen if physical terminal data rate information is available to the PAD software subsystem. If this information is not available, the PAD will use a default value of 14 (9600 bits-per-second) for this parameter.**

### Example

```
* par? 11
11:14
```

**The PAR? command displays the value of parameter 11 as 14, or 9600 bits-per-second, which is a common value for this parameter.**

## Parameter 12 PAD Flow Control

**The Flow Control parameter determines whether or not a terminal can send flow control characters to the PAD. These characters, DC1 and DC2, indicate whether or not the terminal is ready to accept characters from the PAD. DC1 and DC2 are ASCII characters used to switch an ancillary transmitting device on and off (Appendix B lists these ASCII characters.).**

**The CCITT requires support for this parameter, but it has no effect on a virtual port. If you enable flow control by setting the parameter value to 1, the DC1 and DC3 characters can only control the local physical device interface, and only if that physical terminal supports flow control.**

| Value | Means |
|---|---|
| **0** | **No use of X-ON (DC1) and X-OFF (DC3).** |
| **1** | **Use of X-ON and X-OFF for flow control.** |

**If the PAD Flow Control parameter is set to 1, and the PAD receives an X-OFF, the network may be able to store a full packet level window of information.**

### Example

```
* set 12:1
*
```

**With parameter 12 set to 1, the PAD allows the X-ON and X-OFF flow control characters.**

## Parameter 13 Linefeed Insertion After <CR>

**The Linefeed Insertion After <CR> parameter specifies whether or not the PAD inserts a Linefeed character in the character stream to or from the terminal or printer after each carriage return. This parameter only applies when the PAD is in data-transfer state.**

| Value | Means |
|---|---|
| **0** | **Do not insert linefeeds.** |
| **1** | **Insert a linefeed after each <CR> in the data stream to the terminal.** |
| **2** | **Insert a linefeed after each <CR> in the data stream from the terminal.** |
| **4** | **Insert a linefeed after each <CR> in the echo to the terminal.** |

**You can combine these parameter values in one PAD command. For example, 5 combines the values 1 and 4, and indicates that the PAD should insert a linefeed after each carriage return in the data stream and in the echo to the printer or terminal.**

### Example

```
* set 13:1
*
```

**With parameter 13 set to 1, the PAD does not insert a linefeed character after carriage returns.**

## Parameter 14 Linefeed Padding

**The Linefeed Padding parameter specifies how many padding characters (nulls) the PAD inserts after a linefeed character in the character stream that the PAD sends to a printer. This value affects the printing mechanism; the appropriate value allows the printing mechanism to function correctly. The documentation for your particular printer should have more information about linefeed padding.**

| Value | Means |
|---|---|
| **0-255** | **The number of padding characters (nulls) that the PAD will send to the printer after the PAD transmits a linefeed character.** |

### Example

```
* set 14:5
*
```

**With parameter 14 set to 5, the PAD sends five null characters to the printer after it receives a linefeed character.**

## Parameter 15 PAD Editing

**The PAD Editing parameter specifies whether or not you can edit PAD commands in data-transfer state as well as in the PAD command state. The editing functions include delete character, delete line, and display line, which you specify through parameters 16, 17, and 18. Although Recommendation X.3 does not require support for PAD editing in data-transfer state, editing is always available during PAD command state. You must set the value of this parameter to 1 if you want specify values in the PAD editing parameters:**

**Parameter 16 Character Delete**
**Parameter 17 Line Delete**
**Parameter 18 Line Display**

**The value of parameter 4, Idle Timer, does not change if this parameter is set to 1, which affects the idle timer.**

| Value | Means |
|---|---|
| **0** | **No use of editing in the data-transfer state.** |
| **1** | **Use of editing in the data-transfer state. When the value of this parameter is set to 1, these PAD operations are suspended:**<br><br>**Data forwarding on full packet until the editing buffer is full.**<br>**Data forwarding when the idle timer expires.** |

**The X.28 standard defines certain PAD editing service signals which the PAD sends to the printer or terminal instead of echoing the editing characters. Parameter 19, Editing PAD Service Signals, controls the content of these editing service signals.**

### Example

```
* set 15:1
*
```

**With parameter 15 set to 1, users can edit PAD commands when the PAD is in data-transfer state.**

## Parameter 16 Character Delete

**The Character Delete parameter defines a character which causes the PAD to delete the character it has most recently received from the terminal. The value of parameter 15, PAD Editing, must be set to 1 to use this parameter in data-transfer state.**

**During the data-transfer state of the terminal, the PAD does not assemble the delete character into the packet that it will transmit to the X.25 network. During the PAD command state, the PAD does not interpret the delete character as part of the PAD command that you are editing.**

| Value | Means |
|---|---|
| **0-126** | **The decimal value of an ASCII character from international alphabet number 5 (IA5), which will delete the character that the PAD has most recently received from the terminal. Appendix B lists these characters.** |
| **127** | **The <DEL> character deletes the character that the PAD has most recently received from the terminal.** |

### Example

```
* set 16:127
*
```

**With parameter 16 set to 127, the <DEL> character deletes the character that the PAD has most recently received from the terminal.**

## Parameter 17 Line Delete

**The Line Delete parameter defines a character which causes the PAD to delete the line it most recently received from the terminal. The value of parameter 15, PAD Editing, must be set to 1 to use this parameter in data-transfer state.**

**If the PAD receives this character when the terminal is in data-transfer state, the PAD discards all characters being assembled into a packet. If the PAD receives this character when it is in command state, the PAD discards all characters being assembled into the PAD command.**

| Value | Means |
|---|---|
| **0-23** | **The decimal value of an ASCII character from international alphabet number 5 (IA5), which deletes the line that the PAD has most recently received from the printer or terminal. Appendix B lists the values for these characters.** |
| **24** | **The <CAN> character deletes the line that the PAD has most recently received from the printer or terminal.** |
| **25-255** | **The decimal value of an ASCII character from international alphabet number 5 (IA5), which deletes the line that the PAD has most recently received from the printer or terminal. Appendix B lists the values for these characters.** |

**Example**

```
* set 17:24
*
```

**With parameter 17 set to 24, the <CAN> character deletes the most recently received line that the PAD has received from the terminal.**

## Parameter 18 Line Display

**The Line Display parameter defines a character that causes the PAD to display all the characters it is receiving from the printer or terminal. The value of parameter 15, PAD editing, must be set to 1 to use this parameter in data-transfer state.**

**If the PAD receives this character in data-transfer state, it sends all the characters being assembled into a packet to the terminal. The PAD does not assemble the line display character into the packet that it sends to the network. If the PAD receives this character in command state, it sends all the characters being assembled into a PAD command to the printer or terminal. The PAD does not include the line display character in the PAD command.**

| Value | Means |
|---|---|
| **0-17** | **The decimal value of an ASCII character from international alphabet number 5 (IA5) which displays a line of characters from the printer or terminal.** |
| **18** | **The <DC2> character from IA5 displays a line of characters from the printer or terminal.** |
| **19-255** | **The decimal value of a character from international alphabet number 5 (IA5) which displays a line of characters from the printer or terminal.** |

**Example**

```
* set 18:18
*
```

**With parameter 18 set to 18, the PAD displays lines when users enter the <DC2> character.**

## Parameter 19 Editing PAD Service Signals

**The Editing PAD Service Signals parameter specifies whether or not the PAD sends editing service signals, or messages, to the terminal when the PAD receives editing characters.**

**To use this parameter, the value of parameter 15, PAD Editing, must be set to 1, and the value of parameter 6, Control of PAD Service Signals, cannot be 0. See Chapter 5 for more information about PAD editing service signals.**

| Value | Means |
|---|---|
| 0 | Do not send editing PAD service signals. |
| 1 | Send editing PAD service signals for printers. |
| 2 | Send editing PAD service signals for video display terminals. |
| 8 and 32-126 | Send editing PAD service signals, using one ASCII character from this range of decimal values. |

### Example

```
* set 19:1
*
```

**With parameter 19 set to 1, the PAD sends service signals to printers when it receives editing characters from those printers.**

## Parameter 20 Echo Mask

**The Echo Mask parameter specifies whether or not the PAD returns, or echoes, certain characters to the terminal that it receives from that terminal. The parameter values specify the character or characters you want to suppress, or mask. The value 0 specifies no echo mask. If you choose not to mask characters, the PAD echoes all characters it receives from the device.**

**The value of parameter 2 ,Echo, must be 1 (enabled) to use this parameter.**

| Value | Means |
|---|---|
| 0 | No echo mask. If you use this value, the PAD echoes all characters. |
| 1 | No echo of the <CR> character. |
| 2 | No echo of the <LF> character. |
| 4 | No echo of the <VT>, <HT>, and <FF> characters. |
| 8 | No echo of the <BEL> and <BS> characters. |
| 16 | No echo of the <ESC> and <ENQ> characters. |
| 32 | No echo of the <ACK>, <NAK>, <STX>, <SOH>, EOT, <ETB>, and <ETX> characters. |
| 64 | No echo of editing characters as designated by parameter 16 Character Delete, parameter 17 Line Delete, and parameter 18 Line Display. |
| 128 | No echo of all other characters in columns 0 and 1 of international alphabet 5, not listed in values 1, 2, 4, 8, 16, 32, 64, and the character <DEL>. Appendix B lists these ASCII values. |

**You can combine these parameter values in one PAD command. For example, 6 combines the values 2 and 4, and causes the PAD not to echo the <LF>, <VT>, <HT>, and <FF> characters.**

### Example

```
* set 20:3
*
```

**With parameter 20 set to 3, the PAD does not echo the carriage return <CR> or linefeed <LF> characters.**

## Parameter 21 Parity Treatment

**The Parity Treatment parameter allows the PAD to check parity in the data stream from the terminal, or generate parity in the data stream to the terminal, or both.**

| Value | Means |
|---|---|
| 0 | No parity checking or generation. |
| 1 | Parity checking. |
| 2 | Parity generation. |

**You can combine the values 1 and 2 in one PAD command to indicate parity checking and generation.**

**Example**

```
* set 21:3
*
```

**With parameter 21 is set to 3, the PAD checks and generates parity in the data stream from the terminal.**

## Parameter 22 Page Wait

**The Page Wait parameter determines whether or not the PAD stops sending characters to the terminal after it transmits a certain number of linefeed characters to the terminal. The PAD resumes sending characters when one or more of these conditions exists: the PAD receives a data forwarding condition from the terminal, the PAD sends the "linefeed delete" service signal to the terminal, or when the PAD echoes the linefeed character to the terminal. When the PAD has stopped sending characters to the terminal, the PAD is in a page wait condition.**

**The PAD resumes sending characters when it receives a characters if one or more of these conditions exist:**

•

| Value | Means |
|---|---|
| **0** | **Disable page wait.** |
| **1-255** | **Enable page wait after the PAD sends the number of linefeed characters to the terminal that you give as the parameter value (1-255).** |

**If the PSN supports this parameter, the standard requires support for the values 0 and 23. Other values are optional.**

**Example**

```
* set 22:20
*
```

**With parameter 22 set to 20, the PAD enters a page wait condition after it sends 20 linefeed characters to the terminal.**

**End of Chapter**

# Chapter 5

# Using the X.28 PAD Commands and PAD Service Signals

**This chapter describes the PAD commands and PAD Service Signals. The commands allow you to establish connections with remote X.25 addresses, set and view PAD profiles, and send request packets to remote PADs. The commands in this chapter are compatible with the X.28 standard for PAD commands.**

**Several of the commands in this chapter set or display PAD parameters and PAD profiles. They require that you enter profile names, parameter numbers, and parameter values. Chapter 4 explains more about PAD profiles, parameters, and parameter values.**

**Many of these commands generate PAD service signals. Service signals are messages from the PAD that indicate why a command has succeeded or failed, or that there is a problem on the X.25 network. The PAD service signals are described at the end of this chapter.**

**The PAD commands in this chapter are the following:**

**CALL**
**CLR**
**FACILITIES**
**FULL**
**HALF**
**HELP**
**INTERRUPT**
**LISTEN**
**PAR?**
**PROF**
**RESET**
**RICLR**
**RPAR?**
**RPROF**
**RSET**
**RSET?**
**SET**
**SET?**
**STATUS**
**TABS**

## Obtaining the PAD Prompt

**You enter PAD commands from the PAD prompt. How you obtain the PAD prompt depends on whether you connect to the PAD from a virtual port, or you recall the PAD to command state during an active virtual circuit.**

### Connecting to the PAD from a Virtual Port

**LAT and Telnet services make connections to the PAD through the virtual ports you specify in the service. For example, the following service returns the PAD prompt when you enter it at ports 20-30:**

```
Xyplex> set service pad1 ports 20-30 enabled
```

**To connect to the PAD, enter the service name. When you see the Xyplex status message indicating that a session has been established, enter the <New Line> or <CR> key once or twice until the PAD prompt appears:**

```
Xyplex> connect pad1
Xyplex -10- Session 1 to PADCONNECT on node X00A69 established
*
```

**If the connection is successful, the PAD prompt appears. The default PAD prompt on the X.25 Gateway is an asterisk *. You can change this default with the DEFINE/SET SERVER X25 PROMPT commands. From the PAD prompt you can enter PAD commands.**

**From a Telnet host, you could also connect to the PAD directly, using its Telnet address and an X.25 port number. After you enter the command, enter the <New Line> or <CR> key once or twice until the PAD prompt appears:**

```
Xyplex> telnet 140.179.20.1: 2200

*
```

**If the connection is successful, the PAD prompt appears.**

### Returning the PAD to Command State During a Virtual Call

**PAD parameter 1, PAD Recall, determines whether or not you can enter a predefined recall character to return the PAD to command state while it is in data-transfer state during a virtual call. If this parameter is set to 0, you cannot recall the PAD to command state. If the parameter is set to 1, you enter the @ character to recall the PAD. If the parameter is set to any of the values 32-126, you enter a specified ASCII character to recall the PAD. When you enter the recall character, the PAD prompt appears and you can enter commands.**

## Entering PAD Commands

**The PAD commands follow the same format as X.25 Gateway commands.**

```
*  PADCOMMAND [keyword] [keyword variable]
```

**You can enter PAD commands in either upper- or lowercase letters.**

### Abbreviating PAD Commands

**You can abbreviate many of the PAD commands to the shortest unambiguous string of characters that the system can interpret. For example, the FACILITIES command begins with F, and F is the only character you need to issue the FACILITIES command. You could also enter FAC or FACIL. The FULL command also begins with F, so you need to enter at least FU to issue the FULL command so that the system does not misinterpret it. Each command description indicates whether or not you can abbreviate it.**

## CALL

### Call an X.25 address

**The CALL command sends a call request packet to the remote X.25 address you specify in the command. If the remote device agrees to accept the call, the X.25 Gateway PAD sends a Call Connected service signal to the terminal. The PAD is then in data transfer state and you can send and receive data.**

**If you do not include an X.25 address in the command, the PAD uses the last entered address as the default. The ? argument displays the current default address.**

**If you want to define per-call facilities for this call, you must do so before you issue the CALL command. See the FACILITIES command, later in this chapter, for information on how to assign per-call facilities.**

**You can also enter an X.25 address at the PAD prompt without using the CALL command.**

#### Abbreviation

**C**

#### Syntax

**CALL [?] | [[*address*][*P | *D*userdata*]]**

| Where | Means |
|---|---|
| **?** | **Display the current default X.25 address. The default is the last address entered on this PAD.** |
| ***address*** | **The 1 to 15 digit X.25 address.** |
| ***P*u*serdata*** | **Do not echo the contents of the *userdata* field on the screen. The *user-data* field can include up to 12 characters.** |
| ***D*u*serdata*** | **Echo the contents of the *userdata* field on the screen. The *userdata* field can include up to 12 characters.** |

## Examples

**1. The CALL command with the ? argument displays the last-entered X.25 address.**

```
* call ?
* 123654
```

**2. A user calls this address with a LAN destination in the *userdata* field.**

```
* call 123654*DHost1
Call Connected
```

**3. A user calls an X.25 address without the CALL command.**

```
* 123654
Call Connected
```

## CLR

**Send a clear request packet to the remote PAD**

**The CLR command sends a clear request packet from the local PAD to the remote PAD. If the request is successful, the PAD terminates the virtual circuit, the local PAD sends a Clear Confirmation PAD service signal to the terminal, the PAD prompt appears, and the PAD can accept other commands. If you clear a PVC with the CLR command, you cannot reconnect the PVC until you initialize the X.25 Gateway.**

**To use the CLR command, you must escape from the PAD connection-in-progress state or data-transfer state to recall the PAD to command state. To do this, enter a predefined character specified by the value of PAD parameter 1, PAD Recall. This character can be any graphic character or the data-link escape character <@>, which is hexadecimal 10 in the ASCII table. If the PAD Recall parameter is set to 0, however, you can not recall the PAD to command state.**

### Abbreviation

**None**

### Syntax

**CLR**

### Example

**A UNIX user enters the predefined <@> character to escape from the PAD connection-in-progress state. Once the PAD is in command state, the user enters the CLR command to end the connection. The PAD issues a CLR CONF service signal to indicate that the termination request is successful.**

```
%  <@>
*
* clr
CLR CONF
*
```

## FACILITIES

**Specify per-call facilities**

**The FACILITIES command stores a per-call facilities request field for use on all future CALL commands. You can also use this command with the * argument to clear the current facilities request field in the local PAD. See Chapter 2 for more information on per-call facilities. See *The X.25 Gateway Commands Reference Guide* for information about how to assign per-call facilities to virtual ports through the Xyplex command interface. Any facilities' values that you set through the PAD take precedence over values defined through the Xyplex commands.**

**To set facilities with this PAD command, you need to use the CCITT standard hexadecimal values for these facilities as variables in the command. Consult the CCITT standards documentation to obtain these hexadecimal values.**

### Abbreviation

**F**

### Syntax

**FACILITIES [* | *facilities*]**

| Where | Means |
|---|---|
| * | Clear the current per-call facilities request field in the local PAD. |
| *facilities* | A string of 0 to 63 hexadecimal digits that represents X.2 facilities identifiers and their values. |

### Example

**The FACILITIES command sets a packet size of 256 bytes with the facilities identifier 420808.**

```
* facilities 420808
*
```

## FULL

### Operate in full duplex mode

**The FULL command causes the PAD to operate in full duplex mode. This command has the effect of setting the value of PAD Parameter 2, Echo, to 1 (echo enabled). The PAD operates in full duplex mode until you terminate the current virtual circuit.**

**The PAD operates in full duplex mode by default.**

### Abbreviation

**FU**

### Syntax

**FULL**

### Example

```
* full
*
```

## HALF

### Operate in half duplex mode

**The HALF command causes the PAD to operate in half duplex mode. This command has the effect of setting the value of Parameter 2 Echo to 0, (no echo). The PAD operates in half duplex mode until you terminate this virtual circuit.**

**You can use the command options to echo specific characters, and to display the characters that the PAD echoes in half duplex mode.**

### Abbreviation

**HA**

### Syntax

**HALF [*] | [[-] *ch*1, *ch*2, . . . *ch*n]]**

| Where | Means |
|---|---|
| * | **Display the characters, if any, that the PAD echoes in half-duplex mode.** |
| *chn* | **A number from IA5 which represents an ASCII character that the PAD will echo in half-duplex mode.** |
| - | **Do not echo the characters you specify with a number from IA5 in half-duplex mode.** |

### Examples

**1. This command enables half-duplex mode and displays the message that the PAD does not echo any characters.**

```
* half *
will echo:  none
*
```

**2. This command enables half-duplex mode and specifies that the PAD will echo the ! character, represented by the number 3.**

```
* half 3
will echo 3
*
```

## HELP

### Display the list of PAD commands

**The HELP command displays the list of PAD commands and variables. The X.25 Gateway may not support all of the options for the commands in the display. The following example shows a help display which includes the command options that the X.25 Gateway supports.**

### Abbreviation

**H**

### Syntax

**HELP**

### Example

```
* help
```

```
CALL [?]|[[address] [*P|*Duser-data]]
CLR
FACILITIES [*|facilities]
FULL
HALF [*] | [[-] ch1, ch2, . . . chn]]
HELP
INTERRUPT
LISTEN [ADDR=address|DATA=user-data]
PAR? [ref1,[ref2,...,refn]]
PROF [?|profile]
RESET
RICLR
RPAR? [ref1[,ref2,...,refn]]
RPROF [profile|?]
RSET [ref1:val1[,ref2:val2,...,refn:valn]]
RSET? [ref1:val1,[,ref2:val2,...,refn:valn]]
SET [ref1:val1[,ref2:val2,...,refn:valn]]
SET? [ref1:val1[,ref2:val2,...,refn:valn]]
STATUS
TABS {LCL tab-num} {REM tab-num} {EXP exp-num}
*
```

## INTERRUPT

**Send an interrupt packet to the remote PAD**

**The INTERRUPT command signals the local PAD to send an interrupt packet to the remote PAD. To use the INTERRUPT command, you must escape from the PAD connection-in-progress state or data-transfer state to recall the PAD to command state. To do this, enter a predefined character specified by the value of PAD parameter 1, PAD Recall. This character can be any graphic character from the ASCII table in Appendix B. If the PAD recall parameter is set to 0, however, you can not recall the PAD to command state.**

**After you enter the INTERRUPT command, the PAD reestablishes the X.25 session.**

### Abbreviation

**I**

### Syntax

**INTERRUPT**

### Example

**A UNIX user enters the <@> character to escape from the PAD connection-in-progress state. Once the PAD is in command state, the user enters the INT command. the PAD sends an interrupt packet, which causes the remote PAD to send an interrupt-confirmation packet. The PAD then resumes the X.25 session.**

```
%  <@>

*

.
.

* int

%
```

## LISTEN

### Specify a listen address for an incoming call

**The LISTEN command specifies a listen address or user-data for the virtual port associated with this PAD. If the listen address or user data you specify in this command matches that of an incoming call, the PAD accepts the call. If the listen address or user data does not match, the PAD rejects the call. The listen address or user-data remains in effect until you change it.**

**A listen address specified on the PAD takes precedence over a listen address specified in an X.25 service. See Chapter 3 for information about specifying a listen address in an X.25 service.**

### Abbreviations

**L A D**

### Syntax

**LISTEN [ADDR=*address* | DATA=*user-data*]**

| Where | Means |
|---|---|
| ***address*** | **A 1 to 15 digit X.25 address.** |
| ***user-data*** | **0 to 12 ASCII characters that represent information from the remote PAD.** |

### Examples

**1. The LISTEN command specifies that the local PAD can accept calls at this virtual port from a resource with the address 1253698.**

```
* listen address=1253698 ↵

*
```

**2. The LISTEN command specifies that the PAD can accept calls at this virtual port from a resource with the characters xuser123 as the last seven characters in the user data field.**

```
* listen data=xuser123 ↵

*
```

## PAR?

**Display parameter values of the default outbound profile of the local PAD**

**The PAR? command displays the parameter values of the outbound profile of the local PAD. If you enter the PAR? command without arguments, the PAD displays all parameter values for the profile. You can also specify values for individual parameters with parameter numbers through the *ref* argument.**

### Abbreviation

**none**

### Syntax

**PAR? [*ref*1,[*ref2,...refn*]]**

| Where | Means |
|---|---|
| *ref* | **A valid X.3 parameter number. X.3 parameters are numbered from 1 to 22.** |

### Example

**The PAR? command has no arguments. The PAD displays the values of all the parameters in the inbound profile for the current port.**

```
* par?

1:64, 2:1, 3:127, 4:2, 5:0, 6:5, 7:2, 8:0, 9:0, 10:0,
11:14, 12:1, 13:4, 14:0, 15:0, 16:127, 17:24, 18:18, 19:2,
20:0, 21:3, 22:0

*
```

## PROF

### Change the default outbound profile of the local PAD

**The PROF command changes the default outbound profile of the local PAD. If you use the ? argument with this command, the PAD displays the name of the default outbound profile for the virtual port, and the names of all other available profiles. If you do not use an argument, the PAD displays only the default outbound profile for the virtual port.**

### Abbreviation

**none**

### Syntax

**PROF [? | *profile*]**

| Where | Means |
|---|---|
| **?** | **List all available profile identifiers.** |
| ***profile*** | **The name of an available profile. The X.25 Gateway includes forty profiles with names that you can change. The profile identifiers that come with the X.25 Gateway are these:**<br><br>**HOST**<br>**CC_SSP**<br>**CC_TSP**<br>**CRT**<br>**HARDCOPY**<br>**CRT_NOE**<br>**XYPLEX7. . . XYPLEX40** |

## Examples

**1. The PROF ? command displays the current and available profiles on the X.25 Gateway PAD.**

```
* prof ?

Profile:  CRT_NOE

Permanent:

HOST
CC_SSP
CC_TSP
CRT
HARDCOPY
CRT_NOE
XYPLEX7
XYPLEX8
XYPLEX9
XYPLEX10
XYPLEX11
XYPLEX12
XYPLEX13
XYPLEX16
.
.
.

XYPLEX31
XYPLEX32
XYPLEX33
XYPLEX34
XYPLEX35
XYPLEX36
XYPLEX37
XYPLEX38
XYPLEX39
XYPLEX40

USER DEFINED:

*
```

**2. The PROF command sets the PAD profile to CRT.**

```
* PROF CRT

*
```

## RESET

**Send a reset packet to the remote PAD**

**The RESET command sends a reset-request packet from the local PAD to the remote PAD to resynchronize the virtual circuit. The reset packet from the local PAD has the cause code set to zero (DTE originated), and the diagnostic code set to zero (no additional information). The reset request may cause the PAD to discard outstanding data packets.**

**The packets sent and packets received sequences within the session are reset to 0 after you enter this command.**

### Abbreviation

**none**

### Syntax

**RESET**

### Example

**The <@> character recalls the PAD to command state so that the user can issue the RESET command.**

```
% <@>

* reset

*
```

## RICLR

**Send an invitation-to-clear packet to the remote PAD**

**The RICLR command signals the local PAD to send an invitation-to-clear packet to the remote PAD. This causes the remote PAD to flush any outstanding data it has received to the remote DTE, and then to issue a clear request packet. When the remote PAD receives an invitation to clear packet, the PAD may wait to issue the clear request packet, depending on the application at the remote resource.**

### Abbreviation

**RI**

### Syntax

**RICLR**

### Example

```
* riclr
*
```

## RPAR?

**Display the default inbound profile parameter values of the remote PAD**

**The RPAR? command displays the parameter values in the default inbound profile of the remote PAD. You can specify individual parameters or enter the RPAR? command without arguments to display all parameter values.**

### Abbreviation

**RPA**

### Syntax

**RPAR? [*ref*1,[*ref2,...,refn*]]**

| Where | Means |
|---|---|
| *ref* | **A valid X.3 parameter number. X.3 parameters are numbered from 1 to 22.** |

### Example

**The RPAR? command specifies parameters 15, 16, and 17 as arguments. The remote PAD displays the these parameters with their values in the default inbound profile.**

*** rpar? 15, 16, 17**

```
par 15:1, 16:127 , 17:24

*
```

## RPROF

**Change the default inbound profile of the remote PAD**

**The RPROF command changes the default inbound profile of the remote PAD. Before you attempt to change a remote profile, you may want to check the list of profile identifiers on the remote PAD with the ? argument.**

### Abbreviation

**RPR**

### Syntax

**RPROF [*profile* | ?]**

| Where | Means |
|---|---|
| ***profile*** | **The name of an available profile. The MAXserver X.25 Gateway includes forty profiles with names that you can change. The profile identifiers that come with the X.25 Gateway are these:**<br><br>**HOST**<br>**CC_SSP**<br>**CC_TSP**<br>**CRT**<br>**HARDCOPY**<br>**CRT_NOE**<br>**XYPLEX7 . . . XYPLEX40** |

**The profile identifiers on the remote PAD may be different.**

| | |
|---|---|
| **?** | **Display the current profile identifier and a list of available profile identifiers.** |

## Examples

**1. The RPROF ? command displays the default inbound profile and the available profiles on the remote PAD, which is part of another X.25 Gateway.**

```
* rprof ? ↵

Profile:  CRT

Permanent:

HOST
CC_SSP
CC_TSP
CRT
HARDCOPY
CRT_NOE
XYPLEX7
XYPLEX8
XYPLEX9
XYPLEX10
XYPLEX11
XYPLEX12
XYPLEX13
XYPLEX16
.
.
.

XYPLEX31
XYPLEX32
XYPLEX33
XYPLEX34
XYPLEX35
XYPLEX36
XYPLEX37
XYPLEX38
XYPLEX39
XYPLEX40

*
```

**2. The RPROF command changes the profile on the remote PAD to CRT_NOE.**

```
* rprof crt_noe ↵

*
```

## RSET

**Set the parameter values in the default inbound profile of the remote PAD**

**The RSET command changes the parameter values in the inbound profile of the remote PAD, but does not display them.**

### Abbreviation

**none**

### Syntax

**RSET [*ref*1:*val*1[,*ref*2:*val*2,...,*refn*:*valn*]]**

| Where | Means |
|---|---|
| ***ref*** | **A PAD parameter number. The X.3 standard defines twenty-two PAD parameters, numbered from 1 to 22. You can specify up to twenty-two parameter numbers in the RSET command.** |
| ***val*** | **An X.3 PAD parameter value. Parameter values are decimal numbers that represent different information associated with each parameter. You can specify only one value for each parameter.** |

**Separate parameter numbers and parameter values in the command line with a colon :**

### Example

**This command sets Parameter 2, Echo, to 0: do not echo characters on the terminal. It sets Parameter 3, Data Forwarding, to 2: forward data on receipt of a carriage return <CR> character.**

```
* rset 2:0, 3:2
*
```

## RSET?

**Change the parameter values in the profile of the remote PAD and display the values**

**The RSET? command changes the parameter values in the default inbound profile of the remote PAD and displays those values. If you have a video terminal, the PAD displays the values on the screen. If you have a printing terminal, the PAD prints the parameter values.**

### Abbreviation

**none**

### Syntax

**RSET? [*ref*1:*val*1,[*ref*2:*val*2,...*refn*:*valn*]]**

| Where | Means |
|---|---|
| *ref* | **An X.3 PAD parameter number. The X.3 standard defines twenty-two PAD parameters, numbered from 1 to 22. You can specify up to twenty-two parameter numbers in the RSET? command.** |
| *val* | **An X.3 PAD parameter value. Parameter values are decimal numbers that represent different information associated with each parameter. You can specify only one value for each parameter.** |

**Separate parameter numbers and parameter values in the command line with a colon :**

### Example

```
* rset? 2:0, 3:2 ↵

PAR 2:0, 3:2

*
```

**This command sets Parameter 2, Echo, to 0: do not echo characters on the terminal. It sets Parameter 3, Data Forwarding, to 2: forward data on receipt of a carriage return <CR> character.**

## SET

**Change the parameter values in the default outbound profile of the local PAD**

**The SET command changes parameter values in the outbound profile of the local PADto the values you specify, but does not display them.**

### Abbreviation

**none**

### Syntax

**SET [*ref*1:*val*1,[*ref*2:*val*2,...*refn*:*valn*]]**

| Where | Means |
|---|---|
| ***ref*** | **An X.3 PAD parameter number. The X.3 standard defines twenty-two PAD parameters, numbered from 1 to 22. You can specify up to twenty-two parameter numbers on the command line** |
| ***val*** | **An X.3 PAD parameter value. Parameter values are decimal numbers that represent different information associated with each parameter. You can specify only one value for each parameter on the command line.** |

**Separate parameter numbers and parameter values in the command line with a colon :**

### Example

**This command sets Parameter 2: Echo, to 0 - do not echo characters on the terminal. It also sets Parameter 3, Data Forwarding, to 2: forward data on receipt of a carriage return <CR> character.**

```
* set 2:0,3:2 ↵
*
```

## SET?

**Change the parameter values in the profile of the local PAD and display the values**

**The SET? command changes the parameters values in the outbound profile of the local PAD and displays those values. If you have a video terminal, the PAD displays the values on the screen. If you have a printing terminal, the PAD prints the parameter values.**

### Abbreviation

**none**

### Syntax

**SET? [*ref*1:*val*1,[*ref*2:*val*2,...*refn*:*valn*]]**

| Where | Means |
|---|---|
| *ref* | **An X.3 PAD parameter number. The X.3 standard defines twenty-two PAD parameters, numbered from 1 to 22. You can specify up to twenty-two parameter number-parameter value pairs on the command line.** |
| *val* | **An X.3 PAD parameter value. Parameter values are decimal numbers that represent different information associated with each parameter. You can specify only one value for each parameter on the command line.** |

**Separate parameter numbers and parameter values in the command line with a colon :**

### Example

**This command sets Parameter 2, Echo, to 0: do not echo characters on the terminal. It sets Parameter 3, Data Forwarding, to 2: forward data on receipt of a carriage return character.**

```
* set? 2:0,3:2 ↵

PAR 2:0,3:2

*
```

## STATUS

**Display status information about the current virtual call**

**The STATUS command displays information about the status of the current virtual port. The FREE status messages indicates that no virtual circuit currently exists. The ENGAGED status message indicates that a virtual circuit does currently exist. In addition to the status, the message includes the transmission speed of the link, and the logical channel number in use at a port with an active virtual circuit. See the section on PAD service signals at the end of this chapter more information.**

### Abbreviation

**S**

### Syntax

**STATUS**

### Example

**1. The PAD responds to the STATUS command with the following information at port 40, where no virtual circuit currently exists..**

```
* status
FREE:  PORT #40 / 9600 BAUD
```

**2. The PAD responds to the STATUS command with the following information at port 20, where a virtual circuit is active.**

```
* status
ENGAGED:  PORT #20 / LC #36 / 9600 BAUD
```

## TABS

**Set and read the tab parameter on the local PAD**

**The TABS command sets and reads three nonstandard parameter values on the local Xyplex PAD. These values affect the number of spaces the PAD includes in a tab in incoming data and outgoing data. You can enter this command without arguments to read the values without setting them.**

### Abbreviation

**T L R E**

### Syntax

**TABS [LCL *tab-num*] [REM *tab-num*] [EXP *exp-num*]**

| Where | Means |
|---|---|
| **LCL** | **Expand tabs to the number of spaces in the *tab-num* variable for echo and incoming data. The *tab-num* variable is a number from 0 to 16. The *exp-num* variable must be set to 1 in the EXP argument for this value to take effect.** |
| **REM** | **Expand tabs to the number of spaces in *tab-num* for outgoing data. The *tab-num* variable is a number from 0 to 16. The *exp-num* variable must be set to 1 in the EXP argument for this value to take effect.** |
| **EXP** | **Enable or disable expansion of tabs. The *exp-num* variable can have these values:**<br>**1 Enable tab expansion.**<br>**0 Disable tab expansion.** |

### Example

**The TABS command enables the expansion of tabs for echo and incoming data to 10 spaces and outgoing data to 10 spaces.**

```
* tabs exp 1 lcl 10 rem 10
*
```

## X.29 PAD Service Signals

**From time to time, the local PAD sends informational and error messages to your terminal. These messages are PAD Service Signals, and are defined in CCITT recommendation X.28 as part of the standard language between the end user and the PAD. Some of these signals are a direct response to PAD commands, while others may indicate some problem on the network. This section describes the CCITT X.28 PAD Service Signals in alphabetical order, beginning with symbols.**

| Signal | Means |
|---|---|
| * | The default local PAD prompt. |
| *backspace-space-backspace* | Character delete indication for video terminals. Repetition of this sequence may indicate line deletion. |
| / | Character delete indication for printing terminals. |
| *return-linefeed* | Acknowledgment PAD service signal. This sequence can indicate the end of a service signal or that the PAD received the last command you entered. |
| CLR *cause* | Clear indication service signal. The PAD sends the CLR signal when the PSN clears a virtual call or when an attempt to make a call fails. The value of the *cause* field indicates why the PSN cleared the connection. Standard values for cause are the following: |

**DER** Out of Order. The number you called is out of order or not available. It may or may not be available at a later time.

**DTE** DTE Clearing. The remote DTE cleared the call.

**ERR** Local procedure error. The PAD detected an error from the local DTE.

**INV** Invalid facility request. The calling DTE requested an incorrect or unsupported facility. See Chapter 2 for a list of valid X.2 facilities that the X.25 Gateway supports. Check with your local PSN administration for a list of facilities that the PSN supports.

| Signal | Means | |
|---|---|---|
| | **NA** | **Access barred. Something is preventing a connection between the calling DTE and the called DTE, such as an incompatible closed user group (CUG).** |
| | **NC** | **Network Congestion. The call cleared because of temporary network congestion or network faults. If you made the call through an automatic connection, the local PAD attempts another call automatically. If you made the call from the PAD with a CALL command, you must attempt the call again.** |
| | **NP** | **Not obtainable. The X.25 address you called was out of the number plan or unassigned. Check that you are calling the correct X.25 address.** |
| | **OCC** | **Number busy. The remote DTE is engaged in another call, and cannot accept the incoming call.** |
| | **RNA** | **Reverse charge acceptance not subscribed. The remote DTE does not subscribe to the reverse charge acceptance facility.** |
| | **RPE** | **Remote procedure error. The remote PAD detected a procedure error caused by the remote DTE, and cleared the connection.** |
| **CLR CONF** | | **Clear confirmation service signal. The local PAD sends the CLR CONF signal to your terminal after it sends a clear request packet to the remote PAD and the remote PAD has returned a clear confirmation packet.** |

| Signal | Means |
|---|---|
| **DTE *address* [FAC:*facilities*] COM [P \| D*userdata*** | **Indication of an incoming call. This message includes information about an incoming call from a remote DTE. The *address* field is the Internet address of the remote DTE, the *facilities* field contains user subscription facilities for this call, and the *user-data* field contains up to 12 characters of data, such as a LAN address.** |
| **[DTE *address*] [FAC: *facilities*] COM** | **Call connected service signal. The information in this signal appears after a remote DTE receives and accepts a call from the local DTE. The *address* field is the X.25 address of the remote DTE. The *facilities* field contains the values from the call accepted packet, although they may be different from those in the connection request if facilities negotiation has occurred.** |
| **ENGAGED \| FREE** | **Response to PAD STATUS command. ENGAGED indicates the presence of an established call, and FREE indicates no established call.** |
| **ERR** | **Error service signal. This signal indicates that the PAD command you entered was incorrect. Check the syntax of the command and reenter it.** |
| **GCOM PAD *version*: ASYNC PORT # *port, baud rate* BAUD** | **PAD identification service signal. The PAD sends this signal to identify itself to the local DTE. The syntax of this signal is specific to each PAD; the syntax shown here is the default version for this PAD. The network administrator may customize the syntax for this message with the DEFINE/SET SERVER X25 WELCOME command.** |
| **PAGE** | **Page wait condition.** |

| Signal | Means |
|---|---|
| **TRANSFER DTE *address facilities userdata*** | **DTE reselection indication. This signal indicates that the PAD is selecting an alternate DTE to receive the call. The DTE *address* field indicates the alternate address, the *facilities* field lists the facilities associated with this DTE, and the *userdata* field contains the data for the call.** |
| **PAR *ref1:val1* \| INV,[*ref2:val2* \| INV,...,*refn:valn* \| INV]** | **Response to SET and SET? PAD commands. The PAD responds with this signal when you specify invalid parameter values in the *ref* and *val* fields of the SET and SET? commands. See Chapter 4 for a list of valid CCITT X.3 parameters and values.** |
| **RESET *cause diagnostic code*** | **Reset service signals. The PAD sends a reset signal to the local DTE when a packet reset occurs. The value in the *cause* field indicates the cause of the reset. The following are the standard reset cause values:** |

| Value | Means |
|---|---|
| **DTE** | **The remote DTE has reset the virtual call.** |
| **ERR** | **A local procedure error caused the reset.** |
| **NC** | **Network congestion caused the reset.** |
| **RPC** | **A remote procedure error caused the reset.** |

**The values in the *diagnostic code* field, specified in ANNEX E to CCITT recommendation X.25, fall into these categories:**

| Value | Means |
|---|---|
| **0** | **No additional information.** |
| **16-31** | **Invalid packet type.** |
| **32-47** | **Packet not allowed.** |
| **48-63** | **Timer expired.** |
| **64-79** | **Problems with call setup, call clearing, or call registration.** |
| **80-95** | **Miscellaneous.** |
| **96-111** | **Not assigned.** |
| **112-127** | **International problems.** |
| **128-255** | **Reserved for network specific diagnostics (not all or character delete indication).** |

**End of Chapter**

# Chapter 6

# Basic Troubleshooting

**This chapter describes several problems that sometimes occur while using the X.25 Gateway, and some possible solutions to them. This chapter includes these sections:**

- **Status Problems with the X.25 Levels**

**If you cannot attempt to make a virtual call, a hardware problem might exist at level 1, or an incorrect parameter setting might exist at level 2 or 3. Refer to this section if you cannot attempt a virtual call.**

- **Conditions that prevent virtual calls**

**If you attempt to make a virtual call, but a Clear Cause and Diagnostic code appear on your terminal, refer to this section.**

- **Incorrect parameter settings**

**If you have established a virtual circuit, but notice slow system response time or that the data you send or receive is incomplete, a problem might exist with one or more PAD parameter settings. Refer to this section if you suspect a problem with PAD parameters.**

## Status Problems with the X.25 Levels

**When all three X.25 levels function correctly, the "State" line of the Show Server X25 Status display indicates that all three levels are "Up:"**

**State: Line Up/Frame Up/Packet Up**

**When all three layers are "Up," you can attempt virtual calls. If any of these levels are "Down," however, a problem exists, you cannot make virtual calls. The following sections describe some of the possible conditions at each of the three X.25 levels that can prevent them from being "Up," and what you can do to fix them.**

### Level 1 Problems

**A problem at level 1, the physical layer, is a hardware problem and affects the status of all three X.25 levels. If you observe a status such as this:** `Line Down/ Frame Down/ Packet Down`, **assume a level 1 problem before you check the other levels.**

**To determine the source of the problem, first check that the hardware is properly installed. If the X.25 Gateway is a 6625 card, be sure that is properly seated in the chassis.**

**Next, check the status lights on the front panel of the 6625 card or the 6025 standalone unit. Figure 6-1 shows the status lights on a 6625 card as they appear when level 1 is up, and 6-2 shows the status indicators on a 6025 card when level 1 is "Up."**

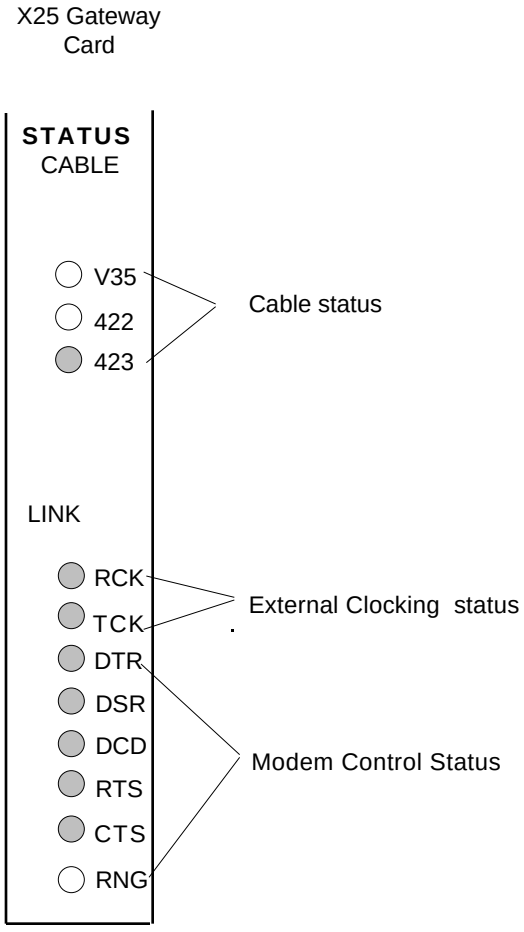


**Figure 6-1. The Status Lights on a 6625 Card**

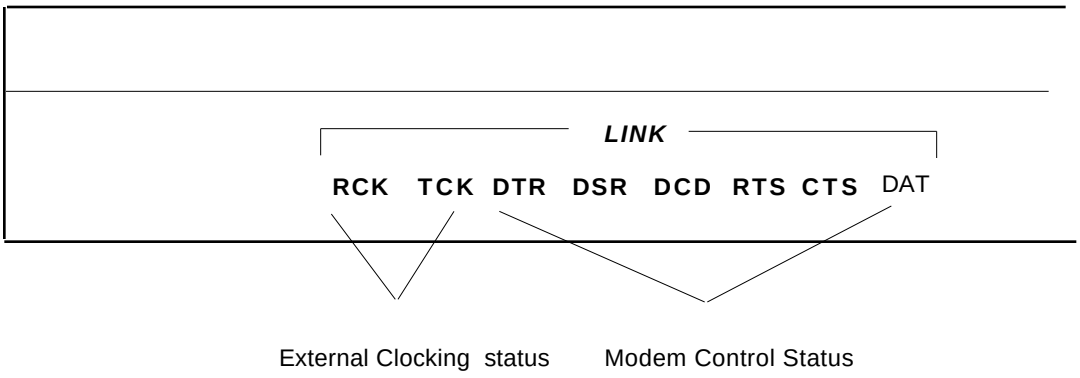


**Figure 6-2. The Status Indicators on a 6025 Standalone Unit**

**Cable status**

**The cable status on the 6625 card indicates the type of cable between the X.25 Gateway and the attached device, in this case 423. If no cable lights appear, check that the cable is plugged in, and that you are using the correct cable. If the cable is not plugged in, no lights appear on the card or the standalone unit.**

**External Clocking Status**

**The X.25 Gateway requires an external clock, so the attached device must provide the clock. If the clock is missing, the RCK and TCK lights do not appear. Check that the attached device provides the clock.**

**Modem Control status**

**When X.25 is enabled and the network is communicating with the X.25 Gateway, all modem control lights appear *except* RNG on the 6625 card and DAT on the 6025 standalone unit. If DTR and RTS are lit, but other modem status lights are not lit, check that X.25 is enabled on the X.25 Gateway. X.25 communication is always enabled in the permanent database, but you can enable or disable it in the operational database with the SET SERVER X25 [ENABLED/DISABLED] command.**

**After you change any hardware settings on the card or the standalone unit, reinitialize the X.25 Gateway and view the Show Server X25 Status display. Correcting a level 1 problem can cause all three levels to appear "Up." If level 2 and level 3 are still down, check the level 2 parameter settings.**

## Level 2 and Level 3 Problems

**A problem at level 2, the frame layer, affects the status of the packet layer as well. If you observe a status such as this:** `Line Up/ Frame Down/ Packet Down`**, check the level 2 parameter settings first. These include the error recovery timers (T1,**

T2, T3), the retransmission attempt counter (N2), the Extended Frame Sequence Numbering facility, and the Frame Layer window size. The defaults for these facilities and parameters are usually appropriate. Check with the PSN administration to determine if you have the correct level 2 and level 3 settings.

The setting of the level 3 OPMODE characteristic must be correct, or you cannot make virtual calls. The default is a DTE. The settings for the user facilities and logical channel numbers at level 3 must agree with those that the PSN administration supports. These do not affect the level 3 status, although they do prevent you from establishing a virtual circuit. If you have enabled the level 2 Extended Frame Sequence Numbering facility, be sure you have enabled the level 3 Extended Packet Sequence Numbering facility as well.

## Conditions That Prevent Virtual Circuits

When the status of all three X.25 levels is "Up," a call request can still fail for certain reasons. The PSN can reject a call request packet, or the local DTE/DCE interface may not agree on packet sizes or user facilities. When a call request fails, the X.25 interface returns two messages codes to the caller: a Clear Cause and a Diagnostic code. Most of the time, you can correct the problem once you determine the reason for the failure from these codes. The codes appear in the following format:

CLR CAUSE: (0x# #), DIAGNOSTIC (0x# #)

where 0x indicates that the following number is a hexadecimal value and ## is a hexadecimal error code.

Table 6-1 lists the hexadecimal values for clear causes and their meanings. Table 6-2 lists the hexadecimal values for the diagnostic codes and their meanings. Use these tables to determine the cause of the failure.

For example, the X.25 interface returns the following Clear Cause and Diagnostic codes if you call an incorrect X.25 address when the X.25 Gateway is configured as a DTE:

CLR CAUSE: UNRECOGNIZED (0x0D), DIAGNOSTIC: (0x31)

**The Clear Cause is 0D, which Table 6-1 lists as "Not obtainable," indicates that the network did not locate the X.25 address. The Diagnostic code is 31, which Table 6-2 lists as "Timer expired for incoming call." This indicates that the network kept looking for the address until the DCE T11 timer. To correct this problem, check the valid X.25 addresses available on the network, and use a correct address. If you make a call with a facility enabled that the network does not support, the PSN returns a Clear cause such as "Reverse charging acceptance not subscribed," or "Fast select acceptance not subscribed."**

**Table 6-1. Clear Cause Codes**

| Hex | Decimal | Clearing Causes |
|---|---|---|
| 00 | 00 | DTE originated |
| 01 | 01 | Number busy |
| 03 | 03 | Invalid facility request |
| 05 | 05 | Network congestion |
| 09 | 09 | Out of order |
| 0B | 11 | Access barred |
| 0D | 13 | Not obtainable |
| 11 | 17 | Remote procedure error |
| 13 | 1 | Local Procedure Error |
| 15 | 21 | RPOA out of order |
| 19 | 25 | Reverse charging acceptance not subscribed |
| 21 | 33 | Incompatible destination |
| | | |
| 29 | 41 | Fast Select Acceptance not subscribed |
| 39 | 57 | Ship absent |
| 7B | 123 | Cleared by local packet level |
| 7C | 124 | Restart received |
| 7D | 125 | X.25 link down |
| 89 | 137 | Out of order (host restart of svc) |
| 93 | 147 | Local procedure error |
| | | Registration confirmation causes |

(*continues*)

**Table 6-1. Clear Cause Codes (*continued*)**

| | | |
|---|---|---|
| 03 | 03 | Invalid facility request |
| 05 | 05 | Network congestion |
| 13 | 19 | Local procedure error |
| 7F | 127 | Registration / cancellation confirmed |
| | | Resetting causes |
| 00 | 00 | DTE originated |
| 01 | 01 | Out of order |
| 03 | 03 | Remote procedure error |
| 05 | 05 | local procedure error |
| 07 | 07 | Network congestion |
| 09 | 09 | Remote DTE operational |
| 0F | 15 | Network operational |
| 11 | 17 | Incompatible destination |
| 1D | 29 | Network out of order |
| 7B | 123 | Reset by local packet level |
| 81 | 129 | Out of order (host restart of PVC) |
| 85 | 133 | Local procedure error |
| | | Restarting causes |
| 01 | 01 | Local procedure error |
| 03 | 03 | Network congestion |
| 07 | 07 | Network operational |
| 7F | 127 | Registration / cancellation confirmed |
| 81 | 129 | Network operation (Link came up) |
| 87 | 135 | Local procedure error |

**Table 6-2. CCITT Diagnostic Codes**

| Hex | Decimal | CCITT Diagnostic Codes |
|---|---|---|
| 00 | 00 | *No additional information* |
| 01 | 01 | Invalid P(S) |
| 02 | 02 | Invalid P(R) |
| 10 | 16 | *Packet type invalid* |
| 11 | 17 | For state r1 |
| 12 | 18 | For state r2 |
| 13 | 19 | For state r3 |
| 14 | 20 | For state p1 |
| 15 | 21 | For state p2 |
| 16 | 22 | For state p3 |
| 17 | 23 | For state p4 |
| 18 | 24 | For state p5 |
| 19 | 25 | For state p6 |
| 1A | 26 | For state p7 |
| 1B | 27 | For state d1 |
| 1C | 28 | For state d2 |
| 1D | 29 | For state d3 |
| 20 | 32 | *Packet not allowed* |
| 21 | 33 | Unidentifiable packet |
| 22 | 34 | Call on one-way logical channel |
| 23 | 35 | Invalid packet type on a permanent virtual circuit |
| 24 | 36 | Packet on unassigned logical channel |
| 25 | 37 | Reject not subscribed to |
| 26 | 38 | Packet too short |
| 27 | 39 | Packet too long |
| 28 | 40 | Invalid general format identifier |
| 29 | 41 | Restart or registration packet with non-zero LCN |
| 2A | 42 | Packet type not compatible with facility |

(*continues*)

**Table 6-2. CCITT Diagnostic Codes (*continued*)**

| Hex | Decimal | CCITT Diagnostic Codes |
|---|---|---|
| 2B | 43 | Unauthorized interrupt confirmation |
| 2C | 44 | Unauthorized interrupt |
| 2D | 45 | Unauthorized reject |
| 30 | 48 | *Timer expired* |
| 31 | 49 | For incoming call |
| 32 | 50 | For clear indication |
| 33 | 51 | For reset indication |
| 34 | 52 | For restart indication |
| 40 | 64 | *Call set-up, call-clearing, or registration problem* |
| 41 | 65 | Facility/ registration code not allowed |
| 42 | 66 | Facility parameter not allowed |
| 43 | 67 | Invalid called address |
| 44 | 68 | Invalid calling address |
| 45 | 69 | Invalid facility/registration length |
| 46 | 70 | Incoming call barred |
| 47 | 71 | No logical channel available |
| 48 | 72 | Call collision |
| 49 | 73 | Duplicate facility requested |
| 4A | 74 | Non-zero address length |
| 4B | 75 | Non-zero facility length |
| 4C | 76 | Facility not provided when expected |
| 4D | 77 | Invalid CCITT-specified DTE facility |
| 50 | 80 | *Miscellaneous* |
| 51 | 81 | Improper cause code from DTE |
| 52 | 82 | Not aligned octet |
| 53 | 83 | Inconsistent Q bit setting |

## Problems caused by Incorrect Parameter Settings

**If you successfully establish a virtual circuit, but the data you receive is incomplete, appears missing, or arrives very slowly, the parameter settings on the PAD of the X.25 Gateway virtual port or the remote PAD may be incorrect. This section describes several parameters that can cause common problems, the symptoms of those problems, and some possible ways to solve them.**

**You can use PAD commands or Xyplex commands to view the parameter settings of a particular profile.**

**PAD commands:**

**PAR?** **Displays the parameter settings of the default outbound profile of the local PAD.**

**RPAR?** **Displays the parameter settings of the default inbound profile of the remote PAD.**

**Xyplex command:**

**SHOW/LIST SERVER X25 PORT ALTERNATE CHARACTERISTICS**

**This command shows the parameter settings of the profile currently in use at the port during an active virtual circuit. If a call from the PSN established the virtual circuit, the display shows an inbound profile. If a call from the LAN established the virtual circuit, the display shows an outbound profile.**

**Parameter 3 Data Forwarding**

**Parameter 3, Data Forwarding, specifies certain character sets that signal the PAD to assemble and forward a packet sequence to the network. This parameter is sometimes set to 127, which specifies the all characters cause data forwarding, because this setting can improve character turnaround time on the Gateway. This may degrade throughput, however, because the PAD sends so many very small packets out on the virtual circuit.**

**Other ways to improve throughput include the following:**

- **Set parameter 3 to 0 and parameter 4, Idle timer, to a value such as 2 (see also the note on Idle Timer Considerations, later in this section).**
- **Decrease the value of the LAT circuit timer, and increase the value of the PORT TYPEAHEAD SIZE and the values of the X.25 DEFAULT PACKET SIZE and MAX PACKET SIZE.**

**Parameter 4 Idle timer**

**The value of PAD Parameter 4, Idle Timer, determines how many intervals the idle timer will wait to receive characters from the terminal before it assembles the characters into a packet and sends the packets to the network. The idle timer parameter in the X.25 Gateway is set to intervals of 20 milliseconds by default. If you reset this to a value that is too low, however, it may affect the data flow in the following ways.**

- **A low Idle Timer value can cause unacceptably small packets, depending on the link speed. If this is the case, you may notice slow system response time and "choppy" data.**
- **A high Idle Timer value can cause the PAD to use excessive amounts of memory. In extreme cases, the X.25 Gateway may run out of memory entirely.**

**If you notice these problems, you can increase the value of the Idle Timer parameter.**

**End of Chapter**

# Appendix A

# X.25 Gateway Status and Error Messages

**The X.25 Gateway displays messages that describe the status of operations and indicate when errors occur. This appendix lists these status and error messages. The X.25 Gateway software displays status and error messages in one of two formats:**

**Xyplex -*nnn*- Message text**
**Message text**

**The three digit status or error code (*nnn*) always appears when you are logged onto the remote console port (Port 0). Display of the three digit status or error code at Port 1 is controlled by the PORT MESSAGE CODES characteristic.**

**Xyplex -801- Facilities Field is full for port *n***

**There is no more room in the facilities field for this port. To add to or change the facilities for this port, you must first clear the facilities field with the DEFINE/SET SERVER X25 *port-list* FACILITY NONE command.**

**Xyplex -802- Not valid for DCE**

**The X.25 Gateway has been configured as a logical DCE with the DEFINE/SET X25 LEVEL_3 OPMODE command. The feature you specified has no meaning for a DCE.**

**Xyplex -803- Not valid for DTE**

**The X.25 Gateway has been configured as a logical DTE, which is the default setting for the Opmode characteristic. You can change the Opmode with the DEFINE/SET X25 LEVEL_3 OPMODE command. The feature you specified has no meaning for a DTE.**

**Xyplex -804- NUI must be Alphanumeric Text**

**The information you transmit using the NUI facility must include alphanumeric characters only.**

**Xyplex -805- NUI String *n* is Too Long**

**The number of alphanumeric characters in an NUI string must not exceed twelve.**

**Xyplex -806- RPOA Must Be Numeric**

**The RPOA gateway identifier always consists of numeric characters only.**

**Xyplex -807- Welcome Must Be Alphanumeric Text**

**The characters in the X.25 Gateway welcome string must include only alphanumeric characters.**

**Xyplex -809- Address is Too Large**

**An X.25 address must be between 1 - 15 digits long.**

**Xyplex -810- Welcome String is Too Long**

**The text in the welcome string for the X.25 Gateway cannot exceed 79 ASCII characters.**

**Xyplex 811- Loopback not allowed with active virtual calls**

**You cannot enable Loopback mode with active virtual calls.**

**814 - LCN in use by port *x*.**

**The logical channel number you assigned to a port while trying to assign a PVC at that port is currently in use by port *x*. Each port that supports a PVC must have a unique logical channel number.**

**815 - LCN is out of range.**

**The logical channel number you assigned to a port while trying to configure a PVC at that port is out of the range of valid logical channel numbers.**

**816 - Port *x* is a PVC**

**You attempted to assign a permanent switched virtual circuit to port *x*, which has already been configured as a permanent virtual circuit. A port can be assigned either a PVC or a PSVC; not both.**

**817 - Port *x* is a permanent SVC**

**You attempted to assign a permanent virtual circuit to port *x*, which has already been assigned to a permanent switched virtual circuit. A port can be assigned either a PVC or a PSVC; not both.**

**End of Appendix**

# Appendix B

# ASCII Values for International Alphabet Number 5

**Table B-1. Decimal and Hexadecimal Values for ASCII Characters (International Alphabet Number 5 - IA5).**

**Low Nibble** **High Nibble**

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 0 | NUL 0 | DLE 16 | SP 32 | 0 48 | @ 64 | P 80 | ` 96 | p 112 |
| 1 | SOH 1 | DC1 17 | ! 33 | 1 49 | A 65 | Q 81 | a 97 | q 113 |
| 2 | STX 2 | DC2 18 | " 34 | 2 50 | B 66 | R 82 | b 98 | r 114 |
| 3 | ETX 3 | DC3 19 | # 35 | 3 51 | C 67 | S 83 | c 99 | s 115 |
| 4 | EOT 4 | DC4 20 | $ 36 | 4 52 | D 68 | T 84 | d 100 | t 116 |
| 5 | ENQ 5 | NAK 21 | % 37 | 5 53 | E 69 | U 85 | e 101 | u 117 |
| 6 | ACK 6 | SYN 22 | & 38 | 6 54 | F 70 | V 86 | f 102 | v 118 |
| 7 | BEL 7 | ETB 23 | ' 39 | 7 55 | G 71 | W 87 | g 103 | w 119 |
| 8 | BS 8 | CAN 24 | ( 40 | 8 56 | H 72 | X 88 | h 104 | x 120 |
| 9 | HT 9 | EM 25 | ) 41 | 9 57 | I 73 | Y 89 | i 105 | y 121 |
| A | LF 10 | SUB 26 | * 42 | : 58 | I 74 | Z 90 | j 106 | z 122 |
| B | VT 11 | ESC 27 | + 43 | ; 59 | K 75 | [ 91 | k 107 | { 123 |
| C | FF 12 | FS 28 | , 44 | < 60 | L 76 | \ 92 | l 108 | \| 124 |
| D | CR 13 | GS 29 | - 45 | = 61 | M 77 | ] 93 | m 109 | } 125 |
| E | SO 14 | RS 30 | . 46 | > 62 | N 78 | ^ 94 | n 110 | ~ 126 |
| F | SI 15 | US 31 | / 47 | ? 63 | O 79 | _ 95 | o 111 | DEL 127 |

**In Table B-1, the decimal value for each ASCII character appears next to the character within each cell of the table. For example, the decimal value of the LineFeed character in column 0, row A, is 10.**

**End of Appendix**

# Appendix C

# PAD Profile Tables

**This Appendix includes two blank PAD profile tables, similar to Table 4-2, but without profile names and parameter values. Use these tables to record the new profile names and parameter values that you create when you modify the existing profiles that come predefined with the X.25 Gateway. You can to copy this table before you fill it in, so that you will have extra blank copies.**

| Parameters | Profiles | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 PAD Recall | | | | | | | |
| 2 Echo | | | | | | | |
| 3 Data Forwarding | | | | | | | |
| 4 Idle Timer | | | | | | | |
| 5 Ancillary Device Code | | | | | | | |
| 6 Control of PAD Service Signals | | | | | | | |
| 7 PAD Operation /Receipt of Break | | | | | | | |
| 8 PAD Discard | | | | | | | |
| 9 Padding After <CR> | | | | | | | |
| 10 Line Folding | | | | | | | |
| 11 Binary Speed | | | | | | | |
| 12 PAD Flow Control | | | | | | | |
| 13 Linefeed Insert after <CR> | | | | | | | |
| 14 Linefeed Padding | | | | | | | |
| 15 PAD Editing | | | | | | | |
| 16 Character Delete | | | | | | | |
| 17 Line Delete | | | | | | | |
| 18 Line Display | | | | | | | |
| 19 Editing PAD Service Signals | | | | | | | |
| 20 Echo Mask | | | | | | | |
| 21 Parity Treatment | | | | | | | |

| Parameters | Profiles | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 PAD Recall | | | | | | | |
| 2 Echo | | | | | | | |
| 3 Data Forwarding | | | | | | | |
| 4 Idle Timer | | | | | | | |
| 5 Ancillary Device Code | | | | | | | |
| 6 Control of PAD Service Signals | | | | | | | |
| 7 PAD Operation /Receipt of Break | | | | | | | |
| 8 PAD Discard | | | | | | | |
| 9 Padding After <CR> | | | | | | | |
| 10 Line Folding | | | | | | | |
| 11 Binary Speed | | | | | | | |
| 12 PAD Flow Control | | | | | | | |
| 13 Linefeed Insert After <CR> | | | | | | | |
| 14 Linefeed Padding | | | | | | | |
| 15 PAD Editing | | | | | | | |
| 16 Character Delete | | | | | | | |
| 17 Line Delete | | | | | | | |
| 18 Line Display | | | | | | | |
| 19 Editing PAD Service Signals | | | | | | | |
| 20 Echo Mask | | | | | | | |
| 21 Parity Treatment | | | | | | | |

# Appendix D

# Communications Server V5.1 Features not Supported in X.25 Gateway V1.3

**Version 1.3 of the Xyplex X.25 Gateway supports most of the features in protocols in Version 5.1 of the TCP/IP-LAT Communications Server. This Appendix lists those features and protocols not supported on X.25 Gateway virtual ports or port 1, and those features and protocols supported on port 1 only.**

## Simultaneous Local and Remote Parameter Storage

**Simultaneous local and remote parameter storage is supported on the MAXserver 6025 and 6800 standalone X.25 Gateways only; not the 6625 card.**

## Features and Protocols Not Supported on Virtual Ports or Port 1

- **The APGEN Utility**
- **The XPRINTER protocol**
- **Event Logging**
- **PRT3270**
- **The XREMOTE protocol**
- **The LPD daemon**

## Features and Protocols Supported on Port 1 Only

- **Dialback support for modems**

  **Dialup Support for ports**
- **Script Serving**
- **Autobaud Support for ports**
- **Access control for ports**
- **Character Size**
- **DSRWAIT**
- **DSRLOGOUT**
- **DCD Timeout**
- **Modem Control**
- **The Multisessions protocol**
- **Remote Modification**

**End of Appendix**