

**Lucent Technologies**  
Bell Labs Innovations



# **Data Networking Products Terminal User Guide**

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# Preface

The *Data Networking Products Terminal User Guide* contains the information most terminal users need to gain access to services available with BNS-2000 networks. It does not contain information about specific terminals, host computers, or printers. See your network administrator or product documentation for details about specific devices.

The following may be helpful in using this guide:

- If you are a first-time terminal user, begin with Chapter 1 and read through Chapter 4.
- If you are familiar with Data Networking Products nodes, you may want to skip to Chapter 2 for basic information (for example, making and disconnecting calls).
- For information on the availability of extended operations such as directory assistance, two-way stations, modems, or dialers, see Chapter 3.
- For information on user commands, see Chapter 4.
- For information about X.25 services, see Chapter 5.
- For information on synchronous terminals, see Chapter 6.
- For an explanation of messages, see Appendix A.
- For a terminal user's checklist of important information, see Appendix B.
- For help finding topics, see the Index.

This guide uses certain style conventions to make the information easier to understand and use. The following table summarizes these conventions.

Convention	Explanation
<b>THIS Typeface</b>	shows prompts and messages displayed on your terminal. They may be sent to your terminal either from a Data Networking Products node or from another device in the network.
THIS Typeface	shows characters entered at the terminal keyboard.
RETURN	indicates a specific key on your keyboard.
< >	distinguishes information that varies depending on circumstances. The characters within the angle brackets may be part of a message sent to the terminal, or something entered from the terminal keyboard.
UPPERCASE/lowercase	input may be entered at the terminal keyboard. Examples in this guide are presented in lowercase.

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# Introduction

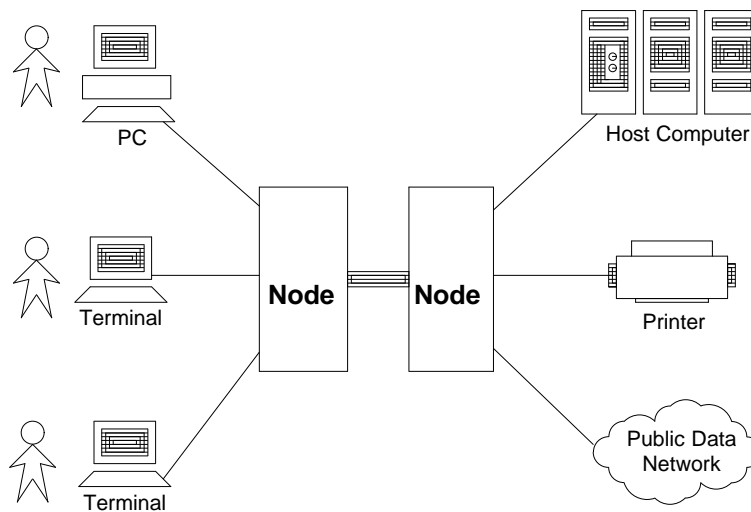
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# Introduction

The data switches supported by Data Networking Products nodes connect terminals, printers, computers, and networks in a wide range of network applications (Fig. 1-1). There may be one or more switches in a *network*. Each switch is called a *node*.

From a terminal or personal computer (PC), you can make calls through the node to devices on networks of any size without being directly and permanently connected to those devices. You will usually be unaware of the node, since interactions with it occur only when a connection is established while you are making a call to another device on the network.



**FIGURE 1-1. You and the Node**

## What Is a Terminal?

Terminals are devices through which data can enter or exit a computer system. Within the context of this document, two categories of terminals are discussed:

- those primarily designed for computer communications, usually called *terminals*. When a terminal is turned on, it is ready to provide communication functions and to be used to "talk" with the network as soon as the screen or terminal display warms up.
- those that are independent computers, such as *personal computers* (PCs). PCs differ from terminals in that a PC provides communication functions only when a software package that emulates (behaves like) a terminal is running on it. You must run the terminal emulation software to prepare a PC for use as a communications terminal.

When the word *terminal* is used in this guide, it means either a terminal or a PC running terminal emulation software, behaving like a terminal.

## Terminal Operations

Terminals transmit information from the keyboard to the communications port and display the responses on a screen. They communicate in both directions, to and from the port.

The physical connections between the terminal and the local node and the settings that make the terminal compatible with the node are set up by the network administrator. You *may* have permission to change certain settings (parameters). Changing settings is discussed in later chapters of this guide.

**Caution:** You should know how your terminal operates before changing any terminal settings.

## The Terminal-to-Network Connection

A cable connects your terminal to the local node at a piece of hardware within the node called a module. (Other devices on the network are also connected this way.) Each module is designed with a specified number of ports or channels, allowing for an identification scheme for each terminal or device in the network. The identifying information includes the name of the local node, the module number, and the port number.

As a terminal user, you send data to and receive data from other devices connected to the network. Communicating with another device (called a *terminal session*) requires that you first establish a connection with the local node. From the local node you may gain access to the larger network.

After you have gained access to the local node, you can *make a call* to a network service, or to another device on the network, by typing and entering the network address of the service or device. If the address you enter is valid, the nodes in the network act together to put the call through to the destination device. When the call is set up, you communicate directly with the device.

At first, it is difficult to distinguish between starting a *terminal session* and *making a call*, because each phase occurs rapidly and in succession. The network, however, sees them as separate actions.

Predefined destinations (PDDs) are set by the network administrator. PDDs restrict members of originating groups, those groups which can initiate calls, to communication with one predefined device in the network. If your terminal is configured to call a predefined destination, you are not given the option of selecting a destination because your port is immediately connected to the predefined destination. In other words, the **DESTINATION:** prompt does not appear when you turn on your terminal. In essence, the call is made for you. Security for this type of call is ensured by putting terminals assigned to predefined destinations in secure areas.

## Prompts

Prompts indicate that the node is waiting for input to initiate, continue, or end a terminal session. Familiarity with the correct responses to the prompts comes with experience in using the network. Certain prompts are sent by the network while others are sent by the device you are calling. The network prompts you may see include the following:

- **COMMAND:**
- **NETWORK ACCESS PASSWORD:**
- **DESTINATION:**
- **GROUP:**
- **<groupname> GROUP PASSWORD:**

These prompts are explained in more detail in later chapters.

## Messages

Five types of messages may appear on your screen:

- *Login incorrect* is the only login error message that might appear when you log on. See **Appendix A**.
- *Messages of the day* are administered by the network administrator to contain a welcome to the network, advice on how to use the network, a scheduled maintenance announcement, or information on new software availability. The message is displayed when you first gain access to the local node.
- *Destination error messages* are sent to the terminal when you make a mistake in your response to the **DESTINATION:** prompt; see **Appendix A**.
- *Command error messages* are sent to the terminal following your response to the **COMMAND:** prompt; see **Appendix A**.
- *Informational messages* are sent to the terminal in response to a command you entered; see **Appendix A**.

## The Network Administrator

One of the network administrator's main concerns is successful use of the network by terminal users. The network administrator assigns terminal users to *groups*, which partially determines the services the members of the groups are permitted to access from their terminals. The network administrator also ensures that passwords are assigned and overall network security is maintained.

Some of the network administrator's responsibilities are

- initiating network security, including:
  - establishing the security patterns that are checked when calls are made
  - installing network passwords
  - assigning security restrictions for network destinations (but not passwords for host computers)
- administering the network attention signal and how the network responds to that signal
- enabling user commands
- administering messages of the day
- providing access to the directory assistance feature

## Network Security

Several features ensure that a call made from your terminal is authorized by the network:

- network access restrictions
- originating group security
- use of the select group feature
- closed user group (CUG) security

The requirement of a password constitutes a *network access restriction*. Permissions are checked when you first attempt to gain access to the local node, or when you attempt to make a call to a service on the network. In many networks, security is checked at every attempt to gain network access and for all call attempts. The password, which you can get from the network administrator, allows you to gain access to the local node.

Your terminal, along with every device that can originate a call, is assigned to a group. Every group is assigned a password that must be entered correctly to gain access to the local node. It is a common security practice to change the password periodically. The network administrator usually informs you of the change.

Other facts about passwords that are worth remembering include

- Passwords do not appear on the screen when entered.
- A password should be committed to memory. Avoid writing it down.
- When a password is entered incorrectly too many times, the terminal locks up. Contact your system administrator.
- A password may be established for the host you are calling. When your call reaches the host, you are prompted for that password. Host passwords are set by host administrators, not by the network administrator.

After you have gained access to the local node and made a call attempt, another security method, called *originating group security*, can be used to restrict network services or destinations from accepting your call. The group to which you are assigned has access to a particular set of services on the network, such as certain host computers. When you attempt to call one of these services, the permissions for your group are checked and if authorized, you are connected to the destination. If a member of another group attempts to call this destination, the network denies the call.

Another feature, called *select group*, allows you to select a new group identity. By selecting the new identity, you acquire the calling permissions of the new group. This security method requires that you enter a new group password. Without the password, access to the new group is denied and the new calling permissions are not gained. The select group feature provides flexibility because it allows you to change to groups that can call destinations not authorized for your default group.

An additional method of service restrictions, called *closed user group (CUG)* security, restricts access to endpoints according to membership in a closed user group. With this method, each calling device and destination is configured with a CUG profile. A CUG profile is the list of closed user groups of which an endpoint is a member. When a call is made, the originating CUG profile is compared to the destination CUG profile. If there is a match, the call is permitted. Security checking is transparent. If security is not passed, a message is output. **Chapter 5** contains more details about CUG profiles and security checking with X.25 services.

From the preceding discussion you can see the importance of knowing about security information in order to use the network successfully. Specifically, you should know

- the network access password for your group
- the addresses of services your group is authorized to call
- whether you have the capability to select another group identity
- the addresses of services authorized for the other groups you may be able to select
- the group passwords for other selectable groups

This information can be obtained from the network administrator and should be noted on the checklist provided in **Appendix B**.

## Network Attention Signal

The network attention signal notifies the network that you want to talk to it, make a new call, or enter one of the available user commands. The common default for a network attention signal is `BREAK` `BREAK` entered within one second.

The network attention signal may be set to some other key or sequence of keys by the network administrator. Check to find out what the network attention signal is for your port connection.

The network administrator also determines how the network reacts to the network attention signal. The signal can be used to disconnect the current call and give the **DESTINATION:** prompt or return the **COMMAND:** prompt. These settings are covered in more detail in later chapters.

Occasionally `ESCAPE` `ESCAPE` is used as the network attention signal. This attention signal may cause problems for you, because `ESCAPE` `ESCAPE` causes the very next character entered to be ignored by the local node. If this is your attention signal, enter an extra character such as `SPACE` or `RETURN` after entering the attention signal and before entering a character you want the local node to recognize, such as a user command.

If you have permission to use command mode, you can use the **netattn** address as a means of moving from the **DESTINATION:** prompt to the **COMMAND:** prompt. **netattn** is a special destination provided for users who need access to the command mode but cannot use an administrator-configured attention signal. If you inadvertently entered **netattn**, got the **COMMAND:** prompt, and want to return to your terminal session, simply enter `continue` and press `RETURN` .

## Changing Terminal Settings

Most terminals have changeable settings that allow them to communicate with the local node, the network, or other devices on the network. Product literature supplied with your terminal explains these settings and how to change them for your terminal.

There are also settings administered within the network, called *port settings*. These settings, determined by the network administrator, allow the local node to communicate successfully with the port to which your terminal is connected.

Your terminal settings and the administered port settings should match. Making any changes to either terminal settings or port settings may cause a mismatch and disable communications. For this reason, it is a good idea to leave terminal settings alone unless you are experienced with them.

You may have permission from the network administrator to use the **set** command to change some of the port settings. This command and others are explained in **Chapter 4**.

---

## A Typical Call Scenario

What follows is a typical call scenario for a terminal user connected to a node. Assume that you have an account on a host computer with an address of *lzvax1*. The host computer is connected to the same node as your terminal. You want to gain access to the network (at the local node), make a call to the host computer, log on to it, do your work, and log off.

- To begin a *terminal session* with your local node, turn on your terminal. Your particular terminal is set to beep when the power is on. You hear the beep, but see nothing on the screen.
- To establish a connection with the local node, press the  key a few times. The node sends its first message:

**STATION ID - gold/8.3**

The message shows that your terminal and the local node are connected, and identifies the node/module.port for your terminal connection. Record the STATION ID in case you need to report a problem to the network administrator.

- The node may send a second message. It is a prompt for a security password.

**NETWORK ACCESS PASSWORD:**

Enter the password to gain access to the node.

- The node may send a third message, similar to the one below, if a message has been entered by the network administrator:

**Welcome to the network. For help, dial 555-0222.**

The network administrator has programmed this message of the day. It usually contains helpful information.

- To *make a call*, respond to the prompt that asks for the destination you wish to call.

**DESTINATION:**

Type the address of the host computer to which you want to gain access and press the  key:

**DESTINATION:** lzvax1

- To complete the call to the host computer service, answer the prompts sent from the host computer to your terminal.

**login:** abc

**Password:** kkugoh

(Remember the login and password prompts are only samples shown for the purposes of this example.)

Providing the information is entered correctly, you have now gained access to your computer account.

- To log off the computer and the network, once you have completed your work, use the logoff procedure you received from your host system administrator. When you log off the computer, the node **DESTINATION:** prompt appears. This prompt shows that the call to *lzvax1* has been disconnected.

You have now made a call to *lzvax1* and disconnected it, but you are still in a terminal session with the local node. The node prompt on your terminal, **DESTINATION:**, is asking you to *make another call over the network*. You can make another call, or end the terminal session, by using your attention signal.

Other call scenarios can be more complicated because of the variations possible with:

- your terminal type and model
- the type of destination called
- the size of the network
- the service you wish to call
- the level of network and host computer security
- the user commands entered

Basic procedures and extended operations for your terminal are covered in more detail in later chapters.

## Checklist

Information available from your network administrator is needed to help you set up your first session at the terminal. Gather this data by bringing a copy of the checklist in **Appendix B** to your network administrator.

Because you may need to report a problem to the network administrator, always record the STATION ID printed on your screen at the beginning of a terminal session. It is the network address of the terminal you are using. Each terminal has a different STATION ID.

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# Basic Information

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# Basic Information

The basic information needed to use a terminal connected to a node is covered in this chapter. You are introduced to:

- the general rules for use of the network:
  - command abbreviations
  - timeouts
  - too many invalid entries
  - edit keys
- the procedures for accomplishing specific tasks:
  - gaining access to the network
  - making a call to a network destination
  - placing a call on hold
  - disconnecting a call

This chapter also clarifies special situations and provides information about exceptions to basic terminal operations. For the latter reason, it is a good idea to read the entire chapter.

## General Rules

You should be aware of the following general rules before beginning procedures:

- Typed entries are not acted upon by the other end of the call connection until you press `RETURN`.
- There is a time limit for entering a response.
- Too many invalid entries to the same prompt lock the terminal.
- Certain keys, called edit keys, can be used to correct typing mistakes.

## Command Abbreviations

User commands entered at the **COMMAND:** prompt can be entered in their entirety or in abbreviated format. The abbreviations can be found in Table 4-2 or in Command Descriptions in **Chapter 4**.

## Timeouts

A timeout occurs when you take longer than 20 seconds to respond to a prompt. The local node sends you a message or a character that indicates your prompt has timed out. Action must be taken to get the prompt back. The messages sent after a timeout and your responses to the timeout are not always the same for every port. Your response is dependent on how the network administrator has administered the port, the type of module the terminal is connected to, or other variables. Table 2-1 shows various timeout situations and responses.

When a modem connection times out, the phone call is disconnected. You have to redial the modem pool number and start over again; see Modems in **Chapter 3**.

TABLE 2-1. Timeouts

Node Prompt	Default Timeout Message *	Your Action	Result
<b>DESTINATION:</b>	@	RETURN	<b>NETWORK ACCESS PASSWORD:</b> or <b>DESTINATION:</b>
		BREAK BREAK **	<b>COMMAND:</b> <b>DESTINATION:</b>
	<b>GROUP:</b>	enter group	<b>GROUP PASSWORD:</b>
	<b>NETWORK ACCESS PASSWORD:</b>	enter password	<b>DESTINATION:</b>
<b>NETWORK ACCESS PASSWORD:</b>	@	RETURN	<b>NETWORK ACCESS PASSWORD:</b>
<b>GROUP:</b>	@	RETURN	<b>DESTINATION:</b>
<b>COMMAND:</b>	<b>Command mode timeout; reconnecting</b>	RETURN	returns to <b>DESTINATION:</b> or previous terminal session

\* The messages sent as a result of a timeout depend on how the port is administered. This column shows messages that can be administered to follow a timeout of the prompt in the first column.

\*\* Or another administered network attention signal

## Too Many Invalid Entries

When you respond incorrectly too many times to network prompts, the local node sends a message to your terminal and the terminal locks. You will receive the following message, which indicates what you should do next:

```
Too many invalid attempts, turn terminal off, then on, to
continue.
```

This message appears after the tenth successive invalid entry to the **DESTINATION:** prompt and after the third successive invalid entry to the **GROUP:** or **NETWORK ACCESS PASSWORD:** prompts.




The node also sends an alarm message to the system console that alerts the network administrator of a possible attempted security violation (someone trying to break into the network).

## Edit Keys

Edit keys are available to correct errors made while typing user commands or responding to prompts. Use them before retyping characters. Table 2-2 shows the edit keys and their functions.

---

**TABLE 2-2. Edit Keys**

Key	Function	Comment
	change character	This key moves the cursor back one space to the left. Reenter correct characters.
	cancel character	This key causes the last character entered to be disregarded. However, the last character still appears on the screen.
	erase line	This key erases everything typed on the line.

## Procedures

The four procedures that follow are designed to aid you in:

- gaining access to the network
- making a call to a network destination
- placing a call on hold (if enabled for your port)
- disconnecting a call

### Procedure 2-1. Gaining Network Access

1. If your terminal is off, turn it on. You will get an indication from the terminal that the power is on. If you are dialing through a modem, use the modem pool number for the network. The number is available from the network administrator.

For terminals assigned to call only a predefined destination (PDD), the call is made when the terminal is turned on. If you do not receive any call completion indicator (for example, host messages), try one of the following:

- a. If the **COMMAND:** prompt appears, enter the **continue** command:

```
COMMAND: c   
Reconnecting
```

- b. If the **DESTINATION:** prompt appears, press  :

```
DESTINATION: 
```

If nothing indicating PDD call completion appears, press the network attention signal. (The default is   .) The network attention signal initializes a PDD call that has momentarily hung.

2. If the screen is garbled, press  a few times. If the screen *remains* garbled, contact your network administrator for assistance.

3. The first network message identifies the port to which your terminal is connected. For example

**STATION ID - gold/8.3**

means you are connected to *port 3 of module 8*, which is on a node called *gold*. Record the STATION ID in case you have to report problems to the network administrator.

4. Subsequent prompts now depend on how the network administrator has administered the port to which your terminal is connected.

- a. If your prompt is

**NETWORK ACCESS PASSWORD:**

type the password and press .

- b. If your prompt is

**GROUP:**

type the group name you want to select and press .

Your next prompt is

**<groupname> GROUP PASSWORD:**

Type the group password and press .

5. If the network administrator has set up a message of the day, it is displayed now.

The *message of the day* is printed whenever you reestablish access to the network. If your port is configured as a two-way station (explained in **Chapter 3**) or you can only call a predefined destination, the message prints once when the terminal is turned on.

6. The **DESTINATION:** prompt should appear next. If it does not appear, press  a few times. If it still does not appear, enter the network attention signal. (The default is  .

Error messages are displayed when errors occur while you are attempting to gain access to the network; see **Appendix A** for a list of error messages and corrective actions.

## Procedure 2-2. Making a Call

1. To call a network service or another device (for example, a host), enter the address of the host at the **DESTINATION:** prompt. The address will vary depending on whether you want to reach a local host or a device in a different exchange, area, or network.
  - local call

To make a local call, enter the local service address. In the example below, the host named *rhino* is on a local node.

**DESTINATION:** rhino
  - different exchange

To make a call to a device or service in a different exchange, you may have to enter the exchange and local service address separated by a slash. In the example below, the host named *green* is in a different exchange (called *576*).

**DESTINATION:** 576/green
  - different area

To make a call to a device or service in a different area, you may have to enter the area, exchange, and service address separated by slashes. In the example below, the host named *clarinet* is in an exchange called *band*, in an area called *sf*.

**DESTINATION:** sf/band/clarinet
  - different network

To make a call to a device or service in a different network, you may have to enter the network, area, exchange, and local service address separated by slashes. In the example below, the network name *net1* is located at the beginning of the address used in the preceding example.

**DESTINATION:** net1/sf/band/clarinet

If you don't know the address of a destination, the directory assistance feature may be helpful. Directory Assistance, in **Chapter 3**, provides details.
2. When your call reaches the host, you may be required to enter a personal login and password to gain access to the host. These requirements are set by the host administrator and not by the network administrator.
3. If the call could not be completed, the network sends a message to the screen indicating what went wrong; see **Appendix A** for error message information.

See Destination Addresses in **Chapter 3** for more information on call addresses.

### Procedure 2-3. Placing a Call on Hold

The **continue** command is used to place a call on hold. You can place up to seven calls on hold at the same time and keep an eighth call active. The *call hold* feature allows you to assign tags to each call and to switch between them. This feature may not be enabled for your port.

If this feature is enabled for your port, read the following special considerations before proceeding with the steps for placing a call on hold:

- You must be at the **COMMAND:** prompt to enter a command. You may have permission to use all or some of the user commands. If so, you can use the network attention signal to get the **COMMAND:** prompt either at the **DESTINATION:** prompt or during an active call.
- If your port is configured to disconnect when the network attention signal is entered, the local node returns the **DESTINATION:** prompt. Under this configuration, the **COMMAND:** prompt does not appear and a call cannot be placed on hold.
- If you attempt to place a call on hold while transmitting or receiving data, the result may be lost data or duplicated data. Wait until data transmission or reception is complete before placing a call on hold.

To place a call on hold, do the following:

1. Get to the **COMMAND:** prompt by entering the network attention signal at the **DESTINATION:** prompt.
2. Perform one of the following steps (a, b, c, d, or e) depending on the **continue** command option you want to use.

- a. To return to the previous connection:

**COMMAND:** c

- b. To return to a tagged connection:

**COMMAND:** c vax1

- c. To place the current call on hold:

**COMMAND:** c new

The node prompts for a tag. Choose a tag that makes the call easy to remember. Tags for held calls can be up to four alphanumeric characters.

**CURRENT CALL HAS NO TAG.**

**ENTER TAG (UP TO 4 CHARS)**

**(<CR> TO DISCONNECT):** vax1

- d. To place the current call on hold and tag it vax1:

**COMMAND:** c new vax1

The node responds with: **DESTINATION: .** Now enter the address of another service you want to call; for example, vax2.

**DESTINATION:** vax2

- e. To return to a previously tagged call and place the current call on hold with a tag:

**COMMAND:** c <previouscall> <currentcall>

For example, enter

**COMMAND:** c vax1 vax2

to return to the call you previously tagged vax1 and place your current call on hold with the tag vax2.

Screen messages announce the hold and return to the previously tagged call.

## Procedure 2-4. Disconnecting a Call

There are three scenarios for this procedure:

1. Your terminal may be configured to disconnect calls when you enter the network attention signal. For example, if you enter

you will get **Disconnecting.**

If so, no further action is necessary.

2. If your terminal is assigned to a *predefined destination*, turn off your terminal. If your terminal is left on, the destination host may continue to send prompts or messages to the terminal. For example, you may get **Conversation ended** if the host terminates the call.
3. If you get the **COMMAND:** prompt after entering the network attention signal, you can use a variation of the **disconnect** user command, abbreviated as **d**. For option a or c (which follow), the node returns the **DESTINATION:** prompt to your terminal. For option b, the node returns the **COMMAND:** prompt. If no input is given and a timeout occurs, the **DESTINATION:** prompt then appears.

- a. To disconnect only the current call:

**COMMAND:** d

The terminal responds with the following message:

**Disconnecting.**

- b. To disconnect a labeled call, such as one labeled **vax1**:

**COMMAND:** d vax1

The terminal responds with the following message:

**Disconnecting vax1.**

- c. To disconnect all calls:

**COMMAND:** d all

The terminal responds with the following message:

**All calls disconnected.**

---

# Extended Operations

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---

# Extended Operations

This chapter supplements the basic information contained in **Chapter 2**. It covers:

- destination addresses including X.121 addresses and speedcall addresses
- directory assistance
- the select group feature (for asynchronous terminal users only)
- displaying and changing port settings
- two-way stations
- modems
- modem pool dialer

Procedures are included that explain how to get directory assistance and how to select a new group; both are extended operations.

## Destination Addresses

The procedure for Making a Call contained instructions for making calls from your terminal to destinations that are located:

- on your local exchange
- on a different exchange in the same area
- on an exchange in a different area
- on an area and exchange in a different network

Each of these destinations requires an address. The network administrator assigns addresses, containing up to four parts, to every callable destination. The addressing scheme designates the parts as

<network>/<area>/<exchange>/<local>

Each part can consist of up to eight alphanumeric characters, such as

f4net1/nj1/essx1/host22

*Dialing*, or *making a call*, means entering an address at the **DESTINATION:** prompt.

Worth mentioning here, but covered in detail in **Chapter 5**, is that some network destinations may also have X.121 addresses. These are strictly numeric addresses, usually associated with X.25 data services, that support CCITT Recommendation X.121. Asynchronous endpoints that have access to, or are accessed by, endpoints on an X.25 host or an X.25 PDN *must* have X.121 numeric addresses assigned to them. X.121 addresses *may* be assigned, however, to any asynchronous endpoint. Like alphanumeric mnemonic addresses, they also consist of up to four parts. The parts are designated as

<DNIC>/<SR>/<SA>/<EPN>

These acronyms stand for

- DNIC - Data Network Identification Code
- SR - Service Region
- SA - Service Area
- EPN - Endpoint Number

X.121 addresses as used in X.25 services are explained in detail in **Chapter 5**.

There are several points to remember about network addresses:

- Entering all four parts of an address always works, as long as all four parts have been defined by the administrator for every node that the call will pass through.
- You need to enter only the local address for calls to destinations on your local exchange.
- You may need to enter the exchange/local address for calls to destinations on another exchange.
- You may need to enter the area/exchange/local address for calls to destinations outside your area.
- You may need to enter the network/area/exchange/local address for calls to destinations on another network.
- X.121 addresses are numeric, while the network addresses are alphanumeric; each address scheme has four parts that correspond to the four parts of the other scheme.
- Within a network, either the alphanumeric or the X.121 address may be used. They may be mixed in one extended address as long as they are separated by slashes.

Three of the items above say *You may need to enter* because the network administrator can enable features on your node that make entering the correct address simpler. One of these features is called *speedcall addresses*.

## Speedcall Addresses

To administer speedcall addresses, the network administrator assigns a name for a multilevel address. The name is usually just a few characters, so there is less to remember. For example, suppose the network administrator assigns `neck` as the speedcall name for `east/nj/zoo/giraffe`. Instead of entering the longer four-part address, you would enter `neck` at the prompt:

**DESTINATION:** `neck`

If you include more than the speedcall name, the call may still work, depending on how the node is configured. Entering `neck` or `zoo/neck` or `nj/neck` or `nj/zoo/neck` will all work, although this negates the purpose of the speedcall.

A speedcall name can be assigned for any callable destination on the network. The network administrator should be able to provide a list of speedcall names.

## Directory Assistance

Directory assistance is another extended operation the network administrator may make available to you. The feature provides the addresses of any destinations to which you can gain access, including speedcall addresses. Only the addresses your originating group has permission to call appear when you request directory assistance. If a port has an X.121 address, it is also listed.

Procedure 3-1 provides the information for getting directory assistance. To access help for directory assistance, enter "?.", "?.help", or "?.h" at the **DESTINATION:** prompt.

### Procedure 3-1. Accessing Directory Assistance

Directory assistance is available for a variety of destinations providing the network administrator has enabled the feature on the destination node. (You will know that directory assistance has not been enabled if no directory assistance information is displayed after your query.) Read "a" for local destinations, "b" for destinations in a different exchange, "c" for destinations in a different area, or "d" for destinations in a different network.

- a. **To get directory assistance for local destinations**, enter a question mark (?) at the **DESTINATION:** prompt.

**DESTINATION:** ?

The response is a list of destinations on the local node you can address.

- b. **To get directory assistance for destinations in a different exchange** than your terminal, enter the exchange, a slash, then the question mark.

**DESTINATION:** mg/?

- c. **To get directory assistance for destinations in a different area** than your terminal, enter the area name, a slash, the exchange, a slash, and then a question mark.

**DESTINATION:** nj/mh/?

For this example, the response includes a list of destinations in the nj/mh area/exchange you have permission to call.

- d. **To get directory assistance for destinations in a different network** than your terminal, enter the network name, a slash, the area name, a slash, the exchange, a slash, and then a question mark.

**DESTINATION:** East/nj/mh/?

The response is a list of destinations for the requested area and exchange (nj/mh), not the whole network (**E**ast).

If the directory fills more than one screen, the directory assistance paging feature allows asynchronous terminal users to move forward one page (enter **p**), move forward one-half page (enter **h**), or quit (enter **q**). You can also request no paging (enter **?np**). (The **?np** option does not apply to terminals connected through SYNC8 [BSC3270] modules.) A **DESTINATION:** prompt appears at the end of a directory assistance listing.

Screen 3-1 shows a sample listing that was returned following a request for directory assistance. The text following the screen explains the listing.

```

DESTINATION:  nj/lc/?
Help is available.  At the DESTINATION prompt enter: ?.help
DIRECTORY ASSISTANCE FOR:

      NETWORK/AREA/EXCHANGE - East/nj/lc
      DNIC/SR/SA - 3002/201/580

ADDRESS      X.121 ADDRESS DESCRIPTION
NETWORK: East DNIC:3002   pdn1
AREA:   nj   SR:  201   New Jersey
        sf   SR:  495   San Francisco
EXCH:   lc   SA:  580   Liberty Corner
        mg                   Mountain Gorge
        mh                   Murray Hill
LOCAL:  com2 EPN:  1455   Lab computer_2
        com3                   1111-1200Lab computer_2
SPEED:  go   SPEED:      3002/nj/mg/com2
                   4444   3002/201/580/1455

Enter p to move forward one page, h to move one-half page,
or q to quit.

Help is available.  At the
DESTINATION:
prompt enter:
nj/lc/?.help

Conversation ended.

<message of the day>

DESTINATION:

```

### SCREEN 3-1. Sample Directory Assistance Display

Screen 3-1 depicts the following information:

- The network name is *East*, and its X.121 DNIC is *3002*.
- The area name is *nj*, and it also has an X.121 address, *201*.
- The exchange is *lc*, or *580* in X.121.
- The local service names of East/nj/lc are *com2* and *com3*.
- Local speedcalls are *go* for 3002/nj/mg/com2 and *4444* for 3002/201/580/1455.
- You also have access to services in the areas named *sf* and *nj* and exchanges named *mg* and *mh*.
- All listings under *LOCAL* apply to a "nj/lc/?" entry. Exchanges other than the one requested are also displayed; *mg* and *mh* are other exchanges.

---

## Select Group Feature

When you call a destination, the security pattern associated with your originating group is checked. If that security pattern does not match one that is listed for the destination you are calling, your call does not pass security.

You are placed in a default originating group when you gain network access. However, the network administrator may set your permissions to allow you to switch to other groups whose security patterns match up with the listed patterns for a different set of destinations. If you can change from your default originating group to one of the other groups, you may be able to call different services or devices on the network. Being able to change to a new group identity is called the *select group feature*. Procedure 3-2 explains how to select a new group.

The command **select** is not available to synchronous terminal users.

### Procedure 3-2. Selecting a New Group

Assuming you have gained access to the local node and are prompted for a destination, follow the actions outlined below:

1. **DESTINATION:**    
**COMMAND:**    
**GROUP:**    
**newgrp GROUP PASSWORD:**   
**DESTINATION:**

Selectable groups are always protected by passwords. If you are allowed to change groups, you need information from the network administrator about group names, group passwords, and the destinations authorized for the selectable groups; see **Chapter 4** for more about the **select** command.

2. Your terminal may also be configured so that you *must* select a group prior to making each call. With this scheme, when you establish a connection with the network you skip the **NETWORK ACCESS PASSWORD:** prompt. Security is established by asking for the group name and group password:

```
GROUP: mygroup   
mygroup GROUP PASSWORD:   
DESTINATION: myhost 
```

## Display and Change of Port Settings

You may be allowed to change the settings established by the network administrator for the port to which your terminal connects. The **display** command allows you to display the settings that are in effect. The **set** command allows you to change the settings for the terminal sessions. Both commands are explained in **Chapter 4**.

## Two-way Stations

A PC can be configured as a member of a two-way group, meaning it can both originate and receive calls.

When you turn on your two-way station or connect by dialing through a modem, the network acknowledges the connections by displaying the **STATION ID**:

```
STATION ID - gold/8.3
```

If there is a *message of the day*, it appears next, followed by:

```
Receive mode. Press the return key to originate a call.
```

This means that, by default, the port is ready to *receive* a call from another device. To *originate* a call, press `RETURN`. The **DESTINATION:** prompt appears. Your originating call is subject to the rules explained in the **Select Group Feature** section of this chapter. Call permissions depend on the type of originating group the network administrator configured for your station, even if it is a two-way station. The sequence of prompts sent by the network is the same as described in the **Select Group Feature** section.

Your PC always returns automatically to receive mode if a timeout occurs. To get to the **COMMAND:** prompt from receive mode, press `RETURN`. The **DESTINATION:** prompt will appear. Enter the network attention signal, which may be `BREAK` `BREAK`, and the **COMMAND:** prompt will appear.

## Modems

Modems allow you to gain access to network destinations from a remote location, such as your home. To connect your terminal to the network, use the modem and a telephone line. You also need the telephone number, which is available from your network administrator, for a network modem pool.

The following description is true for basic modem operations. The modem connects to both the terminal and the telephone line. Turn your terminal on. Next, use your telephone or terminal to call the access number of the node. The **STATION ID** message should appear on your terminal screen. You then receive messages and prompts. Consult the instructions specific to your modem.

If timeouts occur at the **DESTINATION:** prompt or at the **NETWORK ACCESS PASSWORD:** prompt, the modem hangs up. You have to make the call again.

## Modem Pool Dialer

Some nodes have a feature called a dialer. A dialer is actually an outgoing modem pool. To make a call using the dialer, you enter the destination address of the dialer, a period (.), and the number you wish to call. The dialer then makes the call for you.

For example:

**DESTINATION:** lc/band/out.12025551212

lc/band/out is the dialer address and 12025551212 is the number for the dialer to call.

You can also request a baud rate by adding a slash and then the baud rate.

For example:

**DESTINATION:** lc/band/out.12025551212/2400

You can request dialer help by entering the <dialer address> followed by a period (.) and help.

**DESTINATION:** lc/band/out.help

---

# User Commands

<b>Command Descriptions</b>	<b>4-6</b>
clraccess	4-6
continue	4-7
disconnect	4-9
display	4-11
help	4-13
reset	4-14
select	4-15
set	4-16

---

# User Commands

The network administrator may make some user commands available to you. User commands can be entered only at the **COMMAND:** prompt. You access this prompt by entering the network attention signal.

If the **DESTINATION:** prompt appears when you enter the network attention signal, no commands are available to you. The network attention signal has disconnected your call.

Table 4-1 presents the user commands in the sequence you would most likely use them. The commands can be entered in uppercase or lowercase.

---

**TABLE 4-1. Relation of Requests to Commands**

To Do This	Enter This Command
list user commands	<b>help</b>
list address and terminal id	<b>display</b>
view module/port parameters	<b>display</b>
view status of held calls	<b>display held</b>
change module/port parameters	<b>set</b>
set attention sequence	<b>set attn</b> <char>
set baud	<b>set baud</b> <rate>
set device flow control	<b>set fc</b> <type>
set network flow control	<b>set nwkc</b> <option>
return to default module/port parameters	<b>reset</b>
choose a group	<b>select</b>
return to previous call	<b>continue</b>
place call on hold with a tag	<b>continue new</b> <tag>
resume held call	<b>continue</b> <tag>
restart terminal session	<b>clraccess</b>
disconnect current call	<b>disconnect</b>
disconnect held call	<b>disconnect</b> <tag>
disconnect all calls	<b>disconnect all</b>

Table 4-2 lists the user commands in alphabetical order and gives each command's abbreviation and function. Additional information for each command follows the table.

**TABLE 4-2. User Commands and Options Summary**

Command	Abbreviation	Function
<b>clraccess</b>	clr	Disconnects all calls and clears all access privileges. Returns you to either the <b>DESTINATION:</b> prompt or the <b>NETWORK ACCESS PASSWORD:</b> prompt.
<b>continue</b>	c	Continues the current call.
<b>continue new</b> <tag>	c new <tag>	Puts the current call on hold and assigns a tag (label) to it. Returns the <b>DESTINATION:</b> prompt.
<b>continue</b> <tag>	c <tag>	Continues the tagged call.
<b>continue</b> <tag1> <tag2>	c <tag1> <tag2>	Switches to the call labeled <i>tag1</i> ; holds the current call and labels it <i>tag2</i> .
<b>disconnect</b>	d, disc	Disconnects the current call.
<b>disconnect all</b>	d all	Disconnects all calls.
<b>disconnect</b> <tag>	d <tag>	Disconnects the call with specified tag(s).
<b>display</b>	disp	Shows local node address (network/area/exch), terminal id, and module/port parameters.
<b>display held</b>	disp held	Shows status of held calls.
<b>help</b>	h	Lists user commands.
<b>reset</b>	reset	Returns module/port parameters to their default values (except for the baud).
<b>select</b>	sel	Selects a group. Disconnects the current call if you haven't tagged the call.

TABLE 4-2. User Commands and Options Summary (continued)

Command	Abbreviation	Function
<b>set</b>	set	Changes port parameters.
<b>set attn</b> <char>	set attn <char>	Sets attention sequence to <char>.
<b>set baud</b> <rate>	set baud <rate>	Sets baud <speed> (for example, 1200 bps).
<b>set fc</b> <type>	set fc <type>	Sets device flow control to <option> (for example, xon).
<b>set nwkfc</b> <option>	set nwkfc <option>	Sets network flow control to <option> (for example, eia).

## Command Descriptions

The following pages provide detailed descriptions and examples of the user commands. Remember, user commands are entered at the **COMMAND:** prompt.

### clraccess

**Description:** The **clraccess** command removes all access permissions. All calls—whether active, held, or suspended—are disconnected. Use this command to remove specific group calling permissions (and disconnect all calls) instead of turning your terminal off.

Entering this command returns you to either the **DESTINATION:** prompt or the **NETWORK ACCESS PASSWORD:** prompt, depending on how the network administrator configured your network access.

**Abbreviation:** clr

---

#### Sample Entry:

**At COMMAND: Prompt:** clraccess

**Terminal Response:** All calls disconnected.

**DESTINATION:**

**Note:** Not available to synchronous terminal users.

---

---

## continue

**Description:** The **continue** command is used to do one of the following:

- return terminal to the previous connection
- return to a tagged call
- put the current call on hold with an identifying tag and return to the **DESTINATION:** prompt
- put the current call on hold with an identifying tag and return to a previously tagged call

Refer to the sample entries below for examples.

**Abbreviation:** **c** (*see (a) above*)  
**c <tag>** (*see (b) above*)  
**c new <tag>** (*see (c) above*)  
**c <prev.tag> <cur.tag>** (*see (d) above*)

**Note 1:** By assigning tags you identify calls.

**Note 2:** Tags can be up to four characters; the words *all* or *new* cannot be used as tags.

---

**Sample Entry for (a):** (to return terminal to the previous connection)

**At COMMAND Prompt:** c

**Terminal Response:** **Reconnecting.**

**Note:** User must take action. Use this command to return to your previous call.

## continue (continued)

---

**Sample Entry for (b):** (to return to a tagged call)

**At COMMAND Prompt:** c ser1

**Terminal Response:** Reconnecting.

---

**Sample Entry for (c):** (to put the current call on hold with +an identifying tag and return to the +**DESTINATION:** prompt)

**At COMMAND Prompt:** c new ser1

**Terminal Response:** Holding ser1.  
<message of the day>

**DESTINATION:**

**Note 1:** In the above example, the current call is put on hold with the tag *ser1* and the **DESTINATION:** prompt appears.

**Note 2:** If you do not specify a tag, the node prompts you for one.

---

**Sample Entry for (d):** (to put the current call on hold with an identifying tag and return to a previously tagged call)

**At COMMAND Prompt:** c ser1 ser2

**Terminal Response:** Holding ser2.  
Switching to ser1.

**Note:** In the above sample, the current call is put on hold with the tag *ser2* and you are returned to the call previously tagged *ser1*.

---

---

## disconnect

**Description:** The **disconnect** command is used to do one of the following:

- a. drop the current call connection and prompt for a new destination
- b. drop the tagged call and prompt for another command
- c. drop all calls and prompt for another destination

Refer to the sample entries below for examples.

**Abbreviation:** **d**, **disc** (*see (a) above*)  
**d** <tag>, **disc** <tag> (*see (b) above*)  
**d all**, **disc all** (*see (c) above*)

**Note:** Entering **disconnect** or **disconnect all** returns you to the **DESTINATION:** prompt; entering **disconnect** <tag> returns you to the **COMMAND:** prompt.

---

**Sample Entry for (a):** (to drop the current call and prompt for a new destination)

**At COMMAND Prompt:** disconnect

**Terminal Response:** **Disconnecting.**  
<message of the day>  
**DESTINATION:**

**Note:** In the above example, the current call is the active call, which may or may not have been placed on hold. It is the previous network connection.

---

## disconnect (continued)

---

**Sample Entry for (b):** (to drop the tagged call and prompt for another command)

**At COMMAND Prompt:** disconnect frr

**Terminal Response:** **Disconnecting frr.**  
**COMMAND:**

**Note:** In the above example, the call tag is *frr*.

---

**Sample Entry for (c):** (to drop all calls and prompt for another destination)

**At COMMAND Prompt:** disconnect all

**Terminal Response:** **All calls disconnected.**  
<message of the day>  
**DESTINATION:**

---

## display

**Description:** The **display** command is used to do one of the following:

- a. show the status of certain variables
  - network/area/exchange node
  - DNIC/SR/SA/EPN
  - station identification
  - message of the day (if any)
  - current group membership
  - destination address
  - port parameters
- b. show held calls, if any

Refer to the two sample entries below for examples.

**Abbreviation:** **disp**  
**disp held**

**Note:** After displaying the information, the node returns you to the **COMMAND:** prompt.

---

**Sample Entry for (a):** (to show the status of certain variables)

**At COMMAND Prompt:** display

**Terminal Response:** (See sample screen on the following page.)

## display (continued)

The output for the **display** command varies; your screen may not look like this:

```

NETWORK/AREA/EXCH NODE:  /nj/tripkwy corey
DNIC/SR/SA/EPN:          ///
STATION:                  17/2.7
MESSAGE OF THE DAY:       (3-line message of the day)
(if there is one)
MEMBER OF GROUP:          sam64
ATTENTION SEQUENCE:       <2 BREAKS>
BAUD RATE:                19200
PARITY:                   NONE
FLOW CONTROL BY NETWORK:  NONE
FLOW CONTROL BY DEVICE:   NONE
IXANY:                    OFF
CALL HOLD:                ON

HELD CONNECTIONS:
TAG   STATE   DESTINATION   TAG   STATE   DESTINATION
---   -
darl  ACTIVE   45.4          frr   HELD    5/44.2
goph  HELD     46.5

```

---

**Sample Entry for (b):** (to show held calls, if any)

**At COMMAND Prompt:** display held

**Terminal Response:** (See screen below for a typical response.)

```

HELD CONNECTIONS:
TAG   STATE   DESTINATION   TAG   STATE   DESTINATION
---   -
darl  ACTIVE   45.4          frr   HELD    5/44.2
goph  HELD     46.5

```

## help

**Description:** The **help** command displays a list of user commands, accepted abbreviations, and brief explanations.

**Abbreviation:** **h**

**Note:** After displaying the list, the terminal returns to the **COMMAND:** prompt.

### Sample Entry:

**At COMMAND Prompt:** help

**Terminal Response:** (See sample screen below.)

**Note:** In the screen below, the lines associated with **SET** and **RESET** are not displayed for all terminals. You may be connected to a module/port that does not permit parameter setting from the terminal.

COMMAND	ABBREVIATION	EXPLANATION
-----	-----	-----
CONTINUE	C, CONT	RETURN TO PREVIOUS NETWORK CONNECTION
	C NEW (TAG)	NEW CONNECTION; HOLD CURRENT CALL WITH TAG
	C TAG1 (TAG2)	SWITCH TO TAG1; HOLD CURRENT CALL WITH TAG2
DISCONNECT	D, DISC	DROP CURRENT NETWORK CONNECTION
	D TAG	DROP HELD CALL WITH TAG
	D ALL	DROP ALL HELD CALL(S)
DISPLAY	DISP	DISPLAY OPTIONS AND STATUS
	DISP HELD	DISPLAY HELD CALLS
HELP	H, HELP	LIST COMMANDS, ABBREVIATIONS, EXPLANATIONS
SELECT	SEL	SELECT ORIGINATING GROUP
CLRACCESS	CLR	CLEAR ACCESS PERMISSIONS
RESET	RESET	RESET ALL OPTIONS TO DEFAULTS
SET	SET ATTN <CHAR>	SET ATTENTION SEQUENCE TO <CHAR>
	SET BAUD <RATE>	SET BAUD RATE TO <RATE>
	SET NWKFC <OPTION>	SET FLOW CONTROL BY NETWORK TO <OPTION>
	SET FC <OPTION>	SET FLOW CONTROL BY DEVICE TO <OPTION>

## reset

**Description:** The **reset** command causes changed terminal port parameters, except *baud*, to return to the original values set by the network administrator.

**Abbreviation:** **reset**

**Note:** After resetting the parameters, the terminal returns to the **COMMAND:** prompt.

---

### Sample Entry:

**At COMMAND Prompt:** reset

**Terminal Response:** **COMMAND:**

**Note 1:** To return to original baud rate, use the **set baud** command.

**Note 2:** Use the **display** command to verify the reset parameters.

---

## select

**Description:** The **select** command allows you to specify the group you want to join. With **select**, only one call can be completed. When the call is disconnected or put on hold, you are returned to the original group. To rejoin the new group, enter **select** again.

**Abbreviation:** sel

**Note:** Entering the **select** command disconnects the current call, but maintains held calls.

---

### Sample Entry:

**At COMMAND Prompt:** select

**Response and Entry:** **GROUP:** account

**Response and Entry:** **account GROUP PASSWORD:**

In the above example, a group called *account* and a group password were specified. If your entries were correct, the **DESTINATION:** prompt appears.

**Note:** The **select** command is not available to synchronous terminal users.

---

## set

**Description:** The **set** command is used to do one of the following:

- a. get help for the **set** command
- b. set the attention signal
- c. find valid baud rates for your terminal
- d. set the baud rate
- e. set the flow control for your device
- f. set the flow control from the local node

Refer to the sample entries for examples.

**Abbreviation:** **set**

**Note 1:** To view the current settings, use the **display** command.

**Note 2:** To return to the default settings, use the **+reset** command.

---

**Sample Entry for (a):** (to get help for the **set** command)

**At COMMAND Prompt:** set

**Terminal Response:** (See screen below.)

COMMAND	ABBREVIATION	EXPLANATION
-----	-----	-----
SET	SET ATN <CHAR>	SET ATTENTION SEQUENCE TO <CHAR>
	SET BAUD <RATE>	SET BAUD RATE TO <RATE>
	SET NWKFC <OPTION>	SET FLOW CONTROL BY NETWORK TO <OPTION>
	SET FC <OPTION>	SET FLOW CONTROL BY DEVICE TO <OPTION>

---

## set (continued)

---

**Sample Entry for (b):** (to set the attention signal)

**At COMMAND Prompt:** set attn <char>  
[where <char> is set to any of the following:

- any ASCII character (for example, enter **a**)
- any control character (for example, to set to CTRL a,
  - enter ^ (carat) followed by **a**
  - or hold  down and enter **a**)
- 1 break (enter  )
- 2 breaks (enter   )
- delete (enter  )]

**For example,**

**at COMMAND prompt:** set attn

**Note 1:** Do not set the attention sequence to a commonly used character. It may prevent performing regular tasks at the terminal.

**Note 2:** To get help, enter **set attn**.

**Note 3:** Use the **reset** command to return to default.

**Note 4:** Use the **display** command to verify your change.

---

**Sample Entry for (c):** (to find valid baud rates)

**at COMMAND:** set baud

**Terminal Response:** (See sample screen on next page.)

## set (continued)

COMMAND	ABBREVIATION	EXPLANATION
-----	-----	-----
SET	SET ATTN <CHAR>	SET ATTENTION SEQUENCE TO <CHAR>
	SET BAUD <RATE>	SET BAUD RATE TO <RATE>
	SET NWKFC <OPTION>	SET FLOW CONTROL BY NETWORK TO <OPTION>
	SET FC <OPTION>	SET FLOW CONTROL BY DEVICE TO <OPTION>

COMMAND: set baud  
INVALID SYNTAX: baud  
USAGE: SET BAUD <RATE>  
WHERE VALID <RATE> IS ONE OF THE FOLLOWING:  
75, 110, 150, 300, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400,  
57600, 76800, 115200

COMMAND:

---

**Sample Entry for (d):** (to set the baud rate)

**At COMMAND Prompt:** set baud <rate> +  
[where <rate> is set to any valid baud]

**For example,**  
**at COMMAND prompt:** set baud 1200

**Note 1:** After setting a baud, the terminal has to be set to the same rate. Use the **set baud** feature of the terminal or emulator package.

**Note 2:** If you set your terminal to a displayed baud that does not work, call your network administrator.

**Note 3:** In certain cases, such as when using a modem, there is added equipment to consider. Changes in baud at the terminal require matching changes at the sending and receiving units and other ports.

**Note 4:** Use the **display** command to verify your settings.

---

## set (continued)

**Sample Entry for (e):** (to set flow control for your device)

**At COMMAND Prompt:** set fc <type>  
[where <type> is set to one of the following:

- **xon** (turn on the XON/XOFF flow control)
- **eia** (turn on the RTS/CTS flow control)
- **none** (turn off all flow control)]

**For example,**

**at COMMAND prompt:** set fc none

**Note 1:** Choosing **xon** turns off **eia** flow control; choosing **eia** turns off **xon** flow control.

**Note 2:** For raw data transfer, as in PC down-loading of executable files or running application-like layers, **xon** flow control might not work. Set flow control to **none** or use another file transfer protocol. Contact your network administrator.

**Note 3:** Use the **display** command to verify your settings.

---

**Sample Entry for (f):** (to set flow control from the local node)

**At COMMAND Prompt:** set nwkfc <option>  
where: <option> is set to one of the following:

- **xon** (turn on the XON/XOFF flow control)
- **eia** (turn on the RTS/CTS flow control)
- **none** (turn off any type of flow control)

## set (continued)

**For example,**  
**at COMMAND prompt:** set nwkfc none

**Note 1:** **nwkfc** is for flow control from the local node only; it does not apply to a remote node, nor to a connection between a node and a host.

**Note 2:** **nfc** can be used instead of **nwkfc**.

**Note 3:** Choosing **xon** turns off **eia** flow control; choosing **eia** turns off **xon** flow control.

**Note 4:** For raw data transfer, as in PC down-loading of executable files or running application-like layers, **xon** flow control might not work. Set **nwkfc** to **none** or use another file transfer protocol. Contact your administrator.

**Note 5:** Use the **display** command to verify your settings.

---

---

# Using X.25 Services

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---

## Using X.25 Services

Data Networking Products provide X.25 services that support two-way, switched connections between asynchronous terminals and:

- X.25 hosts on the network
- endpoints on a Public Data Network (PDN)

The X.25 service provides a Packet Assembler/Disassembler (PAD) between the Data Networking Products asynchronous terminal and X.25 Hosts and PDNs. The service conforms to standards described in CCITT Recommendation X.25, 1988. It supports a number of other CCITT standard recommendations that are related to the X.25 recommendation. These are:

- X.28, which recommends standards for commands sent from a terminal to the PAD, and service signals sent from a PAD to the terminal.
- X.3, which recommends standards for the functions the PAD performs for terminals. It describes parameters, maintained by the PAD, to take care of the details of call setup and data transmission.
- X.29, which defines the protocol between an X.25 host and the PAD.
- X.121, which recommends the international numbering scheme for PDNs that allows a terminal connected to one PDN to address a destination located on another PDN. This address is also used for calls coming from an X.25 host/PDN endpoint to those on the Data Networking Products node.

**NOTE:** If you are an asynchronous terminal user connecting to a Permanent Virtual Circuit (PVC) on an X.25P, you will not have access to Switched Virtual Circuit (SVC)-only type services as described in recommendations X.28, X.3, and X.29.

## X.28 Commands and Service Signals

You can use X.28 commands to exchange information with the PAD:

- to read and/or set X.3 parameters on the PAD
- to set up, clear, or reset a virtual call
- to display the status of a switched virtual circuit connection

The PAD exchanges information with your terminal by sending service signals that communicate

- the X.3 parameter list for your terminal
- whether the virtual call is connected, cleared, or reset

Table 5-1 contains X.28 PAD commands and their functions.

---

**TABLE 5-1. X.28 PAD Commands**

Command	Explanation
CLR	Clears the current virtual call
CON <facilities><address> <data>	Connects to the X.25 Host/PDN endpoint; <facilities> are the X.25 facilities; <address> is the X.121 address; <data> is the call user data
ICLR	Sends an X.29 invitation to clear PAD message to the remote PAD
INT	Sends an X.25 interrupt packet to the destination
PAR? <p,p,p>	Displays values of X.3 parameters; <p> is parameter number in decimal; if no p's are specified, all values are displayed

TABLE 5-1. X.28 PAD Commands (continued)

Command	Explanation
PROF <profile>	Copies X.3 parameter from another profile to the current one or replaces current X.3 parameter values with those from another profile
RESET	Resets the virtual call
RPAR? <p,p,p>	Displays values of the remote PAD's X.3 parameters; <p> is parameter number in decimal; if no p's are specified, all values are displayed
RSET <p:v,p:v,p:v>	Changes values of the remote PAD's X.3 parameters; <p> is parameter number in decimal; <v> is parameter value in decimal
RSET? <p:v,p:v,p:v>	Changes, then displays, values of the remote PAD's X.3 parameters; <p> is parameter number in decimal; <v> is parameter value in decimal
SET <p:v,p:v,p:v>	Changes values of X.3 parameters; <p> is parameter number in decimal; <v> is parameter value in decimal
SET? <p:v,p:v,p:v>	Changes, then displays, values of X.3 parameters; <p> is parameter number in decimal; <v> is parameter value in decimal
STAT	Displays status of host connection

Table 5-2 contains X.28 PAD service signals and explanations.

**TABLE 5-2. X.28 PAD Service Signals**

Standard Format of the PAD Service Signal		Explanation
<address> <data> COM		Indication of incoming call where <address> is the calling address, and <data> is the call user data
BS SP BS		Indication of character delete function completed for video terminals ( <i>see</i> Note 1)
CLR	CONF	Confirmation of clearing
CLR	<i>See</i> Table 5-4	Indication of clearing
COM		Indication of call connected
ENGAGED		Response to <i>status PAD command</i> signal when a call has been established
ERR		Indication that a <i>PAD command signal</i> is in error
Format effector		<i>Acknowledgement PAD service</i> signal
FREE		Response to <i>status PAD command</i> signal when a call is not established
PAGE		Indication that a page wait condition has occurred

*Note 1* The standard format of the indication of the line delete function completed for video terminals is a repetition of the BS SP BS sequence.

TABLE 5-2. X.28 PAD Service Signals (continued)

Standard Format of the PAD Service Signal		Explanation
PAR		Decimal value of parameter: parameter value, INV, or list of invalid parameters
RESET	DTE	1, 2, or 3 characters which represent the decimal value of the diagnostic code (see Note 2)
	ERR	
	NC	
	RPE	
RPAR	Decimal value of parameter: parameter value, INV, or list of invalid parameters	Response to <i>remote read PAD command</i> signal and to <i>remote set and read PAD command</i> signal
<signal>	The characters to be sent are configured by <b>enter x28sig</b> command	PAD identification service signal that is configured by the administrator
<XXX>		Indication of line delete function completed for printing terminals (see Notes 1 and 3)
*		<i>Prompt PAD service</i> signal
\		Indication of character delete function completed for printing terminals

*Note 2* The diagnostic codes are specified in Recommendation X.25. Some networks may not provide these characters.

*Note 3* If echoing is required, the *line delete* character is echoed before the *line deleted PAD service* signal is transmitted.

## X.3 Profile Parameters

The PAD maintains a profile for your terminal that governs the form of communication that takes place between your terminal and the PDN and between your terminal and an X.25 host. The network administrator can design the profile or you can. Using X.28 commands to communicate with the PAD, you can choose or alter a profile for your terminal. *See* Table 5-3 for the X.3 parameters and Procedure 5-1 for changing an X.3 profile.

TABLE 5-3. X.3 Parameters and Values

#	Description	Selectable Values
1	<b>PAD Recall Using a Character</b> - Whether terminal operator can escape from data transfer to PAD command state	0 No PAD recall character selected 1 Character DLE (CTRL) P 32-126 Any graphic character defined by user
2	<b>Local Echo</b> - Whether PAD echoes back characters received from terminal	0 No echo 1 Echo
3	<b>Data Forwarding Characters</b> - Terminal characters that trigger the sending of a partially full packet by the PAD	0 No data forwarding character(s) 1 Alphanumeric characters (A-Z, a-z, 0-9) 2 Character CR 4 Characters ESC, BEL, ENQ, ACK 6 Characters CR, ESC, BEL, ENQ, ACK 8 Characters DEL, CAN, DC2 16 Characters ETX, EOT 18 Characters CR, EOT, ETX 32 Characters HT, LF, VT, FF 64 All characters with ASCII values in the range of 0 to 31, except those shown above for values 2, 4, 8, 16, 32 126 All characters with ASCII values in the range of 0 to 31 and character DEL Note: All ASCII characters with values 3, 5-7, 9-15, 17-31, 33-63, 65-125, 127 may be formed by combinations of values 1, 2, 4, 8, 16, 32, and 64.

TABLE 5-3. X.3 Parameters and Values (continued)

#	Description	Selectable Values	
4	<b>Idle Timer Delay</b> - Timeout value that triggers the sending of partially full packet by the PAD	0 1 2  3–20 21–255	No timeout Mintimer ( <i>see</i> Note 1) One-tenth second One second Increments of twentieths of a second
5	<b>PAD-to-Terminal Flow Control</b> - Whether PAD can exercise flow control over terminal output using XON/XOFF	0 1 2	No use of XON/XOFF Use XON/XOFF for data transfer Use XON/XOFF for data transfer and command states
6	<b>Control of PAD Service Signals</b> - Whether PAD can send service signals (control information) to terminal	0 1 5	No PAD service signals PAD service signals in standard format PAD service signals and prompt in standard format
7	<b>Actions Taken by PAD on Receipt of BREAK Signal from Terminal</b>	0 1 2 4 5 8 16 21  Note:	Nothing Send interrupt packet Reset the virtual circuit Send indication of BREAK Interrupt and indication of BREAK Escape data transfer state Discard output to terminal Discard output, send interrupt and indication of BREAK Values 3, 4, 6, 7, 9–20, 22–31 may be formed by combinations of values 1, 2, 4, 8, 16.
8	<b>Discard Output</b> - Whether PAD discards DTE data intended for terminal	0 1	Normal data delivery Discard data

*Note 1* Mintimer corresponds to an enhanced character processing mode where X.3 parameters 3, 9, 10, 13, 14, 15, and 22 are skipped.

TABLE 5-3. X.3 Parameters and Values (continued)

#	Description	Selectable Values	
9	<b>Padding After Carriage Return</b> - Number of padding characters inserted after carriage return	0 1-12	No padding after CR Number of padding characters to insert
10	<b>Line Folding</b> - Whether PAD inserts control characters to prevent terminal line overflow	0 1-255	No line folding Number of characters per line
11	<b>Async Speed</b> - Terminal speed in bps (read only)	0 2 3 5 6 7 12 13 14 15	110 bps 300 bps 1200 bps 75 bps 150 bps 1800 bps 2400 bps 4800 bps 9600 bps 19200 bps
12	<b>Terminal-To-PAD Flow Control</b> - Whether terminal can exercise flow control over PAD, using XON/XOFF	0 1	No use of XON/XOFF Use of XON/XOFF
13	<b>Line Feed Insertion</b> - Whether PAD inserts line feed (LF) after carriage return (CR) is sent or echoed to terminal	0 1 2 4 5 6 7	No LF insertion Insert LF after CR sent to terminal Insert LF in data stream after CR from terminal Insert LF after echo of CR to terminal Insert LF in data stream after CR to terminal and after echo of CR to terminal Insert LF in data stream after CR from terminal and after echo of CR to terminal Insert LF in data stream to and from terminal and after echo of CR to terminal (4,1)

TABLE 5-3. X.3 Parameters and Values (continued)

#	Description	Selectable Values	
14	<b>Padding After Line Feed</b> - Number of padding characters inserted after line feed (to terminal)	0 1-7	No padding after LF Number of padding characters inserted after LF
15	<b>Editing</b> - Whether PAD supports editing during data transfer (defined in Parameters 16-18)	0 1	No editing Use of editing
16	<b>Character Delete Character</b>	0-127	An ASCII character
17	<b>Line Delete Character</b>	0-127	An ASCII character
18	<b>Line Display Character</b>	0-127	An ASCII character
19	<b>Editing Service Signals</b> - Terminal type for editing PAD service signals (e.g., character delete)	0 1 2 8, 32-126	No editing signals Editing for print terminal Editing for display terminal Editing using one character
20	<b>Echo Mask</b> - Characters that are not echoed to terminal when echo is enabled	0 1 2 4 8 16 32 64 128	No mask (echo all characters) No echo of CR No echo of LF No echo of VT, HT, FF No echo of BEL, BS No echo of ESC, ENQ No echo of ACK, NAK, STX, SOH, EOT, ETB, ETX No echo of editing characters No echo of all other control characters and DEL

TABLE 5-3. X.3 Parameters and Values (continued)

#	Description	Selectable Values	
21	<b>Parity Treatment</b> (of characters to/from terminal)	0	No parity detection or generation
		1	Parity checking
		2	Parity generation
		3	Parity checking and generation (see Note 2)
22	<b>Page Wait</b> - Number of lines to be displayed at one time	0	Page wait disabled
		1-255	Number of LF characters considered by PAD for page wait function

Note 2 Supported only for TY12 modules.

## Selection or Change of X.3 Profiles

To choose an existing profile, at the PAD waiting state prompt, (\*), type PROF followed by the name of a profile. To change an X.3 profile, read the considerations listed below and then proceed to Procedure 5-1. Changing an X.3 Profile.

- X.28 command considerations:

Commands can be typed in either uppercase or lowercase.

After the command executes, you return to the PAD waiting state, the PAD prompt (\*); if a call exists, you return to the data transfer state.

Any parameter that is changed by an X.28 command returns to the value it had at the beginning of the call when the X.25 call is cleared but the connection to the PAD remains.

**ERR** appears in response to a typing error.

- Other considerations are:

For TY12 and Synchronous/Asynchronous Multiplexer (SAM) modules:

- X.3 parameters 5, 12, 21, and 11 are set to match the corresponding terminal options when a call is set up.
- X.3 parameters 5, 12, and 21 can be changed by X.28 command.
- Attempting to change these parameters for terminals connected to other Data Networking Products modules returns the **<parameter #> INV** message.

If you enter the attention signal or return to the **DESTINATION:** prompt, the terminal options are returned to the original values.

For example, assuming you want to place a call made through the PAD on hold, when you enter the attention signal and get the **COMMAND:** prompt, the original values for terminal options (that is, the values they had at the beginning of the call) are restored.

If you return to a held call made through the PAD, X.3 parameter values set by X.28 or X.29 control the call.

Setting the PAD recall character (X.3 parameter 1) to 0 (zero) via an X.28 or X.29 command sets the attention signal to *none*; likewise, restoring the PAD recall character restores the attention signal. If the PAD recall character is set to 0 (zero) and not restored, the attention signal is turned off as well, requiring that you turn off the terminal's power to continue.

If you frequently connect to a PDN and/or an X.25 host and find that you usually need to alter your X.3 profile parameters, you may need a profile more appropriate for your needs. You can work with the network administrator to design a more permanent customized profile.

## Procedure 5-1. Changing an X.3 Profile

This procedure details how to use X.28 commands to change the parameters in an X.3 profile. The commands used to choose or alter profiles are **PROF**, **PAR?**, **SET?**, and **SET**. The procedure uses an example to show how to change one parameter.

1. At the PAD prompt (\*), enter **PAR?** to see the X.23 parameters. (The entry "PAR?" is not echoed on the screen since echo is off.)
2. The PAD displays the X.23 parameters in the following format:

parameter1:parameter1\_value,parameter2:parameter2\_value,...

A sample screen is:

```
PAR1:1,2:0,3:126,4:2,5:1,6:5,7:2...
```

3. Remember that Table 5-3 lists the X.3 parameters and values. In this example, parameter 1 has a value of 1, parameter 2 has a value of 0, parameter 3 has a value of 126, parameter 4 has a value of 2, and so on. As Table 5-3 shows, parameter 1 is the PAD recall character, and a value of 1 means that **CTRL P** is the key sequence used to get it. Parameter 2 is the local echo character, and a value of 0 means there is no echoing of terminal input on the screen.

**NOTE:** When you are done changing the parameters, if a call is up (active), the PAD returns to the data transfer state. Otherwise, it remains in the command state.

4. Let's say you want to change the value of parameter 2 from 0 (No echo) to 1 (Echo) so that terminal input is echoed on the screen. To change the value of parameter 2 from 0 to 1, do the following:
  - a. If the system is in data transfer state, type the PAD recall character **CTRL P** to return to the command state.
  - b. At the PAD prompt (\*), enter **SET?2:1**. The characters are not echoed, since the change isn't in effect yet.
  - c. The following screen appears:

```
PAR2:1
```

```
*
```

As the screen shows, the value of parameter 2 has been changed to 1, and the characters are now echoed.

- d. Any other entry is now echoed from the PAD. When you return to your call to the host, you receive two echoes on your screen; one from the PAD and one from the host. For this reason, most operators choose "no echo" from the X.3 PAD.

## X.121 Addresses

X.121 is the standard addressing scheme for Data Terminal Equipment (DTE) connecting to PDNs. X.121 addresses consist of up to four parts in the format:

<DNIC><SR><SA><EPN>

where

DNIC is the four-digit Data Network Identification Code. This part of the address specifies the PDN.

SR is the three-digit Service Region.

SA is the three-digit Service Area.

EPN is the four-digit Endpoint Number.

X.121 addresses are numeric, for example:

22223334441111

Use the X.121 address to establish a connection through a PAD to an X.25 PDN or an X.25 host. There are two methods for calling a destination using X.25 services:

- double dial calling
- quickcall

---

## Double Dial Calling

With double dial calling,\* you first call the address of the X.3 pad on the node. The address of the X.3 PAD must be entered by the network administrator. Using the X.28 **CON** command, you then call the X.121 address of the destination. Procedure 5-2 details how to use double dial to reach an X.25 host or PDN.

### Procedure 5-2. Using Double Dial

1. Follow Procedure 2-1 to gain access to the local node.
2. To connect to the X.3 PAD within the network, enter the X.3 PAD address at the **DESTINATION:** prompt. For example:  
**DESTINATION:** pdn23
3. The PAD sends an X.28 PAD identification signal to your terminal. It is an optional message configured by the network administrator. It indicates you are connected to the PAD and may send X.28 commands. The PAD prompt (\*) appears. Your terminal is considered to be in the PAD waiting state.
4. At the PAD prompt, enter the X.28 command **CON** (for connect), followed by the numerical (X.121) address of the destination to which you want to connect. For example

\*

**CON** 23411234567899

Optional Facilities and Call User Data can also be entered using double dial. These are explained later under **Quickcall**.

---

\* If the network administrator has associated the "mbit" profile with the address of the X.3 PAD, you cannot make a double dial call. However, you can make a quickcall. If you try to make a double dial call, you will see the error message **Connection not completed. Contact Network Administrator** with error code 35 (Service type mismatch).

5. If you connect successfully, the PAD sends this message:

**COM**

If the call does not connect, the PAD sends this:

**CLR <XXX>**

where XXX is a mnemonic giving the reason for the call not connecting (*see* Table 5-4).

After connecting to the destination, you are in the data transfer state. In this state you can answer login and password prompts, and if successful, carry on communications with the accessed service.

Table 5-4 contains clear indication (CLR) PAD service signals.

---

**TABLE 5-4. Clear Indication PAD Service Signals**

<b>Clear Indication PAD Service Signal</b>	<b>Possible Standard Mnemonics</b>	<b>Explanation (See Recommendation X.96)</b>
Access barred	NA	The calling DTE is not permitted to obtain the connection to the called DTE. Incompatible closed user group would be a possible reason.
DTE clearing	DTE	The remote DTE has cleared the call.
Fast select acceptance not subscribed	FNA	The called DTE has not subscribed to the fast select acceptance facility.
Incompatible destination	ID	The remote DTE/DCE (Data Communications Equipment) interface or the transit network does not support a function or facility requested.
Invalid facility request	INV	Invalid facility requested by the calling DTE.

TABLE 5-4. Clear Indication PAD Service Signals (continued)

Clear Indication PAD Service Signal	Possible Standard Mnemonics	Explanation (See Recommendation X.96)
Local procedure error	ERR	A procedure error caused by the DTE is detected by the PAD. Incorrect format is a possible reason.
Network congestion	NC	A condition exists within the network, such as: 1. temporary network congestion 2. temporary fault condition
Not obtainable	NP	The called DTE address is out of the number plan or is not assigned to any DTE.
Number busy	OCC	The called DTE is detected by the DCE as engaged in other calls and therefore is not able to accept the incoming call.
Out of order	DER	The called number is out of order.
PAD clearing	PAD	The call has been cleared by the local PAD as an answer to an invitation to clear from the remote DTE.
Remote procedure error	RPE	A procedure error caused by the DTE is detected by DCE at the remote DTE/DCE interface.
Reverse charging acceptance not subscribed	RNA	The called DTE has not subscribed to reverse charging acceptance.
Recognized Private Operating Agency (RPOA) out-of-order	ROO	The RPOA nominated by the calling DTE is unable to forward the call.
Ship absent	SA	The called ship is absent.

## Quickcall

A quickcall<sup>†</sup> name lets you call a PDN-type network or an X.25 host by combining a PAD service address with an X.121 address all in one entry. You bypass all the PAD prompts.

### Quickcall Address Format

The quickcall address format is:

<PAD address>.<optional facilities><X.121 address><call user data>

where:

- |                     |  |
|---------------------|--|
| PAD address         | is a PAD service address.  |
| optional facilities | are closed user group, transit network, and reverse charging.  |
| X.121 address       | is the numeric address of a destination endpoint (15-digit maximum).   |
| call user data      | is D followed by up to 16 characters<br>(12 characters if an X.29 high-level protocol ID is used)<br><i>or</i><br>H followed by up to 32 hexadecimal characters (24 characters if an X.29 high level protocol ID is used). There must be an even amount of characters and the characters must be O-9, a-f, or A-F. |

An example is pad.2222H1234.

Optional facilities and call user data can also be entered using double dial as part of the X.28 **CON** command in the following format:

CON <optional facilities><X.121 address><call user data>

---

<sup>†</sup> See footnote in the section entitled **Double Dial Calling**.

## Optional Facilities

You can choose optional facilities using the following format:

<G<cug>,T<rpoa>,<R>->

where

G is used to choose a closed user group (CUG).

cug is the index for the desired CUG.

T is used to select a transit network (RPOA).

rpoa is the DNIC for the RPOA selected. Multiple RPOAs can be specified by repeating the T option up to a maximum of eight times.

R is used to request reverse charging.

The order and number of the facilities are arbitrary.

**Note:** Facilities must be separated by a comma (,) and terminated by a hyphen (-).

## Closed User Group (CUG) Security

Closed user group (CUG) security is featured in Data Networking Products nodes as a set of X.25 facilities. Your access to endpoints is restricted by membership in a closed user group. The following facilities are supported:

- closed user groups
- closed user group with incoming access
- closed user group with outgoing access
- closed user group selection
- closed user group with outgoing access selection

### CUG Profiles

To use CUG security, each asynchronous terminal, host, or gateway is configured with a CUG profile. The CUG profile for your terminal contains a list of CUG identifiers to which it belongs. (A CUG identifier is a number from 1 to 250.) You select one CUG identifier from the list by specifying the index when making an X.25 call. Your terminal also has a default CUG index, which is used when you do not specify one in your call. The profile also specifies whether you have incoming and/or outgoing access from/to other endpoints in a Data Networking Products network or other networks.

If either or both of the following are true, the call passes CUG security:

- The CUG identifier you select exists in the CUG profile of the destination host or gateway.
- You have outgoing access and the destination host or gateway has incoming access.

### Call User Data

Call user data is up to 12 bytes of data, if preceded by a **D**, or 24 bytes of data, if preceded by an **H**, that can be sent to the destination during either a double dial or quickcall. The data follows optional facilities and the X.121 address. Note that space characters in the call user data are ignored.

### Procedure 5-3. Using the Quickcall Method

1. Follow Procedure 2-1 to gain access to the local node.
2. Enter the quickcall name for the desired PDN service or X.25 host at the **DESTINATION:** prompt.

For example:

**DESTINATION:** pdn23.G1,T2468,R-23412345678999

## Incoming Calls to Asynchronous Terminals

The following statements apply to incoming calls to asynchronous terminals configured as two-way stations:

- CUG security works the same as outgoing calls but only in reverse.
- The PAD service signals that indicate an incoming call may be
  - the X.28 PAD Identification Signal, if any
  - calling/called X.121 address
  - call user data (if any)
  - COM**

## Disconnection of a PDN or X.25 Host

You can disconnect a PDN or X.25 host connection in three ways. Procedure 5-4 outlines the ways.

### Procedure 5-4. Disconnecting a PDN or X.25 Host Connection

To disconnect a call to a PDN or an X.25 host, do one of the following:

1. Turn the terminal off.
2. Enter the network attention signal.
  - The port your terminal is connected to may be configured by the network administrator to disconnect the call when the attention signal is entered. In this case, you do not have to do anything to disconnect the call. You receive a **Disconnected** message followed by the **DESTINATION:** prompt.
  - The port your terminal is connected to may be configured to return the **COMMAND:** prompt when you enter the attention signal. In this case, use the **disconnect** command to disconnect the call. You receive a **Disconnected** message, and the **DESTINATION:** prompt.
3. Enter the PAD recall character. **CTRL P** is the common default. This changes you from the data transfer state to the PAD waiting state and returns the PAD prompt (\*). You are still connected to the PAD if the call was originally an outgoing call; otherwise you return to the **DESTINATION:** prompt.

Next, enter the X.28 command **CLR**. The PAD responds with the **CLR CONF** service signal, which means the call is cleared, followed by the PAD prompt (\*). Assuming an outgoing call, Steps 3 and 4 are:

```
CTRL P
* CLR RETURN
CLR CONF
*
```

If what you type is not echoed on your screen, the X.3 PAD parameter 2 (that is, local echo) may not be set.

The PAD prompt (\*) indicates that you are still in the PAD waiting state. You could begin another call by entering **CON** and an X.121 address, or you could enter the network attention signal to disconnect from the PAD (refer to Step 2 above).

---

# Synchronous Terminals

**Synchronous Terminals**

**6-3**

---

# Synchronous Terminals

Data Networking Products nodes support communications for synchronous terminals. Using synchronous services, terminals can connect to either a predefined destination or a callable address.

For synchronous terminals, follow the procedures in **Chapter 2** and **Chapter 3** except for the following:

- When a valid entry is made in response to the **DESTINATION:** prompt, and the call setup is successful, the following message appears in the upper left corner of the screen:

```
** CONNECTED **
```

When the application comes up this message disappears. For example, it could possibly be replaced by a login prompt.

- The **\*\* CONNECTED \*\*** message also appears when you return to a held call. For example:

```
COMMAND: c host1  
Reconnecting host1
```

The screen then clears and **\*\* CONNECTED \*\*** appears in the upper left corner of the screen, possibly very briefly, before being replaced by what was left behind when you placed the call on hold.

- The common default attention string for synchronous switched stations is %ATT. The network administrator *may* specify a different string.
- To enter an attention session at a synchronous terminal, enter the <attention string>, and press . The network administrator also determines how the network reacts to the network attention signal. It can be set to disconnect the current call and give the **DESTINATION:** prompt. Or it can return the **COMMAND:** prompt.
- Use the  key to send data from a synchronous terminal.
- Output from the node to a synchronous terminal first appears in the upper left corner of the screen. When the entire screen fills up, the following message appears:

```
** HIT ENTER KEY FOR NEXT SCREEN **
```

clears the screen. Output again begins in the upper left corner of the screen.  
 clears the screen only in response to this message.

- The STATION ID for synchronous terminals has the following format:  
**node/module.port/control unit.terminal**
- The help screen for synchronous terminals does not include SEL (select), CLRACCS (clear access), SET, or RESET.

It is recommended that you also consult available documentation for your terminal.

---

# Appendix A. Messages

Five types of messages are covered in Appendix A:

- login error messages
- destination error messages
- command error messages
- informational messages
- catastrophic error messages

## Login Error Messages

If you see the message **login incorrect** when you attempt to log on, and you are sure you are using the correct login, simply log on again. If you get the same message again, then contact your network administrator.

## Destination Error Messages

Destination error messages appear when you make an entry error while attempting to connect to a network device (for example, a host computer) or a system error prevents a connection. The destination error messages are listed in Table A-1. Messages which begin with a variable (< >) appear at the beginning of the table. All others are listed in alphabetical order. Some messages contain an error code in parentheses which you can report to the network administrator. The code will help to identify the error type.

**TABLE A-1. Destination Error Messages**

Note: The first four messages in this table begin with an address variable. What actually appears on your screen will be the address you entered.

---

**Message:** <address> is busy. (<error code>)

**Causes:** (01) Endpoint was busy.  
(32) Synchronous Interface Module (SIM) has resource congestion.

**Action:** Try again later. If the problem persists, call the network administrator.

**Variables:** <address> is the destination entered.  
<error code> is the number assigned to a particular error.

---

**Message:** <address> is not answering. (03)

**Cause:** Endpoint associated with <address> is not in service or is in service but is dead.

**Action:** Call the network administrator.

**Variable:** <address> is the destination entered.

---

**Message:** <address> is not recognized. Please check and re-enter. (04, <node address>)

**Causes:** <address> does not exist.

**Action:** Carefully reenter the destination. If the trouble persists, call the network administrator.

**Variables:** <address> is the destination entered.  
<node address> will not appear if the node is local or unknown.

---

TABLE A-1. Destination Error Messages (continued)

---

<b>Message:</b>	<code>&lt;address&gt; will not accept call. Contact network administrator. (07)</code>
<b>Cause:</b>	Access has been denied for security reasons.
<b>Action:</b>	Assuming you are an authorized user, try again. Be careful while entering all passwords.
<b>Variable:</b>	<code>&lt;address&gt;</code> is the destination entered.

---

<b>Message:</b>	<code>Access denied.</code>
<b>Cause:</b>	You attempted to select a group that exists but is not selectable.
<b>Action:</b>	Select another group or call the network administrator.

---

<b>Message:</b>	<code>Baud rate specified is not supported. Contact the network administrator. (29)</code>
<b>Cause:</b>	An invalid baud rate was requested for dialer service.
<b>Action:</b>	Contact the network administrator for valid baud rates. Redial call.

---

<b>Message:</b>	<code>Carrier tone not detected. Enter &lt;dialer name&gt;.help for help. (28)</code>
<b>Cause:</b>	The call was dialed correctly and answered; but the dialer did not detect a carrier tone.
<b>Action:</b>	Try again. If the problem persists, call the network administrator.
<b>Variable</b>	<code>&lt;dialer name&gt;</code> is the address of the dialer.

---

**TABLE A-1. Destination Error Messages** (continued)

<b>Message:</b>	<b>Command mode denied.</b>
<b>Cause:</b>	You have not passed network security and so command mode is not yet available to you.
<b>Action:</b>	Enter the network access password at the <b>NETWORK ACCESS PASSWORD:</b> prompt.
<hr/>	
<b>Message:</b>	<b>Connection not completed. Contact network administrator. (&lt;error code&gt;, &lt;node address&gt;)</b>
<b>Causes:</b>	(zz) Undefined error. (12) Network routing error. (20) Trunk configuration error. (21) Host configuration error. (30) Interface module in down state. (31) Internal error. (33) Vlp data error. (34) X.25 facility error. (35) Service type mismatch. (36) CommKit® Software Interface protocol error. (37) Transmit window too big. (38) Receive window too small. (41) Node-to-node interface problem or multiplexed host interface problem. (43) Node-to-node interface problem or multiplexed host interface problem. (45) Hop count configured for this node has been exceeded. (50) Endpoint hung up the call. (59) Node-to-node interface problem. (60) Node-to-node interface problem.
<b>Action:</b>	Record the error code and node address when they appear. Call the network administrator.
<b>Variables:</b>	<error code> is the number assigned to a particular error. <node address> may also appear. It will not appear if the node is local or unknown.
<hr/>	

TABLE A-1. Destination Error Messages (continued)

---

**Message:** `Connection not completed. Try again. (<error code>)`

**Causes:**

- (05) The Control Computer is at maximum load.
- (06) Internal trunk problem.
- (13) The call timed out in the network.
- (14) The call was not completed by the network.
- (15) Interprocess communication error. Could not send call setup message.
- (16) Channel allocation error.
- (17) Call connect failure.
- (18) Internal routing data error.
- (19) Call collision in trunk.
- (39) Open channel error.
- (40) Internal protocol error.
- (42) A dial string from the node was too long. (Must be less than 129 characters)
- (44) Trunk is busy.

**Action:** Try again, later.

**Variable:** <error code> is the number assigned to particular error.

---

**Message:** `Connection not completed. Try again or enter <dialer name>.help for help. (23)`

**Cause:** The dialer was unable to complete the call.

**Action:** Try again later. If the problem persists, call the network administrator.

**Variable:** <dialer name> is the address of the dialer.

---

**Message:** `Conversation ended.`

**Cause:** The connection has been broken by the other end at your request. For example, logging off initiates a request for the host to hang up.

**Action:** If the call was disconnected unexpectedly, call the destination again.

---

**Message:** `DESTINATION is limited to 72 characters. (10)`

**Cause:** You entered an address that exceeds 72 characters.

**Action:** Check the address and try again.

---

**TABLE A-1. Destination Error Messages** (continued)

**Message:** **Dialed number is busy. (26)**

**Cause:** The dialer detected a busy signal.

**Action:** Try again later.

---

**Message:** **Dialed number is not answering. (27)**

**Cause:** The dialer did not get an answer from the dialed number.

**Action:** Try again. If the problem persists, call the network administrator.

---

**Message:** **Hangup.**

**Cause:** You have entered the attention signal after the destination address was entered and before the call connection was completed.

**Action:** Place the call again to the destination.

---

**Message:** **Invalid group.**

**Cause:** You attempted to select a group that does not exist.

**Action:** Select another group or call the network administrator.

---

TABLE A-1. Destination Error Messages (continued)

---

<b>Message:</b>	Primary dial tone not detected. Enter <dialer name>.help for help. (24)
<b>Cause:</b>	The dialer did not detect an initial dial tone.
<b>Action:</b>	Try again. If the problem persists, call the network administrator.
<b>Variable:</b>	<dialer name> is the address of the dialer.

---

<b>Message:</b>	Receive Mode. Enter the attention sequence to originate a call.
<b>Cause:</b>	Your two-way station is attached to a module that requires the attention signal to get out of receive mode.
<b>Action:</b>	Enter the network attention signal to enter originate mode. If you do not know the attention sequence, contact the network administrator. A common default for a network attention signal is <input type="text" value="BREAK"/> <input type="text" value="BREAK"/> entered within one second.

---

<b>Message:</b>	Receive mode. Press the return key to originate a call.
<b>Cause:</b>	Your two-way station is in receive mode.
<b>Action:</b>	Pressing <input type="text" value="RETURN"/> places the station in originate mode.

---

TABLE A-1. **Destination Error Messages** (continued)

<b>Message:</b>	<b>Secondary dial tone not detected. Enter &lt;dialer name&gt;.help for help. (25)</b>
<b>Cause:</b>	The dialer was told to wait for a secondary dial tone and no dial tone was detected.
<b>Action:</b>	Try again. If the problem persists, call the network administrator.
<b>Variable:</b>	<dialer name> is the address of the dialer.
<hr/>	
<b>Message:</b>	<b>Too many invalid attempts.</b>
<b>Cause:</b>	You entered too many incorrect passwords from a two-way station.
<b>Action:</b>	Check password and start your terminal session over.
<hr/>	
<b>Message:</b>	<b>Too many invalid attempts; hanging up.</b>
<b>Cause:</b>	You entered too many incorrect passwords while dialing in through a modem. The modem hung up the call.
<b>Action:</b>	Redial and start your terminal session over; be more careful making your entries.
<hr/>	
<b>Message:</b>	<b>Too many invalid attempts; turn terminal off, then on to continue.</b>
<b>Cause:</b>	You entered more than nine invalid entries in response to the <b>DESTINATION:</b> prompt.
<b>Action:</b>	Start again at the <b>DESTINATION:</b> prompt. Hit the carriage return. If you do not get the <b>DESTINATION:</b> prompt, power cycle the terminal. If trouble persists, call the network administrator.
<hr/>	

TABLE A-1. Destination Error Messages (continued)

---

<b>Message:</b>	<b>Too many sequential signals; call network administrator.</b>
<b>Cause:</b>	There are transient EIA signals on the channel. A babbling port has probably not been removed.
<b>Action:</b>	Check cable connections at your terminal and at the other end. Be sure they are not loose. Call the network administrator.

---

<b>Message:</b>	<b>Too many sequential signals - removing port; call network administrator.</b>
<b>Cause:</b>	A babbling port has been removed. It must be restored by the network administrator.
<b>Action:</b>	Check cable connections at your terminal and at the other end. Be sure they are not loose. Call the network administrator to have the port put back in service.

---

<b>Message:</b>	<b>Trunk is not in service. Try again later. (&lt;error code&gt;, &lt;node address&gt;)</b>
<b>Causes:</b>	(02) The trunk has failed. (46) Trunk removed from service.
<b>Action:</b>	Try again later.
<b>Variables:</b>	<error code> is the number assigned to a particular error. <node address> is the service address of the node in trouble.

---

**TABLE A-1. Destination Error Messages** (continued)

<b>Message:</b>	<code>You must enter a phone number after the dialer name. Enter &lt;dialer name&gt;.help for help. (22)</code>
<b>Cause:</b>	The correct format (<service-address>.<phone-number>[/baud]) was not followed.
<b>Action:</b>	Carefully reenter the destination address using the correct format. If the problem persists, call the network administrator.
<b>Variable:</b>	<dialer name> is the address of the dialer.
<hr/>	
<b>Message:</b>	<code>Call rejected by destination endpoint. Contact Destination Service Administrator (&lt;error code&gt;)</code>
<b>Cause:</b>	An error has occurred on the destination host, causing the host to reject the call.
<b>Action:</b>	The error codes vary among destination services, so the user must consult the particular destination service documentation or administration to obtain the reason for the error.
<b>Variables:</b>	<error code> is the number returned by the destination service when it declined the call.

---

## Command Error Messages

Command error messages appear when you attempt to use a command at the **COMMAND:** prompt and make an entry error or when system error conditions prevent the execution of the command. The command error messages appear in Table A-2. Those which begin with a variable (< >) appear at the beginning of the table. All others are listed alphabetically.

---

**TABLE A-2. Command Error Messages**

Note: The first four messages in this table begin with a tag variable. What actually appears on your screen will be the tag you assigned to the held call.

---

**Message:** <tag> contains nonprintable characters.

**Cause:** A tag cannot contain nonprintable characters.

**Action:** Try again and enter a tag that does not contain nonprintable characters, has four or fewer characters, and is not "all" or "new."

**Variable:** <tag> is the label assigned to the call.

---

**Message:** <tag> hung up; opposite end disconnected.

**Cause:** A tagged endpoint hung up.

**Action:** View the list of the active and held calls by entering `display held` while at the **COMMAND:** prompt. Call the destination again.

**Variable:** <tag> is the label for the held call that hung up.

---

**Message:** <tag> not found.

**Cause:** You entered a tag to identify a call you wanted to reactivate or disconnect, but it is not assigned to any call. You may have misspelled it or entered control characters or other invisible characters, or noise on the line may have occurred.

**Action:** Try again and use the tag assigned to the call. Enter `display held` to see the tags for all calls.

**Variable:** <tag> is the label you entered, as you entered it.

---

TABLE A-2. **Command Error Messages** (continued)

**Message:** <tag> too long.

**Cause:** You entered a tag that was longer than four characters.

**Action:** Try again and enter a tag with four or fewer characters.

**Variable:** <tag> is the label you attempted to enter.

---

**Message:** "All" is not a valid tag name.

**Cause:** "All" may not be used as a tag for a held call.

**Action:** Try again and use a tag that has only printable characters, has four or fewer characters, and is not "all" (or "new").

---

**Message:** Call hold not allowed.

**Cause:** You have tried to save the current call, but you do not have call hold permission.

**Action:** If you believe you should have the *Call Hold* feature, call the network administrator.

---

**Message:** Can't select a group.

**Cause:** You do not have permission to select a group.

**Action:** If you believe you should have the *selectable group* access feature, call the network administrator.

---

TABLE A-2. **Command Error Messages** (continued)

---

<b>Message:</b>	<b>Can't switch; opposite end disconnected.</b>
<b>Cause:</b>	The call you previously placed on hold and just tried to make active has been disconnected from the other end.
<b>Action:</b>	While at the <b>COMMAND:</b> prompt, entering <b>display held</b> gives you a list of active, held, and disconnected calls from which you can select. To reconnect to the disconnected destination, you must make a new call.

---

<b>Message:</b>	<b>Command entered is not available from this terminal.</b>
<b>Cause:</b>	Different network connections allow different commands.
<b>Action:</b>	Enter <b>help</b> at the <b>COMMAND:</b> prompt to view the list of available commands. Try again and correctly enter a valid command.

---

<b>Message:</b>	<b>Command mode timeout; reconnecting.</b>
<b>Cause:</b>	You timed out at the <b>COMMAND:</b> prompt. If you have no active calls, you return to the <b>DESTINATION:</b> prompt. If you have an active call, you return to the active call.
<b>Action:</b>	Get the <b>COMMAND:</b> prompt using the network attention signal.

---

<b>Message:</b>	<b>Connection to destination has been lost.</b>
<b>Cause:</b>	The current call has been disconnected from the other end. Could be the result of a network error or a failed host.
<b>Action:</b>	To view the list of the active and held calls, enter <b>display held</b> while at the <b>COMMAND:</b> prompt. Call the destination again.

---

<b>Message:</b>	<b>Connection to &lt;tag&gt; has been lost.</b>
<b>Cause:</b>	The call <tag>, previously placed on hold, has been disconnected from the other end. To reconnect to that destination, you must make a new call.
<b>Action:</b>	To view the list of the active and held calls, enter <b>display held</b> while at the <b>COMMAND:</b> prompt.
<b>Variable:</b>	<tag> is the label for the held call that is now disconnected.

---

**TABLE A-2. Command Error Messages** (continued)

<b>Message:</b>	<b>Current call has no tag. Enter tag (up to 4 chars) (&lt;cr&gt; to disconnect.)</b>
<b>Cause:</b>	This is the prompt for tagging a call.
<b>Action:</b>	Enter a tag of up to four characters and <input type="button" value="RETURN"/> to hold the call. Enter <input type="button" value="RETURN"/> without a tag to disconnect.
<b>Variable:</b>	<tag> is a label you assign to the call.
<hr/>	
<b>Message:</b>	<b>Currently there are no calls on hold.</b>
<b>Causes:</b>	You tried to switch to a held call, but there are no held calls.
<b>Action:</b>	Check the status of the active call with display held.
<hr/>	
<b>Message:</b>	<b>Disconnect the current call or place call on hold before using SELECT.</b>
<b>Cause:</b>	You must place the current call on hold before attempting to select a new group.
<b>Action:</b>	At the <b>COMMAND:</b> prompt, place the call on hold with the continue command or disconnect the call.
<hr/>	
<b>Message:</b>	<b>Maximum of 7 calls can be held.</b>
<b>Cause:</b>	You attempted to place a call on hold when there were already seven calls on hold. The limit is seven calls on hold plus one active call.
<b>Action:</b>	To place this call on hold, you must first drop one of the seven calls you now have on hold.
<hr/>	

**TABLE A-2. Command Error Messages** (continued)

**Message:** "New" is not a valid tag name.

**Cause:** "New" may not be used as a tag for a held call.

**Action:** Try again and use a tag that has only printable characters, has four or fewer characters, and is not "new" (or "all").

---

**Message:** No current call.

**Cause:** You entered a tag for the current call, but there is no current active call.

**Action:** At the **COMMAND:** prompt, enter the display held command to see all held calls and their tags.

---

**Message:** No current call; no calls have been disconnected.

**Cause:** You entered disconnect without a parameter, which would normally disconnect only the current call, but there was no current call.

**Action:** At the **COMMAND:** prompt, enter the display held command to see all held calls and their tags.

---

**TABLE A-2. Command Error Messages** (continued)

**Message:** Same tag name not allowed.

**Cause:** The tag you requested is already in use.

**Action:** Try again using a different tag.

---

**Message:** Sorry, call not held; try again later.

**Cause:** The node system memory capacity for held calls has been reached. However, you do not have any calls on hold, so you cannot drop any of your calls to hold the call you are attempting to hold.

**Action:** Try again. If the problem persists, call the network administrator.

---

**Message:** Sorry, no more calls can be held.

**Cause:** The node is configured to hold a limited number of calls. That limit has been reached and no more calls can be held until some calls are disconnected. You have calls on hold, so you can disconnect one and place a new call on hold.

**Action:** Disconnect one of your held calls and try again to hold the current call.

---

**Message:** Unknown command; type "help" for list of commands.

**Cause:** The command that you entered is not valid. You may have misspelled it or entered control characters or other invisible characters, or noise on the line may have occurred.

**Action:** Enter help at the **COMMAND:** prompt to view the list of available commands. Try again and enter a valid command.

## Informational Messages

Informational messages appear as a response to commands entered at the **COMMAND:** prompt. They confirm the action requested by the user. The messages are listed alphabetically in Table A-3.

---

**TABLE A-3. Informational Messages**

**Message:** **All calls disconnected.**

**Cause:** This is the response when you enter disconnect all.

---

**Message:** **Currently there are no calls on hold.**

**Causes:** This is the response from entering display held to view all active and held calls, but there are no calls on hold.

---

**Message:** **Disconnecting.**

**Cause:** This is the response when you disconnect the current call.

---

**Message:** **Disconnecting <tag>.**

**Cause:** This is the response when you disconnect a specific tagged call.

**Variable:** <tag> is the label for the held call that is now disconnected.

---

**Message:** **Holding <tag>.**

**Cause:** This is the response when you enter continue new <tag> or help.

**Variable:** <tag> is the label for the held call.

---

**TABLE A-3. Informational Messages** (continued)

**Message:** `Reconnecting.`

**Cause:** This is the response when you request to be connected. It refers to the current call.

---

**Message:** `switching to <tag>.`

**Cause:** This is the response when you enter `continue <tag>` or `continue`.

**Variable:** `<tag>` is the label for the held call.

## Catastrophic Error Messages

Other error messages occur only when there has been a catastrophic Control Computer error or network administrator error. These messages end in the sentence **Call your network administrator**. If one of these error messages appears, note your STATION ID (module and port number) and give this information to the administrator. Your terminal channel is unusable until the problem is corrected.

---

## Appendix B. User Checklist

It is important to record information about your terminal and the services you are authorized to use. Some of the information may have to come from the network administrator. Other information, like the STATION ID and group name, is displayed on your screen when you gain access to the local node. Be sure to record your STATION ID and include it when you report a problem to the network administrator.

Table B-1 provides you with a user checklist for recording this information.

**TABLE B-1. User Checklist**

STATION ID:		
Group Name:		
Module Type:		
Host (Service) Addresses:		
Modem Pool Number:		
Dialer Address:		
Passwords? Network Access Group Password Host(s)	(Memorize passwords)	
Attention Signal:		
Att. Signal Result:	Disconnect	COMMAND: prompt
Dialing Capability?	Yes	No
Predefined Destination?	Yes	No
Select Authorization?	Yes	No
Terminal Autobaud?	Yes	No
Host Autobaud?	Yes	No
Directory Assistance?	Yes	No
Call Hold?	Yes	No
Autodialer Feature?	Yes	No
Set Commands?	Yes	No
What Can Be Set?		
If PC, is it 2-Way?	Yes	No
Receiving Address:		
X.25 Access:	Yes	No
If Yes, PAD Address:		
Quick Call:		
PAD Recall Character:		

---

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