TOTAL CONTROL™

X.25 Packet Assembler/ Disassembler

Version 3.0

REFERENCE MANUAL

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What's New in this Release

This section briefly describes the new features supported by version 3.0 of the X.25 PAD. Complete operational information may be found later in this manual, or as referenced.

New Features

- Management over X.25, or MOX, allows you to configure remote chassis over an X.25 link.
- New configuration methods have been devised for a Windows environment. The protocol stack is now configurable via *Total Control Manager/SNMP*, and a new program, launched from *TCM*, was developed to make Subscriber configuration and tracking very easy.
- Via new TFTP upload / download operations, you may now save your Subscriber configurations to disk and restore your PAD database from that saved file.
- New parameters for Subscriber configuration templates have been developed.
- Banner syntax has been improved to allow you to give the dial-in user more information about the call in progress.
- Additional X.28 commands have been added.

Management Over X.25 (MOX)

A special application has been developed so system administrators may manage remote chassis using the *Total Control Manager/SNMP* software as usual, but over the X.25 Packet Switched Network.

Total Control Management of X.25

With the X.25 3.0 release and the Total Control Management Release 4.0, you may now configure the X.25 PAD via a remote Management Station running the *Total Control Manager/SNMP*.

Subscribers and the X.25 PAD Configurator

USR has developed an off-line graphical user interface configuration program, the *X.25 PAD Configurator*, with which you can configure your Subscriber database configurations. The *Configurator* can be launched as a stand-alone application, as well as from *TCM*.

Saving and Restoring PAD Configurations

With X.25 3.0 and NMC 4.0, the configured records you created as part of the X.25 PAD database (configured records of Subscribers, X.3 Profiles, Banners & Prompts, *etc*.) may now be backed up via an Upload operation. When PAD configuration files are uploaded, they are copied from the PAD's RAM to the management station PC, where a backup can be safely stored. The backup file of the configured database is named with an .x25 filename extension. This file can be copied from the management station to diskette for further backup.

Additionally, Management Release 4.0 and X.25 Release 3.0 provide a Download operation. This operation may be used to restore the configuration in the PAD's RAM. It may also be used as an easy method of configuring an additional PAD with an identical configuration.

Enhancements to X.25

Several enhancements have been made to the X.25 PAD software that don't involve new features such as Upload / Download or Management Over X.25.

Additional X.3 Template Parameters

The parameters described in this section are new to the Subscriber's configurable parameters. New parameters include:

- (107) Max X25 Call Attempts
- (108) Inactivity Timer
- (109) Pass XON / XOFF
- (110) Help Enable / Disable

Improved Banner Syntax

You may now include information in the PAD banner that lets the terminal user know what modem (1-48) and channel (1-4) in the chassis is being used, what slot the modem card inhabits in the chassis (2-13), and the slot the PAD inhabits in the chassis (2-13).

Subscriber Template Accounting Parameter Enabled

The Accounting parameter (6) in the Subscriber template has been disabled in previous versions of the X.25 PAD. This parameter has now been enabled to provide additional address options.

New and Revised X.28 Commands

Affected commands include:

- HOST
- VERSION
- CALLSTATS

How to Use this Document

This guide covers the configuration of the U.S. Robotics X.25 PAD (packet assembler / disassembler). Hardware Install guides for components are supplied separately.

Scope of This Manual

Our intent is not to explain or define X.25 packet transmission or the various worldwide X.25 networks in use. This document is intended as a reference to the U.S. Robotics integrated X.25 PAD, how it works, and how it can be configured to work with the various X.25 networks. We recommend the network administrator be familiar with X.25 as a data transmission method, as well as with the various networks the PAD will interact with during the course of data transmission.

Reference Material

For information about X.25 as a data transmission method, we recommend the following literature:

- ITU-T (formerly CCITT) Blue Book Volume VIII—Fascicle VIII.2 (Recommendations X.1–X.32)
- *Inside X.25: A Manager's Guide*, by Sherman K. Schlar

We Welcome Your Suggestions

Every effort has been made to provide useful, accurate information. If you have any comments or suggestions, please let us know.

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Via the Internet: sysdocs@usr.com

Chapter 1
How the X.25 PAD Works with the Total Control System

The U.S. Robotics X.25 PAD is integrated into the Total Control chassis, allowing digital access between the modem and the PAD. This incorporation of the PAD into the Hub eliminates external equipment and RS-232 cables to increase performance and reduce per-channel cost.

Hardware

The X.25 PAD is part of an integrated system, which incorporates the following hardware components:

- The Single or Dual T1 Network Application Card (NAC), which interfaces with one or two four-wire trunks, respectively.
- The X.25 PAD Gateway Card, which emulates a true PAD.
- The V.35/RS-232 Network Interface Card (NIC), which provides the physical interface to the packet switched network.
- A Quad Modem Card, which contains four independent dial-up U.S. Robotics modems on a single card.
- The chassis midplane, which provides the communication between all components installed in the chassis. The midplane design supports three data buses: TDM (Time Division Multiplexed) Bus, Management Bus, and Packet Bus.
- The Network Management Card (NMC), which serves as an SNMP proxy agent for the *Total Control Manager/SNMP* software. The NMC communicates with all cards in the chassis using the U.S. Robotics Management Bus Protocol.

See the individual hardware manuals for more detailed information about the components.

Software

An important feature of the U.S. Robotics Total Control System is its flexibility. Configuring and managing the components can be done locally via an RS-232 port or via the *Total Control Manager* software based on SNMP.

ANI (Automatic Number Identification) and DNIS (Dialed Number Identification Service) numbers are provided by the public 950 services, Feature Groups B and D, and enhanced 800 services.

If the Gateway card has been configured to accept calls from a specific modem or modem pool and the modem forwards ANI/DNIS, the Gateway may configure and route the call based on its DNIS/ANI. If the modem does not route ANI/DNIS information, the call will still be configured and routed appropriately by the PAD; ANI and DNIS simply make the call routing faster and more efficient.

Because subscriber information, chassis configuration, and host information can be predefined via the *Total Control Manager* software and the Network Management Card, the system can be configured to process certain types of calls in a rapid and consistent manner.

See the *Total Control Manager/SNMP Software Guide* for information on configuring and managing the Total Control System.

Chapter 2
X.25 Packet Switching Strategy

X.25 is a standard recommended by the International Telecommunication Union-Telecommunications (formerly CCITT). X.25 describes the DTE-to-DCE interface for terminals operating in packet mode that are connected to a public data network via a dedicated circuit.

The U.S. Robotics X.25 PAD works in the packet-switched environment to establish, maintain, and disconnect end-to-end logical calls or connections. The X.25 PAD also handles network addressing, call routing, and multiplexing.

Additionally, the product supports several features that dramatically increase the number of calls it can handle. Automatic call routing reduces call setup time by automatically routing incoming calls to their destination via ANI (Automatic Number Identification), DNIS (Dialed Number Identification Service) or Modem Profile. Automatic channel configuration allows dynamic configuration of all asynchronous channels based on ANI, DNIS or subscriber ID. The product will also support protocol spoofing (VisaI—single transaction and VisaII—multiple transaction to reduce transaction processing times.

Supported Standards

The U.S. Robotics X.25 PAD provides the following functionality:

- ITU-T X.25(80), X.25(84), and X.25(88) Level III
- ITU-T X.25(80), X.25(84), and X.25(88) Level II
- ITU-T X.3/X.28/X.29 PAD '80, '84, and '88 versions
- ISO 8208 support for DTE-DTE operation
- ISO 7776 support for X.25 LAPB compatible data link procedures
- IP to X.25 Encapsulation (IXE)
- LLC-2 over IEEE 802.3
- DTE and DCE operation

How the “Triple X” Work Together

Three ITU-T recommendations are used in conjunction with X.25 to support packet network communication. They are often referred to in the industry as the “Triple X” because they work together in an X.25 environment:

- The X.3 recommendation is used to define a set of parameters the PAD (Packet Assembler Disassembler) uses to identify and control the terminal.
- The X.28 recommendation defines control procedures to establish the connection to the PAD, the commands the user sends to the PAD, and the service signals sent by the PAD to the terminal user.
- The X.29 recommendation defines the control messages sent between the PAD and the remote DTE.

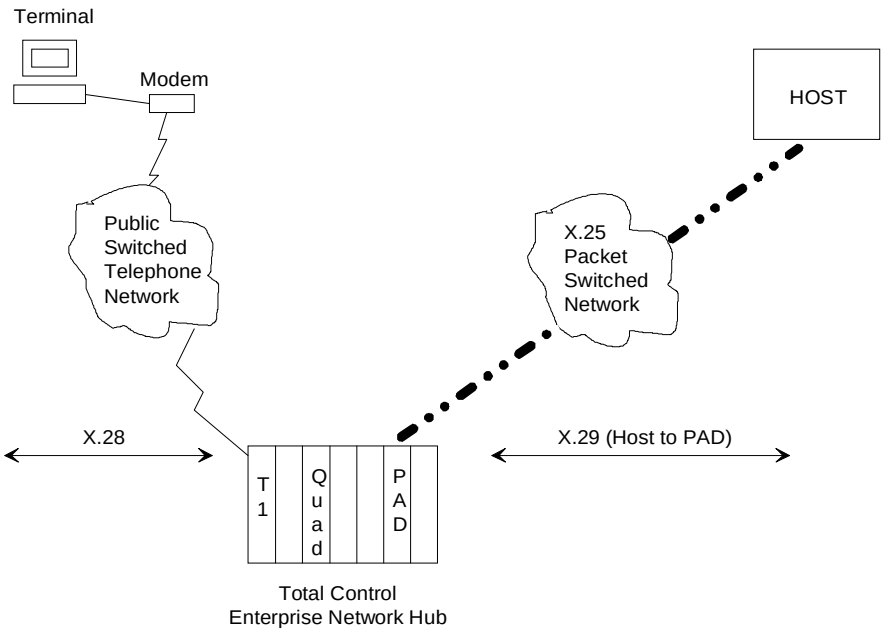


Figure 2.1—”Triple X” Operation with X.25

Chapter 3
Call Routing

When a dial-in call from a terminal comes into the PAD, it must be routed to an appropriately configured modem and to the correct remote host. Using the RS-232 User Interface configuration software, the PAD operator can configure the database so calls are routed appropriately.

Call routing depends on two things:

- Is a configured modem subaddress linked to the modem port the call comes into?
- Is a network subaddress configured to respond to ANI or DNIS from the call

Refer to Figures 3.1 and 3.2 for a diagram of the call route through the logical PAD.

Subaddressing

Subaddressing is a method used by the X.25 PAD to associate configuration information (e.g., X.3 PAD profile) with incoming calls. There are two kinds of subaddresses: modem and network.

A *modem* subaddress associates configuration information with a particular modem. This means all calls going through that modem will use the same configuration data. When a call comes into the PAD, it first attempts to use modem subaddressing.

A *network* subaddress associates configuration information with:

- the telephone number calling into the PAD (ANI).
- a dialed telephone number (DNIS).
- a user accessing the PAD (via ANI or DNIS).

If a call comes into the PAD and it fails to locate a modem configuration via modem subaddressing (Figure 3.1), it then attempts to use network subaddressing (Figure 3.2). It looks for the call ANI and any linked configuration, then its DNIS and any linked configuration. If neither of these is available, the PAD will use a Default modem configuration (also configured by the PAD operator).

Security

The PAD uses modem and network subaddressing to locate a Subscriber template. This template either enables autocall or autoconnect for a terminal application. If the call is interactive, the user may be greeted by a configurable prompt. The Subscriber template also determines if security is enabled and whether a UserID and/or password is required for the call connection.

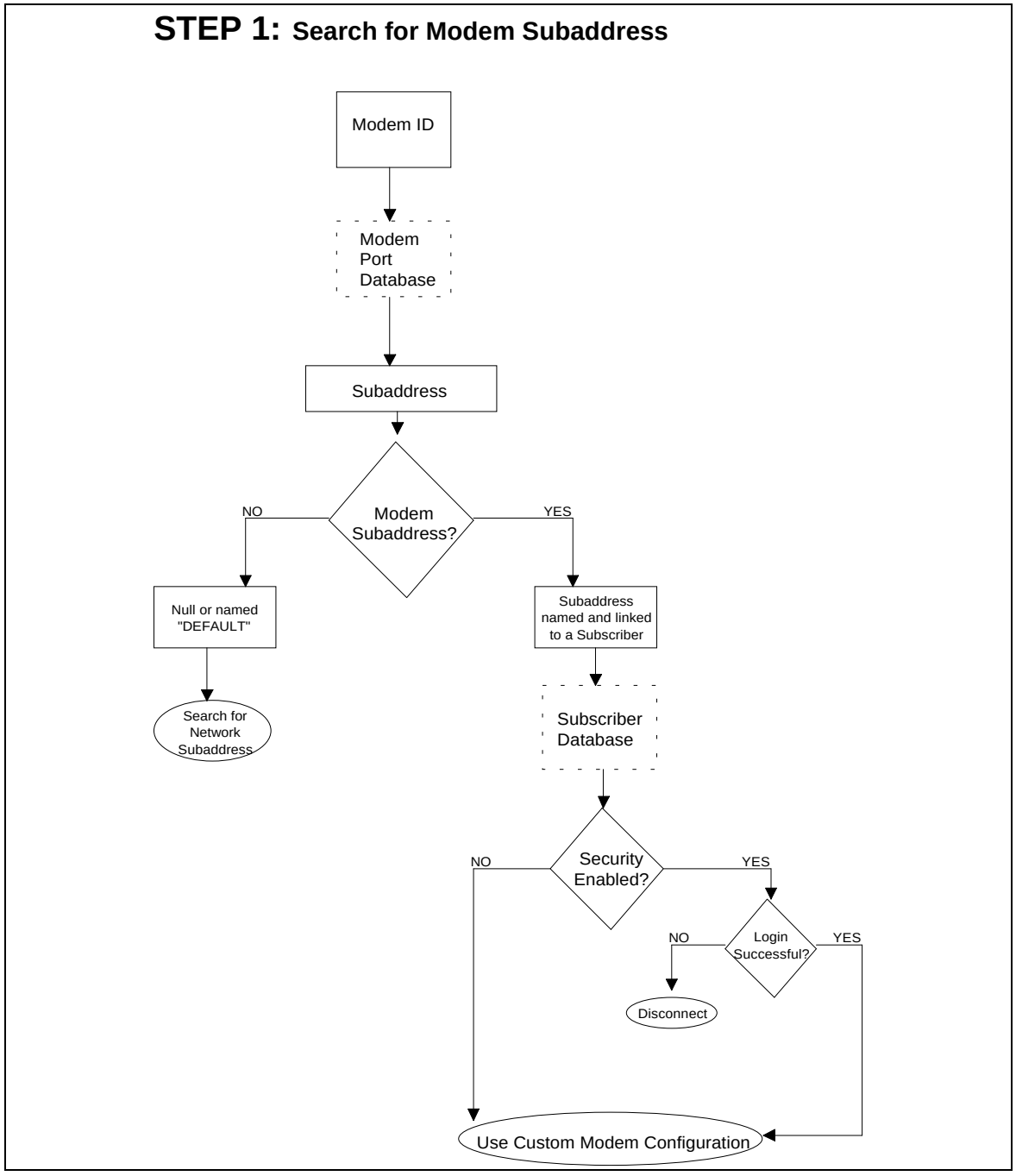


Figure 3.1—Using Modem Subaddress Schemes to Locate Modem Configurations

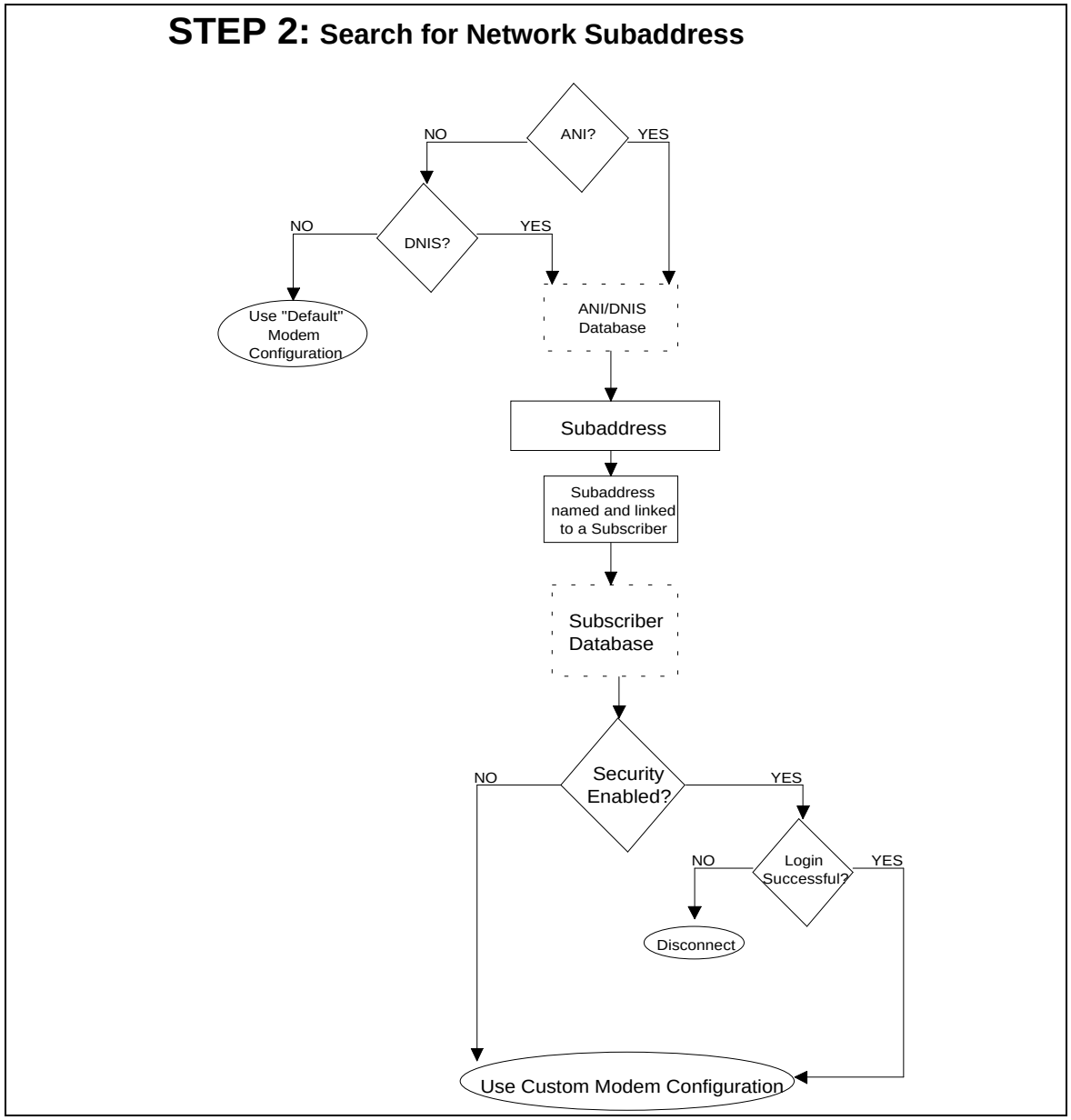


Figure 3.2—Using Network Subaddress Schemes to Locate Modem Configurations

Chapter 4
Application Descriptions

There are three major categories where the U.S. Robotics X.25 PAD can provide increased efficiency over interactive calls, host server calls, and terminal server calls.

The Interactive Application

An interactive application is an X.3 call from a terminal. For instance, the PAD operator may set X.3 parameters or after a dial-in call from a terminal is answered by the PAD, a user may be prompted for security information (user ID and password) and then presented with the PAD prompt.

A dial-out call (from the remote host) follows the same route as a dial-in call, but in the opposite direction.

The X.29 PAD Host Server Application

While terminal servers use X.28 to communicate with the PSTN, host servers communicate with the X.25 packet-switched network (PSN) via X.29 messages.

The host server is responsible for communication with the X.25 PSN side of the network. It “listens” for either X.25 or X.29 incoming calls. When an X.29 call is received, the host server invokes the X.25 PAD application. When an X.25 call is received, the host server invokes an X.25 dial-out application.

The host server recognizes an X.29 call by the CUD (Call User Data) field of an incoming X.25 packet. Upon receiving an X.29 call, the X.29 PAD application determines if this remote host must have password verification.

The X.28 Point of Sale (POS) Terminal Server Application

An example of a POS application is a credit card transaction, where the merchant requests verification of the card holder's account and approval of the purchase.

The U.S. Robotics X.25 PAD provides a transparent pathway between terminal user and remote host. X.28 service signals are filtered out, leaving only remote host X.29 messages for the terminal to recognize and act on.

Protocol Spoofing

The U.S. Robotics PAD may be configured to spoof VisaI and VisaII protocols for POS applications, thus reducing transaction processing time.

Without spoofing, the PAD is transparent to both the Terminal and the Remote Host. Commands and messages are transferred to each side via the PAD, but the PAD merely connects the call. The disadvantage to this calling method is that it is time consuming.

With the spoofing available from the U.S. Robotics X.25 PAD, however, data transmission time can be cut dramatically. You can set up your protocol spoofing method while configuring subscribers. The PAD then implements spoofing every time an incoming call is associated with a subscriber configured for spoofing. Refer to the Operator Interface section of this manual for more information on configuring subscribers.

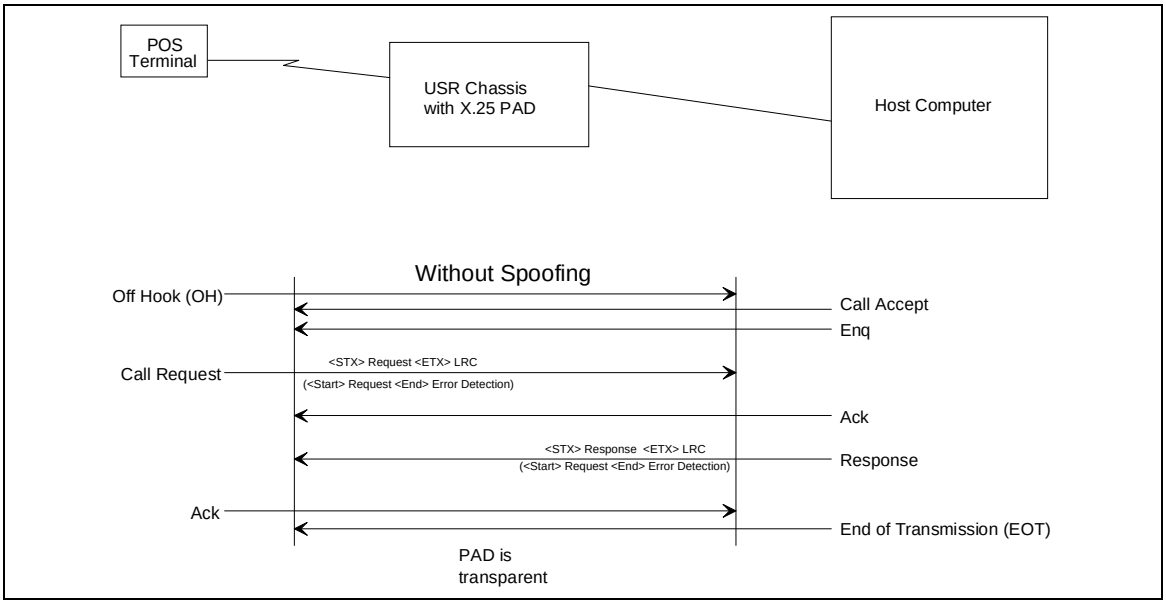


Figure 4.1—Transaction without Spoofing

Transaction without Spoofing

The POS call in Figure 4.1 illustrates the simplicity of a straight POS transaction without spoofing. As simple as this process appears, it is of a relatively long duration.

1 The terminal goes off hook. The X.25 PAD associates the terminal with a Remote Host configuration and places the call to that host.

2 The host accepts the call and sends a call accept packet to the terminal.

3 The host sends an ENQ (enquire) packet, telling the terminal to begin sending data.

4 The terminal sends the Request packet, consisting of a Start Transmission character, the Request information, an End Transmission character, and LRC (error detection).

5 When the host receives the Request, it sends an acknowledgment to the terminal.

6 The host reads the LRC code and analyzes the Request packet. If the Request has been corrupted, the host sends another ENQ, telling the terminal to send the data again.

7 When the host has successfully read the request, it sends a Response packet.

8 The terminal reads the LRC (error detection) code and analyzes the Response packet. If the Response has been corrupted, the terminal sends an ENQ, telling the host to send the data again.

9 When the terminal has successfully read the Response packet, it sends the host an ACK (acknowledgment).

10 The host sends the terminal an EOT) (end of transmission) packet.

11 The call is disconnected.

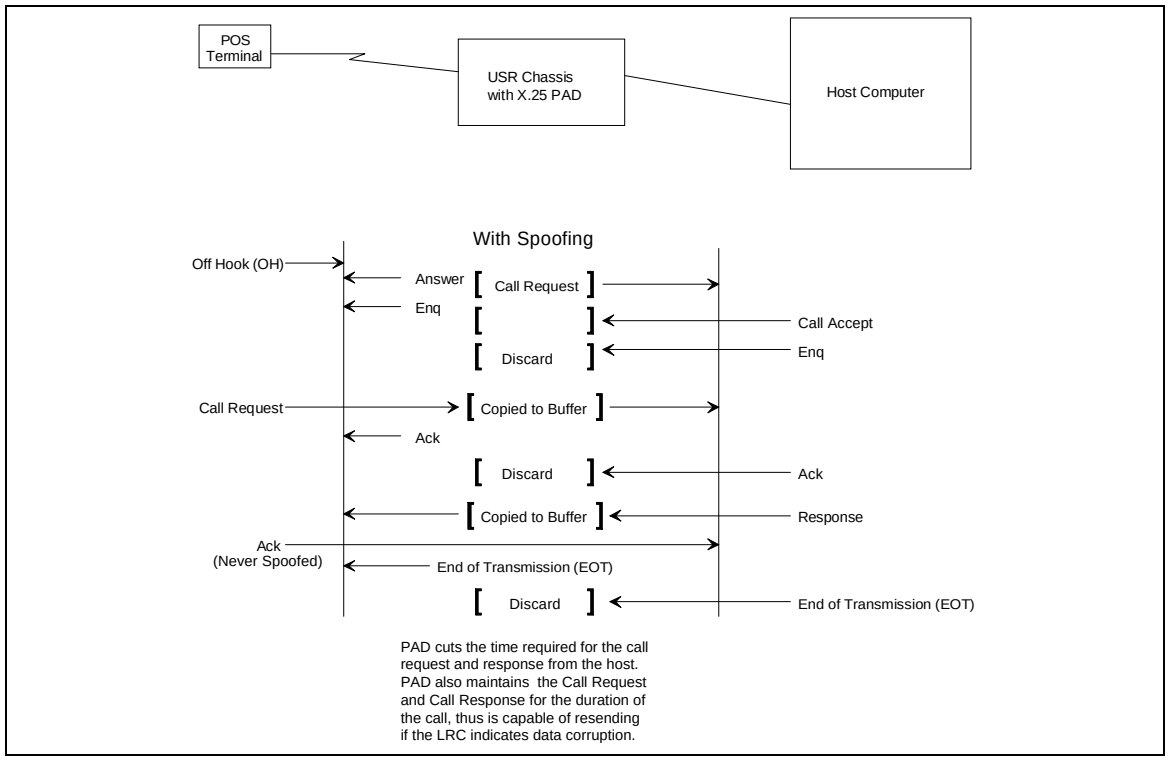


Figure 4.2—Transaction with Spoofing

Transaction with Spoofing

The POS call in Figure 4.2 illustrates a POS transaction completed with spoofing configured. Although this call appears to be more complex, it takes much less time to complete the transaction.

1. The terminal goes off hook. The X.25 PAD simultaneously answers the call and sends an ENQ (enquire) packet, telling the terminal to begin data transmission. It also associates the terminal with a Remote Host configuration and places the call to that host.
2. The host accepts the call and sends a call accept packet to the PAD.
3. The host sends an ENQ packet, telling the terminal to begin sending data, which is intercepted and disregarded by the PAD because it has already asked the terminal for data.
4. The terminal sends the Request packet, consisting of a Start Transmission character, the Request information, an End Transmission character, and LRC (error detection).
5. The PAD checks the data to be sure there has been no data corruption. If the data is not corrupted, the PAD sends an ACK (acknowledgment) to the terminal; otherwise, it sends a NAK (Negative Acknowledgement). When noncorrupted data is received, the PAD maintains a copy of the Request in a special buffer and forwards the Request to the host.
6. When the host receives the Request, it reads the LRC code and analyzes the Request. If the Request has been corrupted, the host sends it sends a NAK to the PAD. The PAD resends the Request data it has maintained in its special buffer.
7. When the host has successfully processed the request, it sends a Response packet.
8. The terminal reads the LRC code and analyzes the Response. If the Response has been corrupted, the terminal sends a NAK to the PAD, which then resends the Response data it has maintained in its special buffer.
9. When the terminal has successfully processed the Response packet, it sends the host an ACK.

   NOTE: This final ACK is *never* spoofed by the X.25 PAD.

10. The PAD forwards the terminal acknowledgement to the host and sends an EOT (end of transmission) packet to the terminal.

11 he host sends the terminal an EOT packet, which the PAD intercepts and disregards because it has already instructed the terminal to end the call.

12 The call is disconnected.

Management Over X.25 (MOX)

A special application has been developed so system administrators may manage remote chassis using the *Total Control Manager/SNMP* software as usual, but over the X.25 Packet Switched Network.

Application Overview

A MOX call requires that a Network Management Card reside in the remote chassis. The NMC performs the management functions; the X.25 PADs merely act as routers for the SNMP commands sent to the NMC from your local Management Station running *Total Control Manager/SNMP*.

Your local Management Station uses *Total Control Manager/SNMP* to send SNMP configuration commands to the NMC in a remote chassis. The local PAD encapsulates SLIP information in X.25 packets and places a call request directed to the remote X.25 PAD. The remote PAD will recognize the call request as a MOX call. Upon receiving the call request, the remote PAD recognizes the MOX request, strips the SLIP information from the X.25 packets, signals the NMC, and begins the data transfer over a null modem cable between the two cards (described later).

NOTE: Never perform a software download to the X.25 PAD during a MOX session.

Call Routing with MOX

When a call comes into the remote PAD, the PAD's current configuration determines the application to be invoked. If the remote PAD is configured for management only operations, all incoming X.25 calls will be routed to the NMC.

If the remote PAD is configured to read the Call User Data (CUD), it will be examined when the call request packet arrives. If the CUD in the call request matches with the MOX CUD stored in the remote PAD's database, the call will be routed to the NMC on the remote chassis.

The X.121 address of an X.25 call contains routing information. Most networks set aside the National Terminal Number's last two digits as an optional subaddress. Generally, this subaddress is assigned by the network administrator, rather than being processed by the Packet Data Network (PDN). The remote PAD compares the subaddress of the incoming call packet with the subaddress stored in its database for routing to the NMC. If there is a match, the call is passed on to the NMC.

Configuring MOX

Software and / or hardware must be configured at both ends of the MOX connection before MOX will function.

Software Configuration for the Remote PAD

The PAD software at the answering side of the connection (remote PAD) must be configured appropriately to recognize and accept a MOX call. This may be done either using the Management Station with *Total Control Manager/SNMP*, or using the local RS-232 User Interface.

MOX Configuration Using Total Control Manager/SNMP

To configure your X.25 PAD for MOX using *Total Control Manager/SNMP*, complete the steps below.

1. Connect to the chassis as described in the Total Control Installation Roadmap.
2. Select the X.25 PAD from the TCM chassis display window, then click on the Programmed Settings icon. The Configuration window appears.
3. Click on the **Parameter Group** drop-down box and select the **Management Over X.25** configuration group.

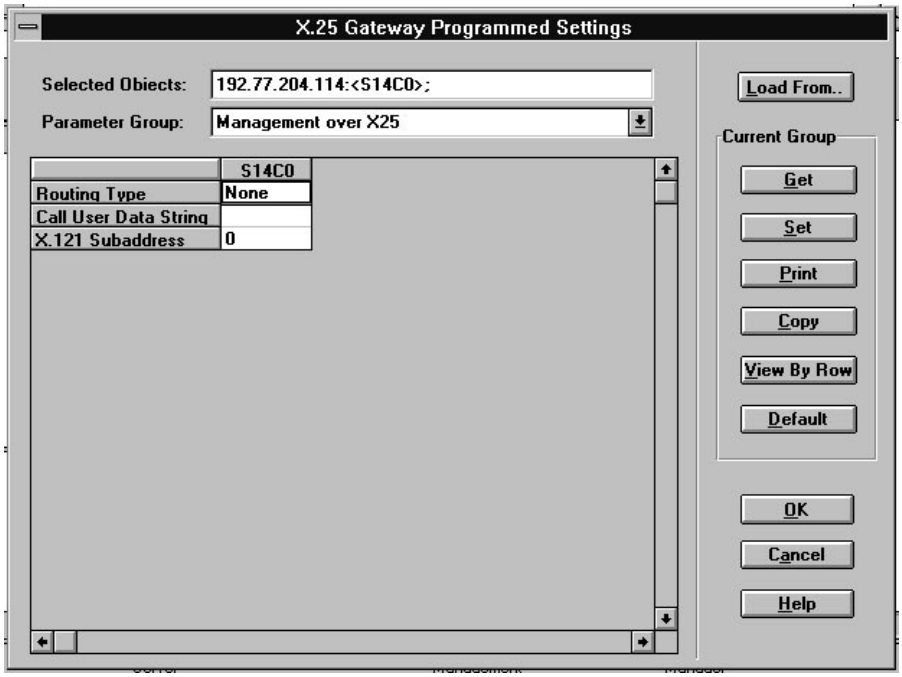


Figure 4.3—Management Over X.25 Configuration Group

4 Configure the Routing Type parameter according to your intended use of the MOX feature.

none	If you set the parameter to this value, all calls will be treated as regular X.25 calls. A MOX call will not be recognized and may be rejected altogether.
subAddr	If you set the parameter to this value, the PAD will look at all X.25 calls for network subaddressing (last two digits of the X.121 called address) before routing the call. If the digits match those configured by the X.121 Subaddress parameter, the call is routed to the NMC as a MOX call.

callUserData	If you set the parameter to this value, the remote (answering) PAD will look at the call user data in every call request packet before routing the call. If the CUD begins with “at” and there is a CUD match in the remote PAD’s database, the call is treated like a MOX call and is routed to the NMC.
Mgt Only	If you set the parameter to this value, the PAD will treat all calls like MOX calls.
both	If you set the parameter to this value, the PAD will look at both the subaddress and the CUD to determine the call type and route it appropriately.

5 Configure the Call User Data String parameter according to your intended use of the MOX feature.

This 12 character alphanumeric string is compared to the incoming X.25 call request CUD. If they match, the call is routed to the NMC. If the Routing Type parameter is configured for Mgt Only, configuring the Call User Data is unnecessary.

> **NOTE**: The CUD string must begin with an “at” followed by the actual CUD. For instance, if the actual CUD is “NSaxTomO” the Call User Data String configured here would be “atNSaxTomO.”

6 Configure the X.121 Subaddress parameter according to your intended use of the MOX feature.

This two-digit number is compared to the subaddress identifier (digits 14 and 15) in the incoming X.25 call address. If they match, the call is routed to the NMC. If the Routing Type parameter for the PAD is configured for Mgt Only, configuring the X.121 Subaddress parameter is unnecessary.

7 Click on the **Set** button. Your configuration settings are now saved.

8 Exit the Configuration window.

9 With the X.25 PAD selected on the chassis display, select **Actions/Commands** from the Configure Menu or click on the Actions/Commands icon. The Commands window appears.

10 Make sure the window is set up for **Software** commands, select **Save to NVRAM** from the command option list and press the **Execute** button.

The PAD intended to be the remote PAD during a Management Over X.25 session is now configured to pass on management commands to the NMC.

MOX Configuration Using the RS-232 User Interface

To configure the remote PAD for MOX using the RS-232 User Interface, complete the steps below.

1 Attach your PC or terminal to the User Interface port (see *Getting Started* in Chapter 5). Press Enter to display the Main Menu.

```
U.S. Robotics

X.25 Gateway Card -- Rel. 3.0.0
Boot Code Linked Date:  10/23/95
Operation Code Linked Date:  10/23/95

Main Menu

1 Configuration
2 Status
3 Commands

Enter menu selection and press Enter.

Menu Selection (1-3):
```

Figure 4.4—Main Menu

2 Select option 1—Configuration from the Main Menu and press Enter. The Configuration Menu appears.

```
Configuration

1 PAD Template Types
2 X.25 Protocol
3 PSN Banner
4 Management Over X.25

Enter menu selection and press Enter or press Esc to exit.

Menu Selection (1-3):
```

Figure 4.5—Configuration Menu

3 Select option 4—Management Over X.25 from the Configuration Menu and press Enter. The Management Over X.25 screen appears.

```
Management Over X.25

FIELD                                          DATA

1: Routing Type                                NONE
2: Call User Data Routing String
3: X.121 Subaddress Routing Digits             00

Esc when done, Ctrl-R to abort
Data Entry Syntax:  field_number:value

Enter Modifications:
```

Figure 4.6—Management Over X.25 Screen

4 Configure the Routing Type parameter according to your intended use of the MOX feature. Use the field_number:value syntax.

NONE	If you set the parameter to this value, all calls will be treated as regular X.25 calls. A MOX call will not be recognized and may be rejected altogether.

SUBADDR	If you set the parameter to this value, the PAD will look at all X.25 calls for network subaddressing (last two digits of the X.121 called address) before routing the call. If the digits match those configured by the X.121 Subaddress parameter, the call is routed to the NMC as a MOX call.
CALLUSERDATA	If you set the parameter to this value, the PAD will look at the call user data in every call request packet before routing the call. If the CUD begins with “at” and there is a CUD match in the remote PAD’s database, the call is treated like a MOX call and is routed to the NMC.
MANAGEMENT ONLY	If you set the parameter to this value, the PAD will treat all calls like MOX calls.
BOTH	If you set the parameter to this value, the PAD will look at both the subaddress and the CUD to determine the call type and route it appropriately.

5 Configure the Call User Data String parameter according to your intended use of the MOX feature. Use the field_number:value syntax.

This 12 character alphanumeric string is compared to the incoming X.25 call request CUD. If they match, the call is routed to the NMC. If the Routing Type parameter is configured for Mgt Only, configuring the Call User Data is unnecessary.

> **NOTE**: The CUD string must begin with an "at" followed by the actual CUD. For instance, if the actual CUD is "NSaxTomO" the Call User Data String configured here would be "atNSaxTomO."

6 Configure the X.121 Subaddress parameter according to your intended use of the MOX feature. Use the field_number:value syntax.

This two-digit number is compared to the subaddress identifier (digits 14 and 15) in the incoming X.25 call address. If they match, the call is routed to the NMC. If the Routing Type parameter for the PAD is configured for Mgt Only, configuring the X.121 Subaddress parameter is unnecessary.

7 Press Esc twice and exit back to the Main Menu.

8 Type **3** at the Main Menu to select the Commands option. The Commands Menu appears.

9 Select option 2—Nonvolatile Storage and press Enter. The Nonvolatile Storage command menu appears.

```
Nonvolatile Storage

21% Available

1) Save Configuration to Nonvolatile Memory
2) Erase Configuration in Nonvolatile Memory

Enter menu selection and press Enter or press Esc to exit.

Menu Selection (1-2):
```

Figure 4.7—Nonvolatile Storage Command Menu

10 Type **1** and press Enter. Wait for the message "Database successfully saved," then press Esc to back out to the Main Menu.

The PAD intended to be the remote PAD during a Management Over X.25 session is now configured to pass on management commands to the NMC.

Hardware Configuration

Both the originating and the answering sides of the connection require specific hardware configurations.

Originating PAD Hardware Configuration

Once the software configuration is complete at the local PAD, complete the steps below:

1 Remove the PAD from the chassis and set DIP switch 5 to the ON position.

> **NOTE**: Some users may try to set the DIP switch without removing the PAD from the chassis. If you do so, you must perform a hardware reset on the card before proceeding.

2 Re-insert the card in the chassis.

3 Cable the Management Station (with *TCM*) to the UI port (Channel 1) on the NIC behind the X.25 card (for a SLIP connection).

4 Cable the V.35/RS-232 NIC to the X.25 network.

Answering PAD Hardware Configuration

Once the software configuration is complete at the remote PAD, complete the steps below:

1 Remove the PAD from the chassis and set DIP switch 5 to the ON position.

> **NOTE**: Some users may try to set the DIP switch without removing the PAD from the chassis. If you do so, you must perform a hardware reset on the card before proceeding.

2 Re-insert the card in the chassis.

3 Using the console cables and null modem adapter provided by U.S. Robotics, cable the UI port (Channel 1) on the V.35/RS-232 NIC behind the X.25 card to the NMC NIC's WAN port (Channel 2) with a Null Modem cable. See Figures 4.8 and 4.9.

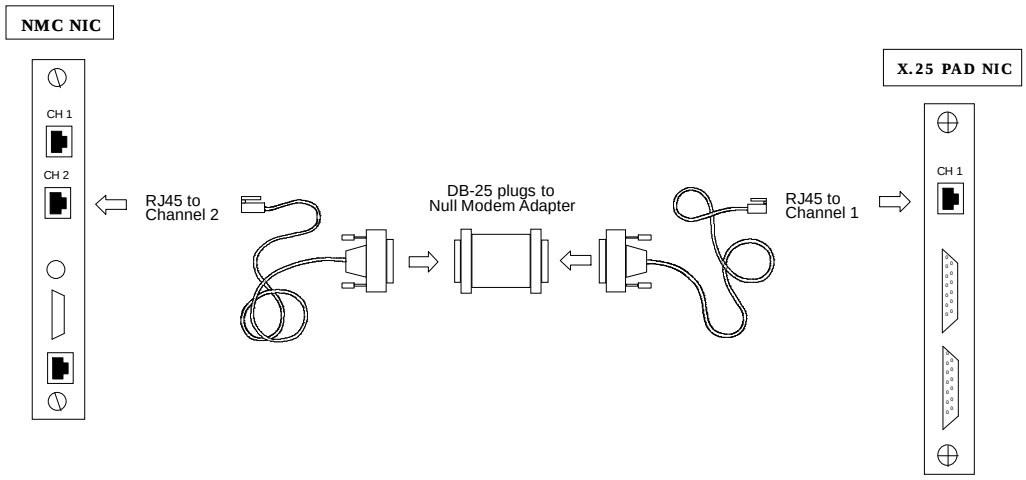


Figure 4.8—Remote (answering) PAD Mox Cabling

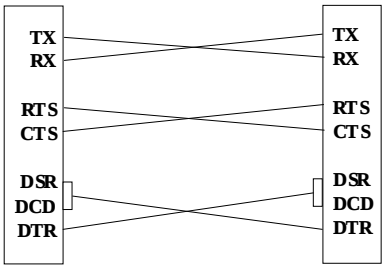


Figure 4.9—Null Pinout

4 Cable the V.35/RS-232 NIC to the X.25 network.

Quick Local MOX Configuration

The easiest way to configure a MOX session is to simply set DIP switch 5 ON. The result depends on how (or if) you have configured your X.25 database for MOX operations.

> **NOTE**: Some users may try to set DIP switch 5 without removing the PAD from the chassis. If you do so, you must perform a hardware reset on the card before proceeding.

New card or database erased

Set DIP switch 5 ON and insert the card in the chassis. The Routing Type is automatically set to Management Only.

> **NOTE**: The Routing Type defaults to a setting of NONE when DIP switch 5 is set to the OFF position.

Database configured and Routing Type saved as NONE

Set DIP switch 5 ON and insert the card in the chassis. The Routing Type is automatically set to Management Only.

> **NOTE**: The Routing Type defaults to a setting of NONE when DIP switch 5 is set to the OFF position.

Database configured and Routing Type saved as CUD or X.121 Subaddressing

If you saved the database with the Routing Type parameter defined as something other than NONE, set DIP switch 5 ON and insert the card in the chassis. The Routing Type parameter will not change, but a MOX session is now possible.

Placing a MOX Call

The following actions are performed at the Originating side of the connection.

1. Launch *TCM*. Select **New** from the File Menu. The New Device window appears.

2. Click on the **Options** button. The New Device window expands.

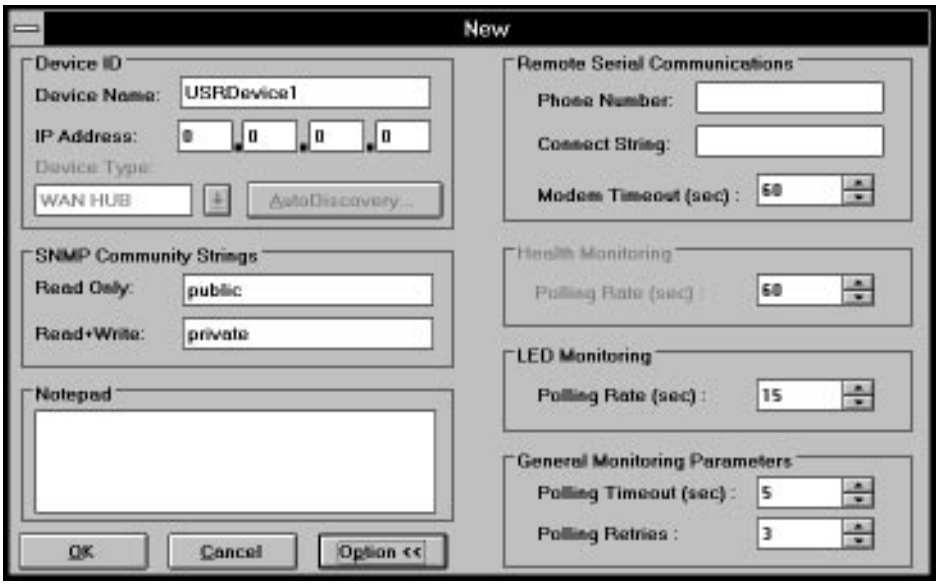


Figure 4.10—Expanded New Device Window

3. Enter the relevant information about the chassis NMC you will be calling, including its IP address, on the left side of the window.

4 Enter a customized dial string for MOX operations in the Connect String field. The string syntax depends on the Routing Type configured at the remote PAD.

Subaddress

If the Routing Type parameter at the remote PAD is set for Subaddress, the syntax is:

AT\RPORT ID.ADDRESS (DIGITS 14 AND 15 INDICATE MOX)

Example: You are connected to the X.25 network through port A of the NIC. The X.121 Subaddress parameter at the remote PAD is configured to recognize "11" as indicating a MOX call.

at\rA.999999999999911

Management Only

If the Routing Type parameter at the remote PAD is set for Management Only, the syntax is:

AT\RPORT ID.

Example: You are connected to the X.25 network through port A of the NIC.

at\rA.

CUD Routing

If the Routing Type parameter at the remote PAD is set for Call User Data, the syntax is:

ATCUD\RPORT ID.

Example: You are connected to the X.25 network through port A of the local NIC. The Call User Data String parameter at the remote PAD is configured to recognize "atNSaxTomO" in the CUD as indicating a MOX call.

ATNSAXTOMO\RA.

Both

If the Routing Type parameter at the remote PAD is set for Both (Subaddress and Call User Data), the syntax is:

ATCUD\RPORT ID.ADDRESS (DIGITS 14 AND 15 INDICATE MOX)

Example: You are connected to the X.25 network through port A. The Call User Data String parameter at the remote PAD is configured to recognize the CUD "atNSaxTomO" as indicating a MOX call. The X.121 Subaddress parameter at the remote PAD is configured to recognize "11" as indicating a MOX call.

ATNSAXTOMO\RA.999999999999911

5 Click on **OK** to initiate the call.

MOX Application: Trap Reporting

One MOX application is to use the remote PAD to route chassis trap information to the Management Station. When configured appropriately, the NMC will simply send trap information to the X.25 PAD to be routed to the trap destination (your local Management Station) over the X.25 network. This application requires the following:

1 Configure for MOX on both ends of the connection per your requirements.

2 Using *TCM*, configure the remote Network Management Card's **Dial-Out Configuration** group.

- The **AT Init String** parameter value should match the Connect String required for your MOX configuration.

  Example: The remote PAD is connected to the X.25 network through port A of the NIC. The Call User Data String parameter at the local PAD (where your Management Station / trap destination is located) is configured to recognize "NSaxTomO" in the CUD as indicating a MOX call. The value for the AT Init String should be:

  NSAXTOMO

- The **WAN Connect Number** parameter value should be the previously configured MOX X.121 subaddress.

  Example: The remote PAD is connected to the X.25 network through port A of the NIC. The X.121 Subaddress parameter at the remote PAD is configured to recognize "11" as indicating a MOX call. The value for the WAN Connect Number should be:

  A.999999999999911

3 Configure the remote NMC to recognize your local Management Station as the trap destination. See the *Total Control Manager/SNMP Software Guide* for detailed instructions.

Chapter 5
RS-232 User Interface Overview

This chapter introduces the RS-232 User Interface configuration program, its requirements, and options. In this chapter, we discuss the concepts you should become familiar with before you set out to configure the X.25 PAD.

Related Topics

Overview

The RS-232 User Interface configuration program is used to integrate the X.25 PAD into your system. You must use this tool to configure templates, display X.25 statistics, send system commands, and manipulate all three layers of the X.25 protocol stack.

This system tool is flexible, so the PAD can be configured to meet your needs now, and in the future. The most important step in PAD configuration is planning. You must know the needs of your dial-up clients and the capabilities of the packet-switched networks (PSNs) you connect with; the PAD is just the "middle-man" between the two.

The first step is to use the RS-232 User Interface to configure the protocol stack, making it compatible with the PSN requirements. Once the stack is configured, you have a basis from which to configure Subscriber records. *Subscriber* is the term we use to describe the basic record of the database. A subscriber is a custom configuration, in that it enables

certain features and acts as a repository for other configured templates (such as modem profiles).

You may configure one modem profile template that meets the needs of all your subscribers, or create templates with subtle variations (for instance, three of those subscribers may require a different banner). The flexibility of the Subscriber database allows you to use one or multiple configurations, based on your application needs.

The X.25 PAD database is made up of configured template information. You set up a template that configures the PAD for a certain type of call (interactive / non-interactive), a call that comes into the PAD from a certain number (terminal), or is directed to a certain number (remote host). The templates you set up are then linked to a Subscriber record. When a call comes into the chassis and is routed to the PAD, the software searches for a match with a subscriber. When a match is found, the modem is configured accordingly and the call is routed.

Template configurations allow modems to be configured and calls to be routed. If you place an interactive call from a terminal, you can also use X.28 commands to configure call data. Supported X.28 commands are listed in Appendix A.

Configuration

Configuring the PAD to meet your needs is accomplished by configuring the protocol stack and by creating a Subscriber database. The configured stack lays the groundwork for the custom call routing and terminal and host control features you can enable as part of the Subscriber template configurations. Appendix E contains some quick How-To's for some common configurations, but you should first be familiar with the configuration logic presented in this chapter.

Minimal Configuration

The X.25 PAD comes with a default configuration that should bring the network connection up immediately, once a few adjustments are made. If you want to check your network status, simply adjust the following, then save the database, and reset the card:

- logical channel numbers (see the Virtual Circuit Ranges template in Chapter 6)
- port ranges (see the Modem Port template in Chapter 7)
- clock source (see the WAN template in Chapter 6)

Protocol Stack

The Physical (WAN), Link Access (LAPB), and Packet (PLP) layers of the X.25 protocol stack can be configured via the RS-232 User Interface.

WAN Template

Configure this template to define the interface between the PAD and the X.25 PSN.

LAPB Template

By configuring this template, you set up the link so both the DTE and DCE can send frames. It defines frame transfer parameters, and defines rules for timing and frame formatting.

PLP Template

PLP configuration parameters are separated into logical groups to simplify PLP configuration. There are 11 possible selections from the PLP Groups Menu.

1. Network Identification
Group 1 specifies the network protocol, X.25 version, and packet-level protocol to be used by the PAD and the connected PSN.

2. Virtual Circuit Ranges
Group 2 specifies the allowable ranges of logical channels assigned to a particular type of virtual circuit.

3. Packet and Window Sizes
Group 3 specifies allowable packet and window sizes, as well as the sequence numbering method on the PSN.

4. Timer and Re-transmission Values
Group 4 specifies allowable timer and re-transmission values.

5. Transit Delay Parameters
Group 5 specifies the allowable attributable delays.

6. Throughput Class Parameters
Group 6 specifies allowable local and remote throughput.

7. Closed User Groups
Group 7 specifies the PAD response to closed user groups.

8. Subscription Options
Group 8 specifies what additional features are supplied by the X.25 PSN.

9. Localization Information

Group 9 specifies how the PAD responds to diagnostic packets, international calls, hexadecimal network addresses, and priority packets.

10. D-Bit Control

Group 10 specifies the PAD response to delivery information flags.

11. Throughput Class Window/ Packet Parameters

Group 11 specifies window and packet negotiation and throughput.

Configuration Planning

Subscriber configurations are made up of configured elements and enabled elements. It is vital to plan and keep track of the protocol stack configuration, as some of the parameters defined in the Subscriber database must be compatible with the stack. You may wish to use a planning technique, such as reference logs, to keep track of the detailed stack configuration. For your convenience, we have provided blank configuration records in Appendix D.

Subscriber

> **NOTE**: This portion of PAD configuration has some dependencies, where, if certain features are to be enabled for a subscriber, some pre-configuration is required in the X.25 Protocol Stack.

The RS-232 User Interface configuration program creates a Subscriber database that is based on the templates you configure. There are 19 templates you can create and link together.

Figure 5.1 is a diagram of the configuration flow (what to configure first) for every configurable template related to the Subscriber database.

Subscriber Template

When you configure a Subscriber template, you link other configured templates (described below) into one entity the system uses to locate configuration information appropriate for a call. The Subscriber template allows the network administrator to consolidate the many features available in the X.25 PAD into a group that can then be associated with an ANI, DNIS, or modem port. When an appropriate call is received at the PAD, it can then pull a single record and configure the modem appropriately for that particular call. The Subscriber template links the following templates, allowing unique configurations.

Autocall Template

An Autocall template is used when a non-interactive call must automatically call a remote host on the PSN. When you configure an Autocall template, you link the call to a primary Remote Host and up to four secondary Remote Hosts on the PSN.

Autoconnect Template

An Autoconnect template allows you to configure a PVC to be used when a non-interactive call must automatically connect with a remote host on the PSN.

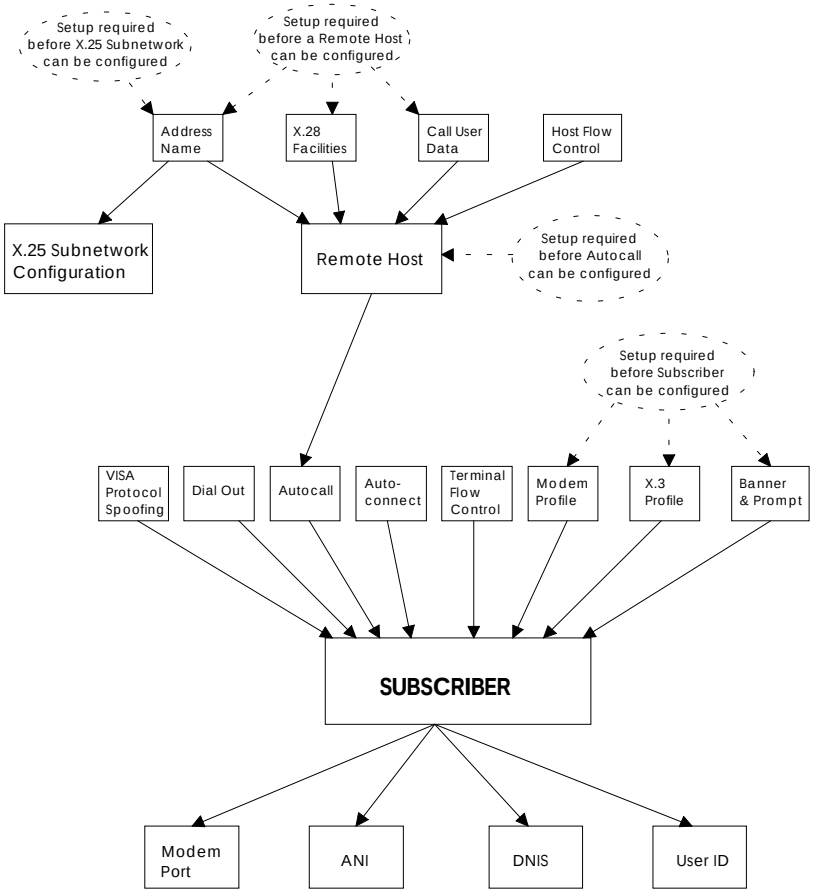


Figure 5.1—RS-232 User Interface Configuration Flow

Dial Out Support Template

When dial-out calling is supported for a remote host, this template allows the remote host to send AT commands and configure a modem in the chassis via the PAD connection.

Terminal Flow Control Template

When terminal flow control is enabled, this template allows the PAD to control the flow of data sent to the remote host from the terminal.

Modem Profile Template

A configured Modem Profile template uses AT commands to configure the modem (in Smart mode) when a call is received at the PAD. This template is also used to configure parity.

Profile Template

By configuring an X.3 Profile template and linking it to a Subscriber template, the X.3 parameters can be set appropriately for an incoming call.

Banner and Prompt Template

This template allows you to set up an appropriate banner and prompt for an incoming call.

Remote Host Template

The name of the Remote Host is an alias. A Remote Host template must also be configured if you want autocall enabled for a subscriber. This template sets specific parameters to be used by the remote host.

Host Flow Control Template

When host flow control is enabled, this template allows the PAD to control the flow of data sent to the terminal from the remote host.

Address Template

When you configure this template, you define the X.25 addressing mechanism to be used when routing a call to a remote host on a PSN.

X.28 Facility Template

A configured X.28 Facility template identifies the X.25 call features (such as Fast Select and Reverse Charging) that can be negotiated with the PSN for an X.25 call.

Call User Data (CUD) Template

This template allows you to define call user data that is part of the call request packet. The CUD field of a call request packet may contain such information as the host name, password, and subaddress.

Modem Port Template

When a call comes into the PAD, this template is checked to find a linked subscriber, which then tells the system how the call should be routed.

ANI (Automatic Number Indication String) Template

When a call comes into the PAD, this template is checked to find a linked subscriber, which then tells the system how the call should be routed. ANI is a TELCO feature that provides the telephone number from which a call is placed.

DNIS (Dialed Number Identification String) Template

When a call comes into the PAD, this template is checked to find a linked subscriber, which then tells the system how the call should be routed. DNIS is a TELCO feature that provides the telephone number being dialed.

User ID Template

This template allows you to configure basic security (User ID and password) for the host.

Subnetwork Configuration Template

This template allows you to configure the X.25 subnetwork (physical port on the NIC).

VISA Protocol Spoofing Template

This template allows you to configure VisaI (single transaction) and VisaII (multiple transaction) spoofing.

Configuration Planning

You may wish to use a planning technique, such as reference logs, to keep track of the detailed subscriber database configuration. For your convenience, we have provided blank configuration records in Appendix D.

Subscriber Configuration Schemes

Full subscriber configuration is rarely necessary, and the system doesn't require it. You may either create a Basic configuration for a subscriber or add Extended configuration. Real-world applications of the PAD configuration are likely to be unique combinations of Basic and Extended subscriber configurations.

- A *Basic* subscriber configuration is required. It consists of a subscriber template with a configured and linked Modem Profile template, X.3 Profile template, and Banner and Prompt template.
- An *Extended* subscriber configuration consists of the Basic subscriber and up to 16 additional PAD templates fully configured and linked.

The administrator can gain immediate access to the configuration program. However, we advise that you complete a thorough analysis of the current operating environment *before* new configurations are created. This reduces the need for later correction or reconfiguration.

The database has certain limits because of the available space on the card. Two Megabytes of Flash ROM are provided with the PAD, allowing 556K of space available for the database. Refer to the NVRAM command screen in Chapter 9. Used for saving or erasing configurations from nonvolatile memory, this screen also displays the percentage of NVRAM currently available.

We have provided the following configuration examples to help you use the database in the most efficient way possible while meeting the needs of your customers.

Example I: 1000 to 1 Ratio for Basic Subscribers

As configured in Figure 5.2 below, the PAD allows you to link up to 1000 ANI, DNIS, or User IDs to each of up to 18 Basic subscribers. This means your database can maintain 18,000 ANI, DNIS, or User IDs attached to 18 Basic subscriber configurations.

NOTE: This configuration scheme is only applicable to interactive calls. Non-interactive calls require additional template configurations, such as autoconnect or autocall.

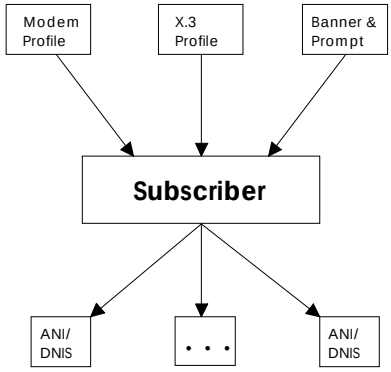


Figure 5.2—Case 1: 1000 ANI, DNIS, or UserIDs for each Basic Subscriber

Example II: 1 to 1 Ratio

If you choose to create one subscriber configuration for every ANI, DNIS, or User ID, you limit the number of subscribers, as well as the number of ANI, DNIS, and User IDs you can configure in the database.

For instance, you can only configure up to 1500 ANI, DNIS, or User IDs when using a 1 to 1 ratio for Basic subscribers. This means you can configure a total of 1500 Basic subscribers.

If you need to use Extended subscriber configurations (perhaps because the calls are non-interactive) and link each ANI, DNIS, and User ID to a single Extended subscriber configuration, you can only configure up to 750 ANI, DNIS, and User IDs. This means you can configure a total of 750 Extended subscribers. Figure 5.3 is a diagram of such a configuration.

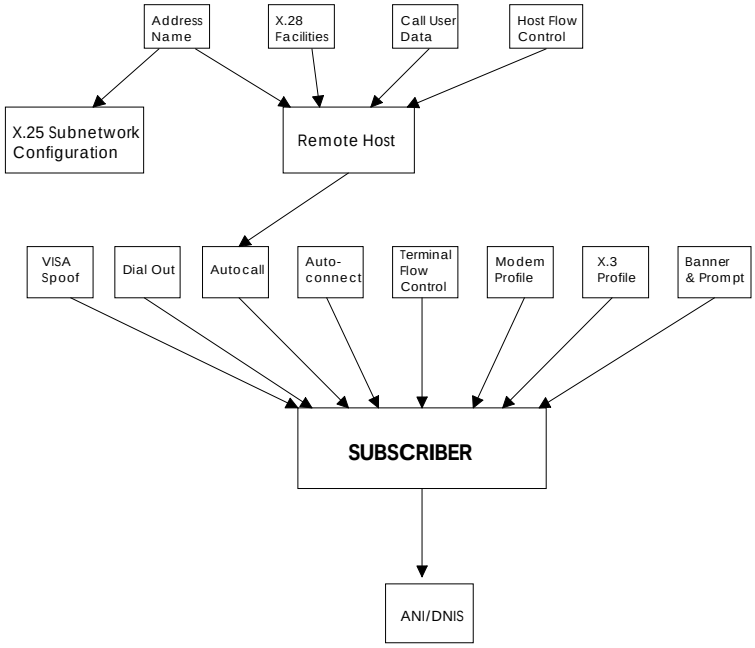


Figure 5.3—Case 2: 1 ANI, DNIS, or UserID for each Extended Subscriber

Planning, Tracking, and Backing Up

When using the RS-232 User Interface, we strongly recommend you use communications software to set up and track your configuration settings, either by capturing your configuration to a file or as a script, or by writing a script from scratch. A script can act as a backup of your database.

Once your database is initially configured, make revisions interactively, rather than by running a script—unless the system is not currently taking in calls (while a script is configuring your database, the PAD will not accept incoming calls). Be sure to edit your initial configuration script and update it with any interactive changes you may have made. This way, you maintain a constant backup of your database configuration.

The sample script below was captured using Qmodem communications software while configuring the modem port record portion of the database.

```
;
;  QuickLearn Script generated at 16:33:53 on 07-05-94
;  May require editing before use.
;
Graphics ANSI
TurnOFF  ECHO
TurnON   8_BIT
TurnOFF  LINEFEED
TurnOFF  XON/XOFF
TurnON   NOISE
TurnON   SCROLL
TurnOFF  PRINT
TurnOFF  SPLIT
TurnON   STATUSLN
TurnOFF  DOORWAY

TimeOut  30     ; Set Waitfor for 30 seconds
Send     "1^M"

Waitfor  " Menu Selection (1-3):"
Delay    100
Send     "2^M"

Waitfor  " Enter Selection:"
Delay    100
Send     "A 3 A^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "4:RS232^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "^[A 1 A^M"

Waitfor  " Menu Selection (1-11):"
Delay    100
Send     "2^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "5:1 6:10^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "^[^[^[1^M"

Waitfor  " Enter Selection:"
Delay    100
Send     "A 6^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "<USR> 1:AT&F&B1&H1&R2 2:AT&F 3:YES 5:EVEN^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "^[A 7^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "<USR>^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "^[A 8^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "<USR>^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "^[A 1^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "<USR> 15:USR 16:USR 17:USR^M"

Waitfor  " Enter Modifications:"
Delay    100
```

```
Send     "^[A 14^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "3:INSERVICE 6:USR^M"

Waitfor  " Enter Modifications:"
Delay    100
Send     "^[^[^["
Exit
```

Getting Started

- Conventions—case sensitivity and how certain keys function within the configuration program
- Data Entry Screen Command Syntax—how to change entries when editing a data entry screen within the configuration program
- Saving the Configuration—saving the configuration in nonvolatile memory

Conventions

The database is case sensitive in the circumstances indicated below. Either set the Caps Lock key whenever you use the database, or be especially careful in the following instances.

- Alias
  A remote host alias name may be configured in the database in upper case, lower case, or a combination. When you place a call to the alias via an X.28 command, however, it must be entered *exactly* as entered in the database. For instance, if you configured a remote host named "RemHost1," you must type *exactly* what you entered if you want to place a Call command to an alias.
- Subnetwork ID
  Whenever called to enter a Subnetwork ID (the selected physical port), you must enter an upper case A, B, or S.

While moving through the configuration program, the keys below have specific functions:

Enter When editing a data entry screen, press the Enter key to update the screen without returning to the previous level.

Esc When editing a data entry screen, press the Esc key to save the current setting to the database and return to the previous level. If pressing Esc does not take you to the previous level, you have made an invalid entry.

Ctrl-R Press this key combination to abort the current operation and return to the previous level.

Data Entry Screen Command Syntax

At the command prompt, use the following syntax to change data values:

[field number]:[data value]<Enter>

For example, to change the value in the first field to 7, type the following command:

1:7<Enter>

You may change multiple entries in one command line, simply by breaking each [field number]:[data value] pair with a space. For instance, if you want to name a template and change the first three data fields, you could do it all in one command:

<ohio> 1:1 2:2 3:3<Enter>

If you want your entry to contain spaces, the entry must be typed within quotation marks (“ “).

1: “Home of Henry Ford” <Enter>

Saving the Configuration

If you modify the X.25 protocol stack or add any modem ports, you must save the database to nonvolatile memory or it will be lost when the system resets or powers off. You must return to the Main Menu, select Commands, and then select Nonvolatile Storage from the Commands menu.

You must reset the card if you want the changes to take effect immediately. To reset the card, return to the Main Menu, select Commands, and then select System Level from the Commands menu.

Refer to Chapter 9 for explicit instructions on saving a configuration to nonvolatile memory and resetting the card.

Initial Setup

1 Attach your PC or terminal to the User Interface Port (see the hardware install guide). Press Enter to display the Main Menu.

If you use a PC, you can use any communications software that provides TTY dumb terminal emulation. Communications settings should be:

- 9600 baud (default hardware setting, see the *Hardware Install Guide*)
- 8 data bits
- 1 stop bit
- no parity
- no flow control
- The COM port that you have cabled to the NIC

```
U.S. Robotics

X.25 Gateway Card -- Rel. 2.0.0
Boot Code Linked Date:  11/23/94
Operation Code Linked Date:  11/23/94

Main Menu

1 Configuration
2 Status
3 Commands

Enter menu selection and press Enter.

Menu Selection (1-3):
```

Figure 5.4—Main Menu

There are three possible selections on the Main Menu.

- Configuration—allows you to configure the PAD Template Types or the X.25 Protocol Stack. Refer to Chapters 6 and 7.
- Status—allows you to view the current X.25 status (statistics for a selected X.25 layer). Refer to Chapter 8.
- Commands—allows you to send system commands related to logs, non-volatile storage, system information, and diagnostic testing. Refer to Chapter 9.

Chapter 6
Configuring the X.25 Protocol Stack

This chapter covers the following topics:

- PLP Parameters Configuration—configuring the packet layer of the protocol stack
- LAPB Parameters Configuration—configuring the link access layer of the protocol stack
- WAN Parameters Configuration—configuring the physical layer of the protocol stack
- PLP PVC Configuration—currently not implemented

Refer to Appendix D for masters of record forms with which you can track your configurations.

When configuring the protocol stack, you will follow the screen flow indicated below.

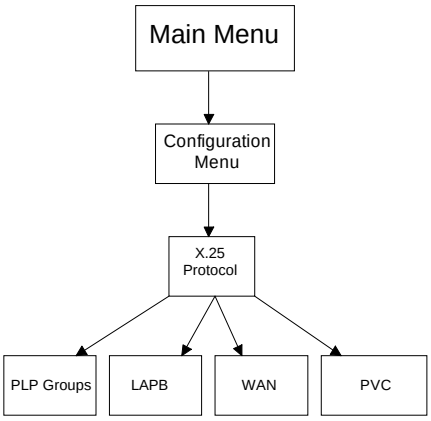


Figure 6.1—PAD Screen Flow

1. Attach your PC or terminal to the User Interface port (see *Getting Started* in Chapter 5). Press Enter to display the Main Menu.

2. Select option 1—Configuration from the Main Menu and press Enter. The Configuration Menu appears.

```
Configuration

1 PAD Template Types
2 X.25 Protocol
3 PSN Banner
4 Management Over X.25

Enter menu selection and press Enter or press Esc to exit.

Menu Selection (1-3):
```

Figure 6.2—Configuration Menu

3. Select option 2—X.25 Protocol from the Configuration Menu and press Enter. The X.25 Protocol Menu appears.

```
X.25 Protocol

1) PLP Parameters
2) LAPB Parameters
3) WAN Parameters
4) Configure PLP PVC (UNIMPLEMENTED)

Enter Subnetwork Followed by Menu Number and Type
Subnetwork (A, B), Menu Number (1-4), Type (ADMINISTRATION, OPERATING)
Press Esc to exit.

Enter Selection:
```

Figure 6.3—X.25 Protocol Menu

4. We recommend you configure the X.25 Protocol Stack by first configuring the WAN, then LAPB, and finally, the PLP parameters.

   Enter the following information, leaving a space between each parameter, and then press Enter.

   - Specify the X.25 protocol stack for the particular port on the NIC (Subnetwork) you are configuring (A or B).
   - Specify which of the four menu options (1-4) you are configuring.
   - Type either A or O to specify whether you want to display Administration or Operating copies of the screens.

If you display an *Administration* copy of the configuration, you can modify the parameters, but they don't take effect until they are saved to Flash ROM and the card is reset. See Chapter 9 for instructions on saving configurations to nonvolatile memory and resetting the card.

If you display an *Operating* (Read Only) copy of the configuration, the parameters reflect the current configuration; they cannot be modified.

Example:

A 2 A <ENTER>

Configure WAN Parameters

Select option 3—WAN Parameters from the X.25 Protocol menu, using the command syntax described in Chapter 5, and press Enter. The WAN data entry screen appears.

(1) Options

This parameter is not currently implemented.

(2) Maximum Frame Size

This parameter determines the maximum number of bytes allowed in each frame.

Settings: 133 to 519

Default: 300

(3) Baud Rate of Internal Clock Source

This parameter determines the baud rate of the clock generated internally.

Settings: 0 to 384000

Default: 57600

(4) Interface Type (RS232 or V.35

This parameter defines the type of physical interface between the PAD and the WAN.

Settings: RS232 | V.35

Default: V.35

(5) Interface Monitoring Using DCD

This parameter instructs the PAD to look at DCD, in addition to DSR, to determine if a line is operational.

Settings: Yes | No

Default: No

(6) Clock Source

This parameter selects the transmission timing source.

DCERXTX = Receive timing from Host for transmit and receive

DCERXONLY = Receive timing from Host for transmit only

INTERNAL = Use internal clock source

Settings: DCERXTX | DCERXONLY | INTERNAL

Default: INTERNAL

Configure LAPB Parameters

Select option 2—LAPB Parameters from the X.25 Protocol menu, using the command syntax described in Chapter 4. The LAPB data entry screen appears.

(1) N2—Max Number of PDU Transmissions

This parameter determines the maximum number of times that a (packet data unit) is sent following the expiration of the Acknowledgment timer, P-Bit (Poll Bit) timer, or Reject timer. It also limits the number of times a Receive Ready with P-Bit set message is sent when the remote host is busy and the Busy timer expires.

Settings: 1 to 255

Default: 2

(2) T1—Acknowledgment Timer

This parameter defines the time (in tenths of a second) during which LAPB expects to receive an acknowledgment of an outstanding IPDU (information packet data unit) or an unexpected response to a sent unnumbered PDU.

Settings: 1 to 3000

Default: 70

(3) P-Bit Response Timer

This parameter defines the time (in tenths of a second) during which LAPB expects to receive a PDU (packet data unit) with the F-Bit (Final bit) set to 1 in response to a command with P-Bit (Poll bit) set to 1.

Settings: 1 to 3000

Default: 10

(4) Reject Response Timer

This parameter defines the time (in tenths of a second) during which LAPB expects to receive a reply to a sent REJ TPDU (reject timer packet data unit).

Settings: 1 to 10000

Default: 25

(5) Busy State Timer

This parameter defines the time (in tenths of a second) during which LAPB waits for an indication of the clearance of a busy condition at the other LAPB.

Settings: 1 to 30000

Default: 100

(6) Link Idle Timer

This parameter defines the time (in tenths of a second) during which the LAPB expects to receive a PDU (packet data unit) from the other LAPB. If it expires, the Poll/Final (P/F) cycle is initiated, which may result in link disconnection. A value of zero disables this function.

Settings: 0 to 32000

Default: 250

(7) Max Delay before Sending RR

This parameter defines the maximum delay (in tenths of a second) before transmitting a delayed RR (receiver ready). The PAD will send an RR, based on this timer, even if there is no data forthcoming. Never set this to a larger value than the T1—Acknowledgment timer value or the call will be dropped when the T1 timer expires.

Settings: 1 to 3000

Default: 4

(8) Max Number of Unacknowledged IPDUs

This parameter defines the maximum number of unacknowledged IP-DUs (information packet data units) that can be received before the RR (receiver ready) acknowledging them all must be sent.

Settings: 1 to 127

Default: 3

(9) Transmit Window Size

This parameter defines the number of unacknowledged PDUs (packet data units) that may be sent.

Normal mode = 1 to 7 (Modulo 8 sequence numbering is used).

Extended mode = 1 to 127 (Modulo 128 sequence numbering is used).

Settings: 1 to 127

Default: 7

(10) Transmit Probe

This parameter determines the position in the data stream before the window is closed, at which an IPDU (information packet data unit) is sent with the P-Bit (poll bit) set to ask for an acknowledgment from the receiver.

Normal mode = 1 to 7 (Modulo 8 sequence numbering is used).

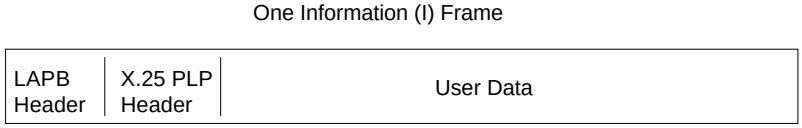
Extended mode = 1 to 127 (Modulo 128 sequence numbering is used).

Settings: 1 to 127

Default: 0

(11) Maximum Size of LAPB I Frame

This parameter defines the maximum Information (I) frame size, comprised of: max user data size + X.25 header length + LAPB header length.



LAPB requires all incoming I frames above a certain size to be rejected by a FRMR (frame reject).

Settings: 133 to 263, 517 to 519

Default: 261

(12) Ignore any UA Frames Received

This parameter instructs LAPB to ignore any UA (unnumbered acknowledgment) frames received when the connection is in an ERROR state (an indecipherable frame has been received).

Settings: Yes | No

Default: No

(13) Retransmit Frame Reject

This parameter instructs LAPB to retransmit a frame reject if one is received when the connection is in an ERROR state (an indecipherable frame has been received).

Settings: Yes | No

Default: No

(14) Transmit Frame Reject

This parameter instructs LAPB to transmit a frame reject if an invalid response is received when the connection is in an ERROR state (an indecipherable frame has been received).

Settings: Yes | No

Default: No

(15) Reject S-Frame without P-Bit Set

This parameter instructs LAPB to send a frame reject if a Supervisor frame is received without the P-Bit (poll bit) set.

Settings: Yes | No

Default: No

(16) XMIT DM on Entry to ADM State

This parameter instructs LAPB to transmit a Diagnostic Message when the PAD enters administrative state.

Settings: Yes | No

Default: No

Configure PLP Parameters

Select option 1—PLP Parameters from the X.25 Protocol menu using the command syntax described above, and press Enter. The PLP Groups Menu appears.

```
PLP groups

1) Network Identification
2) Virtual Circuit Ranges
3) Packet And Window Sizes
4) Timer And Retransmission Values
5) Transit Delay Parameters
6) Throughput Class Parameters
7) Closed User Groups
8) Subscription Options
9) Localization Information
10) D-Bit Control
11) Throughput Class Window/Packet Parameters

Enter menu selection and press Enter or press Esc to exit.

Menu Selection (1-11):
```

Figure 6.4—PLP Groups Menu

1. Type **1** and press Enter to add an entry to 1—Network Identification. The Network Identification data entry screen appears.

2. To change the values on this screen, use the syntax described in Chapter 5.

   To abort an entry at any time, press Ctrl-R.

   NOTE: The system will not do range checks on your data entries. You must use the documented parameter ranges.

3. Press Enter. The information you modified or added appears on the data entry screen. Double check your entries, then press Esc. You are returned to the PLP Groups Menu.

4. Continue to configure the PLP parameters using the command syntax described in Chapter 5. A listing of the configurable parameters from each of the logical groupings follows.

Network Identification

(1) Network Protocol Mode

This parameter allows the user to select a specific network protocol to be used.

Settings:

ACCUNET	LUXPAC
AUSTPAC	PACNET
DATANET	PSS
DATAPAC	TELENET
DATAPAK	TELEPAC
DATEX_P	TRANSPAC
DCS	TYMNET
DDN	VENUS_P
DDX_P	X25_80
F_DATAPAC	X25_84
FINPAC	X25_88
ITAPAC	X25_LLC

Default: X25_84

(2) X.25 Version

This parameter determines the version of the X.25 protocol being used over the network. The NetWare mode of X25_LLC overrides any value in this field to the 1984 standard.

Settings: 80 | 84 | 88

Default: 84

(3) Packet Level Protocol Mode

This parameter indicates the DTE / DCE nature of the link. The DXE (DTE or DCE) parameter is resolved using ISO 8208 for DTE-DTE operation.

> **NOTE:** The physical layer of the PAD is always a DTE; this parameter only applies to the X.25 protocol level.

Settings: DCE | DTE | DXE

Default: DTE

Virtual Circuit Ranges

NOTE: Subnetworks A and B can both use the same logical channel numbers, but each incoming call will be routed to the highest available channel.
If you want calls routed differently, depending on the subnetwork, carefully select appropriate logical channel numbers when configuring the virtual circuit range for each subnetwork.
If the wrong logical channel is selected for a call, and the call is dropped, subsequent calls will not go through (on that channel) until the T21 Call Request Response Timer has expired.

(1) Lowest PVC

This parameter establishes the low end of the permanent virtual circuit range.

Settings: 0 to 4095

Default: 0

(2) Highest PVC

This parameter establishes the high end of the permanent virtual circuit range.

Settings: 0 to 4095

Default: 0

(3) Lowest Incoming Logical Channel

This parameter establishes the low end of the one-way incoming logical channel.

Settings: 0 to 4095

Default: 0

(4) Highest Incoming Logical Channel

This parameter establishes the high end of the one-way incoming logical channel.

Settings: 0 to 4095

Default: 0

(5) Lowest Two-Way Logical Channel

This parameter establishes the low end of the two-way incoming logical channel.

Settings: 0 to 4095

Default: 1024

(6) Highest Two-Way Logical Channel

This parameter establishes the high end of the two-way incoming logical channel.

Settings: 0 to 4095

Default: 1087

(7) Lowest Outgoing Logical Channel

This parameter establishes the low end of the one-way outgoing logical channel.

Settings: 0 to 4095

Default: 0

(8) Highest Outgoing Logical Channel

This parameter establishes the high end of the one-way outgoing logical channel.

Settings: 0 to 4095

Default: 0

Packet and Window Sizes

(1) Sequence Numbering Option

This parameter indicates whether Modulo 8 or 128 sequence numbering operates on the network.

Settings: 8 or 128

Default: 8

(2) Maximum Local Packet Size

This parameter defines the maximum acceptable size of packets in the direction local-to-remote. That is, on any incoming call, a value for the packet size parameter greater than this value will be negotiated down to an acceptable size when the call is accepted.

Settings: 7 to 9 (indicates 2^7 to 2^9)

Default: 8

(3) Maximum Remote Packet Size

This parameter defines the maximum acceptable size of packets in the direction remote-to-local. That is, on any incoming call, a value for the packet size parameter greater than this value will be negotiated down to an acceptable size when the call is accepted.

Settings: 7 to 9 (indicates 2^7 to 2^9)

Default: 8

(4) Default Local Packet Size

This parameter specifies, on a particular subnetwork, the value of the default packet size for the direction local-to-remote. This may be nonstandard, provided the value is agreed on by all communicating parties on the LAN or between the DTE and DCE. The standard value is 7, implying a default data packet size of 128 (2^7) octets for each direction of transmission.

Settings: 47 to 9 (indicates 2^4 to 2^9)

Default: 8

(5) Default Remote Packet Size

This parameter specifies, on a particular subnetwork, the value of the default packet size for the direction remote-to-local. This may be nonstandard, provided the value is agreed on by all communicating parties on the LAN or between the DTE and DCE. The standard value is 7, implying a default data packet size of 128 (2^7) octets for each direction of transmission.

Settings: 47 to 9 (indicates 2^4 to 2^9)

Default: 8

(6) Maximum Local Window Size

This parameter defines the largest acceptable window size on the local network.

NOTE: 127 only allowed for Modulo 128 networks.

Settings: 2 to 127

Default: 7

(7) Maximum Remote Window Size

This parameter defines the largest acceptable window size on the remote network.

NOTE: 127 only allowed for Modulo 128 networks.

Settings: 1 to 127

Default: 7

(8) Default Local Window Size

This parameter specifies, on a particular subnetwork, the value of the default window size. This may be nonstandard, provided the value is agreed on by all communicating parties on the LAN between the DTE and DCE. Most networks use a value of 2.

> **NOTE:** The sequence of the numbering scheme affects the range of this parameter.

Settings: 1 to 127

Default: 7

(9) Default Remote Window Size

This parameter specifies, on a particular subnetwork, the value of the default window size. This may be nonstandard, provided the value is agreed on by all communicating parties on the LAN between the DTE and DCE. Most networks use a value of 2.

> **NOTE:** The sequence of the numbering scheme affects the range of this parameter.

Settings: 1 to 127

Default: 7

(10) Maximum NSDU Length

This parameter specifies a default maximum length of the Network Service Data Unit, beyond which concatenation will be stopped and the data currently held will be passed to the Network Service user.

Settings: 0 to 32000 octets

Default: 256

Timers (in 0.1 secs) and Re-transmission Values

(1) Acknowledgment Delay—Withhold Pending RR

This parameter specifies the maximum number of ticks (0.1 second units) for which a pending acknowledgment is withheld.

Settings: 0 to 32000

Default: 5

(2) T20—Restart Request Response Timer

This parameter specifies in ticks (0.1 second units) the time the DTE waits before responding to a restart request.

Settings: 0 to 32000

Default: 1800

(3) T21—Call Request Response Timer

This parameter specifies in ticks (0.1 second units) the time the DTE waits for a response after a clear request has been issued.

Settings: 0 to 32000

Default: 2000

(4) T22—Reset Request Response Timer

This parameter specifies in ticks (0.1 second units) the time the DTE waits before responding to a reset request.

Settings: 0 to 32000

Default: 1800

(5) T23—Clear Request Response Timer

This parameter specifies in ticks (0.1 second units) the time the DTE waits before responding to a clear request.

Settings: 0 to 32000

Default: 1800

(6) Tvalue—Status Transmission Timer

This parameter is related, but does not correspond exactly, to the DTE Window Status Transmission Timer, T24. It specifies in ticks (0.1 second units) the maximum time during which acknowledgments of data received from the remote transmitter will be withheld. When the timer expires, any withheld acknowledgments will be carried by an X.25 level 3 “Receiver Not Ready” control packet.

Settings: 0 to 32000

Default: 750

(7) T25—Window Rotation Timer

This parameter specifies in ticks (0.1 second units) the DTE will wait for a packet acknowledgment. If no ACK is received within this timeframe, the DTE sends a reset request and the DTE/DCE packet counters are reset to 0.

Settings: 0 to 32000

Default: 1500

(8) T26—Interrupt Response Timer

This parameter is not currently implemented.

(9) Idlevalue—Link-Level Hold Timer

This parameter is not used by the U.S. Robotics X.25 PAD.

Settings: 0 to 32000

Default: 0

(10) Connectvalue—DTE/DCE Resolution Timer

This parameter specifies the number of ticks (0.1 second units) for which the DTE/DCE resolution phase must be completely implemented in order to prevent the (unlikely) event that two packet level entities cannot resolve their DTE/DCE nature. If this time allowance expires without resolution, the link connection will be disconnected and all pending connections aborted.

Settings: 0 to 32000

Default: 2000

(11) R20—DTE Restart Request Retransmit Count

This parameter specifies the number of times a DTE restart request may be retransmitted.

Settings: 1 to 255

Default: 1

(12) R22—DTE Reset Request Retransmit Count

This parameter specifies the number of times a DTE reset request may be retransmitted.

Settings: 1 to 255

Default: 1

(13) R23—DTE Clear Request Retransmit Count

This parameter specifies the number of times a DTE clear request may be retransmitted.

Settings: 1 to 255

Default: 1

Transit Delay Parameters

(1) Local Delay (msecs)

This parameter specifies (in milliseconds) the transit delay attributable to internal processing.

Settings: 0 to 32000

Default: 5

(2) Access Delay (msecs)

This parameter specifies (in milliseconds) the transit delay attributable to the line transmission rate.

Settings: 0 to 32000

Default: 5

Throughput Class Parameters

Throughput Class is the consistent throughput available under optimal conditions for a virtual call or permanent virtual circuit.

(1) Maximum Local Throughput Class

This parameter sets the maximum supported value of the throughput class Quality of Service parameter.

According to ISO 8208, this parameter is bound in the range 3 to 12, corresponding to a range of 75 to 48000 bps.

However, the valid range supported here is 0 to 15. This caters to nonstandard X.25 implementations, which use the Throughput Class Window / Packet Parameters (Group II).

Settings: 0 to 15

Default: 12

(2) Maximum Remote Throughput Class

This parameter sets the maximum supported value of the throughput class Quality of Service parameter.

According to ISO 8208, this parameter is bounded in the range 3 to 12, corresponding to a range of 75 to 48000 bps.

However, the valid range supported here is 0 to 15. This caters to nonstandard X.25 implementations, which use the Throughput Class Window / Packet Parameters (Group II).

Settings: 0 to 15

Default: 12

(3) Default Local Throughput Class

In some networks, such as TELENET, negotiation of throughput class is restricted to a configured default throughput class. In other PSDNs, this value should be set equal to the value of the Maximum Local Throughput Class.

Settings: 0 to 15

Default: 12

(4) Default Remote Throughput Class

In some networks, such as TELENET, negotiation of throughput class is restricted to a configured default throughput class. In other PSDNs, this value should be set equal to the value of the Maximum Remote Throughput Class.

Settings: 0 to 15

Default: 12

(5) Minimum Local Throughput Class

According to ISO 8208, the throughput class parameter is defined in the range of 3 to 12. Some PSDNs may provide different mapping, in which case this parameter is the minimum value.

Settings: 0 to 15

Default: 3

(6) Minimum Remote Throughput Class

According to ISO 8208, the throughput class parameter is defined in the range of 3 to 12. Some PSDNs may provide different mapping, in which case this parameter is the minimum value.

Settings: 0 to 15

Default: 3

Closed User Groups

If your PAD subscribes to Closed User Groups, call routing is determined by the type of CUGs allowed by your network provider.

(1) With Incoming and Outgoing Access

This parameter specifies whether or not this DTE subscribes to one or more Closed User Groups with Outgoing and Incoming Access. Outgoing access means the DTE can make calls outside the CUG; incoming access means the DTE will accept calls from outside the CUG.

Settings: Yes | No

Default: Yes

(2) Preferential

This parameter specifies whether or not this DTE subscribes to a Preferential Closed User Group. If enabled, this parameter implies that the DTE belongs to more than one CUG and has outgoing access. If your network provider uses preferential CUGs, enable this parameter.

Settings: Yes | No

Default: No

(3) With Outgoing Access

This parameter specifies whether or not this DTE subscribes to one or more Closed User Groups with Outgoing Access. The DTE belongs to a CUG, but can place calls outside the CUG, as well. Enable this parameter if your network provider offers you a choice of whether or not you want to use a Preferential CUG.

Settings: Yes | No

Default: No

(4) With Incoming Access

This parameter specifies whether or not this DTE subscribes to Closed User Groups with Incoming Access. The DTE belongs to a CUG, but will accept calls from outside the CUG.

Settings: Yes | No

Default: No

(5) Basic or Extended Format

This parameter defines the maximum number of Closed User Groups to which this DTE subscribes. This will be one of two ranges: Basic (100 or fewer) or Extended (between 101 and 1000).

Settings: Basic | Extented

Default: Basic

(6) Reject Incoming Calls

This parameter provides the means to reject incoming calls in which a CUG is identified in the call request (which is necessary in some networks, such as DDN). If this parameter is disabled, incoming calls specifying a CUG will be ignored.

Settings: Yes | No

Default: No

Subscription Options

(1) Subscribe to Extended Call Packets

This parameter allows you to indicate if the PAD subscribes to extended call packets (window and packet size negotiation permitted) in both directions.

Settings: Yes | No

Default: No

(2) Bar Incoming Extended Call Packets

This parameter allows the PAD to treat window and packet size negotiation in incoming packets as a procedure error.

Settings: Yes | No

Default: No

(3) Fast Select No Restriction

This parameter allows you to indicate if your setup subscribes to fast select with no restriction on response (the PAD will allow extended data).

Settings: Yes | No

Default: No

(4) Fast Select with Restriction

This parameter allows you to indicate if your setup subscribes to fast select with restriction on response (the PAD will clear any extended data with a reject response).

Settings: Yes | No

Default: No

(5) Reverse Charging

This parameter allows you to indicate if the PAD will accept incoming calls that specify the reverse charging facility.

Settings: Yes | No

Default: No

(6) Local Charging Prevention

This parameter allows you to indicate if the PAD subscribes to local charging prevention.

Settings: Yes | No

Default: No

(7) Subscribe to TOA/NPI Address Format

This parameter allows you to indicate if the PAD subscribes to Type of Access / Network Provider Interface address format.

Settings: Yes | No

Default: No

(8) Bar Incoming TOA/NPI Address Format

This parameter allows the PAD to bar incoming call setup and clearing packets that use Type of Access / Network Provider Interface address format.

Settings: Yes | No

Default: No

(9) NUI Override

This parameter allows you to indicate if the PAD subscribes to Network User Identifier Override.

Settings: Yes | No

Default: No

(10) Bar Incoming Calls

This parameter allows the PAD to bar incoming calls (calls to the PAD).

Settings: Yes | No

Default: No

(11) Bar Outgoing Calls

This parameter allows the PAD to bar outgoing calls (calls from the PAD).

Settings: Yes | No

Default: No

Localization Information

(1) Allow Omission of Diagnostic Byte

This parameter allows the PAD to omit the diagnostic byte in incoming restart, clear, and reset indication packets.

Settings: Yes | No

Default: No

(2) Use Diagnostic Packets

This parameter allows the PAD to use diagnostic packets.

Settings: Yes | No

Default: No

(3) 1980 ITU-T Clear Length Restriction

This parameter allows the PAD to restrict the length of a clear indication to 5 bytes and a clear confirm to 3 bytes.

Settings: Yes | No

Default: No

(4) Allow Incoming Diagnostic Packets

This parameter allows the PAD to accept incoming diagnostic packets.

Settings: Yes | No

Default: Yes

(5) Discard Diagnostic Packets on Non-Zero LCN

This parameter allows you to indicate if the PAD discards diagnostic packets on a non-zero Local Channel Number.

Settings: Yes | No

Default: No

(6) Allow Hex Digits in DTE Address

This parameter determines whether DTE addresses may contain hexadecimal digits.

Settings: Yes | No

Default: No

(7) Bar Non-Privileged Listen

This parameter allows you to bar a non-privileged user (*i.e.*, one without superuser privilege) from listening for incoming calls.

Settings: Yes | No

Default: Yes

(8) International Call Recognition

This parameter determines whether outgoing international calls will be accepted. The main use of this field is in conjunction with the International Call Priority field.

Settings: Not distinguished | Examine DNIC (Data Network Identification Code) | OnePrefixed | ZeroPrefixed

Default: Not distinguished

(9) Data Network Identification Code

This four-digit ID identifies the network carrying the call.

Settings: Any four digits

Default: 0000

(10) International Call PriorityLocalization:Call Priority

This parameter determines whether some prioritizing method is to be used for international calls.

Settings: Yes | No

Default: No

(11) Priority Encode Control

This parameter describes how the priority request is to be encoded for this PSDN.

Settings: X2588 | 76DATAPAC | 80DATAPAC

Default: X2588

(12) Priority Packet Forced Value

This parameter determines if priority call requests and priority incoming calls should have the associated packet size parameter forced to a particular value. A value of 0 accepts the non-priority packet size.

Settings: 0, 4 to 12 (indicates 2^4 to 2^{12})

Default: 0

(13) Source Address Control

This parameter provides a means to override or set the calling address in outgoing call requests for this PSDN (Packet Switched Data Network).

OmitDTE = Force omission of the calling DTE address, even if the network service user supplied one.

Uselocal = Use the DTE address configured in the Address Template (LOCAL_ADDRESS) even if the network service user does NOT supply a DTE address.

Forcelocal = Force the calling DTE address to that contained in LOCAL_ADDRESS even if the network service user supplied one.

Nothing = No special action; calling DTE addresses are encoded as if provided by the network service user.

Settings: Omitdte | Uselocal | Forcelocal | Nothing

Default: Nothing

D-Bit Control

(1) D-Bit Accept In

This flag defines the action to take when a Call Accept is received with the D-bit (delivery confirmation bit) set and there is no local D-bit support.

Settings: Leavedbit | Zerobit | Clearcall

Default: Clearcall

(2) D-Bit Accept Out

This flag defines the action to take when a remote user sends a Call Accept with the D-bit (delivery confirmation bit) set when the local user did not request use of the D-bit.

Settings: Leavedbit | Zerobit | Clearcall

Default: Clearcall

(3) D-Bit Data In

This flag defines the action to take when a data packet is received with the D-bit (delivery confirmation bit) set and the local user did not request use of the D-bit.

Settings: Leavedbit | Zerobit | Clearcall

Default: Clearcall

(4) D-Bit Data Out

This flag defines the action to take when the local user sends a data packet with the D-bit (delivery confirmation bit) set, but the remote user has not indicated D-bit support.

Settings: Leavedbit | Zerobit | Clearcall

Default: Clearcall

Throughput Class Window/Packet Parameters

If your network provider does not use the standard values (3 to 12) for Throughput Class parameters defined in the Throughput Class Parameters logical PLP group, you may need to adjust the settings in this group. If you aren't sure what to do, call our Fax On Demand system.

(1) Negotiation

This parameter determines if throughput class negotiation will be used for certain network procedures.

Settings: Yes | No

Default: No

(2) Type

This parameter defines the means by which throughput class encodings can be used to assign packet and window sizes. Some implementations of X.25 do not use the X.25 packet and window negotiation and rely on mapping the throughput class to these parameters.

(Nibble=4 bits)

Settings: Lownibble | Highnibble | Bothnibbles | Nothing

Default: Nothing

(3) Win Mapping

This parameter consists of 16 integers (0 to 15) mapped between throughput class (both RX and TX directions) and a window size parameter. The 16 integers are separated by periods (full stops). A number from 1 to 127 between full stops will alter the default setting for the subnetwork; 0 accepts the default value.

Settings: 1 to 127

Default: 0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0

(4) Pkt Mapping

This parameter consists of integers (0 to 15) mapped between throughput class (both RX and TX directions) and a packet size parameter. The 16 integers are separated by periods (full stops). A number from 4 to 9 between full stops will alter the default setting for the subnetwork; 0 accepts the default value.

Settings: 4 to 9 (2^4 through 2^9)

Default: 0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0

Chapter 7
Configuring a Subscriber

This chapter covers the following topics:

- Initial Setup—configuring preliminary templates
- Subscriber Template Setup—linking preliminary templates into the Subscriber template
- DNIS or ANI Configuration—linking telephone number address information to the Subscriber template
- Additional Template Configuration—setting up optional templates for specific applications
- Managing Existing Templates—displaying, modifying, and removing templates once they have been set up

Refer to Appendix D for masters of record forms with which you can track your configurations.

When configuring the Subscriber database and PAD templates, follow the screen flow indicated below.

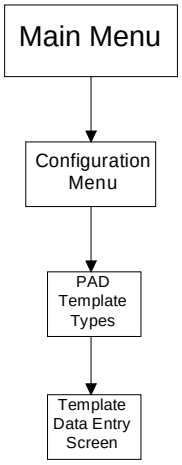


Figure 7.1—Subscriber Screen Flow

Initial Setup

1. Attach your PC or terminal to the User Interface port (see *Getting Started* in Chapter 5). Press Enter to display the Main Menu.

2. Select option 1—Configuration from the Main Menu and press Enter. The Configuration Menu appears.

```
Configuration

1 PAD Template Types
2 X.25 Protocol
3 PSN Banner
4 Management Over X.25

Enter menu selection and press Enter or press Esc to exit.

Menu Selection (1-4):
```

Figure 7.2—Configuration Menu

3. Select PAD Template Types from the Configuration Menu and press Enter. The PAD Template Types Menu appears.

```
PAD Template Types

1) Subscriber                   2) Autocall
3) Autoconnect                  4) Dial Out Support
5) Terminal Flow Control        6) Modem Profile
7) X.3 Profile                  8) Banner and Prompt
9) Remote Host                  10) Host Flow Control
11) Address                     12) X.28 Facilities
13) Call User Data (CUD)        14) Modem Port
15) ANI                         16) DNIS
17) User ID                     18) X.25 Subnetwork Configuration
19) VISA Protocol Spoofing

Enter Operation (add, modify, remove, display) Followed by Template Number.
Press Esc to exit.

Enter Selection:
```

Figure 7.3—PAD Template Types Menu

There are 19 possible selections from the PAD Template Types Menu. Initial Setup requires that you follow this sequence:

- Create a Modem Profile
- Create an X.3 Profile
- Create a Banner and Prompt

This chapter first describes these initial steps, then covers the remaining subscriber configburation options.

Create a Modem Profile

The Modem Profile template is used to send an AT configuration string to configure the modem (in Smart mode) on a per-call basis. The Start string is used to configure the modem before the call is accepted. The Stop string is rarely used in this application.

> **IMPORTANT**: The default Null setting for Start and Stop strings selects the modem's current configuration.
>
> If you change the modem settings for one subscriber via a Start string, we recommend you return to the original modem settings via the Stop string, or begin all Start strings with a reset to modem factory defaults.
>
> Refer to the *Quad Modem Card Operator's Guide* for the factory default modem settings and options.

1. At the PAD Template Types menu prompt, type **A 6** to add an entry to 6—Modem Profile. The Modem Profile data entry screen appears.
2. The first step is to name this Modem Profile configuration by typing the name enclosed in angle brackets (<NAME>). For instance, to name it "ALBERT," type **<ALBERT>** in the Enter Modifications field and press Enter. The Modem Profile template name is required when you configure the Subscriber template.
3. Continue to configure the template appropriately according to the following definitions. Press Enter after you have made your changes to display them on the data entry screen. After verifying the changes, press Esc to return to the PAD Template Types menu.

Modem Profile Template

Name

This is the name of the template configuration. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Start String

This is the modem configuration string to be executed before the modem accepts a call.

Settings: Up to 64 ascii characters (*including* the AT command prefix, carriage return, or spaces)

Default: Null

(2) Stop String

This is the modem configuration string to be executed after the modem ends a call.

Settings: Up to 64 ascii characters (*including* the AT command prefix, carriage return, or spaces)

Default: Null

(3) Autoparity Enable

If Autoparity is enabled, the PAD waits for the hex message 2E0D (a period followed by a Carriage Return) for the length of time defined in the Autoparity Timeout parameter. When the 2E0D is detected, the PAD autodetects modem parity. If the timeout elapses before the 2E0D is detected, the PAD sets the modem parity as defined by the Default Parity parameter.

If Autoparity is not enabled, the PAD sets the modem parity as defined by the Default Parity parameter.

Settings: Yes | No

Default: No

(4) Autoparity Timeout

This is how long (in 50 millisecond units) the PAD will wait for the 2E0D hex message before setting parity according to the Default Parity parameter.

Settings: 0 to 6000 (in 50 millisecond units)

Default: 100

(5) Default Parity

> **NOTE**: When a connection is made, the PAD checks the Parity Treatment parameter after it has checked your Modem Profile template. If Autoparity is enabled, the X.3 parameter will overwrite any parity setting configured in this template.

Settings: Odd | Even | None

Default: None

Create an X.3 Profile

The X.3 Profile template defines the parameters used to format the data sent to the PSN when a call matching the subscriber definition comes into the PAD. See Appendix F for more detailed information about these parameters.

Type **A 7** to add an entry to option 7—X.3 Profile. The X.3 Profile data entry screen appears. After assigning a name, continue to configure the profile appropriately.

X.3 Profile Template

NOTE: Setting a value of 0 for both Data Forward and Idle Timer parameters may enhance performance. However, this may cause problems if you don't fill the modem buffer, as data in the buffer will not be transferred.

Name

This is the name of the X.3 Profile. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Escape Data Transfer

This parameter allows you to enable / disable the ability to escape from Data Transfer mode into Command mode.

Settings: 0 = Not permitted
1 = Permitted

Default: 1

(2) Echo

This parameter allows you to enable / disable echo.

Settings: 0 = No Echo
1 = Echo

Default: 1

(3) Data Forward

This parameter specifies the character(s) that will trigger the forwarding of data when they occur in the data stream. Data will be forwarded when the conditions of this parameter and the Idle Timer parameter and / or the Guard Timer parameter are fulfilled, or whenever the buffer is filled.

Settings:

0 = No data forwarding characters used

1 = Alphanumeric characters (A-Z, a-z, 0-9)

2 = CR (carriage return)

4 = ESC (escape), BEL(<Ctrl-G>, ring bell), ENQ (<Ctrl-E>, enquiry), ACK (<Ctrl-F>, acknowledge) characters

8 = DEL (delete), CAN (<Ctrl-X>, cancel), DC2 (<Ctrl-R>, device control), characters

16 = EXT (<Ctrl-C>, end of text), EOT (<Ctrl-D>, end of transmission), characters

32 = HT (<Ctrl-I>, horizontal tab), LF, (<Ctrl-J, line feed) VT (<Ctrl-K>, vertical tab), FF (<Ctrl-L>, form feed) characters

64 = All other ASCII control characters not included above (except DEL)

Valid Combinations:

(2+4)=6
(1+2+4+8+16+32+64)=127

Default: 2

(4) Idle Timer (msecs)

In compliance with ITU-T, this timer forwards data when time units have expired without reception of additional data.

This timer is sometimes called the *Intercharacter Delay Timer* because, it is the time allowed between transmitted characters. Once the timer expires, the PAD recognizes an idle condition.

NOTES:
When Echo is on and the idle timer is configured, the idle timer setting is the idle timer for the PAD (data is accumulated in the PAD buffer).

When Echo is off and the idle timer is configured, the idle timer setting is the idle timer for the modem.

A high idle timer setting for a data transfer can provide higher throughput (data is accumulated in the modem buffer). However, this may lower throughput on an interactive call. This is because the packet bus is underutilized by the smaller data packets.

Settings: 0 to 255 in units determined by the Timer Conversion parameter

Default: 0

(5) Flow Control

Determines whether the network device can use software flow control. If the system administrator configures the Terminal Flow Control Template, the template configuration takes precedence and this setting may be overwritten.

Settings: 0 = No use of X-ON / X-OFF flow control

1 = Use X-ON(<Ctrl-Q>)and X-OFF (<Ctrl-S>)

Default: 1

(6) Service Signal Control

This parameter determines whether or not Service Signals are transmitted.

Settings: 0 = No service signals

1 = Service signals are transmitted

5 = Service signals and PAD command signals transmitted with the extended dialog mode format (English, French, and Spanish)

Default: 1

(7) Action on Break

This parameter determines what will happen on receipt of a break.

Settings: 0 = No action on receipt of Break

1 = PAD sends X.25 Interrupt packet

2 = PAD sends X.25 Reset packet

4 = PAD sends X.29 Indication of Break message

8 = Escape from Data Transfer

16 = Discard output to terminal

Valid Combinations:

(1+4)=5
(1+4+16)=21

> **NOTE**: 16 is not vaild alone, but may be combined with the other values. This allows the PAD to discard output to the terminal, but only when some type of notification is sent to the sender.

Default: 8

(8) Discard Output

Settings: 0 = Normal Data Delivery

Default: 0

(9) Carriage-Return Padding

Settings: 0 = No padding

1-7 = Number of characters inserted after CR

Default: 0

(10) Line Folding

Settings: 0 to 255 = Number of characters per line

Default: 80

(11) Speed READ ONLY

Settings:

0 = 110 bps
1 = 134.5 bps
2 = 300 bps
3 = 1,200 bps
4 = 600 bps
5 = 75 bps
6 = 150 bps
7 = 1,800 bps
8 = 200 bps
9 = 100 bps
10 = 50 bps
11 = 75/1,200 bps
12 = 240 bps
13 = 4,800 bps
14 = 9,600 bps
15 = 19,200 bps
16 = 48,000 bps
17 = 56,000 bps
18 = 64,000 bps

Default: 14

(12) Flow Control by Terminal

This parameter allows the terminal user to regulate data flow using software flow control in an interactive call. If enabled, the terminal sends Ctrl-S to PAD. PAD stops reading data from the Host. PAD waits until the Tvalue time period (configured in the protocol stack) expires before sending a Receiver Not Ready packet to the Host.

Settings:

0 = No use of X-ON/X-OFF flow control
1 = Use X-ON (<Ctrl-Q>) and X-OFF (<Ctrl-S>)

Default: 1

(13) Line-Feed Insertion

This parameter determines if and when line feeds are associated with Carriage Returns.

Settings: 0 = No line feed insertion

1 = Insert line feed after CR on output to terminal

2 = Insert line feed after CR on input from terminal

4 = Insert line feed after echo of CR to terminal

Valid Combinations:

(1+2)=3

(1+4)=5
(2+4)=6
(1+2+4)=7

Default: 7

(14) Pad after Line-Feed

Settings: 0 = No padding

1-7 = Number of characters inserted after LF

Default: 0

(15) Editing

Settings: 0 = No editing

1 = Editing enabled

Default: 1

(16) Char-Delete Character Error! Bookmark not defined.

This parameter determines the ASCII character, if any, that is used to delete characters.

Settings: 0 = Function disabled

1 to 127 = ASCII character used for character delete

Default: 8

(17) Buff-Delete Character

This parameter determines the ASCII character, if any, that is used to delete buffer contents.

Settings: 0 = Function disabled

1 to 127 = ASCII character used for buffer delete

Default: 24

(18) Buff-Display Character

This parameter determines the ASCII character, if any, that is used to display the current edit buffer before forwarding.

Settings: 0 = Function disabled

1 to 127 = ASCII character used for buffer display

Default: 18

(19) Edit Service Signal

Settings: 0 = No editing of Service Signals

1 = Hard copy terminal

2 = Video display terminal

Default: 2

(20) Echo Mask

Settings: 0 = All characters echoed

1 = No echo of carriage return

2 = No echo of line feed

4 = No echo of video terminal, HT (horizontal tab), FF(form feed)

8 = No echo of BEL (ring bell), backspace

16 = No echo of escape, ENQ (enquire)

32 = No echo of ACK (acknowledge),NAK (<Ctrl-U>, negative acknowledge), STX (<Ctrl-B>, start of text), SOH (<Ctrl-A>, start of header), EOT (end of transmission), ETB (<Ctrl-W>, end of transmission block), ETX (end of text)

64 = No echo of editing characters specified in parameters 16, 17, and 18

128 = No echo of delete and all other ASCII control characters not included above

Default: 0

(21) Parity Treatment

Settings: 0 = Parity not detected or checked

1 = Parity checked

2 = Parity generated

3 = Parity checked and generated

Default: 3

(22) Page Wait

Settings: 0 = No Page Wait

1 to 255 = Number of line feeds sent by PAD before encountering Page Wait

Default: 24

(100) PAD Overwrite Mode

Message mode works best for interactive calls; *Native* mode works best for data transfer, or when you want the PAD to be transparent to the remote host; *Transparent* mode is best when line folding is controlled by the host; *Pipe* mode is best for raw data transfer in non-interactive autocalls; the *None* option works best if you want to customize parameters for the command state, but do not want those changes to affect the data transfer settings.

Refer to Appendix C for more information about modes and how they affect terminal operations.

Settings: Message | Native | Transparent | Pipe | None

Default: None

(101) Timer Conversion

Idle/Guard timer
x Timer Conversion factor
Total
x 5 msec
Data forwarding time

Setting the Timer Conversion to 1 means that the Idle Timer will be measured in 5 millisecond units.

When a Host sets the Idle Timer via an X.29 message, it usually assumes 1 unit = 50 msecs (per ITU-T).

This parameter allows adjustable timer resolution. The default resolution is 1 unit = 5 msecs, with flexibility to change the multiplying factor.

Settings: 1 to 255 in 5 millisecond units

Default: 10

(102) Guard Timer (msecs)

This timer forwards data when the configured time unit has expired.

NOTES:

When Echo is on and the guard timer is configured, the guard timer setting is the guard timer for the PAD (data is accumulated in the PAD buffer).

When Echo is off and the guard timer is configured, the guard timer setting is the guard timer for the modem.

A high guard timer setting for a data transfer can provide higher throughput (data is accumulated in the modem buffer). However, this may lower throughput on an interactive call. This is because the packet bus is underutilized by the smaller data packets.

Settings: 0 = No Guard Timer used

1 to 255 = Delay in 5 millisecond units

Default: 0

(103) Timer Mode

Settings: 0 = No Guard or Idle Timer

1 = Guard Timer (parameter 102) only

2 = Idle Timer (parameter 4) only

3 = Both Guard and Idle Timer

Default: 2

(104) Line Recall

This parameter determines the ASCII character, if any, used to display the last edit buffer forwarded.

Settings: 0 = Function disabled

1 to 127 = ASCII character used for buffer display

Default: 0

(105) STD PAD

This parameter determines if you want the Breakin Recall Character to be compliant with ITU-T specifications.

If the PAD setup is Standard, the Breakin recall character will default to Ctrl-P, with no modifiers.

If the PAD setup is Non-Standard, the Breakin recall character will default to Ctrl-Pa or one of the other modifiers listed below:

a	Enter PAD command mode.
b	Send a break signal to the connected host.
e	Reverse the current echo state (until Enter is pressed).
r	Reset the current call (if any).
t	Forward the current buffered line.
char	Put the character into the buffer-used mainly for control characters DLE, DC2, and CAN.

The terminal user may use the Breakin recall character, revise X.3 settings, and the new configuration will take effect immediately.

Settings: 0 = Non-Standard PAD

1 = Standard PAD

Default: 0

(106) Qbit Ignore

This parameter allows the user to configure the PAD so it will ignore all X.29 messages from the remote host.

Settings: 0 = Allow X.29 Messaging

1 = Ignore X.29 Messaging

Default: 0

(107) Max X25 Call Attempts

This parameter sets the number of allowable call attempts to the PAD. Once the user exceeds the number of call attempts allowed, the call immediately takes down the modem-PAD link by dropping DTR.

> **NOTE**: This parameter may only be set via the RS-232 User Interface and the *X.25 PAD Configurator* programs (it may not be set at the PAD prompt).

Options: 1 to 127

Default: 0

(108) Inactivity Timer

This parameter functions as an inter-call inactivity timer. When a user connects to the PAD, this timer begins counting up to the value configured. If the user makes no call attempt to the host during the allotted time, the modem-terminal link is dropped. If the user makes a successful call to the host, this timer is reset and disabled for the remainder of the connection. When the call to the host is cleared, the timer is once again enabled and it begins counting again. A setting of 0 disables this timer.

> **NOTE**: This parameter may only be set via the RS-232 User Interface and the *X.25 PAD Configurator* programs (it may not be set at the PAD prompt).

Options: 0 to 255 seconds

Default: 0

(109) Pass XON/XOFF

This parameter determines whether or not XON / XOFF characters will be passed on from the terminal through the PAD to the remote host.

Options: 0 = No

1 = Yes

Default: 0

(110) Help Enable/Disable

This parameter enables or disables Help at the PAD prompt.

Options: 0 = No

1 = Yes

Default: 0

Create a Banner and Prompt

The Banner and Prompt template is used to create screen displays that identify the PAD when a call matching the subscriber comes into the PAD.

Type **A 8** to add an entry to option 8—Banner and Prompt. The Banner and Prompt Data Entry screen appears. After naming the template, continue to customize the banner and prompt for your application.

Banner and Prompt Template

Name

This is the name of the configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Banner (Max 80 Chars)

This is the banner to be displayed by your application to a user. You may include information in the PAD banner that lets the terminal user know what modem (1-48) and channel (1-4) in the chassis is being used, what slot the modem card inhabits in the chassis (2-13), and the slot the PAD inhabits in the chassis (2-13).

The banner message allows up to 80 characters. Include the following switches in the configured banner for the noted results. The switches are not case sensitive (#g and #G result in the same information display).

#m Modem Number (1-48)
#c Channel Number (1-4)
#s Slot Number (2-13)
#g PAD Slot Number (2-13)

Example:

Welcome! You are using Channel #c of Modem #m in Slot #s.

Settings: Up to 80 alphanumeric characters

Default: X.25 Gateway

(2) Prompt (Max 6 Chars)

This is the prompt to be displayed by your application to a user.

Settings: Up to 6 alphanumeric characters

Default: PAD>

Subscriber Template Setup

Once you have completed the mandatory steps in *Initial Setup*, you are ready to set up a subscriber. The Subscriber template is used as a routing mechanism. By pointing to templates associated with a particular subscriber and by enabling features such as Autocall or Security, this template *defines* the configuration to be used with a matching call.

1. From the PAD Template Types Menu, select option 1—Subscriber by typing **A 1** and pressing Enter. The Subscriber Data Entry screen appears.
2. Enter the desired parameters for this subscriber, including previously defined template names.

   NOTES:

   You must enter the names of the previously configured Modem Profile, X.3 Profile, and Banner and Prompt templates or the subscriber will be invalid.

   If you enable Autoconnect or Autocall (never both for one Subscriber), security should be off (none), the terminal must be non-interactive, and you must configure an Autoconnect / Autocall template and link it to the Subscriber or the Subscriber record will be invalid.

3. After you have added or modified settings, press Enter to redisplay your entry. Verify your change, and then press Esc to return to the PAD Template Types Menu.

Subscriber Template

Name

This is the name of the configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Autocall Enable

This parameter enables / disables the feature for this subscriber.

Settings: Yes | No

Default: No

(2) Autoconnect Enable

This parameter enables / disables the feature for this subscriber.

Settings: Yes | No

Default: No

(3) Dial Out Enable

This parameter enables / disables the feature for this subscriber.

Settings: Yes | No

Default: No

(4) Flow Control Enable

This parameter enables / disables the feature for this subscriber.

Settings: Yes | No

Default: No

(5) Security

Enable security for User ID, Password and User ID, or disable security.

Settings: User ID | Both | None

Default: None

(6) Accounting (Pass ANI)

This parameter value determines if ANI (Automatic Number Indication String)—the phone number calling into the PAD—is placed in the call request packet *as* the calling address.

Options: 0 = No

1 = Yes

Default: 0

(7) App ID

This parameter is not currently implemented.

(8) Call by Alias Only

This parameter allows you to stipulate that calls should be addressed only by alias. If you enable this parameter, the PAD will not make calls addressed via X.121 addressing.

Settings: Yes | No

Default: No

(9) CUD Overwrite

This parameter is not currently implemented.

(10) Terminal Type

This parameter selects the mode under which the terminal will communicate with the PAD.

When Scriptmode is selected, the terminal will communicate interactively with the PAD, but only for the duration of the current call.

FastAutocall configures the call such that an X.25 session is established simultaneously with establishing a modem connection.

NOTE: A Noninteractive selection disables a PAD prompt for autocalls and autoconnects.

Settings: Interactive | Noninteractive | Scriptmode | FastAutocall

Default: Interactive

(11) Dial Out Support NAME

Optional

This is the name of the configured Dial Out Support template you want linked to this subscriber.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(12) Autocall NAME

Optional

This is the name of the configured Autocall template you want linked to this subscriber.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(13) Autoconnect NAME

Optional

This is the name of the configured Autoconnect template you want linked to this subscriber.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(14) Flow Control NAME

Optional

This is the name of the configured Flow Control template you want linked to this subscriber.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(15) Modem Profile NAME

Mandatory

This is the name of the configured Modem Profile template you want linked to this subscriber.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(16) X.3 Profile NAME

Mandatory

This is the name of the configured X.3 Profile template you want linked to this subscriber.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(17) Banner and Prompt NAME

Mandatory

This is the name of the configured Banner and Prompt template you want linked to this subscriber.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(18) Protocol Spoof Enable

This parameter allows you to enable / disable protocol spoofing.

Settings: Yes | No

Default: No

(19) Protocol Spoof NAME

Optional

This is the name of the configured VISA Protocol Spoofing template you want linked to this subscriber.

Settings: Up to 8 alphanumeric characters

Default: NONAME

DNIS or ANI Configuration

Once the Subscriber template has been configured and named, it can be linked to a DNIS (dialed number) or ANI (caller's number) template. This allows the Subscriber template to be invoked based on the DNIS or ANI of the incoming call.

1. From the PAD Template Types Menu, add an option 15—ANI or option 16—DNIS template. The ANI or DNIS data entry screen appears.
2. Configure the ANI or DNIS appropriately, entering the name of the Subscriber template to which you want to link this DNIS or ANI.
3. After you have added or modified settings, press Enter to redisplay your entry. Verify your change, and then press Esc to return to the PAD Template Types Menu. The DNIS or ANI number is now linked to your subscriber configuration.

ANI Template

ANI

This is the caller's telephone number. This must be a complete match with the ANI forwarded by the modem. Type the number enclosed in angle brackets (<NUMBER>).

Settings: Up to 17 digits

Default: 0

(1) Subscriber NAME

This is the name of the configured Subscriber template you want linked to this ANI.

Settings: Up to 8 alphanumeric characters

Default: NONAME

DNIS Template

DNIS

This is the dialed telephone number. This must be a complete match with the DNIS forwarded by the modem. Type the number enclosed in angle brackets (<NUMBER>).

Settings: Up to 17 digits

Default: 0

(1) Subscriber NAME

This is the name of the configured Subscriber template you want linked to this DNIS.

Settings: Up to 8 alphanumeric characters

Default: NONAME

Additional Template Configurations

PAD configuration is flexible. The following configurable parameters are optional choices from the PAD Template Types Menu. They further define the configuration to be applied to the incoming call.

2. Autocall Template

This template allows you to enter a set of up to five X.25 addresses to be dialed automatically when this feature is enabled in the Subscriber template. If the first address does not match or connect, the call is attempted on another Remote Host number.

> **NOTE:** Before Autocall will be configured, you must configure at least one Remote Host template.

Name

This is the name of this configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Remote Host 1 NAME

This is the name of the primary configured Remote Host template you want linked to this autocall configuration.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(2) Remote Host 2 NAME

This is the name of a secondary configured Remote Host template you want linked to this autocall configuration. A connection with this host will be attempted if the primary host cannot be reached.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(3) Remote Host 3 NAME

This the name of a third configured Remote Host template you want linked to this autocall configuration. A connection will be attempted if Host2 cannot be reached.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(4) Remote Host 4 NAME

This the name of a fourth configured Remote Host template you want linked to this autocall configuration. A connection will be attempted if Host3 cannot be reached.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(5) Remote Host 5 NAME

This the name of a fifth configured Remote Host template you want linked to this autocall configuration. A connection will be attempted if Host4 cannot be reached.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(6) Call Timeout (secs)

This is the time allowed in which to establish a connection.

Settings: 0 to 1800 (seconds)

Default: 0 (No timeout)

3. Autoconnect Template

This template allows you to control PVC-type connections. Permanent Virtual Circuits are hard coded and automatically create a connection between one terminal and one host when a call comes in to the PAD.

Name

This is the name of this configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Subnetwork ID

This is the subnetwork (A = port 1 on the NIC; B = port 2 on the NIC) through which the PVC should be established.

Settings: A | B

Default: A

(2) Logical Channel Identifier

This is the logical channel number (LCN) on which the PVC should operate. The range you configure for the PLP must be compatible with this channel, or the call will be invalid. Refer to the Virtual Circuit Range parameters you configured in the protocol stack.

Settings: 0 to 4095

Default: 0

(3) Continuity Test

This parameter is not currently implemented.

4. Dial Out Support

When dial-out calls are supported, this template allows the *remote host* to dial in to the PAD, configure a modem (Start string), and reconfigure the modem back to its original state when the call is finished (Stop string). Refer to the *Quad Modem Reference Manual* for modem factory defaults and command options.

Name

This is the name of this configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Start String

This is the modem configuration string to be executed before the modem accepts a call.

Settings: Up to 64 ascii characters (*including* the AT command prefix, carriage return, or spaces)

Default: Null

(2) Stop String

This is the modem configuration string to be executed after the modem ends a call.

Settings: Up to 64 ascii characters (*including* the AT command prefix, carriage return, or spaces)

Default: Null

(3) Modem Forwarding Chars

Settings:

0 = No data forwarding characters used

1 = Alphanumeric characters (A-Z, a-z, 0-9)

2 = CR (carriage return)

4 = ESC (escape), BEL(<Ctrl-G>, ring bell), ENQ (<Ctrl-E>, enquiry), ACK (<Ctrl-F>, acknowledge) characters

8 = DEL (delete), CAN (<Ctrl-X>, cancel), DC2 (<Ctrl-R>, device control), characters

16 = EXT (<Ctrl-C>, end of text), EOT (<Ctrl-D>, end of transmission), characters

32 = HT (<Ctrl-I>, horizontal tab), LF, (<Ctrl-J, line feed), VT (<Ctrl-K>, vertical tab), FF (<Ctrl-L>, form feed) characters

64 = All other ASCII control characters not included above (except DEL)

Valid Combinations:

(2+4)=6
(1+2+4+8+16+32+64)=127

Default: 1

(4) Modem Forwarding Timer (msecs)

This parameter sets the forwarding timer in the modem.A value of 0 means there is no forwarding timer.

Settings: 0 to 65535 (in 5 millisecond units)

Default: 0

(5) CUD Call Screening

When enabled, the database will check the security configuration for the Remote Host template. If security is enabled, the password in the CUD of the Dial Out call will be checked against the password configured in the Remote Host template. The call is then accepted or denied on the basis of CUD Call Screening.

The CUD should be 12 characters in length (e.g., HOSTPASSSUBC). The first four characters (HOST) should be the name of the remote host template. The next four (PASS) specify the password configured in the remote host template. The last four (SUBC) specify the name of the subscriber template associated with the dialout call.

Settings: Yes | No

Default: No

5. Terminal Flow Control Template

When enabled, this template allows the PAD to use in-band flow control (XON / XOFF) to control data transfer *from* the terminal *to* the remote host. Once the flow control is established, the PAD retries to send the data in its buffer until there is a successful data transfer or until the call is disconnected.

Name

Enter the name of this configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Retries

Specify how many times do you want the PAD to retry data transfer before the call is disconnected. If the PAD polls the terminal the number of times configured in this parameter and no data is received, the PAD will disconnect the call. A value of 0 disables this feature (the PAD will never drop the call solely because of a flow control condition).

Settings: 0 to 60

Default: 0

(2) Timeout between Retries (50 msecs)

Specify the interval between retries. A value of 0 means the PAD will continuously poll the terminal for data (for as many retries as are configured) with no delay between polling.

Settings: 0 to 60 in 50 millisecond units

Default: 0

(3) Send XON/XOFF

Settings: Yes= PAD will send Ctrl-S and Ctrl-Q characters to the terminal when there is a flow control condition.

No = PAD will only use retries and timeouts to the terminal in response to a flow control condition.

Default: No

9. Remote Host Template

This template allows you to describe a remote host that you want the PAD to connect with for a particular subscriber.

NOTE: Before a Remote Host can be created, you must first configure Address, X.28 Facilities, and CUD templates (described on the following pages) or the Remote Host template will be invalid.

Name

Enter the name of this configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Flow Control Enable

If enabled, the call will use flow control as configured in the named Flow Control template (Parameter 5).

Settings: Yes | No

Default: No

(2) Security

If enabled, the PAD checks for a password in the Call User Data of the call request.

Settings: Yes | No

Default: No

(3) Password

If Parameter 3 is enabled, the PAD will compare the CUD password in the call request to the password entered here. If the passwords do not match, the call is not accepted.

Settings: Up to 5 alphanumeric characters

Default: BYUSR

(4) Flow Control NAME

This is the name of the configured Flow Control template you want linked to this remote host.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(5) Address NAME

This is the name of the configured Address template you want linked to this remote host.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(6) X.28 Facility NAME

This is the name of the configured X.28 Facility template you want linked to this remote host.

Settings: Up to 8 alphanumeric characters

Default: NONAME

(7) CUD NAME

This is the name of the configured CUD template you want linked to this remote host.

Settings: Up to 8 alphanumeric characters

Default: NONAME

10. Host Flow Control Template

When enabled, this template allows the PAD to use in-band flow control (XON / XOFF) to control the data transfer *from* the remote host *to* the terminal. Once the flow control is established, the PAD continues to try to send the data in its buffer until there is a successful data transfer or until the call is disconnected.

NOTE: This template is only valid for a call placed to a host alias.

Name

This is the name of this configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Retries

Specify how many times do you want the PAD to retry data transfer before the call is disconnected. If the PAD polls the host the number of times configured in this parameter and no data is received, the PAD will disconnect the call. A value of 0 disables this feature (the PAD will never drop the call solely because of a flow control condition).

Settings: 0 to 60

Default: 0

(2) Timeout between Retries (50 msecs)

Specify the interval between retries. A value of 0 means the PAD will continuously poll the host for data (for as many retries as are configured) with no delay between polling.

Settings: 0 to 60 in 50 millisecond units

Default: 0

(3) Send XON/XOFF

Settings: Yes= PAD will send Ctrl-S and Ctrl-Q characters to the host when there is a flow control condition.

No = PAD will only use retries and timeouts to the host in response to a flow control condition.

Default: No

11. Address Template

This template allows you to set up and describe a set of addresses for remote hosts on the X.25 network. This template is associated (linked) with the remote host template, so a remote host name (alias) can link the caller to the appropriate remote host on the X.25 PSN.

NOTE: If NSAP (parameter 4) is used, the DTE address (parameter 3) must be defined, and Channel PVC must be selected as the Aflag (parameter 2).

Name

This is the name of this configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Subnetwork (A, B or S)

This is the physical port the call should be routed through to the X.25 PSN. If S is selected, the PAD will switch between ports according to availability.

Settings: A | B | S

Default: A

(2) Aflags

This parameter identifies the format of the Address Flags.

Osinsap = OSI encoded NSAP

X.25 Extended = Non-OSI encoded extended address

Channel PVC = DTE address contains X.121 address

Settings: Osinsap | X.25 Extended | Channel PVC

Default: Osinsap

(3) DTE Address

This parameter identifies the address of your remote host.

Hex digits in the DTE address must have been enabled when you configured the PLP Localization Information parameters in the protocol stack. Otherwise, only digits 0-9 are allowed.

Settings: Up to 17 decimal characters (0, 1, 2, 3...9, A, B...F)

Default: Null

(4) NSAP

This parameter identifies the Network Service Access Point where network service is supplied to the remote host.

Settings: Up to 40 decimal characters (0, 1, 2, 3...9, A, B...F)

Default: Null

(5) Allow X.29 Reselection

This parameter indicates the PAD response to a remote host X.29 reselection message.

Settings: Yes = PAD allows reselection upon host X.29 reselection request

No = PAD will disconnect call if the host requests reselection.

Default: No

12. X.28 Facility Template

This template allows you to set up X.28 features you will use when establishing a call (one template for each remote host).

Name

This is the name of this configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Fast Select

This parameter indicates if up to 128 bytes in the CUD field of the Call Request packet are allowed.

If you want to enable this feature, Fast Select must have been enabled when you configured the PLP Subscription Options in the protocol stack.

Settings: Yes | No

Default: No

(2) Reverse Charge

This parameter indicates if calls requesting Reverse Charging are allowed.

If you want to enable this feature, Reverse Charge must have been enabled when you configured PLP Subscription Options in the protocol stack.

Settings: Yes | No

Default: No

(3) Local Packet Size

This parameter specifies the local packet size—must agree with the configured PLP Packet and Window Sizes in the protocol stack.

Settings: 4 to 9 (2^4 to 2^9)

Default: 8

(4) Remote Packet Size

This parameter specifies the remote packet size—must agree with the configured PLP Packet and Window Sizes in the protocol stack.

Settings: 4 to 9 (2^4 to 2^9)

Default: 8

(5) Local Window Size

This parameter specifies the local window size—must agree with the configured PLP Packet and Window Sizes in the protocol stack.

Settings: 1 to 127 octets

Default: 3

(6) Remote Window Size

This parameter specifies the remote window size—must agree with the configured PLP Packet and Window Sizes in the protocol stack.

Settings: 1 to 127 octets

Default: 3

(7) NUI Field

This is the Network User Identifier supplied by the network provider.

If you want to enable this feature, NUI Override must have been enabled when you configured the PLP Subscription Options in the protocol stack.

Settings: 0 to 64 alphanumeric characters

Default: Null

(8) RPOA Field

This parameter specifies the sequence of one or more Recognized Private Operating Agencies (RPOA) transit networks.

The RPOA must be within the originating country through which the call is routed when more than one RPOA exists in a sequence of one or more gateways.

Settings: 1 to 4 four-digit numbers

Default: Null

(9) CUG Type

Multiuser CUGs allow more than two users in the group, with defined access (outgoing / incoming / preferential).

Bilateral CUGs allow mutual preferential access between two users.

Settings: Muliuser | Bilateral | None

Default: None

(10) CUG Field

This parameter specifies the CUG (if one exists) associated with the current call.

Settings: Up to four digits

Default: 0000

13. Call User Data Template

This template allows you to set up CUD parameters in the call request packet that the remote host can recognize. The CUD field in a call request packet can contain information such as a name, password, and subaddress of a remote host. The remote host can only be assigned one CUD template.

Name

This is the name of this configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) CUD (Max 128 Chars)

If you intend to include spaces in the Call User Data, the entire CUD content must be enclosed in quoatation marks.

If the data in the CUD is more than 12 characters, the PAD will automatically use Fast Select. If the host does not subscribe to Fast Select, the call will be rejected.

Settings: Up to 128 ASCII characters

Default: Null

14. Modem Port Template

This template allows you to specify port characteristics for the particular modem that you want to use for a connection. If matching ANI and DNIS are not available for a call, the modem port configuration can provide information necessary for connection (because it is linked to a Subscriber template).

NOTE: Even if no subscriber template name is entered for parameter 6 in theModem Port template, the call will be routed. The system treats the call as if you had entered “Default” for parameter 6 with no modem subaddress.

We recommend, however, that you *do* enter “Default” as the Subscriber name if the call is not part of a modem subaddress pool.

Refer to Chapter 3 for more information about call routing and the importance of modem subaddresses.

Name

This is the number of the port for which this template is configured. Type the name enclosed in angle brackets (<NAME>).

Settings: 1 to 48
(or 24 numbers between 1 and 48 if you purchased the 24 channel PAD)

Default: 1

(1) Max Retry Time-Out (secs)

This is the interval between retries.

Settings: 5 to 100 in seconds

Default: 10

(2) Port State

This is the current status of the modem port.

Settings: Inservice | Outofservice

Default: Outofservice

(3) Application Type

This is the type of call to be placed through this port.

Settings: Dialin | Dialout

Default: Dialin

(4) Allow Writes to NVRAM

This indicates if the modem is allowed to write to nonvolatile memory.

Settings: Yes | No

Default: No

(5) Subscriber NAME

This is the name of the configured Subscriber template you want linked with this configuration.

Settings: **Up to 8 alphanumeric characters**

Default: **NONAME**

17. User ID Template

This template allows you to set up password security and link it to a subscriber configuration. The name of the User ID template also serves as the security User ID.

User ID

This is the security User ID. Type the User ID enclosed in angle brackets (<USERID>).

Settings: Up to 5 alphanumeric characters

Default: NONAME

(1) Password (Max 8 Chars)

This is the security password.

Settings: 0 to 8 alphanumeric characters

Default: BYUSR

(2) Subscriber NAME

This is the name of the configured Subscriber template you want linked with this configuration.

Settings: Up to 8 alphanumeric characters

Default: NONAME

18. X.25 Subnetwork Configuration Template

This template selects the physical port on the rear panel of the V.35/RS-232 NIC that will be used for a connection, and its subnetwork ID characteristics. The "subnetwork" is the physical interface between the PAD and the PSN. Physical port 1=Subnetwork A and physical port 2=Subnetwork B.

Subnetwork (A or B)

This is the subnetwork for which this template is configured. Type the subnetwork enclosed in angle brackets (<SUBNETWORK>).

Settings: A | B

Default: A

(1) Subnetwork ID in Use

This indicates if the subnetwork ID is currently in use.

Settings: Yes | No

Default: No

(2) Address NAME

This is the name of the configured Address template you want linked with this configuration.

Settings: Up to 8 alphanumeric characters

Default: NONAME

19. VISA Protocol Spoofing Template

This template allows you to set up VisaI (single transaction) and VisaII (multiple transaction) spoofing. Refer to Chapter 4 for a spoofing overview.

Name

This is the name of this configured template. Type the name enclosed in angle brackets (<NAME>).

Settings: Up to 8 alphanumeric characters

Default: NONAME

(1) Delete 1st ENQ Recvd from Remote Host to POS Terminal

If you enable this parameter and the Host has ENQ (enquire messaging) enabled, the PAD will delete the first ENQ the Host sends to the terminal.

Settings: Yes | No

Default: No

(2) Max ENQ Retransmission Count

This is the number of times the PAD should send ENQs (enquire messages) to the terminal if data is not received.

Settings: 0 to 10

Default: 10

(3) ENQ Retransmission Timeout (50 msesc)

This is how long the PAD will wait between ENQs (enquire messages) to the terminal.

Settings: 0 to 255 in 50 millisecond units

Default: 5

(4) Spoof ENQ

If you enable this parameter, the PAD spoofs ENQs (enquire messages) to the terminal.

Settings: Yes | No

Default: No

(5) Spoof ACK

If you enable this parameter, the PAD sends an ACK / NAK to the terminal (ACK if CRC is correct; NAK if CRC is incorrect) upon receipt of data from the terminal.

Settings: Yes | No

Default: No

(6) Spoof EOT

If you enable this parameter, the PAD spoofs an EOT (end of transmission message) to the terminal after receipt of the last transaction from the terminal.

Settings: Yes | No

Default: No

(7) Max Number of Reads for EOT from Remote Host

This is the number of times the PAD reads EOTs (end of transmission messages) from the host before disconnecting the call.

Settings: 0 to 10

Default: 0

(8) Interval between EOT Reads (50 msecs)

This is how long the PAD waits for an EOT (end of transmission message) from the host before timing out and retrying.

Settings: 0 to 150 in 50 millisecond units

Default: 0

(9) Delay before Sending 1st ENQ to POS Terminal (50 msecs)

This is how long the PAD waits after Carrier Detect before sending the initial ENQ (enquire message) to the terminal. If too short a time, the terminal may not read the ENQ.

Settings: 0 to 125 in 50 millisecond units

Default: 0

(10) Wait Timer for Reading Data from POS Terminal (50 msecs)

This is how long the PAD waits to receive data from the modem before "cycling through."

Creating this delay may optimize PAD efficiency when it supports simultaneous calls on many modems.

Settings: 0 to 125 in 50 millisecond units

Default: 0

Managing Existing Templates

When you choose to Remove, Modify, or Display a template from the PAD Template Types Menu, a list of the named templates related to the selected template type appears.

```
<template type> Template Names

1) DEFAULT
2) uswestt3
3) ussouth4
5) brazil04
6) ontario4
7) quebec22

Enter menu selection and press Enter or press Esc to exit.

Enter Selection:
```

Figure 7.4—Listings Menu

1. Type the number corresponding to the named template you want to remove, modify, or display and press Enter. The appropriate template data entry screen appears.
2. Use the data modification convention ([field number]:[data value]) to edit the template parameters.
3. Press Enter. The information you modified is displayed on the data entry screen. Double check your entries, then press Esc. The Listing menu appears again, so you may make another selection.
4. Press Esc again, and you are returned to the PAD Template Types Menu.

Template Number Restrictions

You can only configure 1500 templates of each template type. For instance, you can only configure 1500 Subscribers, 1500 X.3 Profiles, 1500 Modem Port Templates, etc. If you configure 1501 or more, you will not be able to view a list of all configured Subscribers, X.3 Profiles, Modem Port Templates, etc. The screen that displays lists of configured templates will only list the first 1500 entries.

Chapter 8
Obtaining Statistics

When obtaining status information about the protocol stack, you will follow the screen flow indicated below.

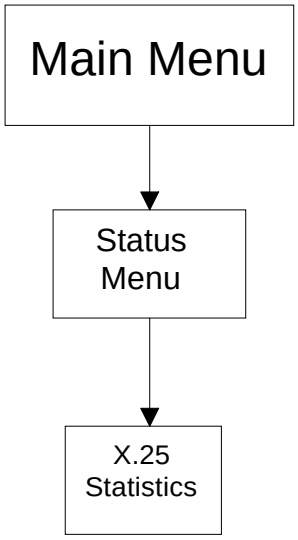


Figure 8.1—Status Flow

1. Attach your PC or terminal to the User Interface port (see *Getting Started* in Chapter 5). Press Enter to display the Main Menu.

2. Select option 2—Status from the Main Menu and press Enter. The Status Menu appears.

```
Status

1 X.25 Protocol


Enter menu selection and press Enter or press Esc to exit.

Menu Selection (1):
```

Figure 8.2—Status Menu

3. Select option 1—X.25 Protocol and press Enter. The X.25 Statistics Menu appears.

```
X.25 Statistics

1) PLP
2) LAPB
3) WAN

Enter Subnetwork (A, B), Followed by menu number.
PLP statistics for all subnetworks are integrated into a single display.
Press Esc to exit.

Enter Selection:
```

Figure 8.3—X.25 Statistics Screen

There are three possible selections on the X.25 Statistics Menu.

- PLP—Provides statistics for the packet layer of all subnetworks.
- LAPB—Provides statistical information for the Link Access Procedure-Balanced layer of the selected subnetwork.
- WAN—Provides statistical information for the WAN (physical) layer of the selected subnetwork.

4. Type A or B to select the subnetwork you want to display; leave a space; type 1, 2, or 3 to select the X.25 layer statistics you want to view; then press Enter. Statistics for the selected layer and subnetwork are displayed. Press Esc to return to the X.25 Statistics Menu.

Chapter 9
Sending System Commands

When you want to send system-related commands, follow the screen flow indicated below.

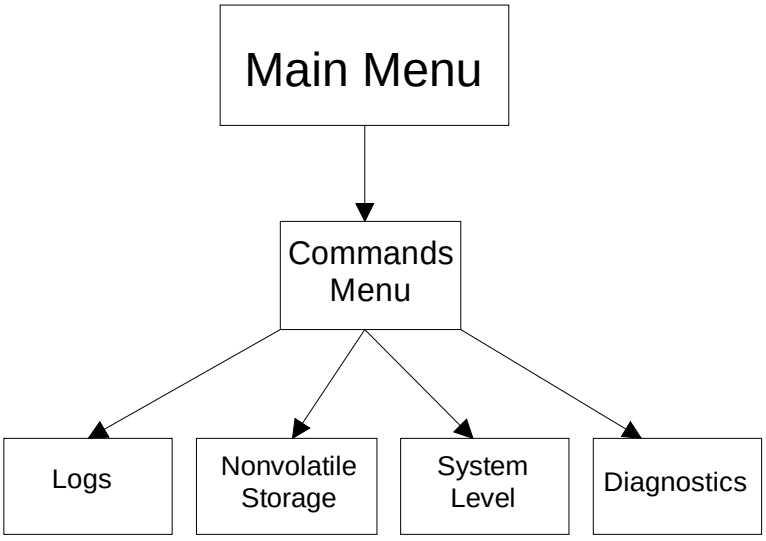


Figure 9.1—System Command Flow

1. Attach your PC or terminal to the User Interface port (see *Getting Started* in Chapter 5). Press Enter to display the Main Menu.

2. Select option 3—Commands from the Main Menu and press Enter. The Commands Menu appears.

```
Commands

1 Logs
2 Nonvolatile Storage
3 System Level
4 Diagnostics

Enter menu selection and press Enter or press Esc to exit.

Menu Selection (1-4):
```

Figure 9.2—Commands Menu

There are four possible selections on the Commands Menu.

- Logs—Allows you to enable, disable, clear and display activity and diagnostic logs.
- Nonvolatile Storage—Allows you to save or erase your current system configuration.
- System Level—Allows you to control the local port.
- Diagnostics—Allows you to run diagnostic testing on the PAD.

3. Select a command group, then press Enter. The selected command menu appears. Press Esc to exit.

Logs

1 To manage system logs, select option 1—Logs and press Enter. The Logs command menu appears.

```
Logs

1) Enable Diagnostic Log
2) Disable Diagnostic Log
3) Clear Diagnostic Log
4) Display X.25 Diagnostic Log
5) Manage System Activity Log
6) Display System Activity Log

Available Diagnostic Log Names:  X.25
When enabling, disabling, or clearing, enter menu number followed by log name.
Press Esc to exit.

Enter Selection:
```

Figure 9.3—Logs Command Menu

2 To display the System Activity Log or X.25 Diagnostic Log, type 6 or 4 and press Enter.

To manage a Diagnostic Log, type 1, 2, or 3; then type the name of the Diagnostic Log and press Enter.

To manage the System Activity Log, type 5 and press Enter.

Nonvolatile Storage

If you have configured any element of the protocol stack or a PAD template and want to save the configuration, select option 2—Nonvolatile Storage and press Enter. The Nonvolatile Storage command menu appears.

```
Nonvolatile Storage

21% Available

1) Save Configuration to Nonvolatile Memory
2) Erase Configuration in Nonvolatile Memory

Enter menu selection and press Enter or press Esc to exit.

Menu Selection (1-2):
```

Figure 9.4—Nonvolatile Storage Command Menu

1 To save your current configuration to NVRAM, select option 1.

> **NOTE**: Be sure to wait for the message "Database successfully saved" before moving on to another operation.

2 To erase the current configuration from NVRAM and perform a hardware reset, select option 2. A prompt will ask if you are sure. Enter **YES** in all capital letters.

System Level

To send commands related to controlling the local port, select option 3—System Level and press Enter. The System Level command menu appears.

```
System Level

1) Reset X.25 Gateway Card
2) Enable/Disable Local Port XON/XOFF Flow Control

Enter menu selection and press Enter or press Esc to exit.

Menu Selection (1-2):
```

Figure 9.5—System Level Command Menu

1. To do a hardware reset of the X.25 card, select option 1.
2. To enable flow control at the local port, select option 2 and type **E**.

   To disable flow control at the local port, select option 2 and type **D**.

Diagnostics

To run diagnostic tests on the PAD, select option 4—Diagnostics and press Enter. The Diagnostic Tests command menu appears.

```
Diagnostic Tests

1) DMA Controller Presence Test
2) DMA and ESCC, Interrupts, and Internal Loopback
3) DMA and ESCC, Interrupts, and External Loopback
4) ESCC Controller Presence Test
5) UART Presence Test

Enter umber of test or any combination.
Tests 1-4 must be followed by Subnetwork A or B (Ex. 2@A, 4@B, etc).

Enter Selection:
```

Figure 9.6—Diagnostic Tests Command Menu

To run a diagnostic test, enter the menu selection and indicate which subnetwork the test should be run on. You can tell the system to run more than one test. For example, to run test 1 on both subnetworks A and B, use the following syntax:

1@A 1@B<Enter>

NOTE: The order in which the tests are run may affect test effectiveness. We recommend you run tests 3 and 4 *before* requesting test 2, or you may receive a Transfer Timeout.

Refer to the *Hardware Install Guide* for descriptions of the tests.

Chapter 10
Windows Configuration Overview

This chapter introduces the Windows configuration options. In this chapter, we discuss the concepts you should become familiar with before you set out to configure the X.25 PAD using *Total Control Manager/SNMP* and the *X.25 PAD Configurator* programs.

Related Topics

Configuring the X.25 Protocol Stack	Chapter 11
Configuring a Subscriber	Chapter 12
Obtaining Statistics	*Total Control Manager/SNMP Software Guide*
Sending System Commands	*Total Control Manager/SNMP Software Guide*

Overview

The Windows system tools (*Total Control Manager/SNMP* and the *X.25 PAD Configurator* programs), like the RS-232 User Interface, are flexible, so the PAD can be configured to meet your needs now, and in the future. The most important step in PAD configuration is planning. You must know the needs of your dial-up clients and the capabilities of the packet-switched networks (PSNs) you connect with; the PAD is just the "middle-man" between the two.

The first step is to use the *Total Control Manager/SNMP* program to configure the protocol stack, making it compatible with the PSN requirements.

Once the stack is configured, you can use the X.25 PAD Configurator program to configure Subscriber records. *Subscriber* is the term we use to

describe the basic record of the X.25 PAD database. A subscriber is a custom configuration, in that it enables certain features and acts as a repository for other configured templates (such as modem profiles).

The X.25 PAD database is made up of configured template information. You set up a template that configures the PAD for a certain type of call (interactive / non-interactive), a call that comes into the PAD from a certain number (terminal), or is directed to a certain number (remote host). The templates you set up are then linked to a Subscriber record. When a call comes into the chassis and is routed to the PAD, the software searches for a match with a subscriber. When a match is found, the modem is configured accordingly and the call is routed.

Template configurations allow modems to be configured and calls to be routed. If you place an interactive call from a terminal, you can also use X.28 commands to configure call data. Supported X.28 commands are listed in Appendix A.

Configuration

Configuring the PAD to meet your needs is accomplished by configuring the protocol stack and by creating a Subscriber database. The configured stack lays the groundwork for the custom call routing and terminal and host control features you can enable as part of the Subscriber template configurations. Appendix E contains some quick How-To's for some common configurations, but you should first be familiar with the configuration logic presented in this chapter. We also provide configuration tips in the *X.25 PAD Configurator* Help.

Minimal Configuration

The X.25 PAD comes with a default configuration that should bring the network connection up immediately, once a few adjustments are made. If you want to check your network status, simply adjust the following, then save the database, and reset the card.

- logical channel numbers (see the PLP Virtual Circuit Ranges parameter descriptions in the *TCM/SNMP Software Guide*)
- port ranges (see the Modem Port template in the *X.25 PAD Configurator* Help program)
- clock source (see the WAN Configuration parameter descriptions in the *TCM/SNMP Software Guide*)

Protocol Stack

The Physical (WAN), Link Access (LAPB), and Packet (PLP) layers of the X.25 protocol stack can be configured via the *TCM/SNMP* software.

WAN Configuration

Configure these parameters to define the interface between the PAD and the X.25 PSN.

LAPB Configuration

By configuring these parameters, you set up the link so both the DTE and DCE can send frames. It defines frame transfer parameters, and defines rules for timing and frame formatting.

PLP Configuration

PLP configuration parameters are separated into logical groups to simplify PLP configuration. There are 11 possible selections from the PLP Groups Menu.

Configuration Planning

Subscriber configurations are made up of configured elements and enabled elements. It is vital to plan and keep track of the protocol stack configuration, as some of the parameters defined in the Subscriber database must be compatible with the stack. You may wish to use a planning technique, such as reference logs, to keep track of the detailed stack configuration.

Subscriber

NOTE: This portion of PAD configuration has some dependencies, where, if certain features are to be enabled for a subscriber, some pre-configuration is required in the X.25 Protocol Stack.

The *X.25 PAD Configurator* program creates a Subscriber database that is based on the templates you configure. There are 19 templates you can create and link together.

Figure 10.1 is a diagram of the configuration flow (what to configure first) for every configurable template related to the Subscriber database.

When you configure a Subscriber template, you link other configured templates into one entity the system uses to locate configuration information appropriate for a call. The Subscriber template allows the network administrator to consolidate the many features available in the

X.25 PAD into a group that can then be associated with an ANI, DNIS, or modem port. When an appropriate call is received at the PAD, it can then pull a single record and configure the modem appropriately for that particular call.

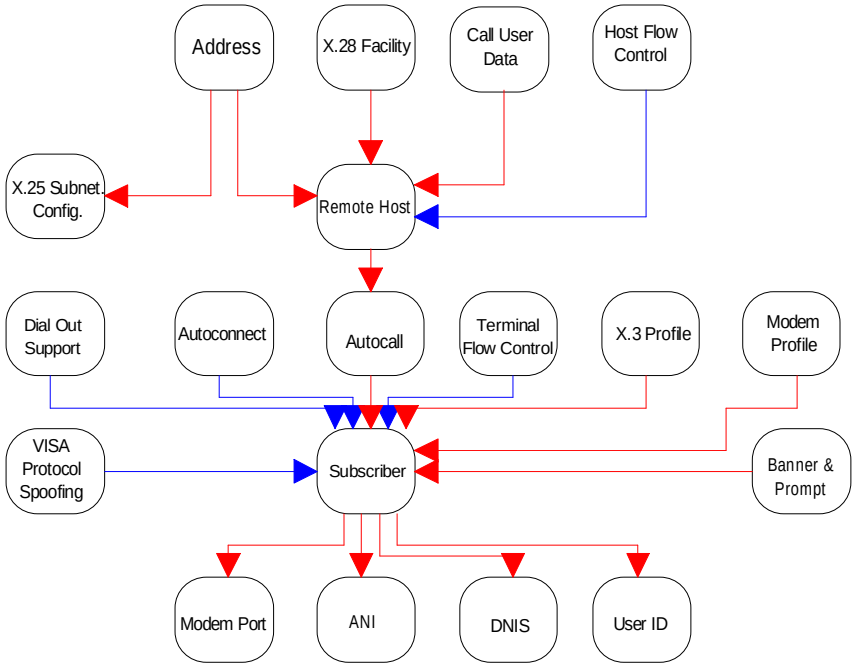


Figure 10.1—Configuration Flow

Subscriber Configuration Schemes

Full subscriber configuration is rarely necessary, and the system doesn't require it. You may either create a Basic configuration for a subscriber or add Extended configuration. Real-world applications of the PAD configuration are likely to be unique combinations of Basic and Extended subscriber configurations.

- A *Basic* subscriber configuration is required. It consists of a subscriber template with a configured and linked Modem Profile template, X.3 Profile template, and Banner and Prompt template.
- An *Extended* subscriber configuration consists of the Basic subscriber and up to 16 additional PAD templates fully configured and linked.

We have provided the following configuration examples to help you use the database in the most efficient way possible while meeting the needs of your customers.

Example I: 1000 to 1 Ratio for Basic Subscribers

As configured in the Figure below, the PAD allows you to link up to 1000 ANI, DNIS, or User IDs to each of up to 18 Basic subscribers. This means your database can maintain 18,000 ANI, DNIS, or User IDs attached to 18 Basic subscriber configurations.

NOTE: This configuration scheme is only applicable to interactive calls. Non-interactive calls require additional template configurations, such as autoconnect or autocall.

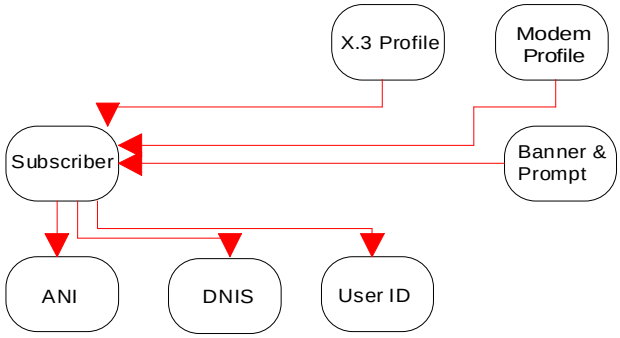


Figure 10.2—Case 1: 1000 ANI, DNIS, or UserIDs for each Basic Subscriber

Example II: 1 to 1 Ratio

If you choose to create one subscriber configuration for every ANI, DNIS, or User ID, you limit the number of subscribers, as well as the number of ANI, DNIS, and User IDs you can configure in the database.

For instance, you can only configure up to 1500 ANI, DNIS, or User IDs when using a 1 to 1 ratio for Basic subscribers. This means you can configure a total of 1500 Basic subscribers.

If you need to use Extended subscriber configurations (perhaps because the calls are non-interactive) and link each ANI, DNIS, and User ID to a single Extended subscriber configuration, you can only configure up to 750 ANI, DNIS, and User IDs. This means you can configure a total of 750 Extended subscribers. Figure 5.3 is a diagram of such a configuration.

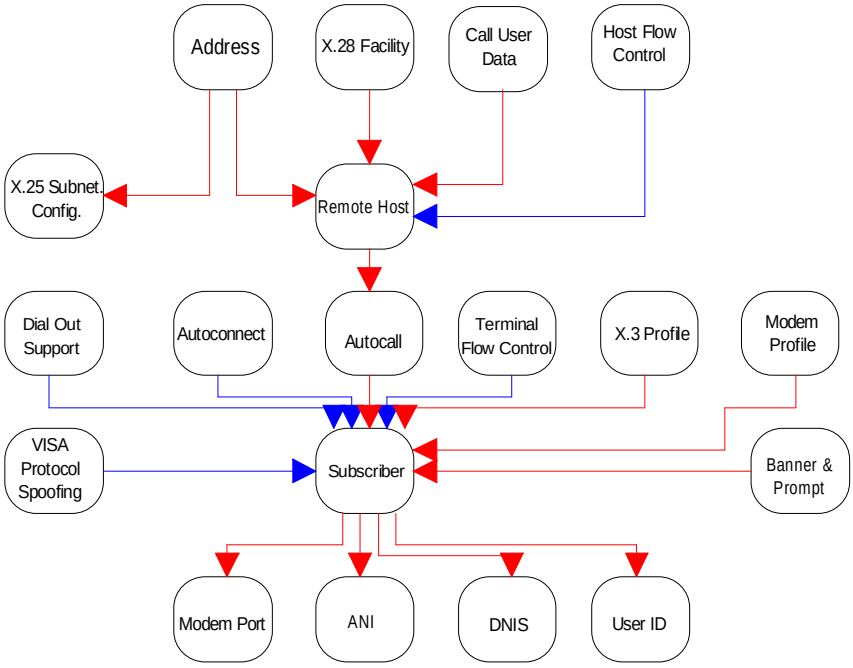


Figure 10.3—Case 2: 1 ANI, DNIS, or UserID for each Extended Subscriber

Saving and Restoring PAD Configurations

With X.25 3.0 and NMC 4.0, the configured records you created as part of the X.25 PAD database (configured records of Subscribers, including X.3 Profiles, Banners & Prompts, *etc.*) may now be backed up via an Upload operation. When PAD configuration files are uploaded, they are copied from the PAD's RAM to the management station PC, where a backup can be safely stored. The backup file of the configured database is named with an .x25 filename extension. This file can be copied from the management station to diskette for further backup.

Additionally, Management Release 4.0 and X.25 Release 3.0 provide a Download operation. This operation may be used to restore the configuration in the PAD's RAM. It may also be used as an easy method of configuring an additional PAD with an identical configuration.

Each uploaded / downloaded file represents a complete X.25 PAD Subscriber configuration set with all 19 tables. Each table may have multiple configured records.

NOTE: Never perform a Download operation when calls are active. The download request will be rejected. Although an Upload request will not be rejected (unless there is heavy NMC traffic), we recommend against performing an Upload operation when calls are active.

Upload Operation

The X.25 PAD NAC contains two versions of its configuration: in RAM and in NVRAM. At any given time, the RAM copy reflects the current configuration values. When an Upload operation is performed, it is the RAM version of the configuration that is uploaded to the Management Station.

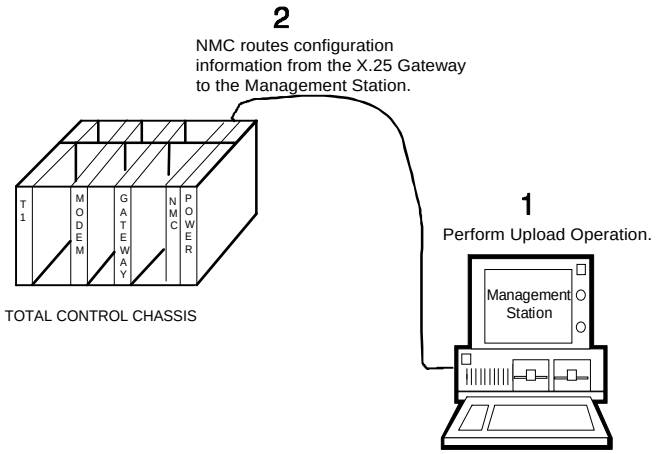


Figure 4.11—X.25 Configuration Upload (to the Management Station)

1 Establish a connection with the NMC in the chassis where the X.25 PAD Gateway card resides. See the *Total Control Installation Roadmap* for procedures for establishing a session.

2 To Upload a configuration from the PAD to the Management Station, open the *X.25 PAD Configurator* and select **Upload** from the File menu. An address window appears.

Figure 4.12—X.25 PAD Address

3 Enter (or accept) the IP address of the Management Station and the slot number of the PAD in the chassis.

4 Click on **OK**. The Upload is performed.

5 The current configuration of the card you just queried appears within the *X.25 PAD Configurator* program and a file called "UPLD#.x25" is created on the Management Station's C:\ drive. It is a good safety measure to rename the *.x25 file.

Download Operation

As previously stated, there are two versions of the PAD's configuration at all times: in RAM and in NVRAM. When a Download operation is performed, the RAM version of the configuration is overwritten. We suggest you perform a Save to Nonvolatile RAM operation before Downloading a new configuration to the card (via the RS-232 User Interface or *TCM*). If you want to return to the previous configuration for any reason, you can then do so by resetting the card. Once you are content with the current configuration in RAM, perform another Save to Nonvolatile RAM operation, thus protecting the configuration, should the card reset for any reason.

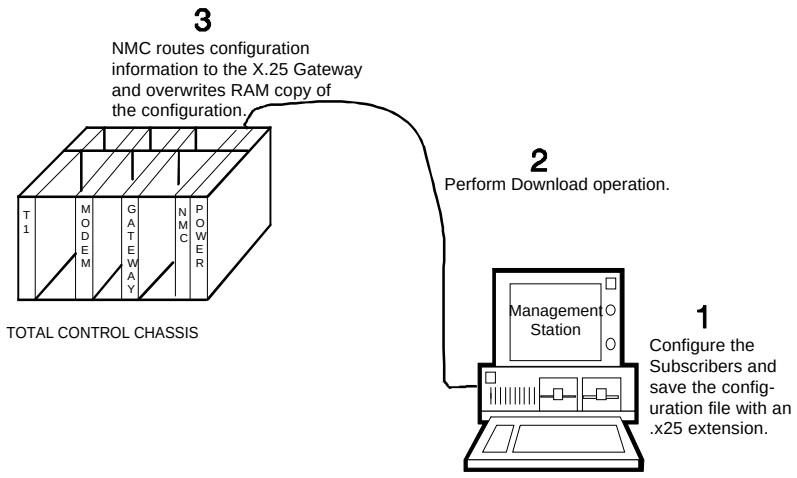


Figure 4.13—X.25 Configuration Download (from the Management Station)

There are two ways to download a configuration from the *X.25 PAD Configurator*. You may either send the configuration currently displayed on the Main Level screen, or you may download a previously configured configuration file.

Displayed Configuration

1. Launch the X.25 PAD Configurator program.
2. Create a configuration file for your PAD, configure the appropriate records, and save it with an .x25 filename extension.
3. Establish a connection with the NMC in the chassis where the X.25 PAD Gateway card resides. See the Total Control Installation Roadmap for procedures for establishing a session.
4. Open the X.25 PAD Configurator and select **Download** from the File menu. An address window appears.

Figure 4.14—X.25 PAD Address

5 Enter the IP address of the NMC in the chassis where the PAD resides and the slot number of the PAD in the chassis.

6 Click on **OK**. The Download is performed.

Saved Configuration File

1 Launch the X.25 PAD Configurator program.

2 Create a configuration file for your PAD, configure the appropriate records, and save it with an .x25 filename extension.

3 Establish a connection with the NMC in the chassis where the X.25 PAD Gateway card resides. See the Total Control Installation Roadmap for procedures for establishing a session.

4 Open the X.25 PAD Configurator and select **File Download** from the File menu.

5 A Windows file browse window appears. Locate the configuration file you want to download to the PAD. Click on **OK** to select it. An address window appears.

Figure 4.15—X.25 PAD Address

6 Enter the IP address of the NMC in the chassis where the PAD resides and the slot number of the PAD in the chassis.

7 Click on **OK**. The Download is performed.

Chapter 11
X.25 Protocol Stack and Total Control Manager/SNMP

This chapter covers the following topics:

- WAN Parameters Configuration—configuring the physical layer of the protocol stack
- LAPB Parameters Configuration—configuring the link access layer of the protocol stack
- PLP Parameters Configuration—configuring the packet layer of the protocol stack

When configuring the protocol stack in the *Total Control Manager/SNMP* program, you will follow the flow indicated below.

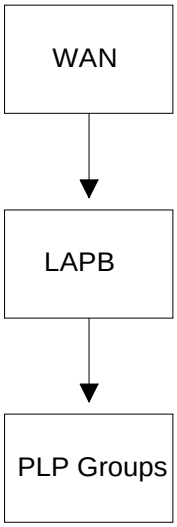


Figure 11.1*—Configuration *Flow

The first step in configuring your PAD is to configure the protocol stack, making it compatible with the Packet Switched Network (PSN) requirements. With X.25 release 3.0 and Total Control management (*TCM* and NMC) release 4.0, the X.25 protocol stack may now be configured via *Total Control Manager/SNMP* software.

NOTE: Although it may appear both the X.25 PAD's RS-232 User Interface and a *TCM* session are concurrently available at your local site, do not attempt to configure any parameters in *TCM* unless you have completely backed out of the RS-232 User Interface (back to the Main Menu).

When you click on the X.25 PAD card (or a port on the card) on the chassis display in *TCM* and click on the Programmed Settings icon, X.25 parameter groups display. For descriptions of each configurable parameter within the parameter group, just select a parameter and click on your right mouse button for the context-sensitive Help.

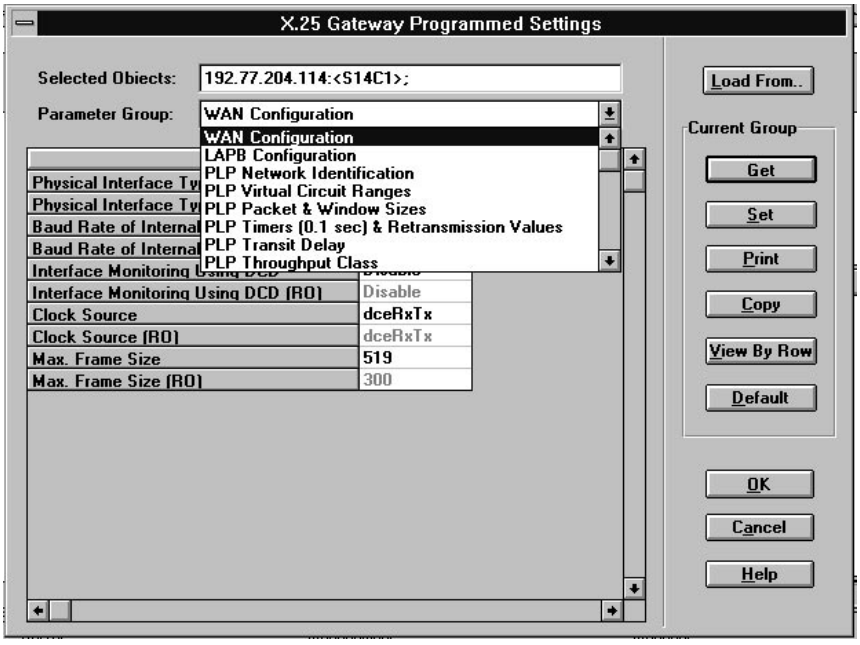


Figure 11.2—X.25 Groups in the TCM Configuration Window

NOTE: X.25 protocol stack parameter values are provided for both read-write and read-only parameters. Read-write parameters may be altered in the interface, but they will not take effect until the card has been reset. Once the card has been reset, the read-write values become the read-only values, as well. The read-only value is the value currently operating in the Gateway's database.

READ-ONLY is called **Operational**; READ-WRITE is called **Administrative**.

X.25 Configurable Parameters in TCM

This section contains a list of the groups and parameters configurable via the *TCM* interface. These parameters pertain to the card-level management and identification, as well as the X.25 Protocol Stack configuration.

Gateway Identification

This configuration group contains parameters that identify the X.25 PAD in the chassis, including:

- Serial Number
- Hardware Revision
- Software Version
- CPU Type
- RAM Installed
- FLASH Installed
- X.25 Database Status
- User Interface Status

Configuration Group

This group contains parameters that provide information specific to the X.25 PAD in the chassis.

- System Date
- System Time
- User Interface Port

Management Over X.25

This configuration group contains parameters used specifically for the MOX operations, including:

- Routing Type
- Call User Data String
- X.121 Subaddress

Packet Bus Sessions

The Packet Bus Sessions configuration group contains parameters that assist the network administrator in configuring dynamic packet bus sessions, including:

- Slot Session Assignment
- Channel Session Assignment
- Availability of Row for Packet Bus Session
- Session Assignment between Entities
- Session Status
- Session Request Status
- Last Packet Communication Type
- Session Tx Packet Count
- Session Rx Packet Count
- Session Packet Size
- Session Packet Timeout Count
- Session Error Status

WAN Parameters

The parameters in this configuration group define the interface between the PAD and the X.25 PSN. Parameters include:

- Options
- Max. Frame Size
- Baud Rate of Internal Clock Source
- Physical Interface Type
- Interface Monitoring Using DCD
- Clock Source

LAPB Parameters

The parameters in this group set up the link so both the DTE and DCE can send frames. It defines frame transfer parameters, and defines rules for timing and frame formatting. Parameters include:

- N2—Max. Number of PDU Transmissions
- T1—Acknowledgment Timer
- P-Bit Response Timer
- Reject Response Timer
- Busy-State Timer
- Link Idle Timer
- Max. Delay before Sending RR
- Max. Number of Unacknowledged IPDUs
- Transmit Window Size
- Transmit Probe
- Maximum Size of LAPB I Frame
- Ignore any UA Frames Received
- Retransmit Frame Reject
- Transmit Frame Reject
- Reject S-Frame without P-Bit Set
- Send DM on Entry to ADM State

Packet Level Protocol (PLP)

PLP Network Identification

The parameters in this configuration group specify the network protocol, X.25 version, and packet-level protocol to be used by the PAD and the connected PSN. Parameters include:

- Network Protocol Mode
- X.25 Version
- Packet Level Protocol Mode

PLP Virtual Circuit Ranges

The parameters in this configuration group specify the allowable ranges of logical channels assigned to a particular type of virtual circuit. Parameters include:

- Lowest PVC
- Highest PVC
- Lowest Incoming Logical Channel
- Highest Incoming Logical Channel
- Lowest Two-Way Logical Channel
- Highest Two-Way Logical Channel
- Lowest Outgoing Logical Channel
- Highest Outgoing Logical Channel

PLP Packet & Window Sizes

The parameters in this configuration group specify allowable packet and window sizes, as well as the sequence numbering method on the PSN. Parameters include:

- Sequence Numbering Option
- Max. Local Packet Size
- Max. Remote Packet Size
- Default Local Packet Size
- Default Remote Packet Size
- Max. Local Window Size
- Max. Remote Window Size
- Default Local Window Size
- Default Remote Window Size
- Max. NSDU Length

PLP Timers (0.1 sec) & Retransmission Values

The parameters in this configuration group specify allowable timer and re-transmission values. Parameters include:

- Acknowledgment Delay—Withhold Pending RR
- T20—Restart Request Response Timer
- T21—Call Request Response Timer
- T22—Reset Request Response Timer
- T23—Clear Request Response Timer
- Status Transmission Timer
- T25—Window Rotation Timer
- T26—Interrupt Response Timer
- Link-Level Hold Time
- DTE / DCE Resolution Timer
- R20—DTE Restart Request Retransmit Count
- R22—DTE Reset Request Retransmit Count
- R23—DTE Clear Request Retransmit Count

PLP Transit Delay

The parameters in this configuration group specify the allowable attributable delays. Parameters include:

- Local Delay (msecs)
- Access Delay (msecs)

PLP Throughput Class

The parameters in this group specify allowable local and remote throughput. Parameters include:

- Max. Local Throughput Class
- Max. Remote Throughput Class
- Default Local Throughput Class
- Default Remote Throughput Class
- Min. Local Throughput Class
- Min. Remote Throughput Class

PLP Closed User Groups

The parameters in this configuration group specify the PAD response to closed user groups. Parameters include:

- With Incoming and Outgoing Access
- Preferential
- With Outgoing Access
- With Incoming Access
- Basic or Extended Format
- Reject Incoming Calls

PLP Subscription Options

The parameters in this configuration group specify any additional features are supplied by the X.25 PSN. Parameters include:

- Subscribe to Extended Call Packets
- Bar Incoming Extended Call Packets
- Fast Select No Restriction
- Fast Select with Restriction
- Reverse Charging
- Local Charging Prevention
- Subscribe to TOA / NPI Address Format
- Bar Incoming TOA / NPI Address Format
- NUI Override
- Bar Incoming Calls
- Bar Outgoing Calls

PLP Localization Information

The parameters in this configuration group specify how the PAD responds to diagnostic packets, international calls, hexadecimal network addresses, and priority packets. Parameters include:

- Allow Omission of Diagnostic Byte
- Use Diagnostic Packets
- ITU-T Clear Length Restriction
- Allow Incoming Diagnostic Packets
- Discard Diagnostic Packets on Non-Zero LCN

- Allow Hex Digits in DTE Address
- Bar Non-Privileged Listen
- International Call Recognition
- Data Network Identification Code
- International Call Priority
- Priority Encode Control
- Priority Packet Forced Value
- Source Address Control

PLP D-Bit Control

The parameters in this configuration group specify the PAD response to delivery information flags. Parameters include:

- D-Bit Accept In
- D-Bit Accept Out
- D-Bit Data In
- D-Bit Data Out

PLP Throughput Class Windows & Packets

The parameters in this configuration group specify window and packet negotiation and throughput. Parameters include:

- Throughput Negotiation
- Type
- Window Mapping
- Packet Mapping

X.25 PAD Configuration

When you select this group from the *TCM* Configuration window, the *X.25 PAD Configurator* program is launched.

Chapter 12
Subscribers and the X.25 PAD Configurator

Once the protocol stack is configured, you have a basis from which to configure Subscriber records. *Subscriber* is the term we use to describe the basic record of the X.25 PAD database. A Subscriber is a custom configuration, in that it enables certain features and acts as a repository for other configured templates (such as modem profiles).

The X.25 PAD database is made up of configured template information. You set up a template that configures the PAD for a certain type of call (interactive / non-interactive), a call that comes into the PAD from a certain address (terminal), or is directed to a certain address (remote host). Your configured templates are then linked to a Subscriber record. When a call comes into the PAD, it searches its database for a match with a Subscriber record. When a match is found, the modem is configured accordingly and the call is routed.

U.S. Robotics has developed an offline graphical user interface configuration program, the *X.25 PAD Configurator*, with which you can configure your Subscriber records. The *Configurator* can be launched as a stand-alone application, or from *TCM*.

The *Configurator* is composed of 20 windows, 19 displaying templates ready for configuration or those you have already configured, and the first screen you will see: *X.25 PAD Configurator* Main Level window.

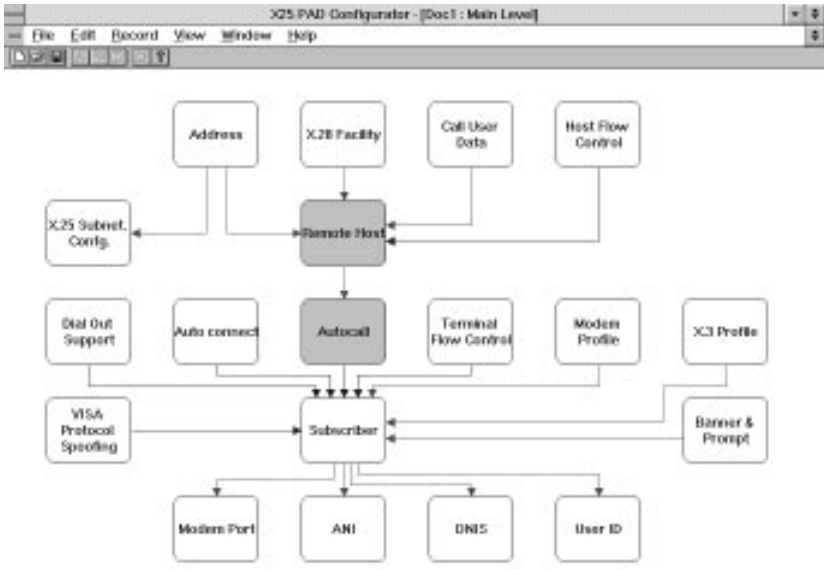


Figure 12.1—Main Level Window of the X.25 PAD Configurator

This window is always displayed when:

- a *Configurator* file is opened from an Upload or Download operation.
- a new *Configurator* file is created.

This screen provides several key indicators designed to help you navigate through the PAD's Subscriber configurations.

Red Line	Indicates required preconfiguration. For instance, Modem Profile, X.3 Profile, and Banner and Prompt templates must be configured before a Subscriber can be configured.
Blue Line	Indicates additional configuration options. For instance, making a Subscriber record specific to Autocalls is an option; however, if you decide to do so, you must first configure a Remote Host record (which, in turn, requires configured Address, X.28 Facility, and Call User Data records).
Shaded box	Indicates that none of the required records have been configured and no "Default" or "NONAME" records were included when the software was shipped (see boxes with red lines pointing to the shaded boxes).

The Main Level window presents all the configurable tables, displays relationships, and provides access to configurable/configured tables. When you click your mouse button on one of the 19 boxes displayed, the template table displays, providing a means to configure settings and create configured records for that template type.

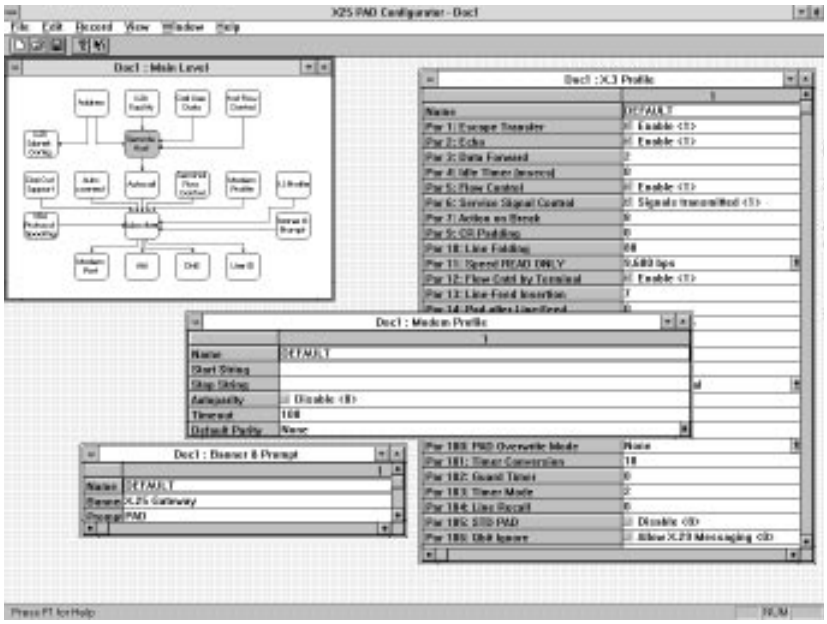


Figure 12.2—Template Tables

Just select a parameter and click on your right mouse button for descriptions of each configurable parameter.

To learn how to configure a Subscriber, select **Contents** from the Help Menu to open the Help program. We have provided some background information to help you plan your configurations and some example configuration applications. Click on the application type most closely resembling yours. In each example, there is a sample Main Level screen with numbers indicating the order in which you should configure the templates. If no number is present, you need not configure that template for your application. If you want to know more about the template and its parameters, click on the number.

Appendix A
Supported X.28 Commands

Communication between the user terminal and the PAD is accomplished by a series of X.28 commands. These commands, entered at the PAD prompt, are only in effect for as long as the current call is in session. Once the call is disconnected, the PAD is configured to its default status.

NOTE: The PAD does not support certain X.28 command combinations and PAD-to-PAD functionality is not supported at this time. Use the X.28 Help command (page A-11) to display a list of supported commands.

Conventions

The following conventions have been used in this document to indicate certain syntactic conditions.

[ ]	Optional information; you do not need to provide this information.
|	Separates options select one.
< >	Enter a value; you must provide a value of this command.
...	And so on; you may continue repeat the previous parameter one or more times.
XXXxxx	Underscore indicates command abbreviation; you may use this abbreviation instead of typing the entire command name.

NOTE: Command names are in UPPER CASE.

Commands

Break

Alias: none

Syntax: B[REAK]

Description: The BREAK command sends a “break” signal to the remote host.

By typing this command, the PAD performs the action specified by the BREAKACTION command.

Example: B (sends a BREAK command)

Notes: none

See Also: BREAKACTION command

X.3 Effects: not applicable

BReakAction

Alias: none

Syntax: BR[E]A[KACTION] [value]

Description: Sets the action to be taken if a BREAK command is issued in Command mode or Ctrl-P B is issued in Data Transfer mode.

Values:

0 = No action
1 = Send interrupt signal
2 = Send a reset
5 = Send interrupt and indication of break
8 = Escape from data transfer state
21= Send interrupt, indication of break, and discard output from the host

If this command value is set to 8 (Escape from Data Transfer State), you can escape from data transfer even if X.3 Parameter 1 (Escape Data Transfer) does not allow it.

If no value is entered, the current setting is displayed.

Example: BRA 1 (BREAK command will send an interrupt signal)

Notes: The user will not normally have to set BREAKACTION, as the host should set the appropriate value it requires.

If X.3 parameter 1=1, then set parameter 1=0 to make the PAD ignore Ctrl-P.

See Also: BREAK and BREAKIN commands

X.3 Effects: X.3 parameter 7 (Action on Break) set to 1.

Breakin

Alias: none

Syntax: BREAKIN [value]

Description: The BREAKIN command alters the PAD recall character (default is Ctrl-P).

By typing BREAKIN and a value modifier, you change the PAD recall character.

When Ctrl-P is issued, the PAD breaks out of Data Transfer mode and performs the action specified by the value typed.

You can change your recall character to use any printable character as the Escape Code, but the PAD will act on that character if it occurs during data transfer. For instance, if you change your escape code sequence to "Za" and a "Z" occurs in the binary data you transmit, the PAD ignores the "Z", expecting it to be part of the escape sequence, and data is lost. If a "Za" actually occurs in your binary data, the BREAK command will be issued.

Example: BREAKIN Ctrl-Pa

Notes: Unless modified by the BREAKIN command, the recall character is Ctrl-P. It may be followed by one of the characters listed below:

a	Enter PAD command mode.
b	Send a break signal to the connected host.
e	Reverse the current echo state (until Enter ispressed).
r	Reset the current call (if any).
t	Forward the current buffered line.
char	Put the character into the buffer—used mainly for control characters DLE, DC2, and CAN.

See Also: BREAK and BREAKACTION commands

X.3 Effects: not applicable

Call

In addition to the CALL command syntax described below, the U.S Robotics X.25 PAD complies with the CALL syntax defined by the ITU-T.

U.S. Robotics CALL Command

Alias: none

Syntax: [[**C]ALL]** *hostname* | *X.121 address* [**+***calling address*] [**~***CUD*] [*facilities*] [s] [**G** | **B**[*CUG*]] [**N***NUI*] [**T***RPOA*] and press Enter

Description: The CALL command sets up a connection to the named host system using any requested facilities.The call may be addressed to the host by either its configured alias or X.121 address (subnetwork ID, DTE address, OSI indicator, and NSAP address).

Command Components

A call can be issued by directing it to a configured remote host name or the remote host's X.121 DTE address. Examples of both types are provided on the following pages.

The command consists of various components, including those described below.

Calling Address	**+**	Indicates the next field is the calling address. If a calling DTE address is not entered in the command string, the PAD will automatically enter the DTE address of the terminal placing the call.

Call User Data	**~**	Indicates the next field is up to 124 ASCII characters of Call User Data (CUD). If the CUD is preceded by a quotation mark, the PAD reads the data between the first quote and the next quote as the CUD. If no quotation mark precedes the CUD, the PAD reads the data between the tilde (~) and the next space as the CUD.If the data in the CUD is more than 12 characters, the PAD will automatically use Fast Select. If the host does not subscribe to Fast Select, the call will be rejected.

Facility Components

> **NOTE:** Do *not* insert a space between the Packet Size (p), Window Size (w), Fast Select (f),and Reverse Charge (r) components of the Facilities portion of the CALL command. The Reselection (s), CUG, NUI, and RPOA components, however, must be set off from the others by a space.

Example: **p7/7w2/2fr s G1234**

p	Packet size. To set both the incoming and outgoing to 7, use **p7/7.**
w	Window size. To set both the incoming and outgoing sizes to 2, use **w2/2.**
f	Include **f** in the string to request Fast Select.
r	Include **r** in the string to request Reverse Charge.
s	Include **s** in the string to bar Reselection.

	CUG	There are two classes of Closed User Group: G = Multiuser—type **G**, then enter the CUG (a four-digit number). B = Bilateral—Can only be two users, though you can be a member of more than one bilateral CUG. Type **B**, then enter the CUG (a four-digit number).
	NUI	Network User Identifier is a string of up to 64 alphanumeric characters (assigned by the network provider), preceded by an **N**, used to identify your call for the purposes of billing or security.
	RPOA	Recognized Private Operating Agency provides the call routing information about your call. Enter **T** followed by up to four RPOA numbers with four digits, each with no spaces.
Address Components (for X.121 Addressing)	S	Subnetwork (physical port) identifier(A or B) The subnetwork through which the call will be placed can be identified in two ways. The actual designator (A or B) can precede the DTE address (see the first Call By Host DTE X.121 Address example below), or a numeric designator (01 = A, 02 = B) can be placed as digits 13 and 14 of the DTE address (see fourth Call By Host DTE X.121 Address example below). Subnetwork identification via 01 and 02 is not supported by X.25 88 networks.

	The A./B. subnetwork identifier takes precedence over the 01/02 identification scheme if both are present in the same Call command string. If numeric subnetwork identifiers are used and the port chosen is not operational (data link with DCE is inoperative), the call will be rejected. If numeric designators are not used and both ports are operational, the PAD will alternate calls between both ports, according to a simple "Who's Next" algorithm.
DTE	DTE address consisting of up to 15 decimal digits, or if X.25 (88) TOA/NPI format is being used, then up to 17 decimal digits.
N	Indicates the next field is an OSI NSAPaddress
X	Indicates the next field is a non-OSI address extension
NSAP	Up to 40 hexadecimal digits indicating the address of the network service access point at which network service is provided to the remote host.

Examples:

Call by Alias

CALL Denver49+999121212121 ~LIHWAYNETOM p7/7w2/2fr s G1222 N659595959595959595959T111233344556

C Denver49 ~LIHWAYNETOM p7/7r G1222

.Denver49 w2/2 s N659595959595959595959

Denver49 s N65959595959595959595959

Call by Host DTE X.121 Address

CALL A.123456789123 +999121212121 ~LIHWAYNETOM p7/7w2/2fr s G1222 N659595959595959595959 T111233344556

C 123456789123 ~LIHWAYNETOM p7/7r G1222

123456789123 w2/2 s N659595959595959595959

12345678912301 s N65959595959595959595959

Notes:

The required alas (host) name to address mapping must have been previously configured in the database (see Chapter 6).

The alias name must be entered exactly as configured, and in the case in which it was configured (upper case, lower case, or a combination).

The subnetwork through which the call will be placed should have been configured in an Address template associated with (linked to) the Remote Host template (alias configuration).

See Also: not applicable

X.3 Effects: not applicable

CALLSTATS

Alias:	CSTATS
Syntax:	CALLSTATS or CSTATS
Description:	Displays the Modem, Modem Slot, and Chassis currently in use by the terminal user, as well as the PAD slot in the chassis.
Example:	CSTATS
Notes:	none
See Also:	not applicable
X.3 Effects:	not applicable

CLeaR

Alias:	none
Syntax:	CL[EA]R
Description:	The CLEAR command closes the current connection.
Example:	CLEAR
Notes:	Once the call is cleared, all X.28 command changes made for that call are cleared and the PAD returns to its default settings.
See Also:	not applicable
X.3 Effects:	not applicable

Echo

Alias: none

Syntax: ECHO [on | off]

Description: The ECHO command specifies whether the echo comes from the PAD or the remote host.

If on is selected, the PAD will echo. If off is selected, echo will come from the remote host.

If no value is entered, the current echo setting is displayed.

Example: ECHO off

Notes: none

See Also: not applicable

X.3 Effects: X.3 parameter 2 (Echo) set to 0 (off) or 1 (on).

EMask

Alias: none

Syntax: EM[ASK[[value]

Description: The EMASK command sets the echo mask to the value specified so you can choose values that should not be echoed to the screen.

Value	*Characters NOT Echoed*
0	All characters will be echoed
1	CR
2	LF
4	VT, HT, FF
8	BEL, BS
16	ESC, ENQ
32	ACK, NAK, STX, SOH, EOT, ETB, ETX
64	DEL, CAN, DC2
128	All other control characters, plus DEL

Characters are not echoed if no value is set.

Entered value is the sum of the combined values selected.

The default setting is 192 (values 64 + 128).

Example: EMASK16

Notes:	Users should not need to change this setting.
See Also:	not applicable
X.3 Effects:	X.3 parameter 20 (Echo Mask) is set.

Flow

Alias:	none
Syntax:	F[LOW][on | off]
Description:	The FLOW command enables or disables local flow control processing of XON / XOFF control characters by the PAD. If flow control is enabled you can use Ctrl-S to halt the output to the terminal and Ctrl-Q to restart it. If no value is entered, the current setting is displayed.
Example:	FLOW off
Notes:	Flow control must be off if you wish to use these control characters for any other purposes (such as EMACS type editors).
See Also:	not applicable
X.3 Effects:	X.3 parameter 12 (Flow Control by Terminal) is set to 0 (off) or 1 (on).

FORward

Alias: none

Syntax: FOR[WARD] [value]

Description: The FORWARD command selects the data forwarding characters.

Values:

0 = No data forwarding characters
1 = Alphanumeric characters
2 = CR
4 = ESC, BEL, ENQ, ACK
8 = DEL, CAN, DC2
16= ETX, EOT
32= HT, LF, VT, FF
64= All other control characters

The entered value is the sum of the combined values selected.

If no value is entered, the current setting is displayed.

Example: FORWARD 16

Notes: The user rarely uses this command.

See Also: not applicable

X.3 Effects: X.3 parameter 3 (Data Forward) is set.

Help

Alias: ?

Syntax: HELP[command]
?[command]

Description: The HELP command displays a one-line summary of all commands.

Example: HELP flow

Notes: none

See Also: not applicable

X.3 Effects: not applicable

Int

Alias: none

Syntax: INT

Description: The INT command transmits an interrupt packet to the remote host.

Example: INT

Notes: none

See Also: not applicable

X.3 Effects: not applicable

LFinsert

Alias: none

Syntax: LF[INSERT][value]

Description: The LFINSERT command sets the linefeed insertion action to be taken when a carriage return is sent or received.

Value	*Action*
0	No LF insertion
1	Add LF after CR in the data from the host
2	Add LF after CR in the data to the host
4	Add LF after CR echoed

The entered value is the sum of the combined values selected.

If no value is entered, the current setting is displayed.

Example: LFINSERT 4

Notes: The host usually sets the parameter value required, so the user should not have to change this parameter.

A value of 1 is invalid if the PAD is operating in Transparent mode. If the PAD is in Native mode, no value is valid (unless echo is on—a value of 4 is then a valid entry).

See Also: TRANSPARENT and NATIVE commands

X.3 Effects: X.3 parameter 13 (Line-Feed Insertion) is set.

LOGhost

Alias: none

Syntax: LOG[HOST]

Description: The LOGHOST command displays incoming and outgoing X.29 messages.

Example: LOGHOST

Notes: This facility is intended for diagnostic use only. PAD performance is noticeably slowed when this facility is enabled.

Sample message:

X29 [RX | TX] Code Par Value Par Value ...

RX Indicates a message received from the host.

TX Indicates a message transmitted to the host.

Code Indicates the X.29 message code with the parameter numbers and values displayed in Par and Value pairs.

- 0 = Parameter Indication message (displays current settings for specified parameters)
- 2 = Set message (sets values for specified parameters)
- 4 = Read message (reads values for specified parameters)

See Also: not applicable

X.3 Effects: not applicable

MESsage

Alias: none

Syntax: MES[SAGE]

Description: The MESSAGE command sets the PAD mode of operation to Message mode.

This mode allows the user to define line-at-a-time exchanges between the PAD and the remote host, with the responsibility of detailed terminal control (including echoing typed input, input editing, and output formatting) resting on the PAD.

Example: MESSAGE

Notes: none

See Also: Appendix C

X.3 Effects: This mode affects X.3 parameters 2, 4, 10, and 15:

2 = 1 (Echo)

4 = 0 (No Idle Timer)

10 = 80 (Line Folding after 80 characters)

15 = 1 (Editing enabled)

NATive

Alias: none

Syntax: NAT[IVE]

Description: The NATIVE command sets the PAD mode of operation to Native mode.

This mode allows the user to define character-at-a-time input forwarding to the host. The host has total control of the terminal, including echoing user input, input editing, and output formatting. Characters typed in are immediately forwarded to the host.

Example: NATIVE

Notes: not applicable

See Also: Appendix C

X.3 Effects: This mode affects X.3 parameters 2, 4, 10, and 15:

2 = 0 (No Echo)

4 = 1 (1/20th second Idle Timer Delay)

10 = 0 (No Line Folding)

15 = 0 No Editing)

PageWait

Alias: none

Syntax: P[AGE]W[AIT][value]

Description: The PAGEWAIT command halts output to the terminal.

Valid value range is 0 to 255 lines output before the display is paused. A value of 0 disables pagewait.

If no value is entered, the current setting is displayed.

Example: PAGEWAIT 80

Notes: This command is only valid in Message mode.

See Also: not applicable

X.3 Effects: X.3 parameter 22 (Page Wait) is set.

PARam

Alias: none

Syntax: PAR[AM]

Description: The PARAM command displays all current X.3 parameter settings in number:value pairs.

Example: PARAM

Notes: none

See Also: PAR? command

X.3 Effects: not applicable

Par?

Alias:	none
Syntax:	PAR? [value]
Description:	The PAR? command displays the setting of a specified X.3 parameter only. If no value is specified, the current values of all X.3 parameters are displayed.
Example:	PAR? 100
Notes:	If a list of parameter settings is queried, each parameter should be separated by a space (*e.g.*, Par? 1 2 100).
See Also:	PARAM command
X.3 Effects:	not applicable

Pipe

Alias:	none
Syntax:	PIPE
Description:	The PIPE command sets the PAD mode of operation to Pipe mode. This mode allows the user to direct raw data to the host via a non-interactive autocall. Pipe mode allows no service signals.
Example:	PIPE
Notes:	While in Pipe mode, you can't escape data transfer and go in to Command mode.
See Also:	Appendix C

X.3 Effects: This mode affects X.3 parameters 1, 2, 5, 6, 7, 9, 10, 12, 13, 14, 15, and 22:

1 = 0 (No Escape from Data Transfer)
2 = 0 (No Echo)
5 = 0 (No Flow Control)
7 = 0 (No Action on Receipt of Break)
9 = 0 (No Carriage Return Padding)
10 = 0 (No Line Folding)
12 = 0 (No Flow Control by Terminal)
13 = 0 (No Line Feed Insertion)
14 = 0 (No Padding after Line Feed)
15 = 0 (No Editing)
22 = 0 (No Page Wait)

PRinTer

Alias: none

Syntax: PR[IN]T[ER]

Description: The PRINTER command sets the PAD for user's hard-copy terminal.

Example: PRINTER

Notes: none

See Also: VDU command

X.3 Effects: X.3 parameter 19 (Edit Service Signal) is set to 1 (Hard Copy Terminal).

PROFile

Alias: none

Syntax: PROF[ILE] [value]

Description: The PROFILE command selects a set of terminal options as a pre-defined X.3 profile.

Value	Option
V1–5	USR-defined standard profiles
90	ITU-T Simple standard
91	ITU-T Transparent standard

If a value is not entered, the current setting is displayed.

Example:	PROFILE v4
Notes:	none
See Also:	Appendix D
X.3 Effects:	not applicable

Quit

Alias:	none
Syntax:	Q[UIT]
Description:	The QUIT command ends the current session.
Example:	QUIT
Notes:	If a call is in progress, it will be ended before ending the session.
See Also:	not applicable
X.3 Effects:	not applicable

ReSeT

Alias:	none
Syntax:	R[E]S[E]T
Description:	The RESET command sends a reset request to the remote host.
Example:	RESET
Notes:	none
See Also:	not applicable
X.3 Effects:	not applicable

Set

Alias:	none
Syntax:	SET par:value par:value...
Description:	The SET command sets the current values of the specified X.3 parameters in parameter number:value pairs.
Example:	SET 1:1
Notes:	If a list of parameter settings is configured, each parameter should be separated by a space (*e.g.*, Set 1:0 2:2). If a parameter number is entered without a value or with an invalid value, the parameter value will not be changed and an INV (invalid value) message is displayed with the parameter number.
See Also:	SET? command
X.3 Effects:	Affects all X.3 parameters set by this command.

Set?

Alias:	none
Syntax:	Set? par par...
Description:	The SET? command displays the current values of the specified X.3 parameters.
Example:	set? 1
Notes:	If a list of parameter settings is configured, each parameter should be separated by a space (*e.g.*, Set? 1 2). You may also change settings with this command by supplying a value with the parameter number (*e.g.*, SET? 1:1 2:2). If a parameter number is entered without a value or with an invalid value, the parameter value will not be changed and an INV (invalid value) message is displayed with the parameter number.
See Also:	SET command
X.3 Effects:	Affects all X.3 parameters set by this command.

STATus

Alias: none

Syntax: STAT[US][ALL]

Description: The STATUS command displays the status of the current connection and host name.

If the value **ALL** is specified (*e.g.*, STATUS ALL),the following additional information is displayed:

- Name of the host connected to
- Terminal characteristics
  - echo mode
  - flow control state
  - mode of operation
  - etc.

Example: STATUS

Notes: none

See Also: not applicable

X.3 Effects: not applicable

TRAnsparent

Alias: none

Syntax: TRA[NSPARENT]

Description: The TRANSPARENT command sets the PAD mode of operation to Transparent mode.

This mode allows the user to define line-at-a-time exchanges between the PAD and the remote host, with the responsibility of output formatting resting on the host.

Example: TRANSPARENT

Notes: none

See Also: Appendix C

X.3 Effects: This mode affects X.3 parameters 2, 4, 10, and 15:

2 = 1 (Echo)
4 = 0 (No Idle Timer)
10 = 0 (No Line Folding)
15 = 1 (Editing Enabled)

VDU

Alias:	none
Syntax:	VDU
Description:	The VDU command sets the PAD for user's display terminal.
Example:	VDU
Notes:	none
See Also:	PRINTER command
X.3 Effects:	X.3 parameter 19 (Edit Service Signal) is set to 2 (Video Display Terminal).

VERSION

Alias:	none
Syntax:	VER[SION]
Description:	Displays the software version of the X.25 PAD.
Example:	VER
Notes:	none
See Also:	not applicable
X.3 Effects:	not applicable

WIDth

Alias:	none
Syntax:	WID[TH][value]
Description:	The WIDTH command defines the width of the terminal screen in use. On output, when the width is reached, a new line is entered. The valid range is 20 to 255.
Example:	WIDTH 80
Notes:	If no value is entered, the current setting is displayed.
See Also:	not applicable
X.3 Effects:	X.3 parameter 10 (Line Folding) is set.

Appendix B
Supported X.29 Messages

X.29 messages are used by a Packet mode DTE to communicate with a PAD.

Message	Function
Set Parameters	The host PAD changes the setting of selected parameters to their assigned values.
Read Parameters	The host PAD requests the terminal PAD report the current setting of parameters in the supplied list.
Set and Read Parameters	The host PAD sets the appropriate parameters, then returns a list of the new parameter values to verify that they were set correctly.
Parameter Indication	The terminal PAD replies to the Read and Set message with this message, which contains a list of the required parameter references and their current values. The Parameter indication may also carry the error indication for those parameters that were unsuccessfully referenced.
Invitation to Clear	The host indicates that orderly call clearing is now possible.
Indication of Break	The host terminal PAD indicates a break condition. This message is generated by the PAD when the X.3 parameter 7 (Action on Break) is set to a value of 21. When the terminal sends a break to the PAD, the PAD first sends an interrupt packet followed by an Indication of Break message. This PAD message specifies that its local X.3 parameter 8 (Discard Output) has been set to 1 and notifies the host that all subsequent data sent to the host will be lost.

Message	Function
Error	The terminal PAD generates an X.29 Error message in response to an X.29 message in four cases: ♦ The received message contained less than 8 bits. ♦ The message contains unfamiliar code. ♦ The message's parameter field format is incorrect or incompatible with the message code. ♦ The message does not contain an integral number of octets. The second octet of the Error message shows which of the above error types is responsible for the error. The third octet of the message code contains additional information about the cause of the error.
Reselection	The Terminal PAD calls the remote host again if a connection was established and disconnected for any reason. The following X.25 facilities are supported for an X.29 reselection: ♦ Fast Select ♦ Closed User Group (CUG) ♦ Bilateral Closed User Group ♦ Network User Identification (NUI) ♦ Reverse Charging ♦ Packet Size ♦ Window Size CUG and NUI information is provided from the original PAD call request, regardless of whether or not there is any CUG or NUI information in the reselection message. To prevent reselection, specify the "S" facility on the PAD command line. For example: **C A.12345678zzzzz S**

Appendix C
X.3 PAD Profiles and Modes

X.3 PAD Profiles

U.S. Robotics provides seven standard X.3 profiles to the PAD user, including the ITU-T's Simple and Transparent profiles.

These profiles can be tailored to your application permanently via the RS-232 User Interface configuration or temporarily on a call-in-progress basis via X.28/X.29 commands.

X.3 PARAMETER	Simple Profile (ITU-T 90)	Transparent Profile (ITU-T 91)	USR-Defined Profiles (V1–5)
Escape from Data Transfer	Permitted	Not permitted	Permitted
Echo	Echo	No Echo	Echo
Data Forwarding Characters	CR, ESC, BEL, ENQ, ACK, DEL, CAN, DC2, EXT, EOT, HT, LF, VT, FF, All other ASCII control characters (except DEL)	No data forwarding characters used	EXT, EOT, HT, LF, VT, FF
Idle Timer	No idle timer used	1 second delay	No idle timer used
Flow of Control by PAD	Use XON and XOFF	No XON/OFF	No XON/OFF
Control of PAD Service Signals	Service signals are transmitted	No service signals	Service signals are transmitted

X.3 PARAMETER	Simple Profile (ITU-T 90)	Transparent Profile (ITU-T 91)	USR-Defined Profiles (V1–5)
Action on Break	PAD sends X.25 Reset packet	PAD sends X.25 Reset packet	PAD sends X.25 Reset packet AND X.25 Interrupt packet
Discard Output	Normal data delivery	Normal data delivery	Normal data delivery
Carriage Return Padding	No padding	No padding	No padding
Line Folding	No line folding	No line folding	V1=72 V2=120 V3=80 V4=132 V5=80
Speed—Read Only	9600 bps	9600 bps	9600 bps
Flow of Control by Terminal	Use XON and OFF	No XON/OFF	Use XON and OFF
Line Feed Insertion	No line feed insertion	No line feed insertion	After CR on input from terminal AND After echo of CR to terminal
Padding after Line Feed	No padding	No padding	No padding
Editing	No editing	No editing	Editing enabled
Character-Delete Character	ASCII character 127	ASCII character 127	ASCII character 127
Buffer Delete Character	ASCII character 24	ASCII character 24	ASCII character 24
Buffer Display Character	ASCII character 18	ASCII character 18	ASCII character 18
Editing Service Signals	Hard copy terminal	Hard copy terminal	V1–4=Hard copy terminal V5=Video Display terminal

X.3 PARAMETER	Simple Profile (ITU-T 90)	Transparent Profile (ITU-T 91)	USR-Defined Profiles (V1–5)
Echo Mask	All characters echoed	All characters echoed	No echo of delete, display, and all other ASCII control characters
Parity Treatment	Parity not detected or checked	Parity not detected or checked	Parity not detected or checked
Page Wait	No page wait	No page wait	No page wait

PAD Modes of Operation

The X.25 PAD operates at all times in one of two states: command or data transfer. The terminal user will only be exposed to the data transfer state of PAD operation. The PAD administrator may have to deal with possible conflicts between the two states.

The key is how you set the X.3 parameters when you set up a Subscriber (see Chapter 7). When you set parameters 1–22, you are telling the PAD how you want it to operate while in a command state. There are two ways to tell the PAD how you want it to operate during a data transfer: set Parameter 100 (PAD Overwrite Mode) in the X.3 Profile template, or enter a specific X.28 terminal command.

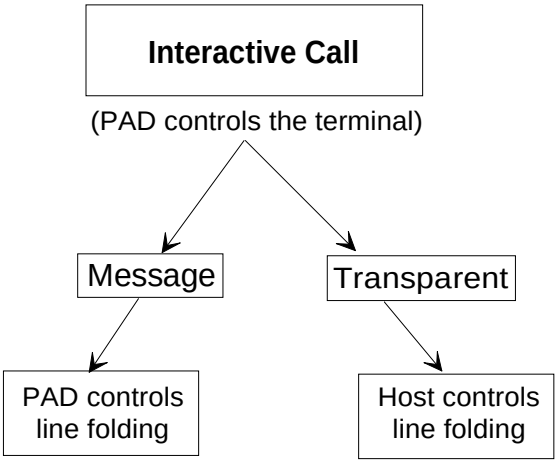
The specific X.28 terminal commands (Message, Native, Pipe, or Transparent) map almost exactly to Parameter 100, but the X,3 Profile template allows five options: Message, Native, Pipe, Transparent, and None. Modes determine whether the PAD or the host will provide echoing, editing, and formatting functions.

The PAD always operates in a mode, even if you select None for Parameter 100. Unless you select a different mode, the PAD will transfer data in Message mode—ideal for interactive calls, but inefficient for other data transfers you may want to make. The most important thing to know about Message mode is that it allows the PAD to act on X.29 messages.

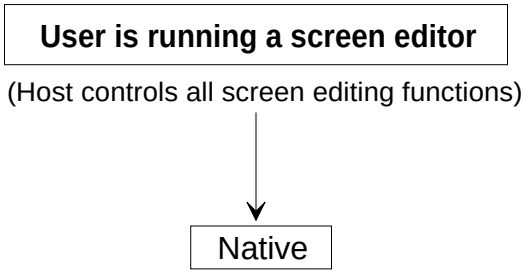
What Mode to Use?

U.S. Robotics offers several modes to best meet your needs.

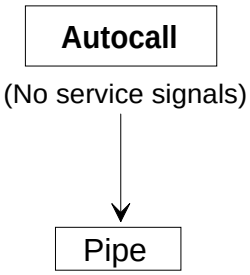
- If you are making interactive calls and you want X.29 messages to act on the terminal, it is best to use Message mode.
- If the user needs the PAD to control the terminal, either Message or Transparent mode should be used.
- If the control of X.3 parameter 10 (Line Folding) is given to the PAD, Message mode should be selected and the PAD will automatically insert a carriage return and line feed after the first 80 characters are received.
- If the control of X.3 parameter 10 (Line Folding)is given to the host, Transparent mode should be used.



- If a user is running a screen editor or similar application where the host application must carry out all screen formatting functions, Native mode should be used.



- If a user wants a raw data transfer operation for an autocall in a noninteractive mode, Pipe mode could be used.



Message Mode

Default. This mode allows the user to define line-at-a-time exchanges between the PAD and the remote host, with the responsibility of detailed terminal control (including echoing typed input, input editing, and output formatting) resting on the PAD.

The PAD will always operate in this mode during data transfer unless another mode is selected in parameter 100 of the X.3 Profile template.

This mode affects X.3 parameters 2, 4, 10, and 15:

2 = 1 (Echo)
4 = 0 (No Idle Timer)
10 = 80 (Line Folding after 80 characters)
15 = 1 (Editing enabled)

Native Mode

This mode allows the user to define character-at-a-time input forwarding to the host. The host has total control of the terminal, including echoing user input, input editing, and output formatting. Characters typed in are immediately forwarded to the host.

This mode affects X.3 parameters 2, 4, 10, and 15:

2 = 0 (No Echo)
4 = 1 (1/20th second Idle Timer Delay)
10 = 0 (No Line Folding)
15 = 0 No Editing)

Pipe Mode

This mode allows the user to direct raw data to the host via a non-interactive autocall.

> **NOTE**: While in PIPE mode, you can't escape data transfer and go in to Command mode.

This mode affects X.3 parameters 1, 2, 5, 9, 10, 12, 13, 14, 15, and 22:

1 = 0 (No Escape from Data Transfer)
2 = 0 (No Echo)
5 = 0 (No Flow Control)
9 = 0 (No Carriage Return Padding)
10 = 0 (No Line Folding)
12 = 0 (No Flow Control by Terminal)
13 = 0 (No Line Feed Insertion)
14 = 0 (No Padding after Line Feed)
15 = 0 (No Editing)
22 = 0 (No Page Wait)

Transparent Mode

This mode allows the user to define line-at-a-time exchanges between the PAD and the remote host, with the responsibility of output formatting resting on the host.

This mode affects X.3 parameters 2, 4, 10, and 15:

2 = 1 (Echo)
4 = 0 (No Idle Timer)
10 = 0 (No Line Folding)
15 = 1 (Editing Enabled)

None

Selecting None means the X.3 parameters are the same in both data transfer *and* command states. If None is selected in parameter 100, the PAD will operate in Message mode, but it won't overwrite parameters 2, 4, 10, and 15.

Appendix D
Configuration Records

The following pages contain blank forms you may wish to photocopy and use if keeping a hard-copy record of your X.25 protocol stack configuration, and configured PAD templates (used for configuring the Subscriber database). These pages may be especially helpful if you are using the RS-232 User Interface as your configuration Tool.

If you are using *Total Control Manager/SNMP*, you can maintain records of your protocol stack configuration by selecting the X.25 PAD card from the graphic display window, opening up the Configuration window, selecting a configuration group, and clicking on the Print button. The configuration parameters will be printed to your local printer.

If you are using the *X.25 PAD Configurator* program, open up the configuration template type you want to print, then select Print from the File menu.

- Refer to Chapter 6 for protocol configuration field definitions. If you are using *Total Control Manager/SNMP*, use the context sensitive Help in the program, or refer to the *Total Control Manager/SNMP Software Guide* for descriptions of the various X.25 parameters.
- Refer to Chapter 7 for subscriber configuration field definitions. If you are using the *X.25 PAD Configurator*, use the context sensitive Help in the program.

Protocol Stack Configuration

Date: _____

WAN

Field	Entry
1. Options	
2. Maximum Frame Size	
3. Baud Rate of Internal Clock Source	
4. Interface Type (RS232 or V.35)	
5. Interface Monitoring Using DCD	
6. Clock Source	

LAPB

Field	Entry
1. N2—Max Number of PDU Transmissions	
2. T1—Acknowledgment Timer	
3. P-Bit Response Timer	
4. Reject Response Timer	
5. Busy-State Timer	
6. Link Idle Timer	
7. Max Delay Before Sending RR	
8. Max Number of Unacknowledged IPDUs	
9. Transmit Window Size	
10. Transmit Probe	
11. Maximum Size of LAPB I Frame	
12. Ignore Any UA Frames Received	
13. Retransmit Frame Reject	
14. Transmit Frame Reject	
15. Reject S-Frame without P-Bit Set	
16. XMIT DISC on Entry to ADM State	

PLP

1. Network Identification

Field	Entry
1. Network Protocol Mode	
2. X.25 Version	
3. Packet Level Protocol Mode	

2. Virtual Circuit Ranges

Field	Entry
1. Lowest PVC	
2. Highest PVC	
3. Lowest Incoming Logical Channel	
4. Highest Incoming Logical Channel	
5. Lowest Two-Way Logical Channel	
6. Highest Two-Way Logical Channel	
7. Lowest Outgoing Logical Channel	
8. Highest Outgoing Logical Channel	

3. Packet and Window Sizes

Field	Entry
1. Sequence Numbering Option	
2. Maximum Local Packet Size	
3. Maximum Remote Packet Size	
4. Default Local Packet Size	
5. Default Remote Packet Size	
6. Maximum Local Window Size	
7. Maximum Remote Window Size	
7. Maximum Remote Window Size	
9. Default Remote Window Size	
10. Maximum NSDU Length	

4. Timer and Retransmission Values

Field	Entry
1. Acknowledgment Delay—Withheld Pending RR	
2. T20—Restart Request Response Timer	
3. T21—Call Request Response Timer	
4. T22—Reset Request Response Timer	
5. T23—Clear Request Response Timer	
6. Tvalue—Status Transmission Timer	
7. T25—Window Rotation Timer	
8. T26—Interrupt Request Response Timer	
9. Idlevalue—Link-Level Hold Time	
10. Connectvalue—DTE/DCE Resolution Timer	
11. R20—DTE Restart Request Retransmission Count	
12. R22—DTE Reset Request Retransmission Count	
13. R23—DTE Clear Request Retransmisssion Count	

5. Transit Delay Parameters

Field	Entry
1. Local Delay (msecs)	
2. Access Delay (msecs)	

6. Throughput Class Parameters

Field	Entry
1. Maximum Local Throughput Class	
2. Maximum Remote Throughput Class	
3. Default Local Throughput Class	
4. Default Remote Throughput Class	
5. Minimum Local Throughput Class	
6. Minimum Remote Throughput Class	

7. Closed User Groups

Field	Entry
1. With Incoming and Outgoing Access	
2. Preferential	
3. With Outgoing Access	
4. With Incoming Access	
5. Basic or Extended Access	
6. Reject Incoming Calls	

8. Subscription Options

Field	Entry
1. Subscribe to Extended Call Packets	
2. Bar Incoming Extended Call Packets	
3. Fast Select No Restriction	
4. Fast Select With Restriction	
5. Reverse Charging	
6. Local Charging Prevention	
7. Subscribe to TOA / NPI Address Formats	
8. Bar Incoming TOA / NPI Address Formats	
9. NUI Override	
10. Bar Incoming Calls	
11. Bar Outgoing Calls	

9. Localization Information

Field	Entry
1. Allow Omission of Diagnostic Byte	
2. Use Diagnostic Packets	
3. 1980 ITU-T Clear Length Restriction	
4. Allow Incoming Diagnostic Packets	
5. Discard Diagnostic Packets on Non-Zero LCN	
6. Allow Hex Digits in DTE Address	
7. Bar Non-Privileged Listen	
8. International Call Recognition	
9. Data Network Identification Code	
10. International Call Priority	
11. Priority Encode Control	
12. Priority Packet Forced Value	
13. Source Address Control	

10. D-Bit Control

Field	Entry
1. D-Bit Accept In	
2. D-Bit Accept Out	
3. D-Bit Data In	
4. D-Bit Data Out	

11. Throughput Class Window/Packet Parameters

Field	Entry
1. Negotiation	
2. Type	
3. Win Mapping	
4. PKT Mapping	

Subscriber Database

Date: _____

Subscriber

Field	Entry
Name	
1. Autocall Enable	
2. Autoconnect Enable	
3. Dial Out Enable	
4. Flow Control Enable	
5. Security	
6. Accounting (Pass ANI)	
7. App ID	
8. Call by Alias Only	
9. CUD Overwrite	
10. Terminal Type	
11. Dial Out Support NAME	
12. Autocall NAME	
13. Autoconnect NAME	
14. Flow Control NAME	
15. Modem Profile NAME	
16. X.3 Profile NAME	
17. Banner Prompt NAME	
18. Protocol Spoof Enable	
19. Protocol Spoof NAME	

Modem Profile

Field	Entry
Name	
1. Start String	
2. Stop String	
3. Autoparity Enable	
4. Autoparity Timeout (50 msecs)	
5. Default Parity	

Profile

Field	Entry
Name	
1. Escape Data Transfer	
2. Echo	
3. Data Forward	
4. Idle Timer (msecs)	
5. Flow Control	
6. Service Signal Control	
7. Action on Break	
8. Discard Output	
9. Carriage-Return Padding	
10. Line Folding	
11. Speed READ ONLY	
12. Flow Control by Terminal	
13. Line-Feed Insertion	

Field	Entry
14. Pad after Line-Feed	
15. Editing	
16. Char-Delete Character	
17. Buff-Delete Character	
18. Buff-Display Character	
19. Edit Service Signal	
20. Echo Mask	
21. Parity Treatment	
22. Page Wait	
100. PAD Overwrite Mode	
101. Timer Conversion	
102. Guard Timer (msecs)	
103. Timer Mode	
104. Line Recall	
105. Std PAD	
106. Qbit Ignore	
107. Max X25 Call Attempts	
108. Inactivity Timer	
109. Pass XON / XOFF	
110. Help Enable / Disable	

Banner and Prompt

Field	Entry
Name	
1. Banner (Max 80 chars)	
2. Prompt (Max 6 Chars)	

ANI

Field	Entry
ANI	
1. Subscriber NAME	

DNIS

Field	Entry
DNIS	
1. Subscriber NAME	

Autocall

Field	Entry
Name	
1. Remote Host 1 NAME	
2. Remote Host 2 NAME	
3. Remote Host 3 NAME	
4. Remote Host 4 NAME	
5. Remote Host 5 NAME	
6. Call Timeout (secs)	

Autoconnect

Field	Entry
Name	
1. Subnetwork ID	
2. Logical Channel Identifier	
3. Continuity Test	

Dial Out Support

Field	Entry
Name	
1. Start String	
2. Stop String	
3. Modem Forwarding Chars	
4. Modem Forwarding Timer (msecs)	
5. CUD Call Screening	

Terminal Flow Control

Field	Entry
Name	
1. Retries	
2. Timeout between Retries (50 msecs)	
3. Send XON / XOFF	

Remote Host

Field	Entry
Name	
1. Flow Control Enable	
2. Security	
3. Password	
4. Flow Control NAME	
5. Address NAME	
6. X.28 Facility NAME	
7. CUD NAME	

Host Flow Control

Field	Entry
Name	
1. Retries	
2. Timeout between Retries (50 msecs)	
3. Send XON / XOFF	

Address

Field	Entry
Name	
1. Subnetwork ID (A or B)	
2. Aflags	
3. DTE Address	
4. NSAP	
5. Allow X.29 Reselection	

Facility

Field	Entry
Name	
1. Fast Select	
2. Reverse Charge	
3. Local Packet Size	
4. Remote Packet Size	
5. Local Window Size	
6. Remote Window Size	
7. NUI Field	
8. RPOA Field	
9. CUG Type	
10. CUG Field	

Call User Data

Field	Entry
Name	
1. CUD (Max 128 Chars)	

Modem Port

Field	Entry
Name	
1. Max Retry Time-Out (secs)	
2. Max Retries	
3. Port State	
4. Application Type	
5. Allow Writes to NVRAM	
6. Subscriber NAME	

User ID

Field	Entry
User ID	
1. Password (Max 8 Chars)	
2. Subscriber NAME	

Subnetwork Configuration

Field	Entry
Subnetwork (A or B)	
1. Subnetwork ID in Use	
2. Address NAME	

VISA Protocol Spoofing

Field	Entry
Name	
1. Send 1st ENQ Read from Remote Host to POS Terminal	
2. Max ENQ Retransmission Count	
3. ENQ Retransmission Timeout (50 msecs)	
4. Spoof ENQ	
5. Spoof ACK	
6. Spoof EOT	
7. Max Number of Reads for EOT from Remote Host	
8. Interval EOT Reads (50 msecs)	
9. Delay before Sending 1st ENQ to POS Terminal (50 msecs)	
10. Wait Timer for Reading Data from POS Terminal (50 msecs)	

Appendix E
Quick Configuration

Minimal Configuration

The X.25 PAD comes with a default configuration that should bring the network connection up immediately, once a few adjustments are made. If you want to check your network status, simply adjust the following, then save the database, and reset the card:

- logical channel numbers
- port ranges
- clock source

Refer to Appendix F for troubleshooting suggestions.

To Bring Up the X.25 Link

1 Configure the WAN parameters in the protocol stack. Refer to Chapter 6 for descriptions of these parameters.

Field	Options
1. Options	—
2. Maximum Frame Size	133 to 519
3. Baud Rate of Internal Clock Source	0 to 384000
4. Interface Type (RS232 or V.35)	RS232 or V.35
5. Interface Monitoring Using DCD	Yes or No
6. Clock Source	DCERXTX, DCERXONLY, or INTERNAL

2 Configure the virtual circuit ranges in the packet layer. Refer to Chapter 6 for descriptions of these parameters.

Field	Options
1. Lowest PVC	0 to 4095
2. Highest PVC	0 to 4095
3. Lowest Incoming Logical Channel	0 to 4095
4. Highest Incoming Logical Channel	0 to 4095
5. Lowest Two-Way Logical Channel	0 to 4095
6. Highest Two-Way Logical Channel	0 to 4095
7. Lowest Outgoing Logical Channel	0 to 4095
8. Highest Outgoing Logical Channel	0 to 4095

3 Save these records to the database and reset the card. Refer to Chapter 9 for instructions.

To Bring Up the PAD Prompt

1 Configure at least one Modem Port template and link it to the default Subscriber template. Refer to Chapter 7 for descriptions of these templates.

2 Save these records to the database and reset the card. Refer to Chapter 9 for instructions.

3 Make a call to that modem and the PAD prompt should display.

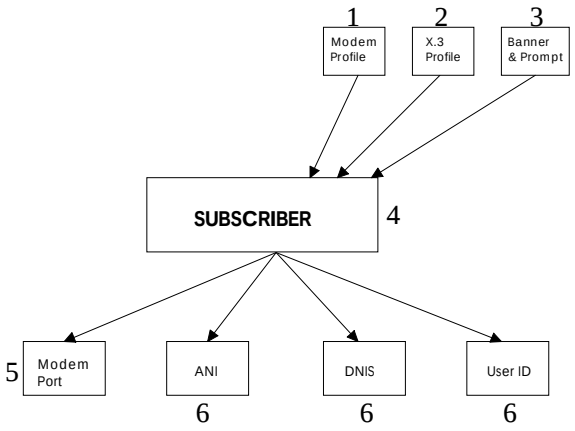
Subscriber Configuration

The following information is intended a s a quick reference for the most common configurations.

Interactive Environment

Configure the following templates to set up a Subscriber configuration for an interactive call. See the sequence steps in the diagram.

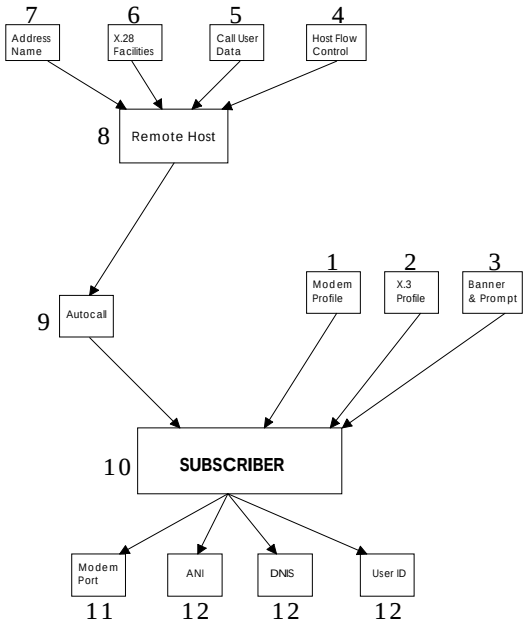
- X.3 Profile
- Modem Profile
- Banner & Prompt
- Subscriber
- Modem Port
- DNIS, ANI, or User ID (optional)



Autocall Noninteractive Environment

Configure the following templates to set up a Subscriber configuration for an autocall. See the sequence steps in the diagram.

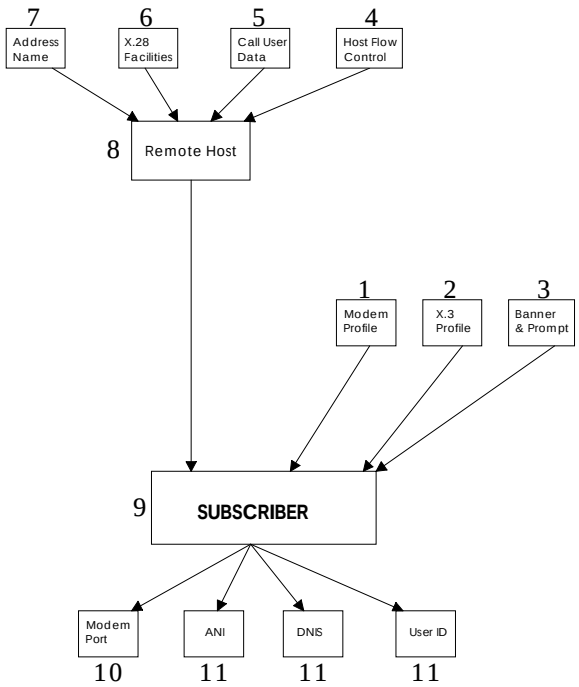
- X.3 Profile
- Modem Profile
- Banner & Prompt
- Host Flow Control
- CUD
- X.28 Facility
- Address
- Remote Host
- Autocall
- Subscriber (enable Autocall, disable Security, and configure for a non-interactive terminal)
- Modem Port
- ANI, DNIS, or User ID (optional)



Interactive Call by Alias

Configure the following templates to set up a Subscriber configuration for a call by alias. See the sequence steps in the diagram.

- X.3 Profile
- Modem Profile
- Banner & Prompt
- Host Flow Control
- CUD
- X.28 Facility
- Address
- Remote Host
- Subscriber (enable Autocall, disable Security, and configure for an interactive terminal)
- Modem Port
- ANI, DNIS, or User ID (optional)



To Set Up Autoconnect

Configure the following templates:

- X.3 Profile
- Modem Profile
- Banner & Prompt
- Autoconnect (PLP PVCs must be configured in the RS-232 User Interface or in *Total Control Manager/SNMP*; the Logical Channel Identifier must be the same here as was configured in the PLP PVC)
- Subscriber (enable Autoconnect)
- Modem Port
- ANI, DNIS, or User ID (optional)

To Set Up Security

Configure the following templates:

- X.3 Profile
- Modem Profile
- Banner & Prompt
- Host Flow Control
- X.28 Facility
- Address
- CUD
- Remote Host
- Subscriber (enable Security)
- User ID

To Configure a PVC

Configure option 2 (Virtual Circuit Ranges) from the PLP Groups in the X.25 Protocol stack. Refer to Chapter 6 for descriptions of these parameters.

Field	Options
1. Lowest PVC	0 to 4095
2. Highest PVC	0 to 4095
3. Lowest Incoming Logical Channel	0 to 4095
4. Highest Incoming Logical Channel	0 to 4095
5. Lowest Two-Way Logical Channel	0 to 4095
6. Highest Two-Way Logical Channel	0 to 4095
7. Lowest Outgoing Logical Channel	0 to 4095
8. Highest Outgoing Logical Channel	0 to 4095

To Bar Incoming/Outgoing Calls

Configure option 8 (Subscription Options) from the PLP Groups in the X.25 Protocol stack. Refer to Chapter 6 for descriptions of these parameters.

Field	Options
1. Subscribe to Extended Call Packets	Yes or No
2. Bar Incoming Extended Call Packets	Yes or No
3. Fast Select No Restriction	Yes or No
4. Fast Select With Restriction	Yes or No
5. Reverse Charging	Yes or No
6. Local Charging Prevention	Yes or No
7. Subscribe to TOA / NPI Address Formats	Yes or No
8. Bar Incoming TOA / NPI Address Formats	Yes or No
9. NUI Override	Yes or No
10. Bar Incoming Calls	Yes or No
11. Bar Outgoing Calls	Yes or No

Because you are revising X.25 protocols, you must reset after saving your changes.

To Modify X.25 Timers

Configure option 4 (Timers and Retransmission Values) from the PLP Groups in the X.25 Protocol stack. Refer to Chapter 6 for a description of these parameters.

Field	Options
1. Acknowledgment Delay—Withheld Pending RR	0 to 32000
2. T20—Restart Request Response Timer	0 to 32000
3. T21—Call Request Response Timer	0 to 32000
4. T22—Reset Request Response Timer	0 to 32000
5. T23—Clear Request Response Timer	0 to 32000
6. Tvalue—Status Transmission Timer	0 to 32000
7. T25—Window Rotation Timer	0 to 32000
8. T26—Interrupt Request Response Timer	0 to 32000
9. Idlevalue—Link-Level Hold Time	0 to 32000
10. Connectvalue—DTE / DCE Resolution Timer	0 to 32000
11. R20—DTE Restart Request Retransmission Count	1 to 255
12. R22—DTE Reset Request Retransmission Count	1 to 255
13. R23—DTE Clear Request Retransmisssion Count	1 to 255

Appendix F
Troubleshooting

Connection Error Messages

If a call is rejected or is disconnected, the PAD displays a hexadecimal error code, along with an error message. Below is a list of the valid error messages and possible causes.

0900	Invalid address is called Remote host is down or not switched on Network between the PAD and remote host is down
00E1	Remote host is down Network between the PAD and the remote host is down
00E2	Remote host is down Network between the PAD and the remote host is down
00E3	Connection request rejected by remote host for unspecified reasons
00E4	Connection request rejected by remote host for unspecified reasons
00E7	Connection request was rejected The called NSAP address on the remote host was busy
00E8	Connection request was rejected The called NSAP address on the remote host is permanently unreachable Host name is not found in gateway table lookup
00EB	Connection request was rejected The called NSAP address on the remote host is unknown
00F1	Connection was disconnected Normal disconnection by the remote host
00F2	Connection was disconnected Abnormal disconnection by the remote host

Diagnostic Codes

In addition to standards ITU-T diagnostic codes, the X.25 PAD also suppoorts the following:

163	Resource Constraint
241	Normal Disconnection
243	Incompatible information in the Call User Data
256	max_msg_buf_len

TFTP Error Codes

Tthe X.25 PAD also suppoorts the following TFTP error codes:

EUNDEF	Undefined error code. Usually caused when no packet is received in the Timeour period.
ENOTGOUND	File Not Found. During a server operation a file was requested that could not be openned.
EACCESS	Access Violation. The requested file was not permissioned. This can only happen during a server operation where the operation was not permissioned.
ENOSPACE	Disk Full or Allocation Exceeded
EBADOP	Illegal TFTP Operation. Either an ACK or DATA packet was received when it should not have been.
EBADID	Unknown Transfer ID
EEXISTS	File Already Exists
ENOUSER	No Such User

Troubleshooting Tips

The X.25 Link Doesn't Come Up?

1 Look at the WAN Statistics screen (refer to Chapter 8). This screen should indicate that DSR, CTS, and DCD are on. If these signals are not on, check the physical cable.

2 If the cable is correctly attached, double-check the interface and clock source configurations. Refer to Chapter 6 for descriptions of these WAN parameters.

Field	Options
1. Options	—
2. Maximum Frame Size	133 to 519
3. Baud Rate of Internal Clock Source	0 to 384000
4. Interface Type (RS232 or V.35)	RS232 or V.35
5. Interface Monitoring Using DCD	Yes or No
6. Clock Source	DCERXTX, DCERXONLY, or INTERNAL

3 Next, double-check the PLP mode and version settings in the X.25 stack configuration. Refer to Chapter 6 for a description of these parameters.

Field	Options
1. Network Protocol Mode	ACCUNET, AUSTPAC, etc.
2. X.25 Version	80, 84, or 88
3. Packet Level Protocol Mode	DCE, DTE, or DXE

4 Double-check to be sure the ports are enabled. Refer to the X.25 Subnetwork Configuration. Refer to Chapter 7 for a description of the parameters.

Field	Options
Subnetwork (A or B)	A or B
1. Subnetwork ID in Use	Yes or No
2. Address NAME	----------

You Called the Remote Host and Received a Diagnostic Packet?

Check the virtual circuit ranges you configured. Refer toChapter 6.

NOTE: If you have a protocol analyzer, use it to determine the cause of the diagnostic packet.

Calls Don't Go Through (Terminal Doesn't Get the PAD Prompt)?

Check the modem's port state in the Modem Port configuration. It should be "inservice." Refer toChapter 7.

Calls Are Not Being Routed Per DNIS?

Check the Subscriber NAME entered in the Modem Port configuration. DNIS-based routing will only be done if the Subscriber NAME points to the DEFAULT subscriber. Refer to Chapter 7.

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