

BRIDGE COMMUNICATIONS, INC.
ETHERNET SYSTEM PRODUCT LINE

COMMUNICATIONS SERVER USER'S GUIDE

09-0024-01

April 1985

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This page records all revisions to this publication, as well as any Publication Change Notices (PCNs) posted against each revision. The first entry posted is always the publication's initial release. Revisions and PCNs subsequently posted are numbered sequentially and dated, and include a brief description of the changes made. A revision always incorporates both the previous revision and any PCNs posted against it. The part numbers assigned to revisions and PCNs use the following format:

aa-bbbb-cc-dd

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Part Number	Date	Description	Affected Pages
09-0024-00	2/84	First Release	Superseded
09-0024-00-01	4/84	PCN	Superseded
09-0024-00-02	7/84	PCN	Superseded
09-0024-00-03	7/84	PCN	Superseded
09-0024-01	3/85	Second Release (reflects the following software releases: SW/1-A/BSC/SDLC release 20000, SW/1-HSM release 11010, SW/1-SNA release 11000, SW/1-SPMUX release 11000, SW/1-TCP release 10200, SW/1-X.25 release 14000, SW/100-A/BSC release 15000, SW/100-488 release 10000, SW/100-TCP release 10200, SW/100-UTIL release 30000)	All

PREFACE

This guide provides the information necessary to configure and use a Communications Server/1 (CS/1) or Communications Server/100 (CS/100) within a Bridge Communications Ethernet system environment. Planning and installation instructions for these devices appear in the Series/1 Planning and Installation Guide and the Series/100 Planning and Installation Guide (references [3] and [4], respectively).

Most users of the Communications Server need only the information that appears in this manual and in the Getting Started Guide (reference [8]). The system installer and network manager also need some of the technical information that appears in the Planning and Installation Guides. If the installation includes a Network Control Server, the network manager also needs the Network Control Server Installation and Operation Guide (reference [5]).

This guide is grouped into seven major sections and one appendix:

Section 1.0 - Introduction: Describes the purpose and scope of this guide and offers recommendations on how to use it.

Section 2.0 - System Overview: Outlines the system software and describes the Connection Service.

Section 3.0 - Connection Service Command Guide: Explains the command format and syntax, provides complete descriptions of all commands, and lists all Connection Service error messages.

Section 4.0 - CS/1 System Generation and Disk Utilities: Describes the CS/1 system generation, disk duplication, disk formatting, and memory dump procedures.

Section 5.0 - CS/100 System Generation and Disk Utilities: Describes the CS/100 system generation, disk duplication, disk formatting, and memory dump procedures.

Section 6.0 - Port Configuration: Explains the port configuration parameters and provides sample configurations for various kinds of devices.

Section 7.0 - Network Management Reports: Describes the network management reports.

Appendix A - Provides a comprehensive list of error messages generated by the Connection Service.

REFERENCES

The following publications describe the Bridge Communications Ethernet System Product Line (ESPL):

- [1] ESPL Overview (Bridge Communications, Inc.)
- [2] Software Technical Reference Manual (Bridge Communications, Inc.)
- [3] Series/1 Planning and Installation Guide (Bridge Communications, Inc.)
- [4] Series/100 Planning and Installation Guide (Bridge Communications, Inc.)
- [5] Network Control Server Installation and Operation Guide (Bridge Communications, Inc.)
- [6] CS/1-SNA Support Guide (Bridge Communications, Inc.)
- [7] Gateway Server User's Guide (Bridge Communications, Inc.)
- [8] Communications Server Getting Started Guide (Bridge Communications, Inc.)

The following publications describe Ethernet and the Xerox Network System protocols:

- [9] The Ethernet, A Local Area Network: Data Link Layer and Physical Layer Specifications, Version 1.0 (Digital Equipment Corporation, Intel Corporation, and Xerox Corporation, 1980)
- [10] Internet Transport Protocols, XSI 028112 (Xerox Corporation, 1981)
- [11] Courier: The Remote Procedure Call Protocol, XSI 038112 (Xerox Corporation, 1981)

The following publications describe the X.25 protocols:

- [12] Draft Revised CCITT Recommendation X.25, COM VII No. 489 (CCITT Study Group VII, 1980)
- [13] Telenet X.25 Documentation Service, PE-xx.001.04B (GTE Telenet Communication Corporation, 1979)

The following publications describe the TCP/IP protocols:

- [14] TCP/IP Internet Protocol Transition Workbook (SRI International, 1982)

- [15] Ethernet Address Resolution Protocol, RFC-826 (SRI International, 1982)
- [16] Internet Protocol, RFC-791 (SRI International, 1982)
- [17] Internet Control Message Protocol, RFC-792 (SRI International, 1982)
- [18] User Datagram Protocol, RFC-768 (SRI International, 1982)
- [19] Transmission Control Protocol, RFC-793 (SRI International, 1982)
- [20] Telnet Protocol, RFC-764 (SRI International, 1982)
- [21] Name Server Protocol, IEN-116 (SRI International, 1982)

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1.0 INTRODUCTION

This guide provides the information necessary to configure and use a Communications Server/1 (CS/1) or Communications Server/100 (CS/100) within a Bridge Communications Ethernet system environment.

This section defines the purpose, scope, and audience of the publication.

1.1 Purpose and Scope

The information in this publication has been prepared for the customer who uses the Connection Service of the Communications Servers. This service is automatically available as part of the product and requires no programming or other enhancement.

Some information has been included about nonturnkey features, that is, features that require modification by the customer in order to provide a different interface or to use the Communications Server in a specialized application. More detailed information about interfacing custom software and adding hardware components is provided in the Software Technical Reference Manual (reference [2]) and the Planning and Installation Guides (references [3] and [4], respectively).

Some models of Communications Server can be booted from a Network Control Server. Information on this option is provided in the Network Control Server Installation and Operation Guide (reference [5]).

1.2 How to Use This Guide

This publication includes both a guide to the Connection Service commands and a comprehensive description of system configuration and maintenance. The material is divided into seven sections that cover four kinds of information:

- Background Information. Section 2.0 provides an overview of the software and describes the kinds of interaction that both users and network managers will have with the Communications Server. This material is essential for the network manager and helpful for most end users.
- Command Guide. Section 3.0 explains the format and syntax of Connection Service commands, provides a description of all commands, and lists all error messages. A user who employs the Communications Server only to make connections on a configured system should read Section 3.0. In addition, the new user should read the tutorial sections in the Getting Started Guide (reference [8]).

- Network Configuration Instructions. Sections 4.0, 5.0, and 6.0 describe the system generation and software configuration procedures. This information is used by the network manager when setting up a new installation or modifying an existing system. Sections 4.0 and 5.0 also describe the disk utilities for the two versions of the Communications Server.

- Network Management Reports. Section 7.0 describes the performance reports generated by the system.

2.0 SYSTEM OVERVIEW

This section describes the Communications Server software and the steps necessary to configure the software for a new installation. The system configuration information is covered in detail in Sections 4.0, 5.0, and 6.0.

This section also contains a summary of how a user typically interacts with the Communications Server and what facilities the Connection Service provides. The Connection Service commands are described in more detail in Section 3.0.

2.1 Access to the Communications Server

A Communications Server typically has two kinds of users: a network manager, who configures and maintains the system, and a number of end users, who use the system only to establish and terminate connections across the network.

For security purposes, the Communications Servers provide for two levels of network management. A Local Network Manager can control the functions of the local Communications Server. A Global Network Manager can make changes to any Communications Server or Gateway Server that is accessible through the local network.

2.2 System Software

Most interactions by both users and network managers are accomplished through Connection Service commands. These commands are issued from a terminal port to create or terminate connections, specify the characteristics of ports, and perform network administration. Some network management functions, however, are accomplished through the system monitor or utilities diskette, discussed below.

2.2.1 CS/1 MCPU Monitor

The MCPU board on the CS/1 includes a monitor in PROM, used primarily for custom software development and debugging. In a standard CS/1 installation, the network manager also uses the monitor during the initial system configuration and for disk duplication and initialization. These procedures are described in Section 4.0 of this guide.

The monitor is accessed through a terminal attached to the CS/1 console port. Refer to the description of the bootstrap options in the Series/1 Planning and Installation Guide (reference [3]). For more information about the monitor, and about the rest of the system software, see the Software Technical Reference Manual (reference [2]).

2.2.2 CS/100 Monitor and Utilities Disk

The CS/100 also has a monitor in PROM, but the monitor is not used during normal operation of the unit. The CS/100 is shipped with a utilities disk containing the software necessary for system configuration and disk duplication and initialization. These functions are described in Section 5.0 of this guide.

In case of a CS/100 crash, the system may branch into the monitor to facilitate troubleshooting. The procedure for making a memory dump from the CS/100 monitor is described in Section 5.5. Other features of the CS/100 monitor are similar to those of the CS/1 monitor, described in the Software Technical Reference Manual (reference [2]). The instructions for accessing the CS/100 monitor through the optional DUEX board are described in the Series/100 Planning and Installation Guide (reference [4]).

2.3 Software Configuration

Once the Communications Server has been installed according to the instructions in the appropriate Planning and Installation Guide, some software configuration may be necessary. Both the CS/1 and the CS/100 have two sets of software-controlled parameters: system generation parameters and configuration parameters.

System generation parameters apply to the Communications Server as a whole. These parameters typically need to be changed only once for a given installation. They are modified through the Sysgen program, described in Sections 4.0 and 5.0.

Configuration parameters apply to the individual ports and may need to be changed more frequently. They can be changed dynamically through the SET, SETDefault, and REMoteSET commands. After running the Sysgen program, the network manager should adjust the default values of the configuration parameters to reflect the requirements of the system. The configuration parameters are described in detail in Section 6.0, and the SET, SETDefault, and REMoteSET commands are described in Section 3.2.

2.4 Connection Service Features

The sections below outline the general features of the Connection Service, which provides a collection of commands for performing the basic Communications Server functions:

- ⊗ Establishing and terminating connections between different devices on a network
- ⊗ Examining and altering configuration parameters (e.g., device type, baud rate, parity, flow control)
- ⊗ Sending and receiving in-band and out-of-band signals (e.g., interrupts)
- ⊗ Switching among multiple connections
- ⊗ Assigning and using a clearinghouse name service
- ⊗ Examining error and traffic statistics

The Connection Service commands are available to each port configured to support an asynchronous terminal device. In some applications, the device may actually be a computer emulating a terminal or a process feeding such a terminal emulator.

The Connection Service commands are described in detail in Section 3.0.

2.4.1 Connections Among Different Server Types

A Communications Server belongs to one of two families, depending on which high-level protocols are supported by the server. The two sets of high-level protocols are Xerox Network Systems (XNS) and Transport Control Protocol/Internet Protocol (TCP/IP). Communication between members of the same family is supported; however, communication between members of different families is not.

The following Communications Servers provide an interface between an XNS Ethernet network and a variety of different devices:

- ❑ Communication with asynchronous devices is accomplished through the CS/1-A, the CS/100-A, and the CS/1-HSM.
- ❑ Communication with character-synchronous devices is accomplished through the CS/1-BSC and the CS/100-BSC.
- ❑ Communication with Sperry character-synchronous terminal devices is accomplished through the CS/1-BSC running SPMUX multiplexer software; communication with the Sperry character-synchronous host is accomplished through the standard CS/1-BSC.
- ❑ Communication with bit-synchronous devices is accomplished through the CS/1-SDLC.
- ❑ Communication with an SNA host is accomplished through the CS/1-SNA.
- ❑ Communication with an X.25 host is accomplished through the CS/1-X.25.
- ❑ Communication with IEEE 488 devices is accomplished through the CS/100-488.

The following Communications Servers provide an interface between a TCP/IP Ethernet network and a variety of devices:

- ❑ Communication with asynchronous devices is accomplished through the CS/1-TCP and the CS/100-TCP.

In some cases, a single CS/1 may provide more than one kind of interface. For instance, a CS/1 may contain one asynchronous SIO board and one synchronous SIO board, and thus be able to provide network connections to asynchronous, character-synchronous, and bit-synchronous devices. However, each individual SIO board in the CS/1 supports only one kind of interface. The CS/100 does not support hybrid interfaces.

The Connection Service commands described in this guide are available only to a port configured as an asynchronous terminal port (e.g., CS/1-A, CS/100-A, CS/1-TCP, CS/100-TCP). Connections between an asynchronous terminal port and another device can be

established with a connection request issued at the terminal. Connections among other kinds of devices can be established remotely via a third-party connection request from an asynchronous terminal port or locally via a port initialization macro. See Sectio3.2 for a description of the Connect command; macros are discussed later in this section.

Table 2-1 illustrates the typical connections and how they are established.

Table 2-1 Typical Connections Among Server Types

Source Server:	Destination Server:							
	XNS Async	HSM	BSC	SDLC	SNA	X.25	488	TCP Async
XNS Async	d,t	d,t			d,t	d,t	d,t	
HSM	t	t						
BSC			t					
SPMUX			t					
SDLC				t				
X.25						d		
488	t	t					t	
TCP Async								d,t

d = Direct connection by request from source port.
t = Third-party connection by request at remote port, or via port initialization macro.

2.4.2 Session Management

A session, or virtual connection, is a logical connection between two devices through one or more Communications Servers. A session is initiated with the Connect command, usually entered on a terminal device at one end of the connection. Sessions can also be initiated by a network manager on either a local or a remote Communications Server.

The port that initiates the connection is the active end of the connection, and the destination port is the passive end. If the connection is established remotely by a network manager (a third-party connection), neither port is active; both are passive.

The user at the active end of a connection can change session parameters and disconnect the session. A host port cannot issue commands to establish or disconnect a session and cannot change session parameters (refer to the discussion of modes in Section 2.4.4). The Communications Server can terminate a session automatically after activity on the port ceases if the destination port has been configured with an automatic disconnect interval (refer to Section 6.1).

In most installations the Communications Server can be configured to allow multiple simultaneous connections on a single port. The maximum number of simultaneous sessions permitted per port depends both on site requirements and on the high-level protocols running in the server; the number is specified at the time of system generation.

Only one session at a time is active; all other sessions are suspended and flow-controlled.

2.4.3 Physical and Virtual Ports

The asynchronous Communications Servers (e.g., CS/1-A, CS/100-A, CS/1-TCP, and CS/100-TCP) and the character- and bit-synchronous Communications Servers (e.g., CS/1-BSC, CS/1-SDLC, and CS/100-BSC) all offer a clear-cut mapping between ports and physical lines. The servers are equipped with 4 to 32 physical ports, each of which can be connected over a physical line to an individual device. These physical ports are numbered 0 through 31. The port parameters described in Section 6.0 are designed to adjust the port to the physical needs of the attached device.

On the CS/1-HSM, CS/1-SNA, CS/1-X.25, and CS/100-488, the Connection Service is provided on virtual ports rather than physical ports, and the correlation between virtual ports and physical lines is more complex:

- The CS/1-HSM supports up to 64 virtual ports on one or two physical lines. These virtual ports are numbered 32 through 95.
- The CS/1-SNA supports up to 24 virtual ports on one physical line. These virtual ports are numbered 32 through 55.
- The CS/1-X.25 supports up to 48 virtual ports on one, two, three, or four physical lines. These virtual ports are numbered 0 through 47.
- The CS/100-488 provides one virtual port to an IEEE 488 bus, which supports 31 addresses representing up to 15 devices. (Only one address can be accessed at a time.) This single virtual port is numbered 14.

Because a virtual port does not represent a single connector and physical line, many of the port parameters described in Section 6.0 are not applicable.

On all the servers that normally provide only physical ports, virtual ports may be created for access through a program interface. On the CS/1-A, for instance, up to 64 virtual ports (numbered 32 through 95) may be defined. Reference [2] provides more information on program interface services.

2.4.4 Modes of Operation

Each device port on a Communications Server has its own independent user interface, with several different modes of operation. A user at a CS/1-A or CS/100-A terminal port encounters three port modes:

- Listening mode
- Command mode
- Data Transfer mode

Each port operates independently of the other ports, except when two ports are interconnected.

Figure 2-1 illustrates the three modes and shows the typical commands and events that cause a port to change modes. The list below defines the modes:

- Listening mode is in effect when the device attached to a port is first powered on, before any activity has taken place.

A port in Listening mode is available to become the passive end of a connection originated by another port. A terminal port in Listening mode enters Command mode as soon as any key is pressed on the attached device.

A terminal port in Command mode with no connections reverts automatically to Listening mode if no activity takes place on the port for the length of time specified during system generation as the Autolisten interval. A port also enters Listening mode in response to the Listen command, which can be entered locally on the attached terminal or remotely by a network manager. When a port changes into Listening mode, an "at" sign (@) may be displayed on the terminal screen. Any key typed on the local keyboard then causes the port to change from Listening mode to Command mode.

A host port reverts to Listening mode whenever a session to the port is terminated.

- In Command mode, which occurs only on a terminal port, the port responds to commands entered on the attached device. If the commands are performed locally (e.g., setting or changing device characteristics) or if a remote connection request fails, the port remains in Command mode. If a connection is successful, the port enters Data Transfer mode and subsequent terminal input is transmitted to the destination.

A terminal port enters Command mode as soon as the Communications Server detects the presence of the device on the port, usually when the device is powered on and a key is pressed. Host ports do not enter Command mode.

If no activity takes place on a port in Command mode for the Autolisten interval specified during system generation, the port reverts to Listening mode.

As long as a port is in Command mode, a connection may be established from the local device to a remote device, but not from a remote device to the local device. If a user at another port wants to establish a connection to a port that is in Command mode, the port must first be put into Listening mode with the Listen command or through the timeout of the Autolisten interval.

- A port is in Data Transfer mode when it is actively communicating with another port. The Communications Server scans the data stream entered on the attached terminal for a predetermined set of attention characters; all other data is passed as typed, with no further interpretation or translation. The attention characters can be limited to the enter-command-mode character or can include a set of local editing characters (refer to Section 6.1.4).

A user at a terminal port in Data Transfer mode can interrupt a session with the break key or the enter-command-mode character (if this parameter is set). The terminal port enters Command mode, and the host port remains in Data Transfer mode. The user can then enter the RESume command to change back to Data Transfer mode, causing transmission of data to the destination to resume. Alternatively, the user can terminate the session with the DisConnect command. The host port then returns to Listening mode, and the terminal port remains in Command mode.

While a device is in Data Transfer mode, no connection may be established to it from a remote device.

A host port in Data Transfer mode terminates the connection if the automatic disconnect feature is enabled and no activity is detected during the interval specified by the AUTODISCONNECT parameter (refer to Section 6.1.1). The host port then returns to Listening mode and the terminal port returns to Command mode. The default AUTODISCONNECT interval is 60 minutes; a different interval may be specified with the SETDEFAULT command. Note that the Automatic Disconnect feature applies only to host ports.

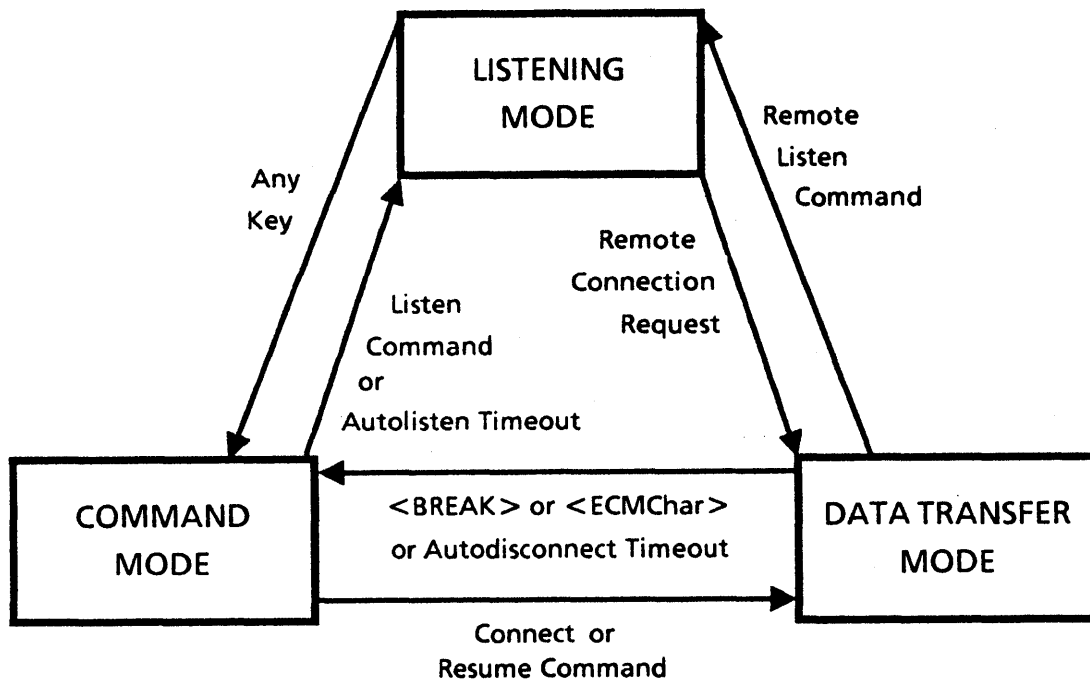


Figure 2-1 Terminal Port Modes of Operation

2.4.5 Privilege Levels

The commands available to a user vary depending on the user's established privilege level. Three privilege levels are available: User, Local Network Manager, and Global Network Manager.

A User ordinarily uses the Communications Server only for accessing other devices. A port with User privilege can make connections between that port and another device and can change some parameters for compatibility between the local and remote devices. A User can also switch among multiple sessions and execute macros.

A Local Network Manager can create or dissolve connections between any port on the local Communications Server and any other port on the network. The Local Network Manager can also define or review port configuration parameters, set up logical names and rotaries, display the performance statistics gathered by the Communications Server, define macro files, and broadcast messages to ports on the local Communications Server.

A Global Network Manager can do everything the Local Network Manager can do, but for all ports and servers on the network. The Global Network Manager can also set up access groups, define the passwords used for access control, and monitor network security statistics.

The actual set of commands available at each privilege level can be adjusted during system generation.

Note that a port cannot be configured for a specific privilege level. The default privilege level for all ports is always User. A higher privilege level is acquired through a dialogue with the Communications Server, including entry of a password.

The commands available at each privilege level are described in Section 3.2, the parameters that govern access control are described in Section 6.1, and network statistics reports are described in Section 7.0.

2.4.6 Help Facility

The Help facility is provided as a memory aid. If the user types a question mark (?) in response to the Communications Server prompt or after partially typing a command, the system responds with a list of all commands or parameters that are valid at that point. The Help screen always lists the command format appropriate to the user's privilege level. The list of commands and parameters differs depending on whether or not a session exists for the port.

In the following example, the sequence "CS/l>" represents the prompt on the CS/l. The prompt is settable on both the CS/l and the CS/100. For clarity in the example, user input is underlined. All other text represents the Communications Server's response. This example shows the help screen that appears if a current session exists from the user's port to a host port.

```
CS/l> ?
Connect      <address>[,<address>] [ECM] [Q]
DEQueue      [<session number>]
DisConnect   [<session number>]
DO           <macro-name>
Echo         <string>
Listen
Pause        [<seconds>]
REMOteSET    <param-name> = <value> ...
REMOteSHoW   [<param-name>] ...
RESume       [<session number>]
SET          <param-name> = <value> ...
SHoW         <argument> ...
Switch       [<session number>]
Transmit     <string> | InBandBreak | OutBandBreak
```

```
CS/l> s?
SET          <param-name> = <value> ...
SHoW         <argument> ...
Switch       [<session number>]
```

```
CS/l> set l?
SET LFDelay   = None | <number> (sixtieths of a second)
SET LFInsertion = None | ( OutputCrLf , EchoCrLf )
SET LFPad     = None | <number> (1-127 nulls of padding)
SET LineERase = Disabled | <char>
SET LocalEditing = ( DataEditing | NoDataEditing ,
                    CmdEditing | NoCmdEditing )
```

```
CS/l> set lfp = none
```

2.4.7 Macro Facility

Both Communications Servers support "macros," named files that contain a series of individual commands. Typically, the network manager sets up a macro file containing the command sequence necessary to perform a specific function, and the users execute the file with a one-line command. Macros can be executed at any terminal device port on the system.

The system supports two kinds of "initialization macros," macros that are executed automatically whenever the Communications Server is reset or powered on and macros that are executed automatically whenever the device attached to an individual port changes from Listening mode to Command mode.

The system initialization macro is executed every time the Communications Server is booted. The network manager establishes the system initialization macro by defining a macro whose name begins with the letters "init" (see Section 3.2 for more information about these special filenames). A system initialization macro can be used, for example, to automatically establish a connection between two devices that do not have the Connection Service interface available (such as a host and a lineprinter, or a synchronous terminal and a synchronous host) whenever the server is booted. System initialization macros cannot be defined on servers that provide a host interface via one or more virtual ports (i.e., CS/1-HSM, CS/1-SNA, CS/1-X.25, and CS/100-488). Therefore, a system initialization macro that connects a host attached to one of these servers and a device attached to another server must be defined on the other server.

A port initialization macro is executed every time the device attached to the port changes from Listening mode to Command mode. Port initialization macros are assigned via a configuration parameter. A port initialization macro can be used, for example, to request a connection with a specific host and initiate the login procedure every time a user powers on the terminal.

Macros are also useful for setting configuration parameters for compatibility with different devices. If a port is used with more than one terminal, for example, a different macro can be defined for each terminal. Before switching to an alternative device, the user executes a macro to make the port compatible with that device. Similarly, macros can be defined that set up a terminal port for communication with multiple host computers having different terminal requirements.

The commands used to define, execute, and remove macros are described in Section 3.2. The configuration parameter used to assign a port initialization macro to a port is described in Section 6.1.

2.4.8 Logical Names and Rotaries

To simplify the process of making connections, the Communications Servers include facilities for assigning logical names to individual ports or groups of ports. The system then handles port contention and selection without repeated connection attempts by the user. The logical name may be either a clearinghouse name (for XNS servers) or an internet name (for TCP servers).

If a device can be accessed through more than one port on a given server, the network manager assigns a single rotary number to the group of ports. This "local rotary" facility is commonly used when a single host has multiple ports on a single Communications Server.

The network manager then associates a logical name with the rotary number or a single port address. This allows the user to establish a connection to a device without knowing the network address of the device. If the logical name is associated with a rotary number that represents multiple ports to one device, the user can make a connection to the device without ascertaining which individual ports are free.

The network manager can also establish a "global rotary" (i.e., a set of ports on two or more different servers that provides access to a single host) by associating a logical name with a list of addresses. Each address in the list may represent a single port or a local rotary of ports.

The commands used to assign rotary numbers and clearinghouse names are described in Section 3.2.

2.4.9 Access Control

The Connection Service provides a way to control access to any destination ports in the network by means of port configuration parameters. One parameter is used to assign one or more destination ports to an access group. Another parameter is used to assign an access word to one or more source ports. A third parameter is used to assign a password to each access group.

When a user requests a connection to a port in an access group, the server compares the access word of the source port to the access group of the destination port. If the access group and access word match, the server completes the connection. If the access group and access word do not match, the server notifies the user that the port is access-controlled and prompts for the password assigned to the access group. Unless the password is entered correctly, the connection request fails.

Only a Global Network Manager can establish access groups, access words, and group passwords, or display the current values of these parameters. Each Communications Server supports up to 16 access groups, 16 group passwords, and one access word per port. Refer to Section 6.1 for detailed information on these parameters.

Access control is not supported by the TCP servers.

2.4.10 Call Queueing

The Connection Service includes a call queueing feature. If a connection request cannot be completed because the destination port is already connected with another device, the user can ask to be alerted as soon as the port becomes available. The queueing feature is invoked by adding the parameter "q" to a connection request. If the destination device is available at the time the command is entered, the connection is established immediately and the queueing request is ignored.

The system tracks all queue requests on a first-come, first-served basis. The port that has been waiting the longest is always given the next available connection. Call queueing can be invoked for connections to either a single port or a rotary port.

When a destination port with queued requests becomes available, the Communications Server puts the port in a reserved state, so that no connection can be established except by the first port in the connection queue. Meanwhile, the system sends a terminal bell signal and a message to the first port in the queue. The user at the queued port then has five minutes to complete the connection by issuing the RESume command. If the user fails to complete the connection, the destination port becomes available to the next port in the connection queue, if any.

While the destination port is in a reserved state, and before the connection is completed by the user at the requesting port, a network manager at another port can interrupt the queue with the Listen command. One Listen command directed at the destination port removes the first requesting port from the queue. If only one port was in the queue, the destination port is then in Listening mode. If more than one port was in the queue, a second Listen command issued within approximately one minute removes all remaining ports from the queue and puts the destination port in Listening mode.

A user at the requesting port can remove the port from the connection queue at any time.

The commands used to queue, manipulate, and dequeue connections are described in Section 3.2.

Call queueing is not currently supported by the TCP servers.

2.4.11 Access to Network Management Functions

Access to the Connection Service network management functions is available through several methods. The choice of a particular access method depends on several factors:

- Type of function to be performed
- Type and location of the server affected by the procedure
- Type and location of the device from which the network manager performs the functions

The management functions, such as examining or altering port configurations, assigning logical names, and obtaining network management reports, are usually performed from a terminal attached to an asynchronous I/O port using the commands described in Section 3.0.

With Local Network Manager privilege, the network manager can perform these functions on behalf of any port on the local server. With Global Network Manager privilege, the network manager can also perform them on behalf of remote ports (provided the remote server is running the same family of protocols as the local server).

To perform a single-command function on a remote server, the network manager can access the destination server in remote mode. In remote mode, all commands entered affect the destination server until the network manager exits remote mode. However, remote mode access limits the amount of data that can be transmitted to the requesting port, and long displays such as statistical reports may be truncated.

To perform multiple-command functions remotely, or to display reports that are too long to display in remote mode, the network manager can make a connection to a special network management port on the target server. Port number 136 on any ESPL system running the Connection Service is reserved for remote network management access. When a connection is made to this special port number, the default privilege level is User. After establishing the required privilege level, the network manager has access to all of the management functions provided by the Connection Service. Port 136 supports only one connection at a time.

Access to the network management functions on an ESPL server is also available from some non-ESPL devices that are attached directly to the Ethernet (e.g., personal computers running EtherTerm software). From one of these devices, the network manager can connect to port 136 on the destination ESPL server and perform any Connection Service network management functions available on that server.

2.5 Diskless Systems

Both the CS/1 and the CS/100 are available either with or without an internal disk drive. Systems without disk drives must be booted from the Network Control Server/150 (NCS/150). The NCS/150 can support the CS/1-A, CS/1-BSC, CS/1-SDLC, CS/100-A, and CS/100-BSC. All other types of servers require an internal disk drive. For the most part, the Connection Service operates the same way regardless of the bootstrap source. There are, however, a few differences.

If a Communications Server is to be fully supported by an NCS/150, the NCS/150 must first be configured to support the server. This procedure is described in the Network Control Server Installation and Operation Guide (reference [5]).

The NCS/150 disk contains a separate set of configuration files for each server that it supports. Once the files are established on the NCS/150, the network manager can configure individual ports on the client servers by following the same procedures used on a server with a local disk drive.

The NCS/150 keeps a single set of clearinghouse names, access group passwords, macro files, and named configuration files. All servers using the services of a single NCS/150 share these resources. In order to define or remove a macro or to establish or delete a named configuration file, the network manager follows the same procedures used on a server with a local disk drive. Since they are all shared, the network manager should be careful not to overwrite an existing macro or configuration table established from another server supported by the same NCS/150.

Clearinghouse names, access groups, and Global Network Manager privilege level passwords can only be established or changed from a terminal attached to port 0 of the NCS/150 or while accessing the NCS/150 in remote mode from a terminal connected to a Communications Server. Remote mode is described in Section 3.2.

Each NCS/150 also keeps a set of named configuration tables that match the sample configurations listed in Sections 6.1 and 6.2. The network manager can use the Read and Save commands in conjunction with these named files to configure individual ports for communication with various kinds of devices. Refer to Section 3.2 for examples of this process.

A server with a disk drive can be booted either locally or from an NCS/150. The early model servers shipped with disk drives, however, do not automatically support the network bootstrap option. In order to boot from a network boot server, an early model server must have a firmware update. On the CS/1, network bootstrap is supported by MCPROMs designated M1 MMON 01D or later. On the CS/100, network bootstrap is supported by MP PROMs designated T1 MMON 01D or later. For more information, contact Bridge Communications or a qualified service representative.

2.6 Software and Firmware Release Numbers

Each ESPL server model is shipped with software and firmware designed for use with that model. The software is contained on a diskette labeled with the product type and software version number. The product type and software version information is also stored as data on the diskette itself, in the form of a software release number. Firmware is contained in PROMs labeled with the firmware type and version number. The type and version information is also stored as data in each PROM.

In the course of troubleshooting a problem with a server, the Bridge technical support staff may need to know the system's software and firmware release numbers. Most software and firmware release numbers can be displayed with the SHow VERSION command (refer to Section 3.2). The software release number of the Series/100 Utilities Diskette is displayed on a terminal attached to port 0 when the utilities diskette is booted.

Each software release number consists of an alphanumeric designator indicating the product type and a numeric suffix indicating the version number of the software. For example:

SW/1-A/BSC 17000

In this case, the string "SW/1-A/BSC" indicates the product is a CS/1-A or CS/1-BSC, and the number "17000" indicates the software is version number 1.7. Higher version numbers represent more recent releases. Table 2-2 lists the meanings of the software designators for all Bridge products.

Each firmware release number consists of an alphanumeric prefix indicating system hardware type and PROM size, an alphanumeric designator indicating the firmware type, and a numeric suffix indicating the firmware version number. For example:

M1 MMON 01B

In this case, "M1" indicates Series/1 hardware and 32K bytes of PROM, "MMON" indicates the firmware is the MCPU Monitor, and "01B" indicates the firmware is version number 1B. Higher version numbers represent more recent releases. Older versions of firmware may not be displayed by the SHow VERSION command. Table 2-3 lists the meanings of the firmware designators for all Bridge PROMs.

Table 2-2 Software Release Number Prefixes

<u>Prefix</u>	<u>Product and Service</u>
SW/1-A/BSC/SDLC	CS/1-A, CS/1-BSC, or CS/1-SDLC Connection Service
SW/1-HSM	CS/1-HSM Connection Service
SW/1-SNA	CS/1-SNA Connection Service
SW/1-SPMUX	CS/1-BSC Connection Service with the Sperry Multiplexer Software
SW/1-TCP	CS/1-TCP Connection Service
SW/1-X.25	CS/1-X.25 Connection Service
SW/2-CS/ICS	GS/1 Connection and Interconnection Services
SW/3	GS/3 Interconnection Service
SW/100-A/BSC	CS/100-A and CS/100-BSC Connection Service
SW/100-488	CS/100-488 Connection Service
SW/100-TCP	CS/100-TCP Connection Service
SW/100-UTIL	CS/100 Utilities Diskette
SW/150-NCS	NCS/150 Network System Software
SW/150-NCS-UTIL	NCS/150 Utilities Diskette

Table 2-3 Firmware Release Number Prefixes

<u>Prefix</u>	<u>Firmware Type</u>
M0 ASYN	Series/1 Asynchronous SIO firmware
M0 BSC-	Series/1 Bisynchronous SIO firmware
M0 HDLC	Series/1 HDLC SIO firmware
M1 SYNC	Series/1 Synchronous SIO firmware
M1 MMON	Series/1 MCPMU monitor firmware
M0 EDL1	Series/1 Ethernet Datalink EC/1 firmware
M0 EDL2	Series/1 Ethernet Datalink EC/2 firmware
T0 ASYN	Series/100 Asynchronous SIO firmware
T0 BSC-	Series/100 Bisynchronous SIO firmware
T0 I488	Series/100 IEEE 488 SIO firmware
T1 MMON	Series/100 MP monitor firmware
T0 EDL1	Series/100 Ethernet Datalink firmware

3.0 CONNECTION SERVICE COMMAND GUIDE

This section describes the format and syntax of the Connection Service commands and provides a complete list of all commands.

The Connection Service is available to all ports configured to support an asynchronous terminal device. The device may actually be a host emulating a terminal or a process feeding such a terminal emulator. Refer to the discussion of the Device parameter in Section 6.1.1 for information on configuring the port device type.

3.1 Command Format and Syntax

This section describes the general form of the Connection Service commands, the local editing capabilities of the Communications Servers, and the specific conventions used for entering different kinds of information.

Commands are usually entered at a user terminal in response to the Communications Server prompt. The prompt can be modified on both the CS/1 and the CS/100. In this guide, the default CS/1 prompt (the string "CS/1>") is used in all examples.

3.1.1 Format

The most common command format has two parts: a command verb and one or more parameters. The command verb is always entered first, followed by a space and the parameters; the command is terminated by pressing the return key. Some of the commands include a keyword between the verb and the parameters. A few commands require only the verb, terminated by the return key.

Most commands have an alternative network manager form, which contains an optional address field so that the network manager can control remote ports. The address, if used, appears in parentheses after the verb.

The following examples of command format (from simple to more complex) show both the user version and the network manager version of the formats.

<u>User Version</u>	<u>Network Manager Version</u>
verb	verb (address)
verb parameter	verb (address) parameter
verb keyword parameter	verb (address) keyword parameter

Before a command line is terminated with the return key, the text of the line may be edited with the special editing characters discussed in the next section. These characters can be altered for each port. In some circumstances, they can be used by a port in Data Transfer mode. For further information, refer to the discussion of local editing parameters in Section 6.1.4 and the discussion of the MOde parameter in Section 6.1.3.

To make the process of entering commands as fast and easy as possible, the Connection Service provides some shortcuts. Commands may be abbreviated to the shortest unambiguous string of characters that can be interpreted by the system. The rules for abbreviating commands and parameters are listed in Section 3.1.3.

A help facility is provided to remind the user of the valid commands and their parameters, and a macro facility is available so that complex command sequences can be executed with a one-line command.

3.1.2 Special Characters

Table 3-1 describes the notation used in this guide to represent some of the special characters on the typical device keyboard. Table 3-2 lists the default characters used for editing a command locally before terminating the command line by pressing the return key. These characters can be altered with the SET command.

Table 3-1 Notation of Keyboard Symbols

<BREAK>	Represents the break key. Usually located at the far right end of the keyboard, labeled BREAK or BRK.
<CTRL-char>	Represents a control character, obtained by holding down the key labeled CTRL or CTL and simultaneously pressing the specified key. Table 3-2 contains a list of the default control characters.
<ESC>	Represents the escape key. Usually located at the left end of the keyboard, typically labeled ESC or ESCAPE. Most terminals have an escape key; some require a control sequence instead (usually <CTRL-[>).
<RETURN>	Represents the return key. Usually located at the right end of the keyboard, labeled RETURN or CR.

Table 3-2 Local Editing Characters

<CTRL-H>	Erases the last character that was typed. Each additional <CTRL-H> erases an additional character, back to the beginning of the line. If no characters remain on the line, <CTRL-H> causes the terminal bell to ring. This character is defined by the ERase parameter. The backspace key performs the same function as <CTRL-H>.
<CTRL-R>	Causes everything entered since the last return to be reprinted on the terminal. This is useful on a paper terminal, where the ERase character causes a crosshatch (#) to echo on the terminal; when the line is reprinted, crosshatches and deleted characters are removed, making it easier to verify that the line is correct. This character is defined by the ReprintLine parameter.
<CTRL-U>	Erases everything that has been typed since the last return. If the current line contains no text, <CTRL-U> causes the terminal bell to ring. This character is defined by the LineERase parameter.
<CTRL-V>	Instructs the Communications Server to treat the next character entered as data and to ignore any special meaning that the character may have for the system. This character is necessary so that the other characters in this list can be entered as text, with no special meaning. This character is defined by the VERBatim parameter.
<CTRL-W>	Erases all characters back to the last space. For each additional <CTRL-W> entered, an additional word is erased, back to the beginning of the line. If no text is left on the current line, <CTRL-W> causes the terminal bell to ring. This character is defined by the WordERase parameter.

3.1.3 Command Abbreviation

Both commands and parameters can be abbreviated to the smallest number of characters that can be meaningfully interpreted by the system. For example, the Connect command is the only command beginning with a "c", so "c" is the only character needed to issue the Connect command. On the other hand, several commands begin with an "s". Thus, in order to make a distinction between the SAve, SET, SETDefault, SHow, and SWitch commands, the user must enter at least two characters, that is, "sa", "set", "setd", "sh", or "sw", respectively.

If a command parameter is a composite of two or more words, the abbreviation usually consists of the initial letter of each word. For example, the minimum abbreviation of "StopBits" is "sb", and "DataBits" is "db".

When commands and parameters are printed in this guide and in screen messages, the minimum form of each word is printed in upper case characters; characters that can be left out are printed in lower case. Note that commands and parameters can actually be entered in either upper or lower case, or a combination of both; the distinction between upper and lower case is made in this guide for clarity of abbreviation only.

3.1.4 Syntax Notation

The individual command descriptions in Section 3.2 present the syntax of each command. The following notation is used in the descriptions:

- | | |
|--------------------|--|
| UPPER CASE LETTERS | Represent the shortest unambiguous abbreviation of the command or parameter. |
| lower case letters | Represent variable or optional portions of the command or parameter. |
| angle brackets <> | Enclose a variable parameter or value. The angle brackets are never entered. |
| square brackets [] | Enclose an optional parameter or a list of optional parameters. The brackets are never entered. |
| parentheses () | Enclose an optional address field or a list of multiple values being assigned to a single parameter. If the field is included, the parentheses are always entered. |

- vertical bar | Separates mutually exclusive items in a list enclosed by brackets. The vertical bar is never entered.
- ellipsis ... Following a parameter name or value, indicates that one or more additional parameters may be specified on the same command line. The ellipsis is never entered.

Most commands accept only a parameter name or value of a particular type. These parameters and values fall into the following categories:

- numbers Numbers represent parameter values or session numbers. Refer to Section 3.1.5 for the conventions for entering numbers.
- names Names usually represent either system-defined parameter names or parameter values (written as <param-name> or <value>), or user-defined macros or files (written as <macro-name> or <filename>). Refer to Section 6.1 for all system-defined parameter and value names.
- strings Some parameter values can be set to user-defined strings, ranging from a single character (written as <char>) to a multi-character string (written as <string>). Refer to the string conventions listed in Section 3.1.5.
- addresses The Communications Servers recognize a number of different address types, including physical addresses, port identification numbers, network identification numbers, and clearinghouse names (written as <physical address>, <portid>, <netid>, and <clearinghouse name>, respectively). The notation "<address>" means that the command accepts various combinations of these address types. Refer to the addressing and naming conventions listed in Sections 3.1.6 and 3.1.7 (for Ethernet addresses) and Sections 3.1.8 and 3.1.9 (for TCP addresses).

3.1.5 Specifying Parameter Values

Depending on the parameter, parameter values can be expressed as names, sets of names, numbers, string text, or addresses. This section describes the rules that govern the way numbers and string text are specified.

The parameter and value names are listed in Section 6.1. The rules for specifying addresses in commands are described in Section 3.1.6.

The SET and SETDefault commands require both parameter names and parameter values. Each parameter name is followed by an equal sign (=) and one or more values. Spaces are permitted, but not required, before and after the equal sign. If more than one parameter value is being assigned to a single parameter, the values must be enclosed in parentheses and separated from one another by commas. For example:

```
dataforward=alphanumeric
device=(terminal,glass)
baud = 4800
```

Numbers may be expressed in any of four radices (bases), according to these conventions:

1. A decimal number is entered without a radix definition. For example:

```
128
```

2. A hexadecimal number is preceded by a percent sign (%) as a radix definition. The alphabetic digits may be expressed in either upper or lower case. For example:

```
%40FF
%40ff
```

3. An octal number is preceded by the radix definition "%(8)". For example:

```
%(8)100
```

4. Binary numbers are preceded by the radix definition "%(2)". For example:

```
%(2)0000101
```

A session number is a single-digit identifier assigned by the Communications Server to each connection that exists on a port. If no session number is specified in a command that allows a session number, the current session is assumed.

String values fall into three categories: single characters, control characters, and variable-length strings.

1. Single characters, either alphanumeric characters or symbols, are enclosed in apostrophes ('). The system makes no distinction between upper and lower case in single alphabetic characters. For example:

```
'S'
's'
'@'
```

2. Control characters are entered as a character preceded by a caret symbol (^), without enclosing apostrophes. The valid control characters are <CTRL-@>, <CTRL-A> through <CTRL-Z>, <CTRL-[>, <CTRL-\>, <CTRL-]>, <CTRL-^>, and <CTRL-_>. Alphabetic control characters may be entered in either upper or lower case. The SHow command always displays control characters in upper case.

For example, <CTRL-G> (the terminal bell) can be specified in string text in either of the following ways:

```
^G
^g
```

When displayed with the SHow command, either entry will appear as "^G".

**** NOTE ****

The Communications Servers permit both single characters and control characters to be represented by their numeric ASCII values. To specify characters by their numeric values, follow the rules for entering numbers instead of the rules for entering characters. Note that even if characters are specified by their numeric values, the SHow command displays them as upper case characters.

3. Variable-length strings (e.g., the parameter defining the welcome message printed on the screen when the terminal is first powered on) are enclosed in quotation marks. For example:

```
"Welcome to your Communications Server"
```

The full character set may be used, including upper and lower case letters, numbers, symbols, and control characters. Control characters (e.g., <CTRL-G>) are entered in string text in the same way as described in item 2, above.

Note that a few characters with special meaning to the Communications Server must be preceded by a backslash (\) in string text to prevent the characters from being misinterpreted. These symbols are the apostrophe ('), backslash (\), caret (^), and quotation mark ("). For example, to include an apostrophe in string text, enter a backslash followed by an apostrophe (\'). To specify one backslash (\) as part of string text, enter two backslashes (\\); the first prevents the Communications Server from treating the second as a special character. (Note that the caret referred to in this paragraph is a literal caret, used to denote control characters, not the <CTRL> key held down in a control-character sequence.)

Form effectors (carriage control characters) may be included in string text either as control characters or as single-letter identifiers preceded by a backslash. Table 3-3 lists the form effectors.

Table 3-3 Form Effectors in String Text

<u>Result</u>	<u>Letter Identifier</u>	<u>Control Character</u>
Backspace	\b	^H
Return	\r	^M
Escape	\e	^[
Formfeed	\f	^L
Newline (linefeed)	\n	^J
Tab	\t	^I

For instance, to generate the default Connection Service welcome message followed by a return-linefeed sequence, enter this string:

"Welcome to your Communications Server \r \n"

Numeric characters may be included in string text and will print exactly as entered. A number preceded by a backslash, however, will be interpreted as an octal number representing a control character or other single character. For example:

\010

3.1.6 Specifying Ethernet Addresses

Ethernet addresses apply to servers running the XNS protocols. For the equivalent addressing conventions for servers running the TCP protocols, refer to Section 3.1.8.

This section describes the rules that govern the way Ethernet addresses are specified. In general, an address can be expressed as a single physical address, a clearinghouse name, a list of addresses or names, or a combination of all three.

A physical address contains up to four fields: a network address, an Ethernet address, a port number, and an optional phone number.

- The network address field contains 8 hexadecimal digits and is always preceded by an ampersand (&). The network address uniquely distinguishes one Ethernet network from all other Ethernet networks. If the network address is omitted, the local network address is assumed.
- An Ethernet address field contains 12 hexadecimal digits and is always preceded by a percent sign (%). The Ethernet address uniquely identifies each Communications Server on a single network. If this field is omitted, the local Communications Server's Ethernet address is assumed.

The Ethernet address of each Communications Server is assigned by Bridge Communications with the authority of Xerox Corporation. The address is stored in PROM and can be displayed with either the SHow NetMap command or the SHow ADDRess command. SHow NetMap lists the addresses of all Communications Servers on the network that run the same set of high-level protocols; the first address listed is the address of the local server.

- The port number field contains up to 3 decimal digits and is preceded by an exclamation point (!). The port number uniquely identifies each port on a Communications Server. A port number is the smallest possible legal address.
- The phone number field contains up to 15 decimal digits. The number, if entered, is always preceded by a crosshatch symbol (#). If the destination of the session is a dialup resource, this field is used to specify the phone number of the resource. If the destination of the session is a host connected to an X.25 network or an X.25 host connected to an Ethernet network via a CS/1-X.25, this field must be used to specify the destination X.25 address. An X.25 address contains a 4-digit Data Network Identification Code (DNIC), 6 to 8 digits of destination host address, and, optionally, 2 to 4 digits of subhost address (usually a port number). Trailing zeros may be omitted.

A clearinghouse name consists of 3 hierarchically arranged fields: a local name, a domain name, and an organization name, separated by "at" signs (@). If the organization name (and the "at" sign preceding it) or both the domain name and the organization name (and the "at" signs preceding them) are omitted, the system supplies the default names (see Section 3.1.7). A valid clearinghouse name must contain at least a local name. For example, the following are valid clearinghouse names:

```
localname@domain@organization
localname@domain
localname
```

The localname field may have a maximum of 10 alphanumeric characters or 18 numeric characters. If any characters in the name are alphabetic, the first character must also be alphabetic. Typically, numeric clearinghouse names are used only in conjunction with the GS/1 Connection Service to facilitate connections to devices on an X.25 network (see reference [7] for further information).

The domain and organization fields may each have a maximum of 10 alphanumeric characters, the first of which must be an alphabetic character. Subsequent characters may be either alphabetic or numeric. The only non-alphanumeric characters permitted in the names are the underscore (_) and the period (.).

In the SHow CHN command, which displays the rotary number or physical address of a clearinghouse name, an asterisk (*) may be substituted for one or more fields of the clearinghouse name. The asterisk represents a wildcard character, and means "any value" for that field.

Refer to the discussion in Section 3.1.7 for further details on the use of clearinghouse names.

An address list consists of up to eight addresses and/or names separated by commas. The list specifies a "global rotary," that is, a set of addresses that are equally acceptable as the destination of a circuit. The addresses or names in the list may represent ports on the same server or on different servers.

In the syntax descriptions of each command, the generic term <address> means that any of the following forms of address is acceptable:

- A physical address
- A clearinghouse name
- A clearinghouse name (which represents part of a physical address) followed by part of a physical address

For example, all of the following are valid addresses:

```
&abff5678&1234abcdffff!1#31104081234507
%080000200018!3
modem#3212345
cs15!8
host2
!2
```

In the syntax definitions, the generic term <address list> means that a list of addresses, a list of names, or a mixed list of both is acceptable. For example, all of the following are valid:

```
%080002000123,%080002000101
host1a,host1b,host1c
!10,!128
```

3.1.7 Establishing and Using Clearinghouse Names

The network manager uses the Name command (discussed in Section 3.2) to associate a local clearinghouse name with a specific port or list of addresses. The ports or addresses must be on servers running the XNS protocols. A user can then request a connection to a device using the clearinghouse name, without knowing the physical address of that device.

To set up a local rotary, the network manager first uses the ROTary command (discussed in Section 3.2) to establish an array of ports on a single server, and then uses the Name command to associate a single clearinghouse name with the array. The local rotary is useful when a number of ports are connected to one device (e.g., a host computer). The user can request a connection to the host without knowing if a specific host port is available.

To set up a global rotary, the network manager uses the Name command to associate a clearinghouse name with a list of addresses. The addresses need not be on a single server; more than one server may be grouped into a global rotary. (The user can also specify a connection to a global rotary by including an address list as the destination of the Connect command.)

For servers that boot from a local disk drive, the network manager uses the SETDefault command to establish default domain and organization strings for each Communications Server. The locally defined default strings are assumed automatically whenever a user enters a clearinghouse name without specifying these fields.

For servers that boot from an NCS/150, the network manager uses the SETDefault command on the NCS/150 to specify default domain and organization strings; these strings then apply both to the NCS/150 itself and to all of the NCS/150's client servers. Each client server has the same default strings, unless the network manager subsequently uses the SET command on a client server to establish different settings. These new settings, however, remain in effect only until the next time the server is booted; at that time, the server reverts to the default strings established for the NCS/150.

The XNS ClearingHouse scheme uses sets of centralized Name Servers. The Bridge ESPL implementation, however, distributes this function among the servers. If a requested name is not found in the local database, the Communications Server broadcasts a lookup request to all servers on the network. Each server that boots from a local disk drive maintains its own clearinghouse name database. The clearinghouse name database for all servers supported by an NCS/150 is stored on the NCS/150.

Whenever a clearinghouse name or a command that affects clearinghouse names is entered without specified domain and organization strings, the server that processes the command appends its own default strings. This convention facilitates a hierarchical naming strategy for networks that support a number of different groups and resources.

Within a network or group of interconnected networks, if the same clearinghouse name is defined more than once and mapped to different addresses or address lists, sessions to that name can be misrouted and data can be lost. To prevent this from happening, ensure that no logical name is defined more than once within the network (or internet). To simplify network administration and maintenance, the clearinghouse name database on each Communications Server should include only entries for ports on that server. Similarly, the clearinghouse name database on each NCS/150 should include only entries for ports on servers bound to that NCS/150. In a network containing both a primary NCS/150 and a secondary NCS/150, the clearinghouse name database on the secondary NCS/150 should always be identical to the database on the primary NCS/150 (see reference [5] for further information).

3.1.8 Specifying TCP Addresses

This section describes the rules that govern the way TCP addresses are specified, and applies only to servers running the TCP protocols. In general, a TCP address can be expressed as an internet address, a physical port number, or an internet name.

An internet address consists of 12 decimal digits, which are arranged in four fields. Each field consists of three digits, and the fields are separated by periods:

xxx.xxx.xxx.xxx

The address includes both a network number and a host number. The actual format of these two numbers varies depending on the class of address being designated. Address class is determined by the value in the first address field. Table 3-4 lists the valid address classes, the values used to specify them, and the resulting address format.

Table 3-4 TCP Address Format

<u>Class</u>	<u>Range of First Address Field</u>	<u>Address Format *</u>
A	0 - 127	nnn.hhh.hhh.hhh
B	128 - 191	nnn.nnn.hhh.hhh
C	192 - 223	nnn.nnn.nnn.hhh

* "n" represents a digit of the network number and "h" represents a digit of the host number.

For example, 126.000.000.100 is a class A address, with a network number of 126 and a host number of 000.000.100; 135.001.000.200 is a class B address, with a network number of 135.001 and a host number of 000.200; 192.002.003.255 is a class C address, with a network number of 192.002.003 and a host number of 255.

The maximum value for any single field is 255. In some implementations (e.g., UNIX Version 4.2) the maximum value for the entire host number is 255, regardless of how many digits are available in the host number field.

The important feature of address class is the fact that the class constitutes part of the network number. In order to be able to communicate with one another, all devices on the same network

should be assigned addresses containing identical network numbers. Two devices whose network numbers are different cannot communicate with each other without a gateway. In addition, each host number must be unique within its network. See reference [14] for further information on TCP addressing.

The internet address format does not provide any means of specifying port numbers. Therefore, the Bridge implementation uses different internet addresses to represent different physical ports on a TCP server. Up to 41 different addresses may be assigned to a given TCP server:

- ☒ One server address. This address is mandatory, and is used as the source address for all outgoing packets.
- ☒ One address for each physical port, up to a maximum of 32 ports (numbered 0 through 31). These addresses are optional; they are used only as destination addresses for incoming packets, and are assigned only to ports used as circuit destinations (e.g., hosts or dial-out modems).
- ☒ One address for each rotary number, up to a maximum of eight rotaries (numbered 128 through 135). These addresses are also optional, since they are assigned only to rotaries actually used as circuit destinations, but not to unused rotary numbers.

A port number consists of up to three decimal digits preceded by an exclamation point. Some Connection Service commands permit either physical port numbers or internet addresses to be specified; others permit only physical port numbers, but not internet addresses. Similarly, some command displays (e.g., SHow ADDRESS) include only physical port numbers, but not internet addresses. The command and display descriptions indicate when only physical port numbers apply.

An internet name consists of two hierarchically arranged fields: a network name and a host name. If both network name and host name are specified, they must be preceded by and separated by exclamation points (!). If only the host name is specified, the exclamation points are omitted. A valid internet name must contain at least a host name. For example:

```
!network!host
host
```

When establishing a name, the network manager must specify both the network name and the host name. When requesting a connection to a name, the user may specify either the host name only or both network and host names. If the specified host name is defined on both the local TCP network and an attached TCP network, the user must specify both the network name and the host name.

The combined maximum length of the internet name, including the exclamation points, network name, and host name, is 40 alphanumeric characters; the first character of each field must be an alphabetic character. Subsequent characters within the field may be either alphabetic or numeric. The only nonalphanumeric characters permitted (aside from the separating exclamation points) are the underscore (_) and the period (.).

In the SHow Names command, which displays the internet address associated with an internet name, two wildcard characters may be substituted for all or part of the name. These wildcard characters are the asterisk (*), which indicates "any value," and the tilde (~), which indicates "local value."

Table 3-5 provides examples showing how the wildcards are used.

Table 3-5 Wildcards in TCP Internet Names

<u>Name</u>	<u>Meaning</u>
!net1!host1	Host "host1" on network "net1"
!~!*	All hosts on the local network
!*!host*	All hosts whose names begin with the letters "host" on all networks

3.1.9 Establishing and Using TCP Internet Names

The network manager uses the system generation procedure (discussed in Section 4.0) to assign one or more internet addresses to the TCP server. The addresses must be assigned using the conventions outlined in the previous section.

If any of the ports on the TCP server represent destinations to which circuits will be established, the network manager also assigns internet addresses to those individual ports during system generation. If more than one port on the TCP server provides connections to the same device (i.e., a host computer), the network manager should allocate a rotary number for the ports and assign an internet address to the rotary during system generation. No internet address need be assigned to any port that only originates circuits but never is the destination of a circuit.

The network manager uses the ROTary command to assign ports to a rotary number. The user can then request a connection to the rotary, without knowing if a specific host port is available; the connection is made to the first available port in the rotary.

The network manager uses the Name command to associate an internet name with an internet address (which may represent an individual port or a rotary). The user can request a connection to a resource using its name, without knowing the internet address or rotary number of that resource.

Global rotaries are not currently supported on TCP servers.

The Internet Name Service, as implemented in the CS/1-TCP and CS/100-TCP, is a local database by default. If a requested name is not found in the local database, the server returns an error message.

If an Internet Name Server is present on the network, each CS/1-TCP or CS/100-TCP can be configured during the system generation procedure to send all name lookup requests to the Name Server instead of searching the local database.

Alternatively, a CS/1-TCP or CS/100-TCP may be selected to function as a Name Server. For more detailed descriptions of the Internet Name Server function, see reference [21].

The network portion of an internet name must be unique for each network in an internetwork. Two different devices within an internetwork may be assigned identical host names, but any command requesting a connection to that host name must also specify the network name, or the connection request fails.

3.2 Commands

The following sections provide detailed descriptions of all the Connection Service commands. The descriptions include the syntax of each command, examples showing how the command is used, and a list of possible system responses and error messages. A comprehensive list of all Connection Service error messages is provided in Appendix A.

An explanation of the syntax notation and the rules governing how parameters and values are entered are provided in Section 3.1. A comprehensive list of the parameters that can be specified with the SET, SETDefault, REMoteSET, REMoteSHOW, and SHOW PARAMETERS commands is provided in Section 6.0.

Table 3-6 Command Summary

<u>Section</u>	<u>Command</u>	<u>Description</u>
3.2.1	Broadcast	Send message to user device(s)
3.2.2	Connect	Request virtual circuit
3.2.3	DEFine	Define macro command file
3.2.4	DEQueue	Remove port from connection queue
3.2.5	DisConnect	Terminate virtual circuit
3.2.6	DO	Execute macro
3.2.7	Echo	Echo a string on the terminal
3.2.8	Listen	Permit connections to port
3.2.9	Name	Add name to clearinghouse
3.2.10	Pause	Pause for specified number of seconds
3.2.11	ReaD	Read a configuration or a saved statistics report from diskette
3.2.12	REMOTE	Execute network management commands on another Communications Server
3.2.13	REMoteSET	Set remote device parameters
3.2.14	REMoteSHOW	Display remote device parameters
3.2.15	RESume	Return to Data Transfer mode
3.2.16	ROTary	Assign ports to rotary
3.2.17	SAVE	Save configuration onto diskette
3.2.18	SET	Set active parameters
3.2.19	SETDefault	Specify default or fixed parameters
3.2.20	SHOW	Display parameters, sessions, etc.
3.2.21	SWitch	Change to different session
3.2.22	Transmit	Transmit string to remote device
3.2.23	UNDefine	Remove macro definition
3.2.24	UNName	Remove clearinghouse name
3.2.25	UNSave	Remove configuration file

3.2.1 Broadcast Command

Syntax: Broadcast <string>
Broadcast (<address>) <string>

Default Privilege Level: Local Network Manager

Description: The Broadcast command transmits string text messages within a Communications Server and across the network. The text must follow the syntax described in Section 3.1.5. The maximum permissible length of the string text is 82 characters; if more are specified, an error message is generated and the string is truncated.

If no address is specified, the message is sent to all terminal ports on the local Communications Server. If an address is specified, and if reception of broadcast messages is disabled for the specified port (i.e., if the InterAction parameter is set to BroadcastOFF), the server returns an error message.

For XNS servers, the special address %ffffffffffff can be used to specify all terminal ports on all servers in the network, including the local Communications Server. For TCP servers, the address specified can be either a port number (if the destination port is on the same server as the requesting port) or an internet address (for either local or remote ports), but no mechanism is currently available to specify all ports on all servers with a single address.

If the InterAction parameter for the destination port is set to Verbose, the message is prefixed by the text "Broadcast msg from <portid>". If the InterAction parameter is set to Brief, the message text is displayed without the prefix.

Example 1:

```
broadcast (!1) "Printing requests are due by 1700 today"
```

In this example, the specified text will be transmitted only to port 1 of the local Communications Server.

Example 2:

```
b (%ffffffffffff) "Meeting in the lunch room in 5 minutes"
```

This example sends the message to all terminal ports on all XNS servers on the network.

Normal Responses:

A new prompt appears on the requesting port, and the message text appears on the destination port.

Error Messages:

"Invalid network manager syntax"
"Insufficient privilege"
"Invalid Broadcast syntax"
"String truncated to 82 characters"
"Broadcast is not enabled on that port"

3.2.2 Connect Command

Syntax: Connect <address>[,<address>] [ECM] [Q]
Connect (<address>) <address>[,<address>]

Default Privilege Level: User

Description: The Connect command requests a connection to the specified address. The address can take the form of an Ethernet address, a clearinghouse name, a TCP internet address, or a TCP name. The address or name can represent either a single port, a local rotary, or a global rotary. A global rotary can be specified as a list of up to eight names or addresses, or as a single name to which an address list has previously been assigned.

In the network manager form of the command, the connection is requested from the address or name enclosed in parentheses to the subsequent address. The address or name enclosed in parentheses must be a simple address, or a name that represents a simple address. A simple address can consist only of the network number (optional), Ethernet address (optional), and port number; rotary numbers, phone numbers, or X.25 addresses are not permitted. The subsequent address can be either a physical address or a name; can represent either a single port, a local rotary, or a global rotary; and can contain a phone number or X.25 address.

Connections can not be made from a device attached to an XNS server to a TCP device or vice versa.

For XNS servers, when a connection is requested, the system first compares the AccessWord of the requesting port with the AccessGroup of the destination port (refer to Section 6.1.1). If at least one common group number appears in both sets, the connection is established. If no common group number appears, the system prompts the requestor for a password associated with the AccessGroup parameter of the destination port. If the AccessGroup has more than one value, the password for any one of the values is accepted. Access control does not apply to TCP servers.

In the first form of the command, the destination port must be in Listening mode before the connection can be established. Once the connection is initiated, both ports are placed in Data Transfer mode. If the optional parameter "ecm" is appended, however, the local port is left in Command mode rather than Data Transfer mode.

The optional parameter "q" is the call queueing designation. If this parameter is included, and if the destination port is not in Listening mode when the connection request is issued, then the requesting port is put in a queue for eventual connection. The queued connection constitutes a

session for the requesting port. When the destination port becomes available, the system sends the requesting port a terminal bell signal and a message that the destination device is available. The user then has five minutes in which to claim the connection by issuing the RESume command. If the port is in Data Transfer mode and communicating with a third port when the message is received, then the user must first return to Command mode and then either switch to the queued session or specify the queued session number when issuing the RESume command. Refer to Section 2.4.10 for an overview of the call queueing feature. Call queueing does not apply to TCP servers.

In the second form (the network manager form) of the command, both of the ports being connected must be in Listening mode. When the network manager uses this command to form a connection, neither of the connected ports can use the ECMChar to change from Data Transfer mode to Command mode. Therefore, the connection can be broken only remotely by the network manager or locally by the expiration of the AUto-disconnect interval on the destination port. Call queueing and the "ecm" parameter are not available in the network manager form of the command.

For XNS servers, if the Connect command specifies a clearinghouse name as the destination address but does not include domain and organization fields, the local server automatically appends the default strings.

Port number 136 on any ESPL system running the Connection Service is reserved for network management access from non-ESPL devices that are attached directly to the Ethernet (e.g., personal computers running EtherTerm software). Port 136 supports only one such connection at a time.

Example 1:

```
connect host1
```

This example requests a connection from the local port to the name "host1", which can represent a rotary of ports.

Example 2:

```
c host1_a,host1_b
```

This example requests a connection from the local port to a global rotary consisting of the port(s) represented by the name "host1_a" and the port(s) represented by the name "host1_b". This example applies to either XNS or TCP servers.

Example 3:

```
c (!4) host1
```

This example requests a connection from port 4 on the local Communications Server to the clearinghouse name "host1". This example applies to either XNS or TCP servers.

Example 4:

```
c %1234abcdffff!4 ecm
```

This XNS example requests a connection from the local port to the physical address "%1234abcdffff!4". The addition of the letters "ecm" causes the port to return to Command mode once the connection is made instead of entering into active communication with the destination port.

Example 5:

```
c host1 q
```

This example requests a connection to the clearinghouse name "host1". The addition of the letter "q" requests that if no port to that device is available, the requesting port is to be put into a queue for connection with the first available destination port. This example applies only to XNS servers.

Example 6:

```
c (%080002000010!1) !2
```

This XNS example requests a connection from port 1 on the Communications Server with the Ethernet address %080002000010 to port 2 on the same Communications Server. Note that the use of a complete address within the parentheses implies that the same address applies to the destination port. If the two devices are on different Communications Servers, full Ethernet addresses must be used for both. Only a Global Network Manager can make a connection between two ports that are both on remote Communications Servers (i.e., a third-party interconnect).

Example 7:

```
c 192.000.000.128
```

This TCP example requests a connection to a TCP physical address. The local port must be on a TCP server.

Example 8:

```
c !net2!host1
```

This TCP example requests a connection to the TCP device named "host1" on the network named "net2". The local port must be on a TCP server.

Normal Responses:

```
"Connecting ... Session <n> connected to <address>"
"Connecting ... Interconnection formed"
"Connecting ... Access controlled
Group <n> Password: "
"Connecting ... Remote is busy
session <n> -- queued to <address>"
```

Error Messages:

```
"Insufficient privilege"
"Invalid <physical-address> syntax"
"Invalid Connect syntax"
"Querying Clearinghouse... Clearinghouse name not found"
"Querying Name Server... Internet name not found"
"Connecting ... Timeout failure"
"Connecting ... No response"
"Connecting ... Remote is busy"
"Connecting ... Remote is disabled or nonexistent"
"Connecting ... No more sessions for this port"
"Disconnecting ... session <n> disconnected from <address>"
"Session <n> -- dequeued ... No response"
"Session <n> -- dequeued ... Reserved timer expired"
```

3.2.3 DEFine Command

Syntax: DEFine <macro name> = (<text>)

Default Privilege Level: Local Network Manager

Description: The DEFine command creates a macro file and specifies its contents. A macro is executable by all terminal ports on the Communications Server on which it was created. When a new macro is created with the same name as an existing macro, the new macro contents replace the old macro contents. When a macro is defined for a server that boots from an NCS/150, that macro is available to all servers that boot from the same NCS/150. On a system that boots from an NCS/150, the DEFine command requires Global Network Manager privilege level.

The Communications Server does not distinguish between upper and lower case in macro names.

Macro names beginning with the letters "init" are reserved for system initialization macros. Every time a Communications Server is booted from a local diskette, it checks the diskette for a file called "init"; if the file exists, the server automatically executes it. Every time a Communications Server is booted from an NCS/150, it checks the NCS/150's diskette for a file called "init.xxxx" (where "xxxx" represents the last four digits of the Communications Server's Ethernet address). If the file exists, the server executes it.

If a macro name appears as the value of the InitMacro parameter for a port (refer to Section 6.1.1), that macro is executed automatically each time the device attached to the port is powered on or otherwise detected by the server.

Macro contents must begin with a left parenthesis. If the definition requires more than one line, the first return must appear after the opening left parenthesis. All characters entered between the opening and closing parentheses are part of the macro contents. The macro can contain internal parentheses in balanced pairs. The text of the macro must conform to the conventions for entering strings listed in Section 3.1.5.

A single macro can contain no more than 256 characters. A macro can, however, include the DO command to call another macro.

Except for the DEFine command, a macro can contain any valid Connection Service commands, including commands requesting a connection to a specific port or clearinghouse name and com-

mands associated with a login procedure. The Pause command is usually included in a login macro to give the host time to produce a prompt before the login process starts (see the examples below).

Several commands consume large amounts of system memory when executed within a macro, and should be used with caution:

- Avoid commands that result in long screen displays (e.g., SHow STATistics). If a macro uses up all the buffers in the system, the request is aborted and the requesting port placed in Listening mode. To display more than one screenful of text from within one macro, follow each display command with a pause long enough to allow the terminal device to complete the display.
- Avoid pauses longer than 30 seconds.
- Avoid complex sequences of SHow commands in nested macros.
- Do not use the RESume command in a macro unless it is the last line of the macro.
- Do not use the Connect command in a macro unless it is the last line of the macro or it includes the ECM argument.

Ordinarily, each line of the macro is printed on the terminal screen just before the line is executed. To suppress this display, set the InterAction parameter to NoMacroEcho at the beginning of the macro (see example 2, below). Only the line setting the InterAction parameter will be printed when the macro is executed.

The break key can be used to cancel the DEFINE command at any time before the terminating right parenthesis is entered. The break key also cancels the execution of a macro once it has started.

Once defined, a macro is executed with the DO command, displayed with the SHow Macro <macro-name> command, and deleted with the UNDefine command.

Example 1:

```
define TEK = (  
    set duplex=half interaction=nolfi  
    set localeediting=(nce,nde)  
)
```

This example defines a macro called "TEK" that sets a number of terminal characteristic parameters.

Example 2:

```

define connect_printer = (
    do become_gnm
    connect (host1!13) &00003140%08000200001F!25
    set priv = user
)

define become_gnm = (
    set interaction = nomacroecho
    set privilege = gnm
    <password>
    set interaction = macroecho
)

```

These two macros work together to allow a terminal with User privilege to establish a connection between a host computer and a printer attached to a remote Communications Server. The first macro invokes the second macro, which changes the privilege level of the port without printing the password on the screen. Once the privilege level is changed, the first macro requests a connection between two remote devices and changes the privilege level back to User.

Example 3:

```

def init.001f = (
    connect (!25) host1!13
)

```

This macro accomplishes a connection similar to that shown in example 2, but using a system initialization macro. The connection from port 25 of the first server (Ethernet address ending in "001f") to port 13 of the second server ("host1") is established whenever the first server is booted.

Example 4:

```

def inithost1 = (
    c host1 ecm
    pause 1
    t "abc"
    resume
)

setd InitMacro = "inithost1"

```

The first command defines a port initialization macro called "inithost1", which requests a connection to "host1" and then performs the login steps for user abc. The second command sets the InitMacro parameter for the local port so that the connection will be requested whenever the attached terminal is powered on.

Example 5:

```
def callout = (  
  c modem  
  pause 1  
  t "ATDT9,,4083212345"  
)
```

This macro first makes a connection to an intelligent modem and pauses long enough for the modem to respond. The macro then transmits a command that causes the modem to dial out to a host computer.

Normal Responses:

If a macro is defined successfully, the system responds only with a new prompt.

Error Messages:

```
"Can't save - directory full"  
"Insufficient privilege"  
"Invalid DEFINE syntax"  
"Macro definition too long"
```

3.2.4 DEQueue Command

Syntax: DEQueue [<session number>]

Default Privilege Level: User

Description: The DEQueue command removes the specified session from the port connection queue. If no session number is specified, the current session is dequeued, if appropriate.

This command is not available on TCP servers.

Example 1:

```
dequeue
```

This example removes the connection queueing request for the current session.

Example 2:

```
deq 3
```

This example removes the connection queueing request for session 3.

Normal Responses:

```
"Dequeuing ... session <n> -- dequeued from <address>"
```

Error Messages:

```
"Illegal request -- wrong state"  
"Invalid DEQueue syntax"  
"Invalid session number"  
"No current session"
```

3.2.5 DisConnect Command

Syntax: DisConnect [<session number>]
DisConnect (<address>)

Default Privilege Level: User

Description: The first form of the DisConnect command requests that the specified session be disconnected. If no session number is specified, the current session is disconnected.

The network manager form of the command disconnects all of the specified port's sessions and places the port in Listening mode.

Example 1:

```
disconnect
```

This example requests the termination of the current session.

Example 2:

```
dc 3
```

This example requests the termination of session 3.

Example 3:

```
dc (!14)
```

This example terminates all sessions on port 14 of the local Communications Server and places that port in Listening mode.

Normal Responses:

```
"Disconnecting ... Session <n> disconnected from <address>"
```

Error Messages:

```
"Invalid DisConnect syntax"  
"Invalid network manager syntax"  
"Invalid session number"  
"No current session"
```


3.2.6 DO Command

Syntax: DO <macro name>

Default Privilege Level: User

Description: The DO command executes the specified macro. The macro name can be entered in either upper or lower case.

The break key can be used to interrupt the execution of a macro.

Refer to the description of the DEFine command for the procedure for creating a macro.

Example:

```
do TEK
```

This example executes the command file named "TEK".

Normal Responses:

Ordinarily, each command in the macro file, and the system responses to it, appear on the screen as the command is executed. This echo to the terminal is inhibited if the port's InterAction parameter is set to NoMacroEcho (refer to Section 6.1.1).

Other normal responses vary depending on the contents of the macro.

Error Messages:

```
"Can't DEFine from a macro"  
"Insufficient privilege"  
"Invalid <command name> syntax"  
"Macro does not exist"  
"Macros nested too deeply"
```

Other error messages can be produced if a command contained in the macro fails. Refer to the section that describes the command in question.

3.2.7 Echo Command

Syntax: Echo <string>

Default Privilege Level: User

Description: The Echo command echoes the specified string on the terminal. The string must be specified according to the syntax described in Section 3.1.5. The maximum permissible length of the string is 82 characters; if more are specified, the string is truncated to 82 characters and only the truncated string is echoed.

The most common use of the Echo command is within a macro. The string is sent to the terminal executing the macro even if normal echoing is turned off because the InterAction parameter is set to NoEcho or to NoMacroEcho.

Example:

```
(
set interaction = nomacroecho
set privilege = gnm
<password>
echo "Sessions on the letter-quality printer:"
show (lq_prtr) sessions
set privilege = user
)
```

This example shows the contents of a macro that includes an Echo command. The macro is executed by a port with User privilege to determine the availability of a printer. The macro first turns off echo during macro execution in order to prevent the password from echoing on the terminal when the port's privilege level is set to Global Network Manager. The string enclosed in quotation marks echoes on the terminal, then the output of the SHow command. Finally, the port's privilege level is reset to User.

Normal Responses:

The specified string is displayed on the terminal, followed by a new prompt. If the command is executed within a macro, the new prompt appears after any output from commands within the macro, when macro execution is complete.

Error Messages:

"Invalid Echo syntax"

3.2.8 Listen Command

Syntax: Listen
Listen (<address>)

Default Privilege Level: User

Description: If a port is in Command or Data Transfer mode, the Listen command disconnects all sessions on the port and puts the port in Listening mode. While a port is in Command mode, no connection can be established to that port from a remote device until either the Listen command is given or the Autolisten interval elapses.

For XNS servers, if a port is in a reserved state waiting for a passive connection from a queued port, a Listen command directed at the reserved port removes the requesting port from the queue and frees the destination port for connection with the next port in the queue, if any. A second Listen command within a minute clears all remaining ports from the connection queue and puts the port in Listening mode. Refer to Section 2.4.4 for a description of the modes of operation, and to Section 2.4.10 for a description of call queueing. Call queueing does not apply to TCP servers.

Example 1:

```
listen
```

This example breaks any existing connections and puts the local port in Listening mode so that connections can be made to it.

Example 2:

```
1 (13)
```

This example terminates all existing sessions and puts port 3 on the local server in Listening mode.

Normal Responses:

If a terminal is attached to the affected port, the Listen command usually causes a single "at" sign (@) to appear on the screen.

Error Messages:

```
"Insufficient privilege"  
"Invalid Listen syntax"  
"Invalid network manager syntax"  
"Invalid <physical-address> syntax"
```

3.2.9 Name Command

Syntax: Name <clearinghouse name> = <address> [,<address>]
Name <internet name> = <address> [,<address>]

Default Privilege Level: Local Network Manager

Description: The Name command assigns a logical name to either a physical address or another logical name. The address or name specified after the equal sign can represent a single port, a local rotary (a port number in the range from 128 to 135), or a global rotary (up to eight addresses separated by commas). The maximum permitted length of the address (or address list) specified in the Name command is 120 characters. Refer to Sections 3.1.6 and 3.1.7 for information about XNS clearinghouse names and addresses, and to Sections 3.1.8 and 3.1.9 for information about TCP internet names and addresses.

For XNS servers, the specified name typically represents only the first field in the three-part clearinghouse name (the local name, described in Section 3.1.6). The default strings for the second and third fields (domain and organization) are set with the SETDefault command, either locally (for servers that boot from a local disk drive), or remotely on an NCS/150 (for servers that boot from an NCS/150). These default strings are automatically assumed if the Name command is entered with only a local name. All the servers supported by an NCS/150 share the same default domain and organization strings.

The Name command can specify all three fields of a clearinghouse name. In this case, the newly defined domain and organization strings can be different from the default strings defined for the server; if the strings are different, the name does not appear in the display generated by the SHow CHName command (refer to the description of the SHow command).

If the Communications Server boots from an NCS/150, the network manager must establish all names on the NCS/150 that supports the server. Therefore, the Name command is not valid on a server without an internal disk drive. The NCS/150 can be accessed either through the REMOTE command or from the NCS/150 console terminal.

A CS/1 that boots from an internal disk drive can be set during system generation to differentiate or not differentiate between upper and lower case in names. Neither a CS/100 nor an NCS/150 differentiates between cases in names.

If the Name command cannot be completed because the diskette is write-protected, the system puts a protective lock on the

name database. The database will not be available again until the server is rebooted with a diskette that is not write-protected.

A CS/1 that boots from a local disk drive can support up to 64 names; a CS/100 that boots locally can support up to 24 names; an NCS/150 can support up to 256 names.

Names are removed using the UNName command.

Example 1:

```
name modem = %1234abcdffff!1
```

This example assigns the clearinghouse name "modem" to port 1 on the device whose Ethernet address is %1234abcdffff.

Example 2:

```
n hosta = %080002000015!128
```

This example assigns the clearinghouse name "hosta" to rotary number 128 on the server with the Ethernet address %080002000015. Rotary number 128 must be assigned one or more physical ports through the ROTary command.

Example 3:

```
n acctg = host1!132
```

This example assigns the clearinghouse name "acctg" to rotary number 132 on the server named "host1". Rotary number 132 must be assigned one or more physical ports through the ROTary command.

Example 4:

```
n x25host = %080002010020!128#31144151234501
```

This example assigns the clearinghouse name "x25host" to rotary number 128 on the Gateway Server through which the X.25 network is accessible. The number following the number symbol (#) represents the host's X.25 address. Rotary 128 must also be associated with one or more port numbers through the ROTary command.

Example 5:

```
n cs_8a = %08000200008a
```

This example assigns the clearinghouse name "cs_8a" to the server with Ethernet address %08000200008a. This clearinghouse name can be used as shorthand for the server's full Ethernet address in the REMOTE command or in conjunction with a port number in the Connect command.

Example 6:

```
n modem@acctg@finance = %080002010024!12
```

This example, which specifies all three fields of the clearinghouse name (localname@domain@organization), assigns a name to port 12 on the Communications Server whose Ethernet address is %080002010024.

Example 7:

```
n hostb = cs_1!128,cs_2!128
```

This example assigns the clearinghouse name "hostb" to a global rotary. The global rotary itself consists of two local rotaries, one on the server named "cs_1", and the other on the server named "cs_2". Global rotaries apply only on XNS servers.

Example 8:

```
n !net2!host1 = 192.000.000.255
```

This example assigns the TCP internet name "!net2!host1" to the internet address "192.000.000.255". The address can represent a single port or a rotary.

Normal Responses:

If the command is successful, the system responds only with a new prompt.

Error Messages:

```
"Insufficient privilege"  
"Invalid <physical-address> syntax"  
"Invalid Name syntax"  
"Name in use"  
"Name table is full"
```

3.2.10 Pause Command

Syntax: Pause [<number>]

Default Privilege Level: User

Description: The Pause command causes the system to pause for the number of seconds specified. This command is normally used only within a macro. It can be used in conjunction with other commands to create a macro that makes a connection to a host, pauses long enough for the host to respond, and then transmits a login sequence. A pause between making a connection and transmitting a string is useful for automatic dial-out through an intelligent modem (see the discussion of the DEFINE command). The Pause command is also used with a sequence of SHow commands, which can fill up all available buffers unless separated by a Pause.

If no number of seconds is specified, the system pauses for one second. The maximum length of a pause is one day (86400 seconds).

Example:

```
pause 2
```

This example causes the system to pause for two seconds before executing the next command of the macro in which it appears.

Normal Responses:

The system pauses for the number of seconds specified, up to a maximum of 86400. No other confirmation is displayed.

Error Messages:

"Invalid Pause syntax"

3.2.11 Read Command

Syntax: Read DefaultParameters <filename>
Read (!<portid>) DefaultParameters <filename>
Read STATistics [Sample | Min | <hr> | Day] *
Read (<address>) STATistics [Sample | Min | <hr> | Day]*

Default Privilege Level: Local Network Manager

Description: The Read command is used to restore the in-memory copy of a port's configuration table (a set of parameter values) from a specified file on the diskette. Before entering the command, verify that the diskette is in place in the disk drive. The restored configuration applies to the port from which the command was issued or to the port specified in the network manager form of the command.

On a CS/1 that boots from a local disk drive, the Read command is also used to display network management statistics previously saved on the diskette.

If a question mark is substituted for the argument DefaultParameters or STATistics, the Communications Server displays a help screen describing all valid forms of the command.

To restore configuration tables, specify DefaultParameters. The existing default parameter table in the Communications Server's memory is replaced by the table in the file identified by <filename>. Unlike the SETDefault command, the Read command does not affect the disk copy of the port's default parameter table.

The specified filename can be an alphanumeric name or a number in the range 0 through 31. The system does not differentiate between upper and lower case in filenames. A number is a special kind of filename; each number corresponds to a port number. File number 0 contains the default configuration table for port 0, file number 1 contains the default configuration table for port 1, and so on. Regardless of whether the server boots from a local disk drive or from an NCS/150, each server has its own set of numbered default configuration files. A server that boots from an NCS/150, however, shares a set of named configuration files with all other servers supported by the same NCS/150.

* Applies to CS/1 with local disk drive only.

The Read DefaultParameters command must be used in conjunction with the Save command. A user can, for example, read a numbered file containing the default configuration table for another port into the port 8 table; however, then the port 8 table stored on the diskette may not match the default configuration table stored in memory for port 8. This discrepancy can cause problems for the system. In order to prevent conflict, the user should both Read and Save the desired default configuration table. Refer to the description of the Save command and to the examples in this section for an illustration of this process. Also, Figure 6-1 illustrates the effects of the Read and Save commands.

To review saved network management reports on the CS/1, add the argument STATistics and the desired report type (S for the Busiest Sample report, M for the Busiest Minutes report, <n> for the specified Hour Average report, or D for the 24-Hour Average report). A report type must be specified; if it is omitted, an error message is displayed. Refer to Section 7.0 for a description of the network management reports. The Port Statistics report cannot be obtained via the Read command.

A CS/100 or a CS/1 that boots from an NCS/150 does not save the prior day's statistics, so the Read STATistics command results in an error message. The remote form of the command (Read (<address>) STATistics) can be entered on a CS/100 or a CS/1 that boots from an NCS/150, as long as the address specified is that of a CS/1 that boots from a local disk drive.

Example 1:

```
read (18) defaultparameters 10
save (18) defaultparameters 8
```

This example illustrates how the Read and Save commands are used together to create a new default parameter table for a port and to ensure that the in-memory and disk copies of the table are identical. The Read command reads into port 8's default parameter table the parameters currently stored as a default table for port 10; the Save command saves the in-memory default parameter table to the disk.

Example 2:

```
rd (16) dp vt100
sa (16) dp 6
```

This example first copies the alternate parameter table contained in the file "vt100" (a set of parameters appropriate for a particular terminal type) into the in-memory default parameter table for port 6, and then saves the in-memory default parameter table to the disk.

Example 3:

```
rd stat s
```

This example displays the previously saved "Busiest Sample" report. This form of the command applies only to a CS/1 that boots from a local disk drive.

Normal Responses:

```
"Portid !<n> DefaultParameters loaded  
from configuration <filename>"
```

Error Messages:

```
"File not found"  
"Insufficient privilege"  
"Invalid network manager syntax"  
"Invalid Read syntax"  
"Invalid Read STATistics syntax"  
"Drive door open or diskette missing"  
"Read error"
```

3.2.12 REMOTE Command

Syntax: REMOTE <address>

Default Privilege Level: Global Network Manager

Description: The REMOTE command gives the Global Network Manager access to a network management port on the specified NCS/150, Gateway Server, or remote Communications Server.

While remote mode is in effect, the prompt is the string "remote:". To exit remote mode, press the break key or the character defined by the BReakChar parameter.

Because the network management port cannot be part of a virtual circuit connection, only a subset of the standard commands are available in remote mode. Specifically, commands used to create and manipulate sessions are restricted. The DEQueue, REMoteSET, REMoteSHOW, RESume, SWITCH, and Transmit commands are unavailable, and the Connect command can be used only to interconnect remote ports. On an NCS/150, no commands associated with establishing connections are available. The help facility is available in remote mode; entering a question mark (?) in response to the remote system prompt displays a list of the available commands.

The commands available during remote access to a server other than a Communications Server differ from those available during remote access to a Communications Server. Entering a question mark (?) at the remote mode prompt displays a list of available commands. See reference [5] for a discussion of the commands available on an NCS/150, and reference [7] for a discussion of the commands available on a Gateway Server.

Remote access can be made to a Gateway Server on the local Ethernet or through a Gateway Server to either a Communications Server or a Gateway Server on another Ethernet. However, remote access across a Gateway Server is subject to some limitations. The output of some commands that cause long screen displays (such as "SHOW (!<portid>) Parameters" and "SHOW STATistics") is truncated.

Remote access can not be made from an XNS server to a TCP server or vice versa.

Example:

```
remote cs.host1
connect (12) 18
show allsessions
<BREAK>
```

In this example, the network manager requests remote mode access to the Communications Server whose clearinghouse name is "cs.host1", forms an interconnection between ports 2 and 8 on that Communications Server, requests a list of all sessions on that server, and then exits remote mode.

Normal Responses:

The prompt "remote:".

Error Messages:

```
"Invalid <physical-address> syntax"
"Querying Clearinghouse ... Clearinghouse name not found"
"Insufficient privilege"
```

In addition, when a server accessed in remote mode is inoperative, all commands entered generate the message "Timeout failure".

3.2.13 REMOteSET Command

Syntax: REMoteSET <param-name> = <value> ...

Default Privilege Level: User

Description: The REMoteSET command sets a parameter on the port at the other end of the active session. The command enables users to change parameters on a destination port without accessing a higher privilege level. The command can affect only a port at the other end of an existing connection; otherwise, the REMoteSET command is identical to the SET command.

The parameters that can be set with the REMoteSET command are limited both by the privilege level of the port on which the command is issued and by the parameters supported by the server at the other end of the connection. For example, the CS/1-HSM supports only a subset of the port configuration parameters available to a CS/1-A. If the user's connection is to a port on a CS/1-HSM, only the parameters supported by the CS/1-HSM can be specified with the REMoteSET command. The CS/1 supports higher baud rates than the CS/100. If a user at a CS/1 port requests a higher baud rate for a CS/100 port than is available, the baud rate is actually set to the highest possible rate for the CS/100 (19.2K baud).

This command is not valid on TCP servers.

Example:

```
remset baud=1200
```

This example sets the baud rate of the remote device to 1200.

Normal Responses:

If the command is successful, the system responds only with a new prompt.

Error Messages:

```
"Insufficient privilege"  
"Invalid REMoteSET syntax"  
"Parameter <param-name> unknown"  
"Ambiguous parameter name, try one of: <...>"  
"Missing equal after parameter <param-name>"  
"Missing value after parameter <param-name>"  
"Parameter <param-name>: value '<value>' is illegal"  
"Parameter <param-name>: value '<value>' is out of range"
```

3.2.14 REMoteSHoW Command

Syntax: REMoteSHoW <param-name>

Default Privilege Level: User

Description: The REMoteSHoW command displays a parameter value for the port at the other end of the current session. It follows the same conventions as the SHoW <param-name> command.

This command is not valid on TCP servers.

Example:

```
remsh baud
```

This example requests a display of the baud rate of the remote device.

Normal Responses:

The response depends on the display requested.

Error Messages:

```
"Insufficient privilege"  
"Invalid REMoteSHoW syntax"  
"Parameter <param-name> unknown"  
"Ambiguous parameter name, try one of: <...>"
```

3.2.15 RESume Command

Syntax: RESume [<session number>]

Default Privilege Level: User

Description: The RESume command changes the local port from C-
mand mode to Data Transfer mode, resuming communications for
the specified session. If no session number is specified,
the current session is resumed.

If the local port has just been notified that a queued con-
nection is available, the RESume command completes the pro-
cess of establishing the connection. The queued session has
its own session number, which must be entered if a different
session is active.

The RESume command is meaningful only if a completed or
queued connection exists on a port.

Example 1:

```
resume
```

This example resumes Data Transfer mode for the current ses-
sion.

Example 2:

```
res 2
```

This example resumes Data Transfer mode for session 2.

Normal Responses:

```
"Session <n> with <address> resumed"  
"Queued session <n> connecting ... Access controlled  
Group <n> password: "  
"Queued session <n> connecting ... Session <n>  
connected to <address>"
```

Error Messages:

```
"No current session"  
"No other sessions"  
"Illegal request -- wrong state"  
"Invalid RESume syntax"  
"Invalid session number"  
"Queued session <n> connecting ... Timeout failure"  
"Queued session <n> connecting ... No response"  
"Queued session <n> connecting ... Remote is busy"  
"Queued session <n> connecting ... Remote is disabled  
or nonexistent"
```

3.2.16 ROtary Command

Syntax: ROTary !<rotary> = !<port> [- !<port>] [, !<port> ...]
ROTary !<rotary> += !<port> [- !<port>] [, !<port> ...]
ROTary !<rotary> -= !<port> [- !<port>] [, !<port> ...]

Default Privilege Level: Local Network Manager

Description: The ROTary command is used to assign a rotary number to a single port number or a group of port numbers. The second form of the command adds ports to an existing rotary, and the third form of the command removes ports from an existing rotary.

The ROTary command creates a local rotary only; if a group of port numbers is specified, all ports in the group must be on the same server. Global rotaries are established via the Name command. Global rotaries do not apply to TCP servers.

Regardless of whether a server is booted locally or from an NCS/150, each server has its own rotary list.

Eight rotary numbers are available for use on each Communications Server; rotary numbers range from 128 to 135.

The Connect command can use a rotary number as the destination, indicating that any of the ports assigned to that number are equally acceptable. The rotary number can also be assigned a clearinghouse name, via the Name command, and thus can be specified in the Connect command by name.

A single rotary command can include a single port number, a series of nonconsecutive port numbers, a range of consecutive port numbers, or a combination of consecutive and nonconsecutive port numbers. If a series of nonconsecutive port numbers is specified, the port numbers must be separated by commas (,); if an inclusive range of consecutive port numbers is specified, the starting port number must be separated from the ending port number by a hyphen (-). See the examples below.

A single rotary number can be assigned to both physical and virtual ports.

A network manager can enter the SHow ROTaries command to display a list of all currently established rotaries and their assigned port numbers. On TCP servers, the resulting list shows only port numbers, not internet addresses; the network manager can use the SHow InternetMap command to display the mapping between port numbers and internet addresses.

Example 1:

```
rotary !128 = !4,!7,!13,!15
name host1 = !128
```

In this example, the ROTary command assigns rotary number 128 (!128) to ports 4, 7, 13, and 15 on the local Communications Server. Next, the Name command assigns the clearinghouse name "host1" to the addresses represented by rotary number 128. The user can then simply type the command "connect host1" to obtain a connection to any available port in the rotary.

Example 2:

```
ro !129 = !20-!31
n host2 = !129
```

In this example, the ROTary command assigns rotary number 129 to ports 20 through 31 on the local Communications Server. The Name command then assigns the clearinghouse name "host2" to the rotary.

Example 3:

```
ro !130 = !4,!7,!13,!15,!20-!31
n host3 = !130
```

This example represents a combination of examples 1 and 2. The ROTary command is used to assign rotary number 130 to ports 4, 7, 13, 15, and 20 through 31 of the local Communications Server. Then the Name command is used to assign the name "host3" to the combined rotary.

Example 4:

```
ro !128 -= !7, !13
```

This example removes ports 7 and 13 from rotary 128. No other ports in the rotary are affected.

Normal Responses:

If the command is successful, the system responds only with a new prompt.

Error Messages:

```
"Insufficient privilege"
"Invalid ROTary syntax"
"Portid out of range"
"Rotary number out of range"
"Missing equal sign after <rotary number>"
```

3.2.17 SAve Command

Syntax: SAve DefaultParameters <filename>
SAve (!<portid>) DefaultParameters <filename>
SAve Parameters <filename>
SAve (!<portid>) Parameters <filename>

Default Privilege Level: Local Network Manager

Description: The SAve command writes a configuration table (a set of parameters for a port) to the diskette under the specified filename. Before entering the command, verify that the diskette is in place in the disk drive. A saved configuration table can be restored via the ReaD command.

If a question mark is substituted for an argument in the SAve command, the Communications Server displays a help screen describing all the valid forms of the command.

If the command line specifies DefaultParameters, the port's default configuration table is written onto the file specified by <filename>. If the command line specifies Parameters, the port's current configuration table is written onto the file specified by <filename>.

The filename can be an alphanumeric name or a number in the range 0 through 31 (0 through 13 on a CS/100). If an alphanumeric name is entered, the configuration information is stored on the diskette as an alternate configuration, not a default configuration. The Communications Servers do not distinguish between upper and lower case in filenames. A number is a special kind of filename that is linked to a port number. A configuration table saved with a number as filename becomes the new default configuration table for the port with that number.

**** NOTE ****

When the Communications Server is booted, the default configuration table for each port is read from the file whose name corresponds to the port number. This process overrides any previous attempt to save a default configuration table under any name other than a port number.

If the SAve command is used to write to a numbered file, it should be used in conjunction with the ReaD command, in order to maintain consistency between the default parameter values stored on the disk and the default parameter values stored in memory. Refer to the description of the ReaD command and to example 2, below, for an illustration of this process. Also, Figure 6-1 illustrates the effects of the ReaD and SAve commands.

If the specified file already exists, the new parameter table overwrites the old file.

A server that is to be booted from an NCS/150 must be bound to the NCS/150 before the SAve command is issued (see reference [5] for more information).

Regardless of whether the server boots from a local disk drive or from an NCS/150, each server has an independent set of numbered default configuration files. A server that boots from an NCS/150, however, shares a set of named configuration files with all other servers supported by the same NCS/150.

Saving numbered configuration files requires only Local Network Manager privilege level on all servers. On a server that boots from an NCS/150, saving named configuration files requires Global Network Manager privilege level.

Example 1:

```
save parameters port4.conf
```

This example writes the configuration table for the current session on the local device port to the file "port4.conf" on the diskette.

Example 2:

```
rd (15) dp 0  
sa (15) dp 5
```

This example first reads the default parameter table for port 0 to the default parameter table for port 5, then saves port 5's new default parameter table to disk. Port 0's current and default configuration tables remain unchanged.

Normal Responses:

```
"Portid !<n> default parameters saved  
as configuration <filename>"  
"Session <n> parameters saved as  
configuration <filename>"
```

Error Messages:

```
"Insufficient privilege"  
"Invalid network manager syntax"  
"Invalid SAve syntax"  
"Drive door open or diskette missing"  
"Diskette write protected"  
"Write error"
```

3.2.18 SET Command

Syntax: SET <param-name> = <value> ...
SET (<address>) DATE = mm/dd/yy hh:mm[:ss]

Default Privilege Level: User

Description: The SET command sets a configuration parameter value. The new value takes effect immediately, but remains in effect only for the current session. The SET command differs from the SETDefault command in that a parameter value specified with the SETDefault command takes effect only with the following session, then remains in effect until an explicit SETDefault or SET command overrides it.

The command "set ?" prints a list of all parameters that can be specified.

When multiple values are specified for a single parameter, the values must be separated by commas and enclosed in parentheses. If the parentheses are omitted, the server generates an error message, but the first of the multiple values is written to the active parameter table anyway.

The network manager form of the SET command can be used only to set the system clock. If any parameter other than DATE is specified in this form of the command, an error message is generated. For XNS servers in networks that include an NCS/150, the SET DATE command is not required, since the NCS/150 automatically sets the system clock on each XNS server in the network. For XNS servers in networks that do not include an NCS/150, the date of the local Communications Server and all other XNS servers in the network can be specified using the broadcast address %ffffffffffff in the SET DATE command.

For TCP servers, the network manager should use the SET DATE command after each boot to adjust the date and time displayed in the network management reports to local time. Otherwise, the TCP server calculates time in 24-hour cycles, with midnight at boot time. The SET DATE command must be issued on each server individually; no mechanism is available to set the DATE parameter on all TCP servers in the network at once.

Refer to Section 3.1.5 for the rules governing the way parameter values are specified, and to Section 6.0 for lists of the parameters that can be specified with the SET and SETDefault commands.

On a CS/1 with a disk drive, the network manager can change the privilege level necessary to execute commands. Do not establish a privilege level other than User for the SET command. Otherwise, no one will be able to access higher privilege levels, which is done only through the SET command.

Example 1:

```
set breakaction = inband
set ecmchar = ^C
```

This example sets parameters appropriate for an application requiring the capability of transmitting in-band breaks. The second SET command provides a way to return to Command mode via an ECMChar (the character <CTRL-C>).

Example 2:

```
set (%ffffffffffff) date = 84/02/15 10:15:00
```

This example sets the system clocks on all Bridge servers on the network, including the local Communications Server, to 10:15 a.m. on February 15, 1984. This form of the command does not apply to TCP servers.

Normal Responses:

If the command is successful, the system responds only with a new prompt.

Error Messages:

```
"Invalid SET syntax"
"Invalid SET DATE syntax"
"Insufficient privilege"
"Parameter <param-name> unknown"
"Ambiguous parameter name, try one of: <...>"
"Missing equal sign after parameter <param-name>"
"Missing value after parameter <param-name>"
"Parameter <param-name>: value '<value>' is illegal"
```

3.2.19 SETDefault Command

Syntax: SETDefault [<param-name> = <value>] ...
SETDefault (<address>) [<param-name> = <value>] ...

Default Privilege Level: Local Network Manager

Description: The SETDefault command is used to modify a port's default parameter table or the system's global parameters. A parameter specified with the SETDefault command does not take effect until the next session (not the current session), then remains in effect until reset. A parameter specified with the SET command takes effect immediately but remains in effect only during the current session.

If the SETDefault command is specified without parameters, the Communications Server prompts the user for all parameters, indicating the current default within angle brackets. To leave the default value unchanged, press the return key. To obtain a help screen listing legal values for the parameter being prompted for, enter a question mark (?). To cancel the remainder of the SETDefault, press the break or escape key. Any changes made prior to the time the break or escape key is pressed take effect.

When multiple values are specified for a single parameter, the values must be separated by commas and enclosed in parentheses. If the parentheses are omitted, the Communications Server generates an error message, but the first of the multiple values is written to the default parameter table anyway.

The modified parameters are written to the diskette automatically after the SETDefault command is completed.

Each of the following types of parameter specifications is stored in a different disk file:

- Default port parameters and editing parameters listed in Sections 6.1.1 through 6.1.4.
- Passwords listed in Section 6.1.5.
- Clearinghouse strings listed in Section 6.1.5.
- All other global parameters listed in Section 6.1.5.

Since a single SETDefault command can update only one disk file, the command line must not include specifications from more than one of the above categories.

A parameter table can also be written to the diskette with the SAVE command, and a saved parameter table can be restored from the diskette with the READ command. Note that

there is no need to Read the parameter table after issuing the SETDefault command; the command alters both the default table on the disk and the default table in the Communications Server's memory.

On a server that boots from an NCS/150, the passwords described in Section 6.1.5 must be altered with the SETDefault command on the NCS/150 that supports the server. All servers supported by a single NCS/150 share the same Global-PassWord and the same set of access control passwords.

Refer to Section 3.1.5 for the rules governing the way parameter values are specified, and to Section 6.0 for descriptions of all parameters that can be specified with the SET and SETDefault commands.

Example 1:

```
setdefault prompt="cs_acctg> "
```

This example sets the prompt for terminal ports with User level privilege to the string "cs_acctg> ".

Example 2:

```
setd baud=300 databits=7 stopbits=2 parity=0
```

This example sets the local port's default baud rate, number of databits, number of stopbits, and parity.

Example 3:

```
setd (!3) device = (term,paper)
```

In this example, the device attached to port 3 is configured as a hardcopy terminal.

Normal Responses:

```
"File replaced  
Portid !<n> default parameters saved as configuration <n>"
```

Error Messages:

```
"Insufficient privilege"  
"Parameter <param-name> unknown"  
"Invalid SETDefault syntax"  
"Ambiguous parameter name, try one of <...>"  
"Missing equal sign after parameter <param-name>"  
"Missing value after parameter <param-name>"  
"Parameter <param-name>: value '<value>' is illegal"
```

3.2.20 SHoW Command

Syntax: SHoW <show-keyword> [<parameter> ...]
 SHoW (<address>) <show-keyword> [<parameter> ...]

Default Privilege Level: User

Description: The SHoW command is used to display current parameter values and other system information.

Note that depending on customer requirements, some SHoW keywords and some SHoW parameters may be restricted to Local or Global Network Manager privilege. At the Global Network Manager privilege level, most of the SHoW commands can take an Ethernet address before the keyword (see example 6, below). The displays generated by the SHoW command are tailored to the privilege level of the requesting port.

In remote mode access to another type of server, the list of valid SHoW keywords is tailored to that server. Refer to the appropriate User's Guide for lists of valid keywords and definitions of each.

The command "show ?" displays a list of the valid SHoW keywords appropriate to the port's privilege level, indicating command format. In the following list, keywords valid only on an XNS server are indicated with one asterisk, and keywords valid only on a TCP server are indicated with two asterisks; the remainder are valid on either type of server.

```

SHoW ADDRESS
SHoW AllSessions
SHoW AttachedNets *
SHoW CHNames [ <name> [ @ <domain> [ @ <organ.> ] ] ] *
SHoW CONFIGurations [ <filename> ]
SHoW [ (<address>) ] DefaultParameters [ <param-name> ...]
SHoW GLoBalPARAMeters
SHoW GRoUpPassWords *
SHoW InternetMap **
SHoW MACros [ <macro-name> ]
SHoW NAMES [ <name> ] **
SHoW NetMap [ Short | Long ]
SHoW [ (<address>) ] PARAMETERS [ <param-name> ... ]
SHoW <param-name> ...
SHoW RemoteNets [ <netid> ... ] *
SHoW ROTaries
SHoW SECurITySTATistics
SHoW [ (<address>) ] SESSions [P]
SHoW (<address>) STATistics
SHoW STATistics [ Sample | Minute | <hour> | Day ]
SHoW VERSIon
SHoW VirtualPorts *
```


If the `SHoW` command is entered with no keyword specified, the Communications Server assumes `PARAMeters` as the default keyword.

`SHoW ADDRESS` on an XNS server displays the Ethernet address of the local server and the port number of the local port. On TCP servers, this command displays the port number and either the internet address (if one is assigned) or the words "active only".

`SHoW AllSessions` displays a list of all physical ports on the Communications Server and their statuses. On TCP servers, the resulting list shows physical port numbers, not internet addresses. Use the `SHoW InternetMap` command to display the mapping between physical ports and internet addresses.

`SHoW AttachedNets` displays the network number of the local network. If the command is executed remotely on a Gateway Server, the system displays the network numbers of all networks attached to the gateway. This command is not available on TCP servers.

`SHoW CHNames` displays a list of clearinghouse names. The clearinghouse names represent physical addresses or sets of physical addresses on the system. To display the physical address that the clearinghouse name maps into, use the command `SHoW CHNames <clearinghouse name>`.

Ordinarily, the `SHoW CHNames` command displays only the clearinghouse names in the local clearinghouse whose domain and organization strings match the default domain and organization strings for the local server. If some clearinghouse names have been established with unique domain and organization strings, the entire list can be displayed with this form of the command:

```
SHoW CHNames *@*@*
```

On a server supported by an NCS/150, the clearinghouse names are stored on the NCS/150. The `SHoW CHNames` command (without an argument) displays only those names with the same domain and organization strings as the server on which the command was entered. This command can be entered either on a Communications Server or remotely on an NCS/150. If these two servers have different default domain and organization strings, the resulting displays are different.

This command is not available on TCP servers; refer to the description of the `SHoW NAMES` command.

SHOW CONFIgurations displays a list of all configuration tables saved on the disk. The list of tables includes both default tables (those whose filenames consist of a port number) and alternate tables (those whose filenames consist of alphanumeric characters). SHOW CONFIgurations <filename> displays contents of the parameter table contained in the specified file; both default and alternate tables can be displayed.

SHOW DefaultParameters displays the default parameters for the specified port or, if no port is specified, for the port on which the command is typed. To display a few specific default parameters, type the command and keyword followed by the names of the parameters. To display a list of all default parameters, type the command and keyword only.

SHOW GlobalPARAMeters displays the global parameters discussed in Section 6.1.5 (except for the access group passwords). The display is tailored to the privilege level of the requesting port.

SHOW GRoupPassWords displays a list of all 16 access groups and their passwords. This command is not available on TCP servers.

SHOW InternetMap displays the server's internet address and Ethernet address, as well as the mapping of physical ports and rotary numbers to internet addresses. This command is valid only on TCP servers.

SHOW MACros without an argument displays a list of all macros defined for the local Communications Server (if the server boots locally) or a list of all shared macros (if the server boots from an NCS/150). SHOW MACros <macro-name> displays the contents of the specified macro.

SHOW NAMES displays a list of internet names. The names represent physical addresses or sets of addresses on the system. To display the physical address that the name maps into, use the command SHOW NAMES <internet name>. This command is valid only on TCP servers.

SHOW NetMap displays a list of the addresses of all ESPL servers on the network that run the same set of high-level protocols as the server on which the request is entered (e.g., from a TCP server, the list includes only TCP servers). The first address in the list is always the local Communications Server.

On a CS/1, if the command includes the additional keyword Long, the resulting list also indicates the software release number of any server running SW/1-A/BSC/SDLC Release 2000 or higher or SW/100-A/BSC Release 15000 or higher.

On a CS/1, a maximum of 80 addresses are included in the display; on a CS/100, a maximum of 40 addresses are included. Any server that has been down for five minutes or longer is indicated in the list as inactive; after the server has been inactive for 72 hours, it is removed from the netmap list.

The SHoW PARAMeters command is like the SHoW DefaultParameters command, except that it displays the parameters for the current session. If no connection has been established, the display includes only the port parameters, since no session parameter table exists for a port without sessions. The keyword PARAMeters can be omitted from a request for one or more specific parameters. That is, the command "SHoW BAud" is equivalent to the command "SHoW PARAMeters BAud".

SHoW RemoteNets displays a list of all networks available through gateways on the local network. If the keyword is followed by a network identification number, the system displays the Ethernet addresses of the Gateway Servers through which that network can be accessed. This command is not valid on TCP servers.

SHoW ROTaries displays a list of rotary numbers and the ports that have been assigned to them. For the TCP server, the list indicates physical port numbers, not internet addresses. Use the SHoW InternetMap command to display the mapping between port numbers and internet addresses.

SHoW SECuritySTATistics displays a summary of security-related activity (privilege level and access control) since the most recent system boot. The report is discussed in detail in Section 7.6.

SHoW SESSions displays a list of all current connections between the specified port and other destinations. If the final argument "P" is included, the resulting report shows the physical address of the circuit destination instead of its logical name.

The SHoW STATistics command can take either of two distinct forms. If it is used without a final argument, SHoW STATistics displays a summary of the statistics for the specified port or, if no port is specified, for the port on which the command is typed. If it is used with one of the four closing arguments (Sample, Min, <hour>, Day), the command displays one of the network management reports for the entire Communications Server. See Section 7.0 for a discussion of the statistics reports.

SHow VERSion displays the software release number of the software currently running on the Communications Server, the firmware release numbers of all PROMs in the server, and the time, date, and source of the most recent bootstrap. See Section 2.6 for a description of software and firmware release numbers.

SHow VirtualPorts displays the status of the virtual ports. See Section 2.4.3 for a discussion of virtual ports. This command is not valid on TCP servers.

Example 1:

```
show baud echodata
```

This example requests a display of the current values of the parameters BAUD and ECHODATA.

Example 2:

```
sh conf 16
```

This example requests a display of the default configuration table for port 16 on the local Communications Server.

Example 3:

```
sh date
```

This example requests a system clock display.

Example 4:

```
sh chn hostl*
```

This example requests a display of all clearinghouse names beginning with the letters "hostl".

Example 5:

```
sh chn *@*@Bridge
```

This example requests a display of all clearinghouse names whose organization identifier is "Bridge".

Example 6:

```
sh na
```

This example requests a display of all TCP internet names defined on the local TCP server.

Example 7:

```
sh na !net2!host1
```

This example requests a display of the TCP internet address represented by the internet name "!net2!host1".

Example 8:

```
sh na !~!*
```

This example requests a display of all TCP internet names on the local network.

Example 9:

```
sh (%080002001234) as
```

This Global Network Manager command requests a display of all sessions on the Communications Server whose Ethernet address is %080002001234.

Normal Responses:

Normal responses depend upon which SHow option is requested.

Error Messages:

```
"Invalid SHow syntax"  
"Invalid network manager syntax"  
"Invalid SHow clearinghouse name syntax"  
"Invalid SHow STATistics syntax"  
"Parameter <param-name> unknown"  
"Insufficient privilege"  
"Ambiguous parameter name, try one of: <...>"
```

3.2.21 SWitch Command

Syntax: SWitch [<session number>]

Default Privilege Level: User

Description: The SWitch command is used to suspend the current session and switch the user device to another session on the port. A session is referred to by its session number. If no session number is specified, the most recently active session becomes active. Note that the port remains in Command mode until the RESume command is entered.

Example:

```
switch 2
```

This example requests that the current session be suspended and session 2 be activated.

Normal Responses:

```
"Switching ... to session <n>"
```

Error Messages:

```
"Invalid session number"  
"No other sessions"  
"Invalid SWitch syntax"
```

3.2.22 Transmit Command

Syntax: Transmit <string> | InBandBreak | OutBandBreak

Default Privilege Level: User

Description: The Transmit command is used within a macro definition to instruct the Communications Server to transmit the specified string or break signal to the destination of the current session. If the command is used for transmitting a string, a return is automatically appended.

Note that one Transmit command can be used to send either a string or a break, but not both. Refer to Section 6.1.8 for a discussion of the difference between an in-band break and an out-of-band break.

The string text must be specified according to the syntax described in Section 3.1.5. The maximum permissible length of the string is 82 characters; if more are specified, an error message is generated and only the first 82 characters of the string are transmitted.

Example 1:

```
transmit "myusername"
```

This example transmits the user's login string (myusername) to the destination of the session that is current at the time the macro containing the command is executed.

Example 2:

```
t ibb
```

This example transmits an in-band break to the device at the other end of the current session.

Normal Responses:

Normal responses to the Transmit command depend on the remote device's response to the transmitted text.

Error Messages:

```
"Invalid Transmit syntax"  
"String truncated to 82 characters"
```

3.2.23 UNDefine Command

Syntax: UNDefine <macro-name>

Default Privilege Level: Local Network Manager

Description: The UNDefine command deletes a macro from the macro directory. The Communications Server does not distinguish between upper and lower case in macro names.

On a server that boots from an NCS/150, the UNDefine command requires Global Network Manager privilege level.

Example:

```
undefine TEK
```

This example deletes the macro named "TEK".

Normal Responses:

If the command is successful, the system responds only with a new prompt.

Error Messages:

```
"Macro does not exist"  
"Insufficient privilege"  
"Invalid UNDefine syntax"  
"Invalid network manager syntax"
```


3.2.24 UNName Command

Syntax: UNName <clearinghouse name | internet name>

Default Privilege Level: Local Network Manager

Description: The UNName command deletes a clearinghouse or internet name assignment previously specified via the Name command. A CS/1 that boots from an internal disk drive can be configured during system generation to either differentiate or not differentiate between upper and lower case in names. If the server does make the distinction, then the name must be entered exactly like the entry in the database, including case. The CS/100 and the NCS/150 do not differentiate between cases in clearinghouse names.

If the Communications Server boots from an NCS/150, the network manager must establish and delete all logical names on the NCS/150 that supports the server. The NCS/150 can be accessed either through the REMOTE command or from the NCS/150 console terminal.

Example 1:

```
unname modem
```

This example deletes the XNS clearinghouse entry associated with the name "modem".

Example 2:

```
unname !net2!host1
```

This example deletes the name service entry associated with the TCP internet name "!net2!host1".

Normal Responses:

If the command is successful, the system responds only with a new prompt.

Error Messages:

```
"Name not found"  
"Insufficient privilege"  
"Invalid UNName syntax"
```

3.2.25 UNSave Command

Syntax: UNSave <filename>

Default Privilege Level: Local Network Manager

Description: The UNSave command deletes the specified configuration file from the directory on the diskette. On a server that boots from an NCS/150, the UNSave command requires Global Network Manager privilege level.

On a server that boots from an NCS/150, the UNSave command can be used to delete a named configuration file, but not to delete a default configuration file (i.e., one whose filename consists of a port number). If the network manager attempts to delete a default configuration file, the server does not generate an error message but does not delete the file.

On a server that boots from a local diskette, the UNSave command can be used to delete both named and numbered configuration files. However, if a numbered configuration file is deleted, the server will no longer have a default configuration file for the port with that number. The next time the system is booted, that port will revert to the original defaults described in Section 6.0.

Example:

```
unsave port6.conf
```

This example deletes the saved configuration file named "port6.conf".

Normal Responses:

If the command is successful, the system responds only with a new prompt.

Error Messages

```
"File not found"  
"Insufficient privilege"  
"Invalid UNSave syntax"  
"Invalid network manager syntax"  
"Drive door open or diskette missing"
```

4.0 CS/1 SYSTEM GENERATION AND DISK UTILITIES

This section describes the CS/1 system generation, disk copying, disk formatting, and memory dump procedures.

The procedures are executed from the MCPU monitor, via the system console terminal. For the procedure for accessing the monitor, refer to the description of bootstrap sequences in the Series/1 Planning and Installation Guide (reference [3]).

The console terminal must be an asynchronous, non-block-mode terminal, configured for 8 databits per byte and no parity. The default baud rate of the console port is 9600 baud; other baud rates are selectable via hardware jumper on the MCPU board. See reference [3] for instructions on altering the console port baud rate.

The equivalent procedures for the CS/100 are described in Section 5.0.

4.1 System Generation

The system generation procedure is used to adjust CS/1 system generation parameters to meet the needs of a specific installation. The results of the system generation are recorded on the system disk, which should be backed up afterwards.

Depending on the type of CS/1 software, system generation may not be necessary. The following list outlines restrictions and requirements:

- A CS/1 that boots from an NCS/150 does not require system generation in standard installations. If system generation is required for custom software or a nonstandard installation, the procedure must be performed on a CS/1 with an internal disk drive, and the changes must be copied onto the NCS/150 disk (see reference [5] for detailed instructions). In this case, the software is used by all CS/1s supported by the NCS/150, not just by the CS/1 on which Sysgen was run.
- The CS/1-A, the standard CS/1-BSC, and the CS/1-SDLC are shipped with a set of default parameters designed for standard software on a 32-port system. System generation is required only on a system with custom software or special installation-dependent requirements; refer to Section 4.1.2.
- The CS/1-BSC running SPMUX software is shipped with default parameters for 32 UTS terminals mapped into 3 DCP ports. System generation is always required; refer to Section 4.1.3.
- The CS/1-HSM is shipped with default parameters for one multiplexed line to a DEC host. System generation is always required; refer to Section 4.1.4.
- The CS/1-SNA is shipped with default parameters for one line to an SNA communications processor. System generation is always required; refer to Section 4.1.5.
- The CS/1-TCP is shipped with a set of default parameters designed for standard software on a 32-port system. System generation is always required; refer to Section 4.1.6.
- The CS/1-X.25 is shipped with default parameters for one X.25 line. System generation is always required; refer to Section 4.1.7.

4.1.1 Running the Sysgen Program

The Sysgen program is a menu-based utility for displaying and altering the system generation parameters and saving the changes to the CS/1 system diskette. The program may be performed only on a CS/1 with an internal disk drive.

Sysgen may be executed only immediately after a power-on or reset; the program does not execute properly if communication software has been running prior to the execution of Sysgen. The system diskette must be in place in the disk drive when Sysgen is executed.

To run the Sysgen program, enter the command:

gn

The main Sysgen menu is displayed:

1. View/Alter Module Parameters
2. Save Parameters
3. Exit to Monitor

Enter selection:

Enter the number of the desired option, then press the return key.

The system generation parameters are divided into seven or eight groups, depending on the server type. When the View/Alter option is chosen from the main Sysgen menu, the program displays a list of all parameter groups. The following example shows the typical View/Alter menu for the CS/1-A; the View/Alter menu for other server models may differ.

1. Kernel Parameters
2. IDP Parameters
3. SPP Parameters
4. User Interface Parameters
5. Virtual Terminal Parameters
6. Statistics Monitor Parameters
7. Clearinghouse Parameters

Most system generation parameters are set to default values appropriate for standard installations, and need not be altered by the customer. However, all possible parameters appear in the Sysgen menus in order to allow alterations necessary in custom installations and during software development. For detailed descriptions of all parameters not described in this guide, see the Software Technical Reference Manual (reference [2]).

**** NOTE ****

Sysgen parameters should be altered only by someone with a thorough understanding of the system software.

To select a parameter type, enter the number of the group, then press the return key. Depending on the group chosen, the program displays a menu of parameters, a menu of additional menus, or a hybrid menu of both parameters and additional menus.

To change a parameter, locate the menu that lists that parameter and its value, and then enter the number of the parameter. The resulting prompt may include a list of limits that apply to the parameter value. To enter a new value, respond to the prompt by typing the new value (in hexadecimal, if the value is numeric) then press the return key. To leave the value unchanged, simply press the return key.

Throughout the Sysgen program, pressing the escape key returns the program to the menu at the next higher level.

**** NOTE ****

For terminals that do not have an escape key, the character <CTRL-[> may be used to send an escape character to the program.

For a discussion of individual parameters that must be set on various models of server, refer to Sections 4.1.2 through 4.1.7.

After system generation is complete, and before the modified system generation parameters can take effect, the values must be saved on the system diskette and the system must be booted from that diskette. To save the new values, first press the escape key as many times as necessary to return to the main Sysgen menu. Then select option 2 (Save Parameters) from the main menu.

Sysgen requests confirmation before writing over the old system configuration parameters. First verify that the diskette is in place in the disk drive. Then respond to the confirmation prompt with a "y" to save the new values or an "n" to return to the menu without writing to the disk.

4.1.2 Setting CS/1-A, CS/1-BSC, and CS/1-SDLC Parameter Values

In most installations, unless the CS/1-A, CS/1-BSC, or CS/1-SDLC is running custom software or unless special installation-dependent requirements exist, no system generation parameters should be changed except those in options 4 and 7 (User Interface Parameters and Clearinghouse Parameters, respectively).

The User Interface Parameters may be used to alter the default privilege levels required to execute Connection Service commands.

**** NOTE ****

Do not establish any privilege level other than User for the SET command. Otherwise, no one will be able to access higher privilege levels, which can be done only through the SET command.

The single parameter in the Clearinghouse menu may be used to specify whether the Communications Server distinguishes between lower and upper case in clearinghouse names.

To review the default values of these parameters, first select option 1 (View/Alter Parameters) from the Sysgen main menu, and then select either option 4 or option 7 from the Module Select Menu.

4.1.3 Setting CS/1-BSC SPMUX Parameter Values

In an SPMUX environment, two types of CS/1 are present. The standard CS/1-BSC interfaces the DCP host front-end processor to the Ethernet; the CS/1-BSC running SPMUX software interfaces UTS terminals to the Ethernet. System generation must be performed on both types of CS/1, on the DCP, and on each UTS terminal in the network.

The network manager must ensure that both the CS/1-BSC running SPMUX software and the DCP are configured with the same mapping of terminal addresses to DCP ports; in addition, the network manager must ensure that the UTS terminals are individually configured with the same addresses. For detailed information, refer to the release memo accompanying the SPMUX software diskette.

For the CS/1-BSC on the DCP side, there is only one system generation parameter that might need to be altered.

This alteration improves performance, but is not mandatory. The decision should be made based on whether the system is to be booted from an NCS/150. If the parameter is changed, the system probably will not be able to boot from the NCS/150, but will have to boot from an onboard disk drive.

To make this alteration, select option 5 from the View/Alter menu, then select option 3 from the Virtual Terminal parameters menu; change the depth of the VT-to-agent mailbox from 1 to 2. Note that increasing the value of this parameter may affect MCPU buffer allocation; contact Bridge Communications, Inc., or an authorized service representative for detailed information.

For the CS/1-BSC running SPMUX software, option 8 of the View/Alter menu is used to define the address mapping between the UTS terminals and the DCP host ports.

When option 8 is selected, the system displays a list of two sub-menus:

- The View/Modify Terminal Addresses menu (option 1) maps CS/1 ports to UTS terminal RID/SID addresses and maps the RID/SID addresses to groups representing DCP ports. By default, 32 terminals are mapped into three DCP ports (twelve each to groups 1 and 2, and eight to group 3).

To alter the RID/SID address or group assignment for a CS/1 port, enter the port number of the affected port. The system will prompt for the RID, the SID, and the group. All values must be specified in hexadecimal; each RID/SID address in a group must be unique.

Each UTS terminal consists of two logical screen devices. The SID specified by the user is assigned to the terminal's first screen, and the CS/1 automatically assigns the next higher SID number to the terminal's second screen. Therefore, the SID portion of any terminal address must be greater than the SID of the previous terminal in the list by at least two, or two logical devices will have duplicate addresses. If the addresses are not unique, the system will not function.

- The View/Modify Host Port Addresses menu (option 2) maps terminal group numbers to the Ethernet addresses of the corresponding DCP ports. The default mapping sets all DCP port numbers to zero and contains no valid Ethernet addresses; the addresses and the DCP port numbers must be specified for each CS/1-BSC running SPMUX software.

To map terminal groups to DCP ports, enter the group number associated with the terminals to be multiplexed on a DCP line. The CS/1 then prompts for the Ethernet address and the port number of the associated DCP port.

No two terminal groups may be assigned to the same Ethernet address and port number.

4.1.4 Setting CS/1-HSM Parameter Values

The system generation procedure for the CS/1-HSM includes both mandatory and optional parameters. To review the default values of these parameters, first select option 1 (View/Alter Parameters) from the main Sysgen menu, and then select option 5 (Virtual Terminal Parameters) from the Module Select Menu.

On the CS/1-HSM, the list of Virtual Terminal parameters includes several parameters specifically applicable to the HSM configuration. The parameters are listed twice, once for each possible HSM board in the unit.

- The Base Port ID parameters specify (in hexadecimal) the lowest number in the range of virtual port numbers accessed through each board. If two HSM boards are present, a base port ID must be specified for each board; if only one HSM board is present, the base port ID must be specified for that board, and the second base port ID must be set to zero. Virtual port numbers must be in the range 32 to 95 (decimal).
- The Number of Ports parameters specify (in hexadecimal) how many virtual ports are assigned to each board. By default, 64 virtual ports are assigned to a single HSM board. This parameter is mandatory if two HSM boards are present. In this case, the 64 virtual ports should be evenly divided between the two boards.

**** NOTE ****

In environments with low or medium data traffic levels through the CS/1-HSM, the server can sustain simultaneous sessions on 64 virtual ports. However, in environments with heavy traffic loads through the CS/1-HSM, Bridge Communications recommends reducing the total number of virtual ports (e.g., to 48).

- The UseDTRin parameters determine how the CS/1-HSM handles the DTR signal from the host. If the parameter is set to 0, the CS/1-HSM ignores DTR from the host. If the parameter is set to 1, a connection to a CS/1-HSM port will not succeed until the host raises DTR and will be disconnected automatically when the host drops DTR.

Before the UseDTRin parameter can be set to 1, the host must be sysgen'ed to generate and respond to modem signals; otherwise, DTR will never be raised and no connections can be made to CS/1-HSM virtual ports.

- The Send XON/XOFF parameters determine whether or not the CS/1-HSM uses XON/XOFF flow control to stop and resume data flow from the host. If the parameter is set to 0, XON/XOFF flow control is disabled. If the parameter is set to 1, the CS/1-HSM will send an XOFF message to stop data flow from the host and an XON message to resume data flow from the host.

If the CS/1-HSM is connected to a VAX running the VMS operating system, the Send XON/XOFF parameter should be set to 1 to prevent timeouts.

- The Break Char parameters determine how breaks are sent to the host. If this parameter is set to 0, the CS/1-HSM sends the host a null character with a framing error when a break signal is received from the terminal. If this parameter is set to a value in the range 0x1 through 0xFF, the CS/1-HSM sends the host the specified ASCII character when a break signal is received from the terminal.

If the CS/1-HSM is connected to a VAX running VMS, this parameter should be set to 0x19 (<CTRL-Y>).

The remaining parameters in the menu should not be altered unless the CS/1-HSM is running custom software.

4.1.5 Setting CS/l-SNA Parameter Values

Option 8 of the View/Alter menu on the CS/l-SNA applies specifically to the CS/l-SNA, and is used to define the interface between the CS/l-SNA and the host's communications processor.

The default values of many parameters are factory set to standard values, and need not be specified unless a different value is required; other parameters have no factory default and must be specified.

The network manager or host system administrator must also run the host system generation procedure to specify appropriate values on the host side. For further information on SNA host system generation, see reference [6].

For the CS/l-SNA, the option 8 menu consists of a list of 11 parameters and submenus that define the SDLC protocol interface and three submenus that define the SNA protocol interface.

The SDLC protocol interface is defined by the following parameters and submenus:

- ☒ The Station Address parameter specifies the SDLC station address of the CS/l-SNA. The parameter value must be in the range 0x0 through 0xFF, and must match the address specified by the host. The default value is 0xC1.
- ☒ The SDLC Window Size parameter specifies the maximum permitted number of outstanding unacknowledged SDLC frames. This value must match the window size specified by the host. The default value is 7.
- ☒ The Maximum SDLC Frame Size parameter specifies the maximum size, in bytes, of an SDLC frame. The size includes the SDLC header, the transmission header (TH), the request/response header (RH), and the request/response unit (RU). The value must match the maximum frame size specified by the host. The default value is 0x10B (decimal 267). Note that increasing the value of this parameter may affect MCPU buffer allocation; contact Bridge Communications, Inc., or an authorized service representative for detailed information.
- ☒ The Number of Devices parameter specifies the maximum number of Logical Units (LUs) supported by the CS/l-SNA. The value must be equal to or less than the maximum number of LUs specified by the host. The parameter value must be in the range 0x1 through 0x18; the default value is 0x10.
- ☒ The Exchange ID parameter specifies the value of the third field of the CS/l-SNA's Exchange ID. An Exchange ID is a 12-digit hexadecimal number that identifies the terminal cluster to the host. The ID consists of three fields; only

the third field can be specified. The first field (4 digits) identifies the physical unit type; PU type 2 (0x0200) is the only value currently supported. The second field (3 digits) specifies that the CS/1-SNA emulates a 3274 cluster controller (0x017). The third field (5 digits) is a unique ID assigned to this CS/1-SNA. The entire Exchange ID must match the ID specified for the CS/1-SNA by the host. This parameter need not be specified if the CS/1-SNA is directly connected to the 37x5; it is applicable only to switched or leased lines.

- The Baud Rate parameter determines the speed of the link between the CS/1-SNA and the host. The CS/1-SNA supports speeds from 110 baud to 64K baud; the default is 4800 baud. This parameter is applicable only if the receive clock and transmit clock are set to internal.
- The Duplex parameter determines whether the link is full duplex or half duplex. If the parameter is set to Full, the SIO board provides a Bell 212-type interface. If the parameter is set to Half, the SIO board provides a Bell 208-type interface.

This parameter is affected by the setting of the Line Mode parameter (see Table 4-1). The default is half duplex for switched lines and full duplex for leased lines and direct connections. To override the default combination, first set Line Mode appropriately, and then set Duplex to the desired value.

- The Interface Type parameter determines whether the CS/1-SNA functions as a DTE or as a DCE. This parameter is affected by the setting of the Line Mode parameter (see Table 4-1). The default value is DTE for switched or leased lines and DCE for direct connection. If the parameter is set to DCE, the connector cable must be a synchronous host cable rather than the standard synchronous modem cable. To override the default combination, first set Line Mode appropriately, and then set Interface Type to the desired value.
- The Sense DCD parameter determines the function of the DCD line (pin 8) on the RS-232 interface. The parameter value is affected by the setting of the Line Mode parameter (see Table 4-1) and the parameter function is affected by the settings of the Duplex and Interface Type parameters (see Table 4-2).

The default value of the Sense DCD parameter is ON for switched lines and OFF for direct connections and leased lines. To override the default combination, first set Line Mode appropriately, and then set Sense DCD to the desired value.

- The Mark Idle parameter determines whether an idle line is in mark state (ON) or sync state (OFF). This parameter is affected by the setting of the Line Mode parameter (see Table 4-1). The default value is ON for switched lines, leased lines, and direct connections. To override the default combination, first set Line Mode appropriately, and then set Mark Idle to OFF.
- The Line Mode parameter determines whether the line is a switched line, a leased line, or a direct connection. The default value is switched line. Changing the value of this parameter automatically changes the values of the Duplex, Interface Type, Sense DCD, and Mark Idle parameters. The effect of Line Mode on these other parameters is illustrated in Table 4-1.

The SNA protocol interface is defined by selecting the following three parameters:

- The Negative Response parameter specifies how the CS/1-SNA responds to an activate message from the host. The host may expect no response, or may expect a negative response plus sense code 8004 (illegal destination address field). The default value is no response.
- The Device Types parameter determines the device type of each logical unit specified in the Number of Devices parameter. The possible device types are Screen and Printer. By default, devices 2 and 3 are printer LUs and the remainder are screen LUs. The menu has 24 fields; if fewer than 24 devices are specified by the Number of Devices parameter, the program automatically sets the device type of any LU not present to Disabled.
- The Default Printer parameter may be used to associate a printer LU with one or more screen LUs. For each LU defined as a screen by the Device Types parameter, the user may specify an associated printer. A single printer LU may be associated with more than one screen LU. By default, printer 2 is associated with screen 0, and printer 3 is associated with screen 1.

 Table 4-1 Effect of Line Mode on Other Parameters

	<u>Switched Line</u>	<u>Leased Line</u>	<u>Direct Connect</u>
Duplex	Half	Full	Full
Interface Type	DTE *	DTE *	DCE **
Sense DCD	ON	OFF	OFF
Mark Idle	ON	ON	ON

* Requires use of synchronous modem cable (CBL-SM-25).

** Requires use of synchronous host cable (CBL-SH-25).

Table 4-2 Interaction Among Sense DCD, Duplex, and Interface Type Parameters

<u>Case</u>	<u>Sense DCD</u>	<u>Duplex</u>	<u>Interface Type</u>	<u>Result</u>
1	ON	Full	DTE	The SIO firmware uses DCD to place the receiver in and out of hunt phase. DCD is on pin 8 on an SIO-SM board and on pin 20 on an SIO-ST board or a CS/100.
2	ON	Full	DCE	The SIO firmware uses RTS to place the receiver in and out of hunt phase. RTS is on pin 5 on an SIO-SM board and on pin 4 on an SIO-ST board or a CS/100.
3	ON	Half	DTE	The SIO firmware uses DCD to place the receiver in and out of hunt phase. DCD is also used to condition transmission; when DCD is true, transmission is inhibited. In this configuration, the DCE device must toggle DCD. DCD is on pin 8 on an SIO-SM board and on pin 20 on an SIO-ST board or a CS/100.
4	ON	Half	DCE	The SIO firmware uses RTS to place the receiver in and out of hunt phase. RTS is also used to condition transmission; when RTS is true, transmission is inhibited. In this configuration, the DCE device must toggle RTS. RTS is on pin 5 on an SIO-SM board and on pin 4 on an SIO-ST board or a CS/100.
5	OFF	Full	DTE	The SIO firmware ignores DCD. DCD is on pin 8 on an SIO-SM and on pin 20 on an SIO-ST or a CS/100.
6	OFF	Full	DCE	The SIO firmware ignores RTS. CTS is constant. RTS is on pin 5 on an SIO-SM board and on pin 4 on an SIO-ST board or a CS/100. CTS is on pin 4 on an SIO-SM board and on pin 5 on an SIO-ST board or a CS/100.
7	OFF	Half	DTE	Same as case 1.
8	OFF	Half	DCE	Same as case 2.

4.1.6 Setting CS/1-TCP Parameter Values

Four options of the View/Alter menu may be specified on the CS/1-TCP. These options are used to determine the TCP internet addresses assigned to the server, to alter the privilege level required to execute Connection Service commands, to define the overall topology of the network, and to specify whether a Internet Name Server exists in the network.

The conventions for specifying TCP/IP internet addresses are discussed in detail in Section 3.1.8.

Option 2 (IP Parameters) is used to assign the server's internet address and to establish the internet routing table.

- Select option 3 of the IP Parameters submenu to assign an internet address to the server. If no internet address is assigned, the server's address defaults to 000.000.000.000.

The network portion of the address must be the same for all TCP servers on the same network, and the host portion of the address must be unique for each TCP server on the network.

- Select option 4 of the IP Parameters submenu to establish the internet routing table. The internet routing table is optional, and need only be established if a gateway to a remote network exists on this network.

When option 4 is selected, the program displays a numbered list of all accessible remote networks (if any have previously been entered), then prompts the user for a selection. Enter the first unused number in the list. The program prompts for the network number of the remote network and then for the full internet address of the gateway through which the remote network can be reached. This process must be repeated for each accessible remote network.

Option 4 (User Interface Parameters) may be used to alter the default privilege levels required to execute Connection Service commands.

**** NOTE ****

Do not establish any privilege level other than User for the SET command. Otherwise, no one will be able to access higher privilege levels, which can be done only through the SET command.

Option 7 (Telnet Parameters) is optionally used to assign internet addresses to physical ports and rotaries on the CS/1-TCP.

- Select option 3 of the Telnet Parameters menu to assign internet addresses to physical ports. An address must be assigned to all physical ports that are to be used as circuit destinations (e.g., host, printer, or dial-out modem ports). Do not assign an address to ports that are not used as circuit destinations (e.g., terminal or dial-in modem ports) or to any port number that is not physically present on the CS/1-TCP (e.g., port 32 on a 16-port system).

- Select option 4 of the Telnet Parameters menu to assign internet addresses to rotaries. An address must be assigned to all rotaries that are to be used as circuit destinations (e.g., arrays of host ports). Do not assign addresses to unused rotary numbers.

Option 8 (Name Server Parameter) is optionally used to specify the address of the Internet Name Server, if one exists in the network. By default, this parameter is set to search the local name database only.

4.1.7 Setting CS/l-X.25 Parameter Values

Three options of the View/Alter menu are applicable to the CS/l-X.25: option 5 (Virtual Terminal Parameters), option 8 (X.25 Parameters), and option 9 (X.25 Address Configuration).

Option 5 of the View/Alter menu on the CS/l-X.25 contains a submenu that is used to map virtual ports to lines. The default mapping distributes 48 virtual ports evenly among eight lines. If the system has only one line, all 48 virtual ports should be assigned to that line. If the system has multiple lines of different speeds to a single X.25 host, the mapping can be used to distribute the load by assigning more virtual ports to the faster line(s). Or, if each line is connected to a different host, more virtual ports can be assigned to the host that typically has higher traffic loads.

The lines are numbered 0 through 7, arranged as shown in Table 4-3.

Table 4-3 CS/l-X.25 Line Numbers

<u>Line No.</u>	<u>Board No.</u>	<u>Port No.</u>
0	1	0
1	1	1
2	2	0
3	2	1
4	3	0
5	3	1
6	4	0
7	4	1

Option 8 of the View/Alter menu on the CS/l-X.25 is used to define the interface between the CS/l-X.25 and the X.25 host.

The parameters are requirements of the X.25 interface, and must be specified for each physical line attached to the CS/l-X.25. The default values of many of the parameters are factory set to values appropriate for a Telenet-compatible host; obtain the appropriate values from the X.25 host documentation.

The option 8 menu lists three submenus: Line Parameters, X.25 Level 2 Parameters, and X.25 Level 3 Parameters. To display the

current value of a parameter or to change a parameter in any of these categories, select the appropriate submenu. The system first prompts for the number of the physical line to which the parameters apply, then displays the selected submenu.

The Line parameter determines the address and physical characteristics of each line, and must be specified once per line:

- The Baud Rate parameter specifies the speed of the synchronous line connected to the CS/1. The default line speed for all lines is 4800 baud.

**** NOTE ****

If two lines connected to the same SIO board are of different speeds, the higher-speed line must be connected to port 0 and the lower-speed line must be connected to port 1.

The X.25 Level 2 parameters are as follows:

- The X.25 Level 2 Window Size parameter specifies the X.25 variable K, which represents the maximum number of outstanding unacknowledged packets permitted at Level 2. The value specified must be in the range 1 through 7; the default value is 7.
- The T1 Timer parameter specifies the value (in milliseconds) of the Level 2 retransmission timer. The value of this parameter depends on the requirements of the X.25 interface; the default value is 3000 milliseconds.
- The T3 Timer parameter specifies the value (in milliseconds) of the X.25 Link Initialization timer. The value of this parameter depends on the requirements of the X.25 interface; the default value is 90000 milliseconds.
- The Number of Retries parameter specifies the value of the X.25 variable N2, which determines how many retries are permitted after the T1 timer elapses. The value of this parameter depends on the requirements of the X.25 interface; the default value is 20, counting both the original transmission and subsequent retransmissions.

The X.25 Level 3 parameters are as follows:

- The DTE or DCE parameter determines whether the CS/1-X.25 functions as a DTE or a DCE. The default value is DCE.
- The X.25 Level 3 Packet Size parameter specifies the maximum packet size permitted by the X.25 interface. The value of this parameter depends on the requirements of the X.25 interface; typical sizes are 128 bytes, 256 bytes, 512 bytes, and 1024 bytes. The default value is 128 bytes. Note

that increasing the value of the Packet Size parameter may affect MCPU buffer allocation; contact Bridge Communications, Inc., or an authorized service representative for detailed information.

The CS/1-X.25 also uses the value of the Level 3 Packet Size parameter to obtain the value of the X.25 variable N1 (the maximum number of bytes per frame). The value of N1 is calculated as the Level 3 Packet Size plus two bytes of HDLC header and three bytes of X.25 Level 3 header.

- The X.25 Level 3 Window Size parameter specifies the maximum number of outstanding unacknowledged packets permitted at Level 3. The range of permitted values is 1 through 7; the default value is 2.
- The Take Reverse Charge Call parameter determines whether the CS/1-X.25 allows reverse charge X.25 calls from the host to the Ethernet. By default, reverse charge calls are accepted.
- The Make Reverse Charge Call parameter determines whether all calls from the CS/1-X.25 to the host are reverse charged. By default, calls are not reverse charged.
- The Incoming Calls Barred parameter determines whether incoming calls (i.e., from the host to the Ethernet) are accepted or refused. By default, incoming calls are accepted.
- The Outgoing Calls Barred parameter determines whether outgoing calls (i.e., from the Ethernet to the host) are accepted or refused. By default, outgoing calls are accepted.
- The Number of Clear Request Retries parameter specifies the maximum number of times a clear request may be retransmitted. The range of permitted values is 1 through 10; the default value is 3.
- The Number of Reset Request Retries parameter specifies the maximum number of times a reset request may be retransmitted. The range of permitted values is 1 through 10; the default value is 4.
- The Number of Logical Channels parameter specifies the maximum number of logical channels permitted per physical line. The value of this parameter depends on the requirements of the X.25 interface; the default maximum is 20.
- The Beginning Logical Channel Number parameter specifies both the Logical Channel Group Number (LCGN) and the number of the first logical channel on the line. The value specified must be in the range 001 through 7FF, in the format

"xyy", where "x" represents the LCGN and "yy" represents the number of the first logical channel on the line. If "x" is omitted, the LCGN defaults to 0; if the parameter is not specified at all, both LCGN and first logical channel number default to 0.

- The T10, T11, T12, and T13 parameters specify the values (in milliseconds) of the X.25 Level 3 DCE timers. The values of these parameters depend on the requirements of the X.25 interface; Table 4-4 lists the default values.
- The T20, T21, T22, and T23 parameters specify the values (in milliseconds) of the X.25 Level 3 DTE timers. The values of these parameters depend on the requirements of the X.25 interface; Table 4-4 lists the default values.

Table 4-4 X.25 Level 3 DCE and DTE Timer Values

<u>Timer Name</u>	<u>Default Value*</u>
T10	60000
T11	180000
T12	60000
T13	60000
T20	180000
T21	200000
T22	180000
T23	180000

* Expressed in milliseconds.

Option 9 of the View/Alter menu on the CS/1-X.25 is used to define the X.25 address of each physical line attached to the CS/1-X.25.

4.2 Backing Up the System Diskette

This procedure applies only to a CS/1 that boots from an internal disk drive. For a CS/1 that boots from an NCS/150, the equivalent procedure is performed on the NCS/150; see reference [5] for more information.

After adjusting and saving system generation parameters and completing any port configuration necessary to establish the appropriate configuration tables, the network manager should make a backup copy of the system diskette.

Note that the Copy command can be executed only immediately after a power-on, reset, or system generation procedure. If communication software has been running prior to the execution of the Copy command, the CS/1 will have to be rebooted into the monitor. Refer to the bootstrap sequences described in the Series/1 Planning and Installation Guide (reference [3]).

For systems with MCPU PROMs designated Release 9 or earlier, the Copy command is stored on the system diskette; the diskette must be in place in the disk drive when the command is executed. For systems with MCPU PROMs designated M1 MMON 01B or later, the command is PROM-based and the system diskette need not be in place when the command is executed.

To create one or more copies of the system diskette, enter the Copy command (co) followed by the number of copies desired. For example, to request two copies, enter:

```
co 2
```

The monitor prompts the user to place the source diskette in the disk drive and press the return key. Next, the monitor prompts the user to place the destination diskette in the drive and press the return key again. This procedure is repeated as many times as specified in the Copy command line.

The destination diskette can be unformatted; the Copy command automatically formats it.

4.3 Installing a Software Update

This section describes the procedure for installing a new software release on a Communications Server that is already configured and in place on the network.

This procedure applies only for a CS/1 that boots from an internal disk drive. For a CS/1 that boots from an NCS/150, the equivalent procedure is performed on the NCS/150; see reference [5] for more information.

The general procedure for installing a software update is to replace only the communications software on the diskette, leaving all port configuration tables and Sysgen parameters undisturbed. The exact procedure varies, depending on the sizes of the old and new software releases.

Some new software releases may be incompatible in terms of code size with prior releases, so that an installation that preserves all configuration information is impossible. In some cases, the existing configuration information may be obsolete, and an installation that preserves all configuration information is unnecessary.

Review the needs of the local installation and refer to the release memo that accompanies the new release to determine which installation procedure to use:

- If the existing configuration information is to be retained, and if the new release is size-compatible with the old release, use the procedure described in this section.
- If the configuration information is not going to be retained, or if the two releases are not size-compatible, use the procedure outlined in the previous section for copying the entire diskette. Then complete the installation by performing the system generation and port configuration procedures.

If the release memo accompanying the software distribution diskette contains different instructions for installing the new software, follow those instructions instead of the procedure described here.

The software update installation procedure is performed using the Copy command. The procedure varies depending on the version of the MCPROM installed in the server. Sections 4.3.1 and 4.3.2 describe the procedures for systems with PROMs designated Release 9 or earlier and for systems with PROMs designated M1 MMON 01B or later, respectively.

4.3.1 MCPU PROM Release 9 or Earlier

To install a software update on a system with an MCPU PROM designated Release 9 or earlier, enter the Copy command with the partial option (-p), followed by the number of copies desired. For example, to make two updated diskettes, enter the command:

```
co -p 2
```

The monitor prompts for the starting block number and then for the ending block number of the range to be copied. The starting and ending block numbers may vary with each software release; refer to the release memo that accompanied the software distribution diskette.

Next, the monitor prompts the user to insert the source diskette in the disk drive and then to insert the destination diskette in the disk drive. This step is repeated as many times as specified in the command line.

4.3.2 MCPU PROM Release M1 MMON 01B or Later

To install a software update on a system with an MCPU PROM designated M1 MMON 01B or later, enter the Copy command with the partial option (p), followed by the starting and ending block numbers:

```
co p <starting block> <ending block>
```

The starting and ending block numbers vary with each software release; refer to the release memo that accompanied the software distribution diskette for these numbers.

For example, to copy the range of blocks from 200 through 220, enter the command:

```
co p 200 220
```

The monitor prompts the user to insert the source diskette in the disk drive and then to insert the destination diskette in the disk drive.

With these PROMs, multiple copies may not be specified in the command line. To update multiple diskettes, repeat the procedure once for each copy.

4.4 Formatting a Diskette

This section describes the procedure for formatting a blank diskette for use on a Communications Server; it applies only to a CS/1 with an internal disk drive.

During normal CS/1 use, only the system diskette supplied by Bridge is needed. However, the network manager may want to keep two blank, formatted diskettes available in case a memory dump is necessary to help diagnose a system failure. The procedure for obtaining a memory dump is described in Section 4.5.

**** NOTES ****

On a CS/1 with MCPU PROMs designated M1 MMON 01C or later, the memory dump procedure automatically formats the diskette, so the network manager need not preformat the diskette.

If a diskette is intended to hold communications software, formatting is not normally required, since the Copy command automatically formats the diskette. Format the diskette only if specifically instructed to do so by a Bridge service representative.

The procedure varies depending on the revision level of the MCPU PROMs present in the system.

4.4.1 MCPU PROM Release 9 or Earlier

For systems with MCPU PROMs designated Release 9 or earlier, to format both sides of the diskette currently in the disk drive, enter the following command:

fo

**** CAUTION ****

Ensure that the appropriate diskette is in the disk drive before terminating the command with the return key. After the return key is pressed, the system immediately formats whichever diskette is present, thus erasing all information previously on the diskette.

4.4.2 MCPU PROM Release M1 MMON 01B or Later

For systems with MCPU PROMs designated M1 MMON 01B or later, to format both sides of the diskette currently in the disk drive, enter the following command:

```
fo <density>
```

**** CAUTION ****

Ensure that the appropriate diskette is in the disk drive before terminating the command with the return key. After the return key is pressed, the system immediately formats whichever diskette is present, thus erasing all information previously on the diskette.

For a diskette intended to hold a memory dump, specify 8 sectors per track for all CS/1 models.

For a diskette intended to hold communications software, specify 8 sectors per track for all CS/1 models except the CS/1-SNA, and 9 sectors per track for the CS/1-SNA only.

**** NOTE ****

If a diskette is intended to hold communications software, formatting is not normally required, since the Copy command automatically formats the diskette. Format the diskette only if specifically instructed to do so by a Bridge service representative.

If the command line does not specify a density, the system returns an error message and aborts the command.

4.5 Obtaining a Memory Dump

This procedure is used on the CS/1 to write the contents of the MCPU RAM and the ESB RAM onto diskettes following a system crash. For the CS/1-SNA, a dump may also be made of the Screen Buffer Board (SBB) RAM. The information is used by Bridge Communications' technical support staff to diagnose the cause of the crash.

The procedure is applicable only to systems with a local disk drive.

The procedure is valid only if the MCPU Auto Reboot option was disabled prior to the crash. (To disable Auto Reboot, remove jumper F in MCPU configuration area E1.) Otherwise, the system resets and reboots automatically after a crash, overwriting both MCPU and ESB RAM memory.

The procedure varies depending on the amount of memory in the system, the revision level of the MCPU PROM, and the server type:

- Section 4.5.1 describes the procedure for systems with either 256K or 384K memory and MCPU PROMs designated M1 MMON 01B or earlier.
- Section 4.5.2 describes the procedure for systems with 384K memory and MCPU PROMs designated M1 MMON 01C or later.
- Section 4.5.3 describes the additional procedure required to make a memory dump of the CS/1-SNA SBB board.

Whichever procedure is used, please send the following additional information along with the dump diskettes:

1. The release number of the software running in the system.
2. The release numbers of all firmware in the system.
3. The transceiver brand name and model number.
4. The date and time at which the crash occurred, and any information available about the network traffic load at that time.
5. The condition of all LED indicators on the server front panel and on individual boards.
6. The extent of the system affected (i.e., a single port, several ports, or the entire unit).
7. A description of any symptoms present prior to the crash.
8. The text of any error messages that appeared on the console terminal at the time of the crash (if one was attached).

9. The text of any error messages that appeared on the console terminal during any step of the dump procedure, as well as a description of any action taken to recover from the error (e.g., skipped the step, repeated the step successfully).

4.5.1 MCPU PROM Release M1 MMON 01B or Earlier

This procedure requires two previously formatted diskettes; the instructions for formatting diskettes are provided in Section 4.4.

To obtain a memory dump, perform these steps from the console terminal:

1. Display the contents of the system registers by entering the Display Register command:

```
dr
```

Write down the values listed in the resulting display. This information must be sent along with the dump diskettes.

2. At this point, if the diskettes have not been formatted, use the procedure outlined in the previous section to format them. Formatting the diskettes prior to obtaining the contents of the system registers (step 1) erases the contents of the registers.
3. Insert the first formatted diskette into the disk drive.
4. Write the contents of the MCPU RAM to the diskette. (For 256K systems, this is the entire MCPU RAM area; for 384K systems, this is the first 256K bytes of MCPU RAM.) Enter the Write command as follows:

```
w 1 0 40000
```
5. When the write is complete and the Disk Activity light on the disk drive goes out, remove the diskette and label it "MCPU RAM DUMP."
6. Insert the second formatted diskette into the disk drive.

7. Write the contents of the ESB RAM to the diskette by entering this version of the Write command:

```
w 1 100000 1ffe0
```

If this step fails, write down the error message and include this information with the dump diskettes; then continue to the next step.

8. If this is a 384K system, write the remaining 128K bytes of MCPU RAM to the same diskette by entering this version of the Write command:

```
w 101 40000 20000
```

9. When the write is complete, remove the diskette and label it "ESB RAM DUMP" (for 256K systems) or "ESB RAM AND MCPU RAM DUMP" (for 384K systems).
10. Send the diskettes, the register values displayed in step 1, and any applicable information from the list at the beginning of Section 4.5 to Bridge Communications or an authorized service representative.

In some instances a crash may leave the disk drive unusable because some monitor parameters were overwritten. In this case, the system may respond to step 4 with an error message. To recover from this condition, enter the Software Reset command:

```
k
```

This procedure should reinitialize the monitor correctly without causing too much information to be lost. Return to step 4 above and continue with the memory dump. The information sent with the diskettes should include a note that the Software Reset command had to be entered.

4.5.2 MCPU PROM Release M1 MMON 01C or Later

The procedure for obtaining a memory dump is much simpler for systems with PROMs designated M1 MMON 01C or later. This procedure requires two diskettes.

It is not necessary to preformat the diskettes or to enter the Display Register command; the Dump command automatically performs these steps.

1. From the console terminal, enter the Dump command:

du

The system writes the first 256K bytes of MCPU RAM memory onto the first diskette.

2. When the write is complete, and the Disk Activity light goes out, remove the diskette from the drive and label it "MCPU RAM DUMP."
3. Insert the second diskette. The system then writes the ESB RAM memory and the remaining bytes of MCPU RAM memory onto the second diskette.
4. When the write is complete, and the Disk Activity light goes out, remove the diskette and label it "ESB RAM AND MCPU RAM DUMP."
5. Send the diskettes, along with all the applicable information indicated at the beginning of Section 4.5, to Bridge Communications or an authorized service representative.

In some instances a crash may leave the disk drive unusable because some monitor parameters were overwritten. In this case, the system may respond to step 1 with an error message. To recover from this condition, enter the Software Reset command:

k

This procedure should reinitialize the monitor correctly without causing too much information to be lost. Return to step 1 and continue with the memory dump. The information sent with the diskettes should include a note that the Software Reset command had to be entered.

4.5.3 CS/1-SNA Screen Buffer Board Dump

This procedure is used to obtain a dump of the SBB board RAM. It applies only to CS/1-SNA systems that contain an SBB board.

1. Insert a formatted diskette in the disk drive (refer to Section 4.4).
2. Write the contents of the SBB RAM to the diskette by entering this version of the Write command:

```
w 1 140000 40000
```

3. When the write is complete, remove the diskette and label it "SBB RAM DUMP."

Send the SBB, MCPU, and ESB dump diskettes, along with any applicable information from the list at the beginning of Section 4.5, to Bridge Communications or an authorized service representative.

6.0 PORT CONFIGURATION

This section describes the port configuration parameters and provides sample configurations for devices of various types. The information is grouped into the following sections:

- Section 6.1 describes the configuration parameters applicable to asynchronous ports and provides sample configurations appropriate for various asynchronous devices.
- Section 6.2 describes the configuration parameters applicable to character-synchronous ports and provides sample configurations appropriate for various character-synchronous devices.
- Section 6.3 describes the configuration parameters applicable to bit-synchronous devices.
- Section 6.4 describes the configuration parameters applicable to ports on the CS/1-X.25.
- Section 6.5 describes the configuration parameters applicable to the CS/1-HSM, the CS/1-SNA, and the CS/100-488.

Each port on the Communications Server has a set of default configuration parameters that determine how the port and the attached device interact. Some of the parameters may have to be adjusted for the local installation.

The default parameter tables are stored in the server's memory and in files on the diskette. The tables on the diskette are stored with filenames consisting of numbers corresponding to the ports to which the files apply. Default parameters are divided into four categories:

- Port parameters are dependent on the needs of the attached device, and typically remain constant for a single port.
- Session parameters are more likely to vary when the attached device is communicating with different remote devices or running different applications.
- Editing parameters determine the functions of several special characters.
- Global parameters (e.g., passwords or welcome messages) apply to all ports on a Communications Server.

When a port becomes active, the system creates a working parameter table by copying the port's port parameters, editing parameters, and the global parameters from the default parameter table. When a session is established to a remote device, the server com-

pletes the active parameter table by copying the session parameters from the port's default parameter table. For each new session, the system creates a new active parameter table based on the default parameter table.

For asynchronous ports, settings in both the active and default parameter tables can be altered. For character-synchronous and bit-synchronous ports, only default parameter tables can be altered. For virtual ports on the CS/1-HSM, CS/1-SNA, and CS/100-488, only default parameter tables can be altered, and only a limited number of parameters apply.

Active parameters can be changed only while an active parameter table exists. The change remains in effect only as long as the active parameter table is in use (i.e., while the port remains in Command mode or while a connection exists).

Default parameters can be changed at any time. The SETDefault command changes the default parameter table stored on the disk. The change takes effect the next time the system uses the default table to create a new active parameter table.

**** NOTE ****

A Global Network Manager can set default parameters remotely, but only if the destination server is running, not if it is powered off or running utilities from the monitor.

Some of the commands that affect parameter tables are Read, Save, SET, and SETDefault:

- Read reads an entire table into memory from diskette.
- Save writes an entire table from memory onto diskette.
- SET changes the setting of an active parameter.
- SETDefault changes the setting of a default parameter.

Figure 6-1 illustrates the effects of these commands. Refer to Section 3.2 for detailed descriptions of these commands and of the SHow command, which (depending on the option selected) displays the parameters in default or active parameter tables.

Many parameters can be specified with either the SET command or the SETDefault command. Other parameters can be specified only with the SET command or only with the SETDefault command. The parameter descriptions in the following sections indicate which command(s) can be used to specify each parameter.

In the detailed descriptions, values separated by vertical bars are mutually exclusive (i.e., only one can be specified). Where a list of mutually exclusive values is separated from another

such list by a comma, one value can be specified from each list. Sets of nonexclusive values (i.e., more than one of which can be specified) are enclosed in parentheses and separated by commas.

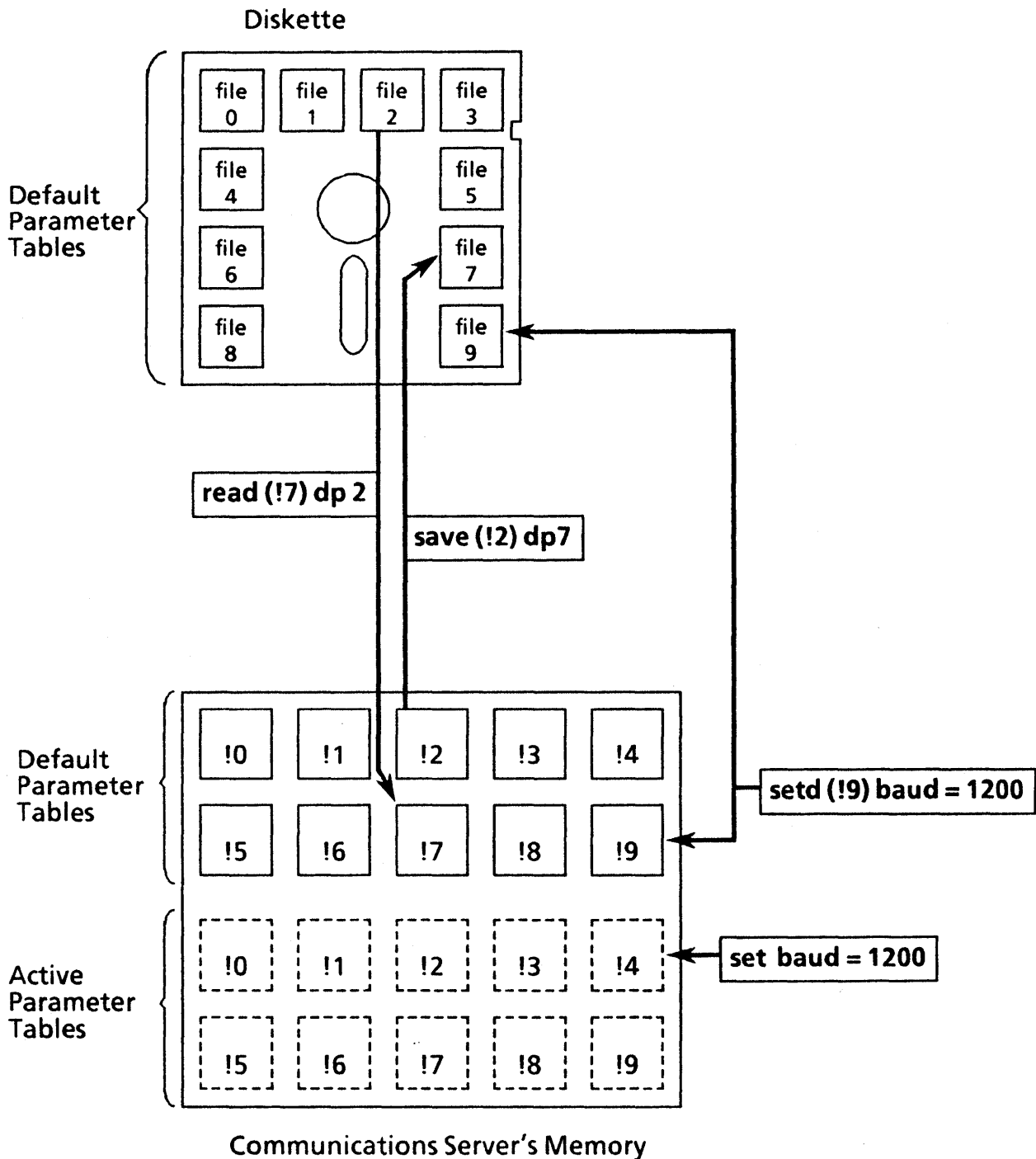


Figure 6-1 Effects of the Read, Save, SET, and SETDefault Commands

6.1 Asynchronous Configuration Parameters

Table 6-1 is a summary of all asynchronous port parameters, listed alphabetically. Upper case characters represent the minimum unambiguous abbreviation of each parameter.

All of the parameters apply to ports on a CS/1-A and a CS/100-A. For ports on TCP servers, all of the parameters apply except those used for access control and for NCS/150 audit trail functions.

Table 6-1 Asynchronous Configuration Parameter Summary

<u>Parameter</u>	<u>Section</u>	<u>Parameter</u>	<u>Section</u>
AccessGroup *	6.1.1	GlobalPassWord	6.1.5
AccessWord *	6.1.1	GroupxPasswd	6.1.5
AUditServerAddr *	6.1.5	IdleTimer	6.1.3
AUTODisconnect	6.1.1	InitMacro	6.1.1
BAud	6.1.2	InterAction	6.1.1
BootServerAddr *	6.1.5	LFDelay	6.1.2
BReakAction	6.1.3	LFInsertion	6.1.3
BReakChar	6.1.3	LFPad	6.1.2
BSDelay	6.1.2	LineERase	6.1.4
BSPad	6.1.2	LinePRotocol	6.1.2
BUffersize	6.1.1	LocalEDiting	6.1.4
CONNectAudit *	6.1.5	LocalPassWord	6.1.5
CRDelay	6.1.2	LongBReakAction	6.1.3
CRPad	6.1.2	MaxSessions	6.1.1
DataBits	6.1.2	MOde	6.1.3
DataForward	6.1.3	NMPrompt	6.1.5
DATE	6.1.5	Organization *	6.1.5
DeVice	6.1.1	PARity	6.1.2
DIscconnectAction	6.1.3	PRivilege	6.1.1
DOmain *	6.1.5	PROMPt	6.1.5
DUplex	6.1.2	ReprintLine	6.1.4
ECHOData	6.1.3	StopBits	6.1.2
ECHOMask	6.1.3	TabDelay	6.1.2
ECMChar	6.1.3	TabPad	6.1.2
EOM	6.1.3	UseDCDout	6.1.2
ERase	6.1.4	UseDTRin	6.1.2
ERRorAudit *	6.1.5	VERBatim	6.1.4
FFDelay	6.1.2	WelcomeString	6.1.5
FFPad	6.1.2	WordERase	6.1.4
FlowControlFrom	6.1.3	XOFF	6.1.3
FlowControlTo	6.1.3	XON	6.1.3
FlushVC	6.1.3		

* Not applicable to TCP servers.

6.1.1 Asynchronous Port Transmission Parameters

This section describes the asynchronous port transmission parameters, usually set by the network manager for each port. The parameters and their permitted values are listed in Table 6-2. Except for the PRIVilege parameter, these parameters apply to both asynchronous and synchronous ports.

Following the table are descriptions of all parameters and parameter values. If the indicated default value is the value desired, the parameter need not be set.

Table 6-2 Asynchronous Port Transmission Parameters

<u>Parameter</u>	<u>Permitted Values</u>
AccessGroup	NoGroup AllGroups (1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9 , 10 , 11 , 12 , 13 , 14 , 15 , 16)
AccessWord	NoGroup AllGroups (1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9 , 10 , 11 , 12 , 13 , 14 , 15 , 16)
AUTOdisconnect	Disabled <number> (1-16000 minutes)
BUffersize	<number> (1-512 bytes)
DeVice	(Host Terminal , Paper Glass)
InitMacro *	<string> (macro name)
InterAction	(Brief Verbose , Echo NoEcho , MacroEcho NoMacroEcho , BroadcastON BroadcastOFF , LFinsert NOLFininsert)
MaxSessions	<number> (1-8 sessions)
PRIVilege **	User LocalNM GlobalNM

* Can be set only with SETDefault, not SET.

** Can be set only with SET, not SETDefault.

The AccessGroup and AccessWord parameters together determine which ports can make connections to which ports. When a connection is requested, the system compares the AccessWord of the requesting port with the AccessGroup of the destination port. If at least one common number appears in both sets, the connection is established. If no common numbers appear, the system prompts the user for a password associated with the AccessGroup parameter for the destination port (see Section 6.1.5). If the AccessGroup has more than one value, the password for any one of the values is accepted. Each of the two parameters can have the value NoGroup, AllGroups, or one or more numbers from 1 to 16. The default value for both parameters is 1.

The AccessGroup and AccessWord parameters do not apply to TCP servers.

The AUTODisconnect parameter specifies an interval after which the current session is disconnected if no activity occurs. The AUTODisconnect interval can be set to a number of minutes in the range 1 to 16000. The default value is 60 minutes. This parameter applies to host ports only.

The BUffersize parameter specifies the size of the data buffer in bytes. It can be set to a value in the range 1 to 512. The data buffer accumulates data until either the buffer becomes full or the interval specified by the IdleTimer parameter elapses; then the data is packetized and forwarded. The conditions under which data is forwarded are also affected by the value of the DataForward parameter. The default buffer size is 82, unless it has been modified during the system generation procedure. Normally, a CS/1 can have up to four ports whose BUffersize is set to 512; the BUffersize for the remaining ports must not exceed 82 for each port. A CS/100 can have up to two ports whose BUffersize is set to 512; the BUffersize for the remaining ports must not exceed 82 for each port.

The DeVice parameter specifies the local device type. One of two primary values can be specified:

Host | Terminal

Specifies whether the device is a host or a terminal.

Setting Device to Host causes the following parameters to be reset automatically: BReakAction is set to Ignore, AUTo-Disconnect is set to 60, and ECMChar and BReakChar are disabled. The BUfferSize parameter is set to the buffer size specified at the time of system generation.

Setting Device to Terminal causes the following parameters to be reset automatically: BReakAction is set to EscDTM, InterAction is set to Verbose and Echo, and BUfferSize is set to the buffer size specified at the time of system generation.

On the CS/1, the default Device parameter values are Host for ports 0 through 3 of each SIO board, and Terminal and Glass for ports 4 through 7 of each SIO board. On the CS/100, the default values are Host for ports 8 and 9, and Terminal and Glass for ports 0 through 7.

If Device is set to Terminal, one of the following secondary characteristics can also be specified:

Paper | Glass

Determines whether the terminal is a video display unit (Glass, the default) or a hardcopy printer (Paper). This affects how backspacing is handled during local editing, for instance, when the user erases a character or a word using the backspace key or the local editing characters. If Device is set to Glass, the Communications Server moves the terminal cursor to the left one column for each character erased. If Device is set to Paper, the Communications Server prints a crosshatch symbol (#) for each character erased instead of moving the print mechanism.

The InitMacro parameter specifies the name of a port initialization macro to be executed automatically each time the device makes a transition from Listening mode to Command mode (refer to Section 2.4.3). The macro itself is defined with the DEFine command (refer to Section 3.2).

**** NOTE ****

This parameter cannot be used to establish a system initialization macro; a system initialization macro can be established only by defining a macro whose name begins with the letters "init" (refer to Section 3.2 for further information).

The InterAction parameter describes the interaction between the local device and the Communications Server. This parameter has no effect on a host port. The possible values are:

Verbose | Brief

Determines whether responses or error messages from the Communications Server to the local device are sent in their short form (Brief) or full-length form (Verbose, the default). Brief responses are "OK" if the requested action is successful, and "Err <n>" if an error is encountered. This pair of values also determine whether broadcast messages are preceded by a header indicating the port number of the sender of the message. Appendix A lists all error messages and their corresponding error numbers. The value Brief is appropriate for a host or a terminal emulator program; Verbose is appropriate for a terminal.

Echo | NoEcho

Determines whether input from the local device, while the device is in Command mode, is echoed back to the device. The default is Echo.

MacroEcho | NoMacroEcho

Determines whether or not macros are echoed on the screen as they are executed. The default is MacroEcho.

BroadcastON | BroadcastOFF

Determines whether or not the port receives broadcast messages. The default is BroadcastON.

LFinsert | NoLFinsert

Determines whether or not the server echoes a return and a linefeed when the user enters a command. This option is useful in half-duplex mode on a terminal that does not echo a linefeed with a return. The default is NoLFinsert.

The MaxSessions parameter specifies the maximum number of open sessions permitted on a single port. The parameter can be set to a number in the range 1 to 8. The default value is 2.

The PRiVilege parameter specifies the privilege level of the local device. This parameter affects all sessions, not just the current or next session. Privilege is not affected if a new configuration table obtained via the Read command contains a different privilege level (see Section 3.2 for a description of the Read command). The default value is User. The PRiVilege parameter is the only parameter whose default value cannot be changed with the SETDefault command. Three privilege levels are available:

User

Specifies User privilege level. User privilege permits the user to display or set characteristics for the local device port.

LocalNM

Specifies Local Network Manager privilege level. This level permits the user to set characteristics and control the status of any port on the local Communications Server and to define the setup of the local Communications Server.

GlobalNM

Represents Global Network Manager privilege level. This privilege level permits the user to set characteristics and control the status of any port on the network and to define the setup of either the local or a remote Communications Server.

6.1.2 Asynchronous Port Physical Parameters

This section describes the port physical parameters, which are usually set by the network manager for all ports. The parameters and their possible values are summarized in Table 6-3.

Table 6-3 Asynchronous Port Physical Parameters

<u>Parameter</u>	<u>Permitted Values</u>
BAud	Low AutoBaud Hi AutoBaud 50 75 110 134.5 150 200 300 600 1200 1800 2400 3600 4800 7200 9600 19.2K 38.4K *
BSDelay/ CRDelay/ FFDelay/ LFDelay/ TabDelay	None <number> (1-127 sixtieths of a second)
BSPad/ CRPad/ FFPad/ LFPad/ TabPad	None <number> (1-127 nulls of padding)
DataBits	5 6 7 8
DUPlex	Half Full
LineProtocol **	ASynchronous BYTESynchronous BITSynchronous
PARity	None Odd Even 1 0 AutoParity
StopBits	1 1.5 2
UseDCDout **	(AlwaysAssert OnConnection , ToggleonDisc NoToggle)
UseDTRin **	Ignore AsDTR AsDCD

* Applies to CS/1 only.
** Can be set only with SETDefault, not SET.

The BAUD parameter specifies the local device baud rate. All baud rates listed in Table 6-3 are supported. Because the CS/1 supports a broader range of baud rates than the CS/100, some limitations apply when the REMoteSET command is used to set the baud rate on a remote device (see the discussion of the REMoteSET command in Section 3.2).

If the BAUD parameter is set to Low_AutoBaud, the Communications Server automatically selects the appropriate device baud rate of 300 or 1200 baud. If the BAUD parameter is set to Hi_AutoBaud, the Communications Server automatically selects the appropriate device baud rate of 2400, 4800, or 9600. If either autobaud value is selected, the first sequence entered after the device is powered on or reset must be "<RETURN>.<RETURN>". The default BAUD value is 9600.

The xxDelay parameters specify the length of the delay (in sixtieths of a second) following the echo or transmission of the specified character before the Communications Server echoes or transmits another character. The default value is None (i.e., no delay). This parameter is designed for use with terminals with a moving print-head mechanism. The delay allows the mechanism to complete its motion before subsequent characters are received.

The xxPad parameters specify the number of nulls the Communications Server inserts between the specified character and the next character. The default value is None (i.e., no nulls inserted). These parameters are alternate forms of the xxDelay parameters.

The DataBits parameter specifies the number of databits per byte. The value can be set to 5, 6, 7, or 8. The default is 8 for all host ports, for one of the terminal ports on the CS/100, and for one of the terminal ports on each CS/1 SIO board. The default for most terminal ports is 7.

The DUPlex parameter specifies whether the local device transmits and receives in half-duplex mode or full-duplex mode. The default value is Full; half-duplex mode is not currently implemented.

The LineProtocol parameter specifies the type of line protocol used by the port. For a CS/1-A or a CS/100-A, any value other than ASynchronous is illegal. The Communications Server automatically sets the value based on the SIO firmware present on the board.

The PARity parameter specifies the local device parity. The values that can be specified are None, Odd, Even, 1 (mark), 0 (space), or AutoParity. The default value is None for host ports (ports 0 through 3 on each CS/1 SIO board and ports 8 and 9 on the CS/100). The default value varies for each terminal port. Refer to the tables in Section 3.2.

The value `AutoParity` is valid only if the `BAud` parameter is set to `Lo_AutoBaud` or `Hi_AutoBaud`.

If `AutoParity` is in effect, the first sequence entered after the device is powered on or reset must be "`<RETURN>.<RETURN>`".

The `StopBits` parameter specifies the number of stopbits per byte. The value can be set to 1, 1.5, or 2. The default is 1.

The `UseDCDout` parameter specifies how the Communications Server supplies the Data Carrier Detect (DCD) signal to the attached device. This option is supported on all ports of the CS/1-A and the CS/100-A. Only some ports on other CS/1 types support this option. Refer to the appropriate Planning and Installation Guide for mapping between DCD, DTR, and the EIA connector pins. One each of two sets of parameter values can be specified:

`AlwaysAssert` | `OnConnection`

Determines when the DCD output signal is asserted.

`AlwaysAssert` causes the DCD output signal to be asserted at all times.

`OnConnection` causes the DCD output signal to be deasserted as long as no connection is established to the device and asserted when a connection is made.

`ToggleonDisc` | `NoToggle`

Determines whether or not the DCD output signal toggles when a connection is broken.

`ToggleonDisc` causes the DCD output signal to be deasserted for at least 65 milliseconds within 150 microseconds after disconnection. Depending on the other `UseDCDout` parameter setting, the signal then either remains deasserted or returns to asserted. This value is used when the Communications Server is connected to certain data switch devices.

`NoToggle` suppresses the toggle upon disconnection. The signal either stays asserted or changes cleanly to deasserted, depending on the other `UseDCDout` parameter setting.

The default value of `UseDCDout` is `AlwaysAssert`, `NoToggle` for all terminal ports and `OnConnection`, `NoToggle` for all host ports. The interaction between these sets of values is illustrated in Figure 6-1; Table 6-12 lists recommended settings of the `UseDCDout` parameter for use with various devices (both figure and table are in Section 6.1.9).

The UseDTRin parameter specifies the response of the Communications Server to the value of the Data Terminal Ready (DTR) input signal received from the attached device. This option is supported on all ports of the CS/1-A and the CS/100-A. Only some ports on other CS/1 types support this option; refer to the appropriate Planning and Installation Guide for mapping between DCD, DTR, and the EIA connector pins. One of three parameter values can be specified:

Ignore

Specifies that the Communications Server does not check the state of the DTR or DSR input signal when a connection is made and takes no action when the signal changes value.

This value should never be specified if the FlowControlTo and FlowControlFrom parameters are set to CTS_RTS (refer to Section 6.1.3). When the FlowControlFrom/To parameters are set to CTS_RTS, the SIO firmware uses DTR to enable and disable the SIO receiver; the UseDTRin parameter must not be set to Ignore or the SIO receiver is never enabled, and the port appears to hang. If the application requires that the DTR signal be ignored, the customer must build a special cable that holds the DTR signal high.

AsDTR

Specifies that the Communications Server checks the state of the DTR input signal before establishing a connection to a port. If the DTR input is deasserted, the unit rejects any connection requests to the port. If the DTR input changes from asserted to deasserted, all connections to the port are terminated and the port enters Listening mode. If the device is a terminal and the input signal changes from deasserted to asserted, a Connection Service process is started for the port (i.e., the WelcomeString is transmitted to the terminal and the InitMacro, if any, is executed). This value is the default for both terminal ports and host ports.

AsDCD

Specifies that the Communications Server does not reject a connection request to the port based on the value of the DTR input. However, if the DTR input changes from asserted to deasserted, all connections to the port are terminated and the port enters Listening mode. If the device is a terminal and the input signal is changed from deasserted to asserted, a Connection Service process is started for the port.

The default value of the UseDTRin parameter is AsDTR for both terminal ports and host ports.

6.1.3 Asynchronous Session Transmission Parameters

Table 6-4 lists the session transmission parameters. Following the table is a description of each parameter, an explanation of each possible value, and an indication of the default.

These parameters can be set with either SET or SETDefault unless otherwise indicated in the table.

Table 6-4 Asynchronous Session Transmission Parameters

<u>Parameter</u>	<u>Permitted Values</u>
BReakAction	IGnore (OutofBand , FlushVC , InBand , EscDTM)
BReakChar	Disabled <char>
DataForward	None (AlphaNum , CR , Control , ESC , EDiting , FormEf , Punct , Term)
DisconnectAction	None SendLongBreak
ECHOData	OFF ON
ECHOMask	None (AlphaNum , CR , Control , ESC , EDiting , FormEf , Punct , Term)
ECMChar	Disabled <char>
EOM	Disabled <char>
FlowControlFrom/To	None XON_XOFF CTS_RTS ENQ_ACK
FlushVC *	OFF ON
IdleTimer	Disabled <number> (1-255 sixtieths of a second)
LFInsertion	None (OutputCrlf , EchoCrlf)
LongBReakAction	IGnore (Listen , OutofBand , InBand)
MOde	Transparent Scroll
XOFF	Disabled <char>
XON	Disabled <char>

* Can be set only with SET, not SETDefault.

The BReakAction parameter specifies the action taken by the Communications Server when a break (or the alternative character specified by the BReakChar parameter) is detected. The value IGnore is mutually exclusive with any other value; more than one of the remaining values can be specified. The default value is InBand for terminal ports and IGnore for host ports. There are five possible values:

IGnore

Specifies no action.

OutofBand

Specifies that an out-of-band break is transmitted to the remote device.

InBand

Specifies that an in-band break is transmitted to the remote device (default).

EscDTM

Specifies that the user port will change from Data Transfer mode to Command mode.

FlushVC

Specifies that all packets for this session currently in the circuit are flushed when a break is detected.

This value implements X.3 parameter 7 and operates in conjunction with the FlushVC parameter (X.3 parameter 8). This value must not be specified unless the destination host supports X.3 parameters 7 and 8 or equivalent functions. Refer to the FlushVC parameter for a description of how this BReakAction value operates.

The BReakChar parameter specifies the character that is interpreted by the server as a break signal. This parameter is useful for terminals that do not have a break key. Since most terminals have a break key, the default is Disabled.

The DataForward parameter specifies the events that cause data to be packetized and forwarded in Data Transfer mode. Some events are predetermined DataForward conditions; these include the elapsing of the IdleTimer (if enabled), the End of Message (EOM) signal, and the ATTN or break signal. One or more of the events listed below can also be specified. The default DataForward value is None, which is mutually exclusive with any other value.

None

Specifies that data is forwarded if the data buffer (size specified by the `BufferSize` parameter) becomes full, or the `IdleTimer` elapses (if set). This is the default value.

AlphaNum

Specifies that a packet is created and forwarded as soon as any upper or lower case alphabetic character or numeric character is detected.

Control

Specifies that a packet is created and forwarded as soon as any control character is detected.

CR

Specifies that a packet is created and forwarded as soon as a return is detected.

ESC

Specifies that a packet is created and forwarded as soon as an escape (`ESC`, `BEL`, `ENQ`, or `ACK`) signal is detected.

EDiting

Specifies that a packet is created and forwarded as soon as any editing character is detected. Alternative editing characters can be specified; refer to Section 6.1.4 for a list of the characters and their default values.

FormEf

Specifies that a packet is created and forwarded as soon as any "Form Effector" character is detected. Form Effectors are the linefeed, tab, and formfeed characters.

Punct

Specifies that a packet is created and forwarded as soon as any "punctuation" character is detected (includes all the nonalphanumeric "graphics" characters, i.e., `! @ # $ % ^ & * () _ - + = ~ ` | \ [] { } : ; " ' < > , . ? /` and space).

Term

Specifies that a packet is created and forwarded as soon as any terminator (`ETX` or `EOT` signal) is detected.

The DISconnectAction parameter specifies the action taken by the Communications Server when a session is disconnected. This parameter is applicable only to host ports, and only to hosts that distinguish between the break signal (approximately 150 milliseconds) and the long break signal (approximately 3 seconds). There are two possible values:

SendLongBreak

Specifies that the server sends a long break to the host when a session is disconnected.

None

Specifies that no long break is sent on disconnection (default).

The ECHOData parameter specifies whether or not the Communications Server will echo input data back to the device while the device is in Data Transfer mode. The default value is OFF.

The ECHOMask parameter specifies which characters are echoed if ECHOData is enabled. The character classes are the same as those listed for the DataForward parameter. If ECHOData is enabled, then all characters that fit the ECHOMask descriptions are echoed when typed. The default ECHOMask value is None.

The ECMChar parameter specifies a character that is interpreted by the Communications Server as a request to change from Data Transfer mode to Command mode. The default value is "^" (representing the character <CTRL-caret>). The defined character cannot be transmitted as data. This parameter is used only if the application requires that a break signal be transmitted as data (i.e., the BreakAction parameter is set to InBand or OutofBand).

** NOTE **

The ECMChar does not change from Data Transfer mode to Command mode if the IdleTimer parameter is set to Disabled and the DataForward parameter is set to None.

The EOM parameter specifies a character to represent the local End of Message (EOM) signal. When the parameter is set to Disabled (the default), every packet that is transmitted is terminated with an EOM signal; in this case, the EOM parameter for the destination port should be set to the same value.

The FlowControlFrom and FlowControlTo parameters specify the flow control mechanism from the Communications Server to the local device (i.e., the Communications Server can turn transmission from the local device on or off) and from the local device to the Communications Server (i.e., the local device can turn transmission from the Communications Server on or off), respectively. For all ports, the default value of both FlowControlFrom and FlowControlTo is XON_XOFF.

These parameters govern local flow control (i.e., between the local device and the local server). The remote device can use different flow control than the local device, since flow control across the network is handled by the servers at either end of the circuit independently of local flow control. Permitted values are:

None

Specifies that no flow control is used.

XON_XOFF

Specifies that the characters defined by the XON (transmit on) and XOFF (transmit off) parameters are used.

CTS_RTS

Specifies that the hardware control lines CTS and RTS are used. Refer to the appropriate Planning and Installation Guide for the mapping between these lines and EIA connector pins, and to Section 6.1.2 for a description of the UseDTRin parameter. This value must not be selected if UseDTRin is set to Ignore. When the FlowControlFrom/To parameters are set to CTS_RTS, the SIO firmware uses DTR to enable and disable the SIO receiver; the UseDTRin parameter must not be set to Ignore or the SIO receiver will never be enabled, and the port will appear to hang. If the application requires that the DTR signal be ignored, the customer must build a special cable that holds the DTR signal high.

ENQ_ACK

Specifies that the ENQ/ACK flow control protocol is used. If this value is set, the server sends the device an ENQ message before sending a block of data, and sends the data only if the device responds with an ACK message indicating it is ready to receive data.

The FlushVC parameter applies only if the BReakAction parameter is set to FlushVC, and specifies whether packets for a session are being flushed (discarded) or transmitted; There are two possible values:

OFF Specifies that packet flushing is disabled (default).

ON Specifies that packet flushing is enabled. If the BReakAction parameter is set to FlushVC and a break is detected, the local server forwards the break signal to the remote server and enables packet flushing. The remote server then forwards the break to the host. If the host supports X.3 parameters 7 and 8 (or a comparable function) the host sends a request to the local server to reset the FlushVC parameter to **OFF**. If the host does not support X.3 parameters 7 and 8, the user must not set the BReakAction parameter to FlushVC, because the host will be unable to disable packet flushing and no packets will be transmitted in either direction following a break signal.

The IdleTimer parameter specifies the interval after which, if no further characters are input from the local device, all accumulated characters are packetized and forwarded. In Data Transfer mode, characters are accumulated in a data buffer until an event specified by the DataForward parameter occurs, the buffer fills, or the IdleTimer interval elapses. IdleTimer can be set to **Disabled** or to a number in the range 1 to 255 (sixtieths of a second).

The default value is 1, which is appropriate for line speeds of 9600 baud or greater. Since characters take longer to be transmitted from the device to the server at lower line speeds, the IdleTimer parameter should be adjusted to an interval greater than or equal to the time needed for a single character to be transmitted (e.g., set IdleTimer to 2 for 4800 baud lines, and to 4 for 1200 baud lines). This reduces packet overhead and improves system performance.

The LFInsertion parameter specifies whether linefeeds are transmitted (or echoed) following a return (or an EOM signal if EOM is set to CR). The default value is None. The parameter accepts three values:

None

Specifies that no linefeed is echoed or transmitted with the return after an EOM signal. This value is mutually exclusive with the other values.

OutputCrlf

Specifies that if an EOM signal is received from the remote device, a return and a linefeed are sent to the device.

EchoCrlf

Specifies that if a return is received from the local device, a return and a linefeed are echoed to the device.

The LongBreakAction parameter specifies the action taken by the Communications Server when a long break is detected. This parameter applies only to terminal ports. The value IGnore is mutually exclusive with any other value; more than one of the remaining values can be specified. The default value is IGnore for both terminal and host ports. There are four possible values:

IGnore

Specifies no action (default).

Listen

Specifies that the port is placed in Listening mode and all sessions for the port are disconnected.

OutofBand

Specifies that the long break signal is transmitted out-of-band to the remote device.

InBand

Specifies that the long break signal is transmitted in-band to the remote device.

The MOde parameter specifies one of two Data Transfer modes:

Scroll

Specifies that the local device is a line-oriented TTY-type terminal or application. Local editing and local echo are enabled.

Setting MOde to Scroll causes the following parameters to be reset automatically: ECHOData is set to ON; LFInsertion is set to EchoCrlf and OutputCrlf; DataForward is set to CR, ESC, EDiting, and Control; and IdleTimer is set to Disabled.

Transparent

Specifies that the local device is a screen-oriented intelligent terminal whose display format is controlled by an application. Local editing and local echo are disabled. Except for the characters defined by the ECMChar and BReakChar parameters, all input from the terminal in Data Transfer mode is transmitted exactly as is; no translation is provided. This is the default value.

Setting MOde to Transparent causes the following parameters to be reset automatically: ECHOData is set to OFF, LFInsertion is set to None, DataForward is set to None, IdleTimer is set to 1, and BReakAction is set to InBand.

The XOFF and XON parameters specify characters that are recognized by the Communications Server as XOFF/XON flow control characters. The default XOFF character is <CTRL-S>; the default XON character is <CTRL-Q>.

6.1.4 Editing Parameters

Table 6-5 summarizes the editing parameters, which can be used in Command mode and during sessions in which the MODE parameter is set to Scroll. Following the table is a description of each parameter, an explanation of the possible values, and an indication of the default. If the default value is acceptable, the parameter does not have to be set by the user.

These parameters can be set either with SET or SETDefault.

Table 6-5 Editing Parameters

<u>Parameter</u>	<u>Permitted Values</u>
ERase	Disabled <char>
LineERase	Disabled <char>
LocalEditing	(CmdEditing NoCmdEditing , DataEditing NoDataEditing)
ReprintLine	Disabled <char>
VERBatim	Disabled <char>
WordERase	Disabled <char>

The ERase parameter specifies the character (default <CTRL-H>) that the Communications Server interprets as an ERase character. Entered before the current line is terminated by the return key, the ERase character deletes the most recently typed character. On most terminals, the backspace key also performs the ERase function.

The LineERase parameter specifies the character (default <CTRL-U>) that the Communications Server interprets as a LineERase character. Entered before the current line is terminated by the return key, the LineERase character deletes the entire line.

The LocalEditing parameter specifies whether local editing is permitted. The default value enables local editing in Command mode but not in Data Transfer mode. One each of two pairs of values can be specified:

CmdEditing | NoCmdEditing

Enables (the default) or disables local editing in Command mode.

DataEditing | NoDataEditing

Enables or disables (default) local editing in Data Transfer mode during a session in which the Mode parameter is set to Scroll.

The ReprintLine parameter specifies the character (default <CTRL-R>) that the Communications Server interprets as a Reprint-Line character. This character is used to reprint all pending input on the current line before the line is terminated by the return key.

The VERBatim parameter specifies the character (default <CTRL-V>) that the Communications Server interprets as a VERBatim character. The VERBatim character causes the next character entered to be used verbatim rather than interpreted by the Communications Server as a special character. The VERBatim character has no effect if the next character entered is a return or the VERBatim character itself.

The WordERase parameter specifies the character (default <CTRL-W>) that the Communications Server interprets as a WordERase character. Entered before the current line is terminated by the return key, the WordERase character deletes the most recent word typed.

6.1.5 Global Parameters

Table 6-6 lists the configuration parameters that determine the welcome message, date, prompts, passwords, and NCS/150 audit trail functions. Each of these parameters affects the entire Communications Server, not just the current port or session. All of these parameters except DATE and BootServerAddr must be specified with the SETDefault command, not the SET command.

The parameters governing NCS/150 audit trail functions do not apply to TCP servers.

Table 6-6 Global Parameters

<u>Parameter</u>	<u>Permitted Values</u>
AUditServerAddr *	<address>
BootServerAddr *,**	<address>
CONNectAudit *	ON OFF
DATE **	<yy/mm/dd hh:mm[:ss]> <mm/dd/yy hh:mm[:ss]>
DOmain ***	<string>
ERRorAudit *	ON OFF
GlobalPassWord	<string>
GroupxPasswd	<string>
LocalPassWord	<string>
NMPrompt	<string>
Organization ***	<string>
PROMPt	<string>
WelcomeString	<string>

- * Not applicable to TCP servers.
 - ** Can be set with SET only, not with SETDefault.
 - *** On a diskless server, can be set with SET only.
-

The AUDitServerAddr parameter specifies the address of the NCS/150 to which the local server sends audit trail data. This parameter is used only to send the local server's audit trail to an NCS/150 other than the one to which the server is bound or to send an unbound server's audit trail to an NCS/150. If the AUDitServerAddr parameter is set to %ffffffffffff and the BootServerAddr parameter is set to anything other than %ffffffffffff, the audit trail data is sent to the address specified by the BootServerAddr parameter; otherwise, the data is discarded. See reference [5] for more information on this facility. This parameter is not valid on a TCP server.

The BootServerAddr parameter specifies the address of the NCS/150 from which the local server boots. This parameter is used only to override the NCS/150 to which the server is bound (e.g., if the server's primary and secondary NCS/150s are down, and another NCS/150 can boot the server on a temporary basis). See reference [5] for more information on this facility. This parameter is not valid on a TCP server, and applies only to a server that is bound to an NCS/150.

The CONNectAudit parameter enables (ON) or disables (OFF) generation of connection-related audit trail statistics by the server. If this parameter is set to ON, the audit trail data is sent to the NCS/150 to which the server is bound or to the NCS/150 specified by the AUDitServerAddr parameter (if any is specified). See reference [5] for more information on this facility. This parameter is not valid on a TCP server.

The DATE parameter is used to set the system clock. The value can be entered in either of the two formats shown in Table 6-6. Times are entered in 24-hour-clock time. The clock is used by the network management reports and should be set after each system boot, unless there is an NCS/150 in the network. Unusually frequent disk activity can cause the clock to drift by a few seconds per year.

If the network manager plans to power off a CS/1 with an internal disk drive, the SET DATE command can be used to ensure that any statistics gathered between the prior midnight and the time of the power-off are saved on diskette. Before powering off the CS/1, set the clock forward to just prior to midnight. When the clock reaches midnight, the CS/1 saves statistics to the diskette.

The DOmain and OrganiZation parameters specify the default domain and organization fields for all clearinghouse names entered on the server. These defaults are automatically appended to the local name unless overridden when the name is entered. The default value of these parameters is the null string ("").

An NCS/150 and the servers that it supports normally have the same default domain and organization strings. The network manager can use the SET command on a diskless server to override

the defaults, but the new values remain in effect only until the next boot, at which time the server reverts to the defaults established for the NCS/150.

The ERRorAudit parameter enables (ON) or disables (OFF) generation of error-related audit trail data by the server. If this parameter is set to ON, the error statistics are sent to the NCS/150 to which the server is bound or to the NCS/150 specified by the AUDitServerAddr parameter (if any is specified). See reference [5] for more information on this facility. This parameter is not valid on a TCP server.

The GlobalPassWord parameter specifies the password (maximum 14 characters) that the user must type when setting the privilege level to Global Network Manager. The default value is null (""). On a Communications Server supported by an NCS/150, the password must be established remotely on the NCS/150.

The GroupxPasswd parameter specifies the password (maximum 14 characters) that a user must enter in order to establish a connection with any device on the local Communications Server when the user's AccessWord values do not match any of the device's AccessGroup values. Each AccessGroup can have its own password. This system is designed to limit access within the network for security purposes. Only a Global Network Manager can set or change AccessGroups, AccessWords, or GroupxPasswds. The default password for all AccessGroups is null (""). On a Communications Server supported by an NCS/150, the passwords must be established remotely on the NCS/150. The GroupxPasswd parameters do not apply to TCP servers.

The LocalPassWord parameter specifies the password (maximum 14 characters) that the user must type when setting the privilege level to Local Network Manager. The default value is null ("").

The NMPrompt parameter specifies the string (maximum 14 characters) that the Communications Server prints on the local device (starting in column 1) to indicate Command mode if the port has Local or Global Network Manager privilege. The default prompt is "cs/1# " on the CS/1 and "cs/100# " on the CS/100.

The PROMPt parameter specifies the string (maximum 14 characters) that the Communications Server prints on the local device (starting in column 1) to indicate Command mode if the port has User privilege. The default prompt is "CS/1> " on the CS/1 and "CS/100> " on the CS/100.

The WelcomeString parameter specifies the string printed on the local device by the Communications Server when the device or the server is powered on or reset. The maximum length of the string is 80 characters. The default string is "^M^J Welcome to your Communications Server ^J". Refer to Section 3.1.5 for conventions for entering string text.

6.1.6 Sample Asynchronous Configurations

This section contains examples of typical asynchronous port configurations and describes how configuration parameters interact with one another depending on the device type of the port and the nature of the application.

Tables 6-7 through 6-11 summarize some of the parameters that are critical to the ability of an asynchronous port to function as required by the application or by the connected device. The tables describe five types of applications:

Table 6-7 Parameters for a terminal-to-host, line-oriented application (e.g., a user terminal interacting with a command interpreter or line-oriented editor)

Table 6-8 Parameters for a terminal-to-host, screen-oriented application (e.g., a user terminal interacting with a screen-oriented editor)

Table 6-9 Parameters for a host-to-host file transfer application

Table 6-10 Parameters for a host-to-printer file transfer application

Table 6-11 Parameters for ports to which dial-in or dial-out modems are attached

Table 6-7 Configuration Parameters for
Terminal-to-Host, Line-Oriented Applications

<u>Parameter</u>	<u>Terminal Port Setting</u>	<u>Host Port Setting</u>
DeVice	Terminal	Host
InterAction	Verbose, Echo	n/a
DataForward	ESC, CR, COntrol	None
IdleTimer	Disabled	1
MOde	Scroll	Transparent
ECHOData	ON	OFF
LFInsertion	OutputCrlf, EchoCrlf	n/a
BReakAction	EscDTM	IGnore
BReakChar	(1)	n/a
ECMChar	Disabled (2)	n/a
UseDCDout (3)	AlwaysAssert	OnConnection
UseDTRin (3)	AsDTR	AsDTR

- (1) BReakChar is defined only if there is no break key on the terminal.
 - (2) An ECMChar may be preferable to a break signal if in-band breaks to the host are desired.
 - (3) See Sections 6.1.2 and 6.1.9 for more information.
-

Table 6-8 Configuration Parameters for
Terminal-to-Host, Screen-Oriented Applications

<u>Parameter</u>	<u>Terminal Port Setting</u>	<u>Host Port Setting</u>
DeVice	Terminal	Host
InterAction	Verbose, Echo	n/a
DataForward	None	None
IdleTimer	1	1
MOde	Transparent	Transparent
ECHOData	OFF	OFF
LFInsertion	None	n/a
BReakAction	InBand	IGnore
BReakChar	(1)	n/a
ECMChar	<CTRL-^> (2)	n/a
UseDCDout (3)	AlwaysAssert, NoToggle	OnConnection, ToggleonDisc
UseDTRin (3)	AsDTR	AsDTR

- (1) BReakChar is defined only if there is no break key on the terminal.
- (2) The ECMChar can be any control character not normally transmitted as data.
- (3) See Sections 6.1.2 and 6.1.9 for more information.
-

Table 6-9 Configuration Parameters for Host-to-Host File Transfer Applications

<u>Parameter</u>	<u>Initiating Host Port Setting</u>	<u>Destination Host Port Setting</u>
DeVice	Terminal	Host
InterAction	Brief, NoEcho	n/a
DataForward	None	None
IdleTimer	60-255 (2)	1
MOde	Transparent	Transparent
ECHOData	OFF	OFF
LFInsertion	None	n/a
BReakAction	InBand	IGnore
BReakChar	(3)	n/a
ECMChar	<CTRL-^> (4)	n/a
UseDCDout (5)	OnConnection	OnConnection
UseDTRin (5)	AsDTR	AsDTR

- (1) The initiating host must be configured as a terminal to initiate the connection, unless the network manager form of the Connect command is used to connect the two ports remotely.
- (2) The IdleTimer setting is host-dependent.
- (3) BReakChar is defined only if the initiating host cannot generate a break signal and needs to signal the other host.
- (4) The ECMChar applies only to the initiating host, and can be any control character not normally transmitted. The host should be programmed to wait after issuing an ECMChar for the interval specified by the IdleTimer parameter before sending more characters.
- (5) See Sections 6.1.2 and 6.1.9 for more information.

Table 6-10 Configuration Parameters for
Host-to-Printer File Transfer Applications

<u>Parameter</u>	<u>Host Port Setting</u>	<u>Printer Port Setting</u>
DeVice	Terminal (1)	Host
InterAction	Brief, NoEcho	n/a
DataForward	None	None
IdleTimer	60-255 (2)	1
MOde	Transparent	Transparent
ECHOData	OFF	OFF
LFInsertion	None	n/a
BReakAction	InBand	IGnore
BReakChar	Disabled	n/a
ECMChar	<CTRL-^> (3)	n/a
UseDCDout (4)	OnConnection	OnConnection
UseDTRin (4)	AsDTR	AsDTR

- (1) The host port must be configured as a terminal to initiate the connection unless the network manager form of the Connect command is used to connect the two hosts remotely.
- (2) The IdleTimer setting is host-dependent.
- (3) The ECMChar applies only to the initiating host, and can be any control character not normally transmitted. The host should be programmed to wait after issuing an ECMChar for the interval specified by the IdleTimer parameter before sending more characters.
- (4) See Sections 6.1.2 and 6.1.9 for more information.
-

Table 6-11 Configuration Parameters for Modem Ports

<u>Parameter</u>	<u>Dial-in Modem Setting</u>	<u>Dial-out Modem Setting</u>
DeVice	Terminal	Host
InterAction	Verbose, Echo	n/a
DataForward	None	None
IdleTimer	1	1
MOde	Transparent	Transparent
ECHOData	Off	Off
LFInsertion	None	n/a
BReakAction	InBand	IGnore
BReakChar	(1)	n/a
ECMChar	(1)	n/a
BAud	(2)	(2)
UseDCDout (3)	AlwaysAssert, ToggleonDisc	OnConnection, ToggleonDisc
UseDTRin (3)	AsDTR	AsDCD

- (1) BreakChar and ECMChar must be defined if the devices accessing the modem use them.
- (2) Set to the same speed as the modem itself.
- (3) See Sections 6.1.2 and 6.2.3 for more information.

6.1.7 Asynchronous Host Configuration

This section describes the procedure for configuring an asynchronous port as a host port.

**** NOTE ****

This information does not apply to the virtual ports on a CS/1-HSM, CS/1-SNA, or CS/1-X.25. Refer to Sections 6.4 and 6.5 for information on configuring the virtual ports on these systems.

On a new unit, some ports are configured for terminal device connections. That is, the following parameters are in effect:

```
device=terminal
mode=transparent
```

The default configuration specifies ports 0 through 3 on each CS/1 SIO board and ports 8 and 9 on the CS/100 as host ports. The network manager can configure additional ports as host interface ports by respecifying the Device parameter. For example, to convert port 4 into a host port, the network manager types the following command from any port other than port 4:

```
setdefault (!4) device=host
```

Refer to Section 3.2 for a description of the SETDefault command and to Section 6.1.1 for a description of the Device parameter.

Note that setting Device equal to Host disables ECMChar and BReakChar; sets InterAction to Brief, NoEcho, NoMacroEcho, and BroadcastOFF; sets BReakAction to Ignore; sets AUToDisconnect to 60 minutes; and sets BUfferSize to the default small buffer size (typically 82 bytes).

6.1.8 Asynchronous Terminal Configuration

The specific configuration appropriate for an asynchronous terminal device depends on the type of device and on the application being run. This section describes some of the configuration parameters and commands that frequently cause confusion.

- Parameters specified with the SETDefault command do not take effect until a new session is opened. Existing sessions are not affected. The parameters then remain in effect until overridden explicitly via another SETDefault or SET command or implicitly via the setting of another configuration parameter.

- The SETDefault command performs an automatic save on the diskette, thus changing the configuration table that is read from the diskette when the system is booted.
- Parameters specified with the SET command take effect immediately and remain in effect until overridden explicitly via another SET command or until the session is terminated. When an additional session is opened while the first connection is still intact, the Communications Server copies a new session parameter table from the default configuration table, not from the current session table.

After multiple sessions are opened, the session parameters for each session can be altered without affecting the parameters of the other sessions.

- The AccessGroup, AccessWord, BReakAction, ECHOMask, LFInsertion, and DataForward parameters accept one or more of a set of values. When new values are set, they are added to the existing list, but values already in the list are not deleted. To remove a value from the list, first set the parameter equal to NoGroup (for AccessGroup and AccessWord), IGHore (for BReakAction), or None (for ECHOMask, LFInsertion, and DataForward). Then set any desired values.
- The BReakAction parameter values OutofBand and InBand are often confused. The difference between the two values is whether or not the break affects the characters that were transmitted just ahead of it and have not yet reached the other end of the circuit. An OutofBand break causes the characters ahead of it in the circuit to be garbled and discarded. An InBand break, however, remains in the queue of characters in the circuit, and characters ahead of the break reach the other end of the circuit before the break.
- Setting BReakAction to both InBand and EscDTM has one side effect. If the user has established a connection to a host and then presses the break key or enters the BReakChar (if one is set), the break is sent in-band to the host as well as intercepted by the Communications Server as a request to change to Command mode. The Communications Server sends a server prompt to the terminal, and the host sends a host prompt to the terminal. The host prompt, however, is not displayed on the terminal until the user enters a RESume command and returns to Data Transfer mode. This can be avoided by changing BReakAction to EscDTM only. The parameter must be set first to IGHore, then to EscDTM. For example:

```
set mode=transparent breakact=ignore breakact=escdtm
```

- If a port is in Command mode, and a Connect, DEFine, DO, Pause, or SHow request is in progress, the request can be aborted with the break key or BReakChar. This terminates the request even if the BReakAction parameter is set to IIgnore.
- A connection from one device to another cannot be established unless the destination device port is in Listening mode. If the destination port is in Command mode or Data Transfer mode, either a user at the terminal or a network manager at a remote terminal can convert the port to Listening mode with the Listen command. Refer to Section 2.4.4 for descriptions of the modes of operation and to Section 3.2 for a description of the Listen command.
- Setting the MOde parameter to Transparent is desirable for many applications (e.g., screen editors) but has some side effects. Setting MOde to Transparent automatically sets BReakAction to InBand only, IdleTimer to 1, ECHOData to OFF, LFInsertion to None, and DataForward to None. With BReakAction set to InBand only, the user cannot return from Data Transfer mode to Command mode using the break key or the BReakChar (if one is set), since neither break signal is intercepted by the Communications Server. Therefore, when setting MOde to Transparent, either set BReakAction to EscDTM before going into Data Transfer mode or ensure that an ECMChar is set. The default ECMChar is <CTRL-^>.
- The LinePRotocol parameter can be displayed but not set for asynchronous terminal ports. This parameter is settable only on character-synchronous and bit-synchronous ports; it determines which of these protocols the port uses.
- If the network manager specifies values for the PARity and DataBits parameters that are inappropriate for the device (e.g., setting DataBits to 8 and PARity to 0 or 1) the port may appear to hang. To recover from this condition, the network manager must use SETDefault command remotely to establish appropriate values and then use the Listen command remotely to reinitialize the port.
- The LongBReakAction parameter takes advantage of some terminals' ability to generate both a normal break signal (approximately 150 milliseconds) and a long break signal (at least 3 seconds). Long breaks are usually generated by pressing both shift and break keys simultaneously. For terminals that can generate a long break signal but cannot toggle the DTR signal, setting the LongBReakAction parameter to Listen permits long breaks to simulate the toggling of DTR (thus placing the port in Listening mode).

6.1.9 Asynchronous Modem Control Lines

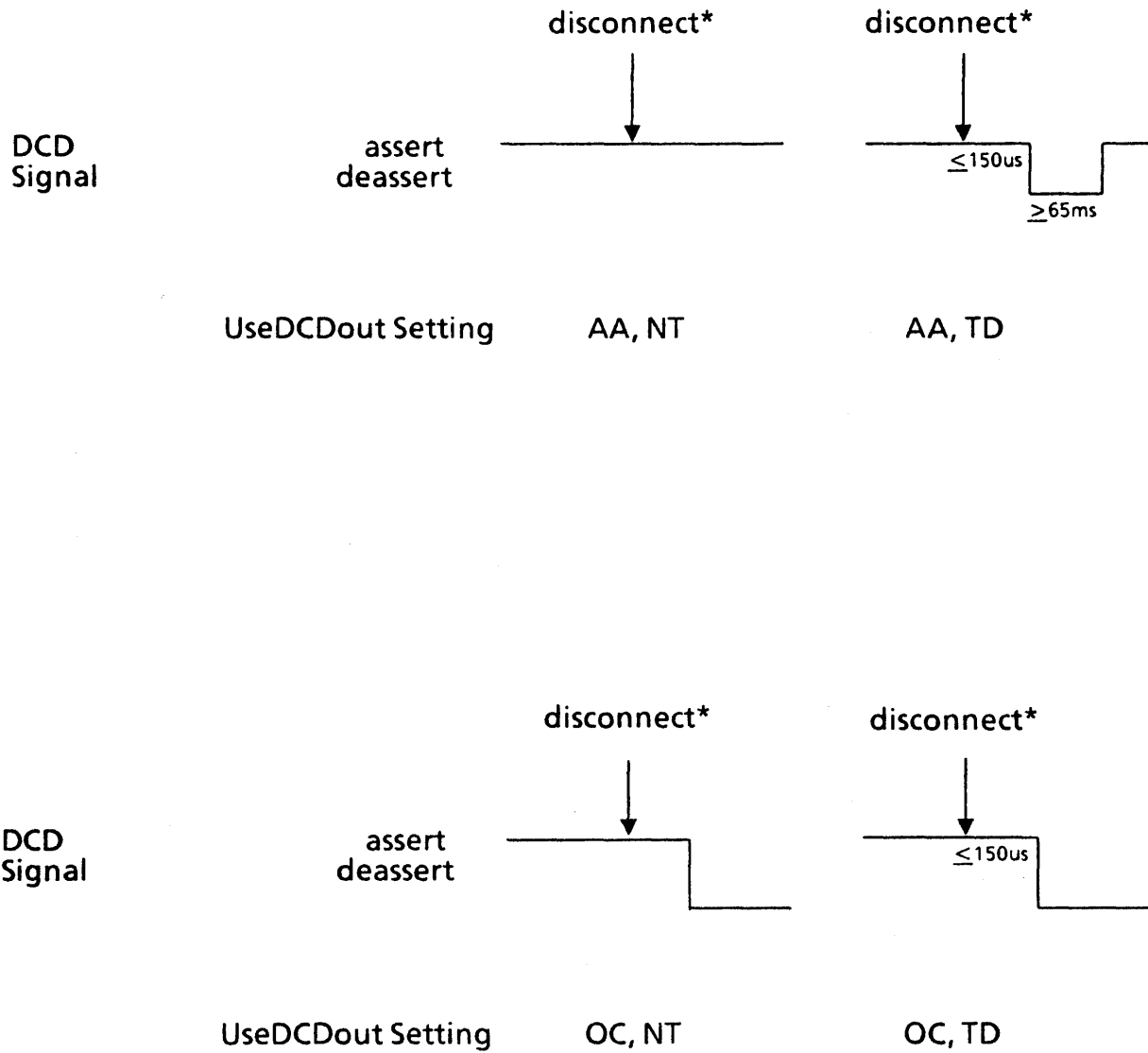
Table 6-12 describes the interaction between the hardware modem control lines DTR and DCD and the software configuration parameters UseDTRin and UseDCDout. The information covers terminal and host ports as well as modem ports, since these lines can be used by devices other than modems. See Section 6.1.2 for a description of the UseDTRin and UseDCDout parameters.

Some modems expect a toggle in the DCD signal at disconnect. Table 6-12 includes separate entries for modems that expect the toggle and modems that do not expect the toggle. Figure 6-2 illustrates the effect of different UseDCDout parameter settings on the DCD signal at disconnect.

The support of modem control lines can also be affected by the cable used to connect the device to the Communications Server. Refer to the appropriate Planning and Installation Guide for cable information.

The parameter UseDCDout controls the Data Carrier Detect signal to the modem from the Communications Server. The signal from the modem is usually called DTR. Most originate modems will not go offhook and most answer modems will not answer a ringing line unless this signal is asserted.

The parameter UseDTRin refers to the Data Terminal Ready signal from the modem to the Communications Server. This signal from the modem is usually labeled DSR.



* The disconnect can come from either end of the session; it can be the dropping of DTR if the UseDTRin parameter is set to anything other than Ignore.

Figure 6-2 Effect of UseDCDout Parameter Settings

Table 6-12 Recommended Settings of UseDCDout and UseDTRin

<u>Device Type</u>	<u>UseDCDout Setting</u>	<u>UseDTRin Setting</u>
Terminal without DTR and DCD lines	don't care	Ignore
Terminal with DTR and DCD lines	AlwaysAssert NoToggle	AsDTR
Host without DTR and DCD lines	don't care	Ignore
Host with DTR and DCD lines	OnConnection NoToggle	AsDTR
Dial-in modem without unattended disconnect	AlwaysAssert NoToggle	AsDTR
Dial-out modem without unattended disconnect	OnConnection NoToggle	AsDCD
Dial-in modem with unattended disconnect	AlwaysAssert ToggleonDisc	AsDTR
Dial-out modem with unattended disconnect	OnConnection ToggleonDisc	AsDCD

6.2 Character-Synchronous Configuration Parameters

This section describes the port parameters specific to character-synchronous devices.

Since the Connection Service commands are not available directly to a character-synchronous port, parameters for a character-synchronous port are set remotely from an asynchronous terminal port on a different Communications Server on the same Ethernet. On a hybrid CS/1 containing both character-synchronous and asynchronous boards, parameters for a character-synchronous port can be set from a port on an SIO-A board on the same CS/1.

Table 6-13 is a summary of all character-synchronous port parameters, listed alphabetically. Upper case characters represent the minimum unambiguous abbreviation of each parameter. All character-synchronous port parameters must be set with the SETDefault command, except those indicated otherwise in the table below.

Table 6-13 Character-Synchronous Port Configuration
Parameter Summary

<u>Parameter</u>	<u>Section</u>	<u>Parameter</u>	<u>Section</u>
AccessGroup	6.2.1	InitMacro *	6.2.1
AccessWord	6.2.1	InterAction *	6.2.1
AUTODisconnect	6.2.1	INTERfaceType	6.2.2
BAud	6.2.2	LinePROtocol	6.2.2
BinaryData	6.2.2	MaxSessions *	6.2.1
BlockCheck	6.2.2	PARity	6.2.2
BReakAction	6.2.3	PassCheck	6.2.2
BSCProtocol	6.2.2	PRIVilege *	6.2.1
BUfferSize	6.2.1	RECVtimer	6.2.2
CarrierSense	6.2.2	RESptimer	6.2.2
CharCode	6.2.2	SOH	6.2.2
DataBits	6.2.2	SYN	6.2.2
DeVice	6.2.1	SynCharCount	6.2.2
DLE	6.2.2	UseDSRout	6.2.2
DUPlex	6.2.2	UsedTRin	6.2.2
FlowControlFrom	6.2.3	XmitTimer	6.2.2
FlowControlTo	6.2.3		

* May be displayed with SHOW, but not set with SETD.

6.2.1 Character-Synchronous Port Transmission Parameters

The port transmission parameters for character-synchronous ports are identical to the port transmission parameters for asynchronous ports. These parameters are described in detail in Section 6.1.1.

Note that all character-synchronous port parameters must be specified with the SETDefault command, not the SET command.

6.2.2 Character-Synchronous Port Physical Parameters

This section describes the character-synchronous port physical parameters, usually set by the network manager for each port. The parameters and their possible values are listed in Table 6-14.

Following the table are definitions of each parameter, explanations of each possible value, and an indication of the default. If the default value is appropriate, the parameter does not have to be set.

Table 6-14 Character-Synchronous Port Physical Parameters

<u>Parameter</u>	<u>Permitted Values</u>
BAud	50 75 110 134.5 150 200 300 600 1200 1800 2400 3600 4800 7200 9600 19.2K 38.4K * 56K *
BinaryData	OFF ON
BlockCheck	None LRC CRC16 CCITT16
BSCProtocol	UTS VIP MODE4C BASIC 3270 3780 HASP FREE-FORM SPECIAL
CarrierSense	OFF ON
CharCode	ASCII EBCDIC

* Applies to CS/1 only.

(continued)

Table 6-14 Character-Synchronous Port Physical Parameters
(continued)

<u>Parameter</u>	<u>Permitted Values</u>
DataBits	5 6 7 8
DeVice	(Host Terminal , Paper Glass)
DLE	<number>
DUPlex	Half Full XmitOnly RecvOnly
INTErfaceType	DCE DTE
LinePRotocol	ASynchronous BYTESynchronous BITSynchronous
PARity	None Odd Even
PassCheck	Pass Strip
RECVTimer	Disabled <number> (1-255 sixteenths of a second)
RESpTimer	Disabled <number> (1-255 sixteenths of a second)
SOH	Include Exclude
SYN	<number>
SyncCharCount	4 8 12 16
UseDSRout	(AlwaysAssert OnConnection , NoToggle ToggleonDisc)
UseDTRin	Ignore AsDTR AsDCD
XmitTimer	Disabled <number> (1-255 sixteenths of a second)

The BAud parameter determines the baud rate of the port and applies only if the SIO board is configured for internal clocks. The setting of this parameter is ignored if the SIO board is configured for external clocks. The maximum load per SIO board is two 56K half-duplex ports.

The BinaryData parameter specifies whether or not IBM transparent procedures for passing binary data are used. The default value is OFF. When the parameter is set to ON, so that the procedures are used, binary data transmission begins when a DLE.STX or DLE.SOH is detected, and continues until a DLE.ETX, DLE.ETB, or DLE.ITB is detected. A DLE.EOT or DLE.ENQ aborts the block. A DLE.DLE is treated as a binary number. The DLE character is excluded from block check calculations, except for the second DLE of a DLE.DLE sequence detected within binary transmission. When the value of the parameter is OFF, the DLE is included in the block check calculations. The BinaryData parameter should never be set to ON if PARITY is enabled.

The BlockCheck parameter specifies the kind of block check character that is generated following a block. The parameter can be set to one of four possible values:

None

Specifies that no block check character is generated or checked.

LRC

Specifies that the ANSI-standard Longitudinal Redundancy Check (LRC) is calculated and appended to the block. If the port is set up for EBCDIC encoding, the LRCs are 8 bits wide with no parity. If the port is set up for ASCII encoding, the LRCs are 7 bits wide, independent of parity. This value is usually appropriate if the ASCII character code is being used.

CRC16

Specifies that the block check character is generated using this polynomial:

$$x^{16} + x^{15} + x^2 + 1$$

This value, the default, represents the standard IBM character-synchronous block check character. If this value is set, the DataBits parameter must be set to 8.

CCITT16

Specifies that the block check character is generated using this polynomial:

$$x^{16} + x^{12} + x^5 + 1$$

If this value is set, the DataBits parameter must be set to 8.

The BSCProtocol parameter defines the control character conventions used at the datalink process. This parameter can be set to one of nine values:

UTS

For compatibility with Sperry character-synchronous Uniscope devices.

VIP

For compatibility with Honeywell character-synchronous VIP devices.

MODE4C

For compatibility with Control Data Corporation standard devices.

BASIC

For compatibility with Burroughs standard devices.

3270

For compatibility with IBM 3270 equipment. This is the default.

3780

For compatibility with IBM 3780 equipment.

HASP

For compatibility with IBM HASP equipment.

FREE-FORM

For use with custom applications. The datalink process monitors only SYN and line-marking characters. When the BSCProtocol parameter is set to FREE-FORM, the BlockCheck parameter must be set to None.

SPECIAL

For use with custom applications. The datalink process follows control character specifications supplied by the user (see the Software Technical Reference Manual, reference [2]).

The CarrierSense parameter determines whether or not the system uses carrier sensing before line turnaround. The possible values are OFF (the default) and ON. This parameter takes effect only if the port is operating in half-duplex mode, which is standard for character-synchronous communication.

On the CS/100, the effect of the CarrierSense parameter depends on the settings of the DUplex and INTERfaceType parameters. On the CS/1, the effect of the CarrierSense parameter depends both on the settings of the DUplex and INTERfaceType parameters and also on whether the device is connected to an SIO-SM (synchronous modem) or SIO-ST (synchronous terminal) board. Table 6-15 shows the interaction between these parameters.

The CharCode parameter specifies how data is encoded. The possible values are EBCDIC (the default) and ASCII. The value EBCDIC may be set only if the BSCProtocol parameter is set to 3270, 3780, or HASP. The value ASCII may be set regardless of the BSCProtocol parameter setting.

The DataBits parameter specifies the number of databits per byte. The value may be set to 5, 6, 7, or 8. The default is 8.

The Device parameter specifies whether the device is a host or a terminal. This parameter is identical in function to the Device parameter for asynchronous devices; refer to Section 6.1.1 for a complete description.

The DLE parameter specifies the Data Link Escape (DLE) character. The value can be entered as the numeric value of the DLE character or as a printing character representing the ASCII equivalent of the numeric value of the DLE character. The default (the hexadecimal value 10) is appropriate in almost all applications. The Communications Server always displays the value of this parameter as the printing character representing the ASCII equivalent of the parameter value. Hexadecimal 10 is displayed as "^P". Refer to Section 3.1 for the conventions for entering numbers.

The DUplex parameter specifies the type of physical interface provided by the SIO board for the port. If DUplex is set to Half (the default), the SIO board provides a Bell 208-type interface. If DUplex is set to Full, the SIO board provides a Bell 212-type interface. When the parameter is set to either XmitOnly or RecvOnly, the SIO board provides a one-way, Bell 208-type interface.

**Table 6-15 Interaction Among Carrier Sense,
Duplex, and Interface Type Parameters**

<u>Case</u>	<u>Carrier Sense</u>	<u>Duplex</u>	<u>Interface Type</u>	<u>Result</u>
1	ON	Full	DTE	The SIO firmware uses DCD to place the receiver in and out of hunt phase. DCD is on pin 8 on an SIO-SM board and on pin 20 on an SIO-ST board or a CS/100.
2	ON	Full	DCE	The SIO firmware uses RTS to place the receiver in and out of hunt phase. RTS is on pin 5 on an SIO-SM board and on pin 4 on an SIO-ST board or a CS/100.
3	ON	Half	DTE	The SIO firmware uses DCD to place the receiver in and out of hunt phase. DCD is also used to condition transmission; when DCD is true, transmission is inhibited. In this configuration, the DCE device must toggle DCD. DCD is on pin 8 on an SIO-SM board and on pin 20 on an SIO-ST board or a CS/100.
4	ON	Half	DCE	The SIO firmware uses RTS to place the receiver in and out of hunt phase. RTS is also used to condition transmission; when RTS is true, transmission is inhibited. In this configuration, the DCE device must toggle RTS. RTS is on pin 5 on an SIO-SM board and on pin 4 on an SIO-ST board or a CS/100.
5	OFF	Full	DTE	The SIO firmware ignores DCD. DCD is on pin 8 on an SIO-SM and on pin 20 on an SIO-ST or a CS/100.
6*	OFF	Full	DCE	The SIO firmware ignores RTS. CTS is constant. RTS is on pin 5 on an SIO-SM board and on pin 4 on an SIO-ST board or a CS/100. CTS is on pin 4 on an SIO-SM board and on pin 5 on an SIO-ST board or a CS/100.
7	OFF	Half	DTE	Same as case 1.
8	OFF	Half	DCE	Same as case 2.

* On the CS/1-BSC, this combination is functionally the same as case 1.

The INTERfaceType parameter specifies whether the port is acting as a DCE or DTE device. If the parameter is set to DCE, the port sets the CTS signal, allowing transmission, whenever the RTS signal is asserted by the other end of the connection. The port transmits after asserting DCD, without waiting for a response. If the parameter is set to DTE, the port first asserts the RTS signal to the modem and then waits for assertion of the CTS signal from the modem before transmitting. The port begins receiving whenever the DCD signal from the modem is asserted. Note that on the CS/100, the cable connectors are wired as DCE devices. Therefore, the RTS signal to the modem is sent from the CTS pin on the CS/100, the CTS signal from the modem is received at the RTS pin on the CS/100, and the DCD signal from the modem is received at the DTR pin on the CS/100. On a port connected to a terminal or host, this parameter should usually be set to DCE, the default. On a port connected to a modem, this parameter should usually be set to DTE.

The LinePRotocol parameter specifies whether asynchronous, character-synchronous, or bit-synchronous transmission is used. The Communications Server automatically sets the value at boot time to either ASynchronous or BYTESynchronous based on the SIO firmware present on the board and on the default value of the LinePRotocol parameter. If synchronous firmware is present, and the default LinePRotocol value is ASynchronous, the value is automatically changed to BYTESynchronous. The network manager should use the SETDefault command to set the value to BITSynchronous for operation with the SDLC pass-through service.

The PARity parameter specifies the local device parity. The possible values are None, Odd, or Even. The default is None. If the BinaryData parameter is set to ON, the PARity parameter must be set to None.

The PassCheck parameter determines how the Communications Server processes the block check character. When it receives a block from an attached device, the Communications Server generates its own block check character and compares it with the block check character received with the block. Whether or not an error is detected, the block is transmitted to the other end of the circuit. The PassCheck parameter determines whether the transmitted block carries the block check character. This parameter can be set to one of two values:

Pass

Specifies that the block check character generated by the source device is transmitted over the network with the data block. This is the default value and the appropriate value for use with the pass-through service now available for character-synchronous communications.

Strip

Specifies that the original block check character is stripped from the block before transmission over the network. When the block arrives at the destination Communications Server, the server regenerates the block check character before transmitting the block to the destination device.

The RECVTimer parameter sets the reception error recovery timer. This timer aborts block reception and generates a timeout error signal if a block's reception time exceeds the time specified by the parameter. The parameter can be set to Disabled, in which case the timer is always off, or to a number between 1 and 255, representing sixteenths of a second. The default value is 64.

The RESpTimer parameter sets the response timer. This timer generates a timeout error signal if the interval between the end of transmission from the Communications Server at one end of a circuit and the beginning of reception at the same server exceeds the setting of the timer. The parameter can be set to Disabled, in which case the timer is always off, or to a number between 1 and 255, representing sixteenths of a second. The RESpTimer parameter is not used by the current Connection Service software. The default value is Disabled.

The SOH parameter determines whether the first Start of Header (SOH) or Start of Text (STX) character is included in the block check character calculation. The parameter can be set to either:

Include

Specifies that the character is included in the calculation. This setting is required if the BSCProtocol parameter is set to MODE4C.

Exclude

Specifies that the first SOH or STX character is excluded from the calculation. This setting is the default and is appropriate for all BSCProtocol values except MODE4C.

The SYN parameter specifies the SYN character. The value can be entered as the numeric value of the SYN character or as the printing character representing the ASCII equivalent of the numeric value of the SYN character. The Communications Server always displays the value of this parameter as the printing character representing the ASCII equivalent of the parameter value. The default (hexadecimal 32) is usually appropriate if the CharCode parameter is set to EBCDIC. The hexadecimal value 16 is usually appropriate if the CharCode parameter is set to ASCII. The Communications Server displays hexadecimal 32 as "'2'" and displays hexadecimal 16 as "^V". Refer to Section 3.1 for the conventions for entering numbers.

The SyncCharCount parameter determines the number of SYN characters that precede each block transmitted. The possible value of this parameter is 4, 8, 12, or 16. The default value (4) is appropriate for most installations.

The UseDSRout parameter specifies how the Communications Server supplies the DTR signal to the attached device.

On the CS/1, the effect of this parameter varies depending on the interface hardware. On an SIO-ST board, UseDSRout has no effect. On an SIO-SM board, UseDSRout affects the DTR signal from the CS/1 to the modem.

On the CS/100, the effect of this parameter depends on the setting of the port's INTERfaceType parameter. If the INTERfaceType parameter is set to DCE, UseDSRout has no effect. If the INTERfaceType parameter is set to DTE, UseDSRout influences the DTR signal to the modem, which is the DCD signal from the CS/100. Refer to the appropriate Planning and Installation Guide for mapping between DSR, DTR, and the EIA connector pins.

One each from two sets of parameter values must be set:

AlwaysAssert | OnConnection

Determines when the DTR signal is asserted.

AlwaysAssert causes the signal to be asserted at all times.

OnConnection (the default) causes the signal to be deasserted as long as no connection is established to the device, and asserted when a connection is made.

ToggleonDisc | NoToggle

Determines whether or not the signal toggles when a connection is broken.

ToggleonDisc causes the signal to be deasserted for at least 200 milliseconds after disconnection. Depending on the other UseDSRout parameter setting, the signal then either changes to asserted or remains deasserted. This value is used when the Communications Server is connected to certain data switch devices.

NoToggle (the default) suppresses the toggle upon disconnection. The signal either stays asserted or changes cleanly to deasserted, depending on the other UseDSRout parameter setting.

The action of these parameter settings is illustrated in Figure 6-3 in Section 6.2.5. For recommended settings of this parameter for use with various devices, see Table 6-26 in Section 6.2.5.

The UseDTRin parameter specifies the response of the Communications Server to the value of the DTR or DSR signal received from the attached device. On the CS/1, the parameter affects system response to the DTR signal for ports on an SIO-ST board, and to the DSR signal for ports on an SIO-SM board. On the CS/100, the effect of the parameter depends on the setting of the INTERfaceType parameter. If INTERfaceType is set to DTE, the UseDTRin parameter has no effect. If INTERfaceType is set to DCE, the parameter affects system response to the DTR signal from the terminal, which is also the DTR signal to the CS/100. Refer to the appropriate Planning and Installation Guide for mapping between DSR, DTR, and the EIA connector pins.

For a third-party, pass-through connection or for a permanent virtual circuit, never set this parameter to any value but Ignore, the default. The Communications Server recognizes three possible values:

Ignore

Specifies that the Communications Server does not check the state of the DTR or DSR input signal when a connection is made and takes no action when the signal changes value.

AsDTR

Specifies that the Communications Server checks the state of the DTR or DSR input signal before establishing a connection to a port. This value is not appropriate for the pass-through Connection Service currently available to character-synchronous ports.

AsDCD

Specifies that the Communications Server does not reject a connection request to the port based on the value of the DTR or DSR input. This value is not appropriate for the pass-through Connection Service currently available to character-synchronous ports.

The XmitTimer parameter sets the transmission error recovery timer. This timer aborts block transmission and generates a timeout error signal if the transmission time of a block exceeds the time specified by the XmitTimer parameter. The parameter can be set to Disabled, in which case the timer is always off, or to a number between 1 and 255, representing sixteenths of a second. The default value is 64.

6.2.3 Character-Synchronous Session Transmission Parameters

This section lists the session transmission characteristics for character-synchronous ports.

The parameters and their possible values are listed in Table 6-16. Following the table are descriptions of each parameter, explanations of the possible values, and an indication of the default. If the default is acceptable, the parameter does not have to be set.

Note that all character-synchronous port parameters must be specified from a remote port with the SETDefault command, not the SET command.

Table 6-16 Character-Synchronous Session Transmission Parameters

<u>Parameter</u>	<u>Permitted Values</u>
BReakAction	IGnore (InBand , OutofBand , FlushVC , EscDTM)
FlowControlFrom	None CTS_RTS
FlowControlTo	None CTS_RTS

The BReakAction parameter specifies the action taken by the Communications Server when a timeout error occurs. The timeout error can be generated by any one of three timers: the RECVTimer, the RESpTimer, or the XmitTimer. The value IGnore is mutually exclusive with any other value; more than one of the remaining values may be specified. The parameter has five possible values:

IGnore

Specifies no action. This is the default value.

InBand

Specifies that an in-band break is transmitted to the remote device when a timeout error occurs.

OutofBand

Specifies that an out-of-band break is transmitted to the remote device when a timeout error occurs.

EscDTM

Specifies that the user port changes from Data Transfer mode to Command mode. This value is not currently implemented.

FlushVC

Specifies that all packets for this session currently in the circuit are flushed. This value is not currently implemented.

The FlowControlFrom parameter specifies the flow control mechanism from the Communications Server to the local device. The Communications Server cannot interrupt transmission once it has started, but it can disallow transmission before it starts. Note that the STX-ETX flow control protocol established for synchronous transmission is always in effect, regardless of the setting of this parameter. On the CS/1, this parameter applies only to devices attached to an SIO-ST board. On the CS/100, this parameter applies only to ports on which the INTERfaceType parameter is set to DCE. The FlowControlFrom parameter accepts the same values as the FlowControlTo parameter, discussed below. The default value is None.

The FlowControlTo parameter specifies the flow control mechanism from the local device to the Communications Server. The local device cannot interrupt transmission once it has started, but it can disallow transmission before it starts. Note that the STX-ETX flow control protocol established for synchronous transmission is always in effect, regardless of the setting of this parameter. On the CS/1, this parameter applies only to devices attached to an SIO-SM board. On the CS/100, this parameter applies only to ports on which the INTERfaceType parameter is set to DTE. The FlowControlTo parameter accepts one of two values:

None

Specifies that no flow control other than STX-ETX is used. This is the default value.

CTS_RTS

Specifies that the hardware control lines CTS and RTS are used. Refer to the appropriate Planning and Installation Guide for the mapping between these lines and EIA connector pins.

6.2.4 Sample Character-Synchronous Configurations

This section contains samples of typical port configurations for use with character-synchronous equipment.

Tables 6-17 through 6-25 summarize some of the parameter settings appropriate for ports connected to various kinds of equipment:

- Table 6-17 Parameters compatible with remote IBM 3274 equipment.
- Table 6-18 Parameters compatible with IBM 3780 equipment.
- Table 6-19 Parameters compatible with IBM HASP equipment.
- Table 6-20 Parameters compatible with IBM 3270 equipment using the ASCII character set.
- Table 6-21 Parameters compatible with Honeywell VIP equipment.
- Table 6-22 Parameters compatible with Sperry UTS equipment using the standard CS/1-BSC pass-through service. These parameters are not applicable if the connection uses the SPMUX multiplexer service.
- Table 6-23 Parameters compatible with Sperry UTS equipment using the SPMUX multiplexer service. These parameters are applicable for ports to which UTS terminals are attached and for ports to which a DCP host front-end processor is attached.
- Table 6-24 Parameters compatible with Control Data Corporation MODE4C equipment.
- Table 6-25 Parameters compatible with Burroughs BASIC equipment.

Table 6-17 Configuration Parameters for
Remote IBM 3274 Equipment

<u>Parameter</u>	<u>Setting</u>
DeVice	Host
BinaryData	OFF
BSCProtocol	3270
BlockCheck	CRC16
CarrierSense	OFF
CharCode	EBCDIC
DataBits	8
DLE	^P (1)
DUPlex	Half (2)
INTErfaceType	DCE
PARity	None
PassCheck	Pass
RECVtimer	64 (3)
RESptimer	Disabled
SOH	Exclude
SYN	'2' (1)
SyncCharCount	4
UseDSRout	OnConnection, NoToggle (2)
UseDTRin	Ignore
XmitTimer	64 (3)
BReakAction	IGnore
FlowControlFrom	None (3)
FlowControlTo	None (3)

- (1) The Connection Service always displays this value as the printing character that represents the ASCII equivalent of the numeric value of the setting.
- (2) Varies in different installations.
- (3) These settings will allow transmission. Depending on the device's timing characteristics, however, performance may improve with some alteration.
-

Table 6-18 Configuration Parameters for
IBM 3780 Equipment

<u>Parameter</u>	<u>Setting</u>
DeVice	Host
BinaryData	ON
BSCProtocol	3780
BlockCheck	CRC16
CarrierSense	OFF
CharCode	EBCDIC
DataBits	8
DLE	^P (1)
DUPlex	Half (2)
INTErfaceType	DCE
PARITy	None
PassCheck	Pass
RECVtimer	64 (3)
RESptimer	Disabled
SOH	Exclude
SYN	'2' (1)
SyncCharCount	4
UseDSRout	OnConnection, NoToggle (2)
UseDTRin	Ignore
XmitTimer	64 (3)
BREakAction	Ignore
FlowControlFrom	None (3)
FlowControlTo	None (3)

- (1) The Connection Service always displays this value as the printing character that represents the ASCII equivalent of the numeric value of the setting.
 - (2) Varies in different installations.
 - (3) These settings will allow transmission. Depending on the device's timing characteristics, however, performance may improve with some alteration.
-

Table 6-19 Configuration Parameters for
IBM HASP Equipment

<u>Parameter</u>	<u>Setting</u>
DeVice	Host
BinaryData	ON
BSCProtocol	HASP
BlockCheck	CRC16
CarrierSense	OFF
CharCode	EBCDIC
DataBits	8
DLE	^P (1)
DUPlex	Half (2)
INTErfaceType	DCE
PARITy	None
PassCheck	Pass
RECVtimer	64 (3)
RESptimer	Disabled
SOH	Exclude
SYN	'2' (1)
SyncCharCount	4
UseDSRout	OnConnection, NoToggle (2)
UseDTRin	Ignore
XmitTimer	64 (3)
BReakAction	IGnore
FlowControlFrom	None (3)
FlowControlTo	None (3)

- (1) The Connection Service always displays this value as the printing character that represents the ASCII equivalent of the numeric value of the setting.
- (2) Varies in different installations.
- (3) These settings will allow transmission. Depending on the device's timing characteristics, however, performance may improve with some alteration.
-

Table 6-20 Configuration Parameters for
IBM 3270 Equipment Using the ASCII Character Set

<u>Parameter</u>	<u>Setting</u>
DeVice	Host
BinaryData	OFF
BSCProtocol	3270
BlockCheck	LRC
CarrierSense	OFF
CharCode	ASCII
DataBits	8
DLE	^P (1)
DUPlex	Half (2)
INTErfaceType	DCE
PARItY	None
PassCheck	Pass
RECVtimer	64 (3)
RESptimer	Disabled
SOH	Exclude
SYN	^V (1)
SyncCharCount	4
UseDSRout	OnConnection, NoToggle (2)
UseDTRin	Ignore
XmitTimer	64 (3)
BReakAction	IGnore
FlowControlFrom	None (3)
FlowControlTo	None (3)

- (1) The Connection Service always displays this value as the printing character that represents the ASCII equivalent of the numeric value of the setting.
 - (2) Varies in different installations.
 - (3) These settings will allow transmission. Depending on the device's timing characteristics, however, performance may improve with some alteration.
-

Table 6-21 Configuration Parameters for
Honeywell VIP Equipment

<u>Parameter</u>	<u>Setting</u>
DeVice	Host
BinaryData	OFF
BSCProtocol	VIP
BlockCheck	LRC
CarrierSense	OFF
CharCode	ASCII
DataBits	8
DLE	^P (1)
DUPlex	Half (2)
INTErfaceType	DCE
PARity	None
PassCheck	Pass
RECVtimer	64 (3)
RESptimer	Disabled
SOH	Exclude
SYN	^V (1)
SyncCharCount	4
UseDSRout	OnConnection, NoToggle (2)
UseDTRin	Ignore
XmitTimer	64 (3)
BReakAction	IGNore
FlowControlFrom	None (3)
FlowControlTo	None (3)

- (1) The Connection Service always displays this value as the printing character that represents the ASCII equivalent of the numeric value of the setting.
- (2) Varies in different installations.
- (3) These settings will allow transmission. Depending on the device's timing characteristics, however, performance may improve with some alteration.
-

Table 6-22 Configuration Parameters for
Sperry UTS Equipment in a Non-SPMUX Environment

<u>Parameter</u>	<u>Setting</u>
DeVice	Host
BinaryData	OFF
BSCProtocol	UTS
BlockCheck	LRC
CarrierSense	OFF
CharCode	ASCII
DataBits	8
DLE	^P (1)
DUplex	Half (2)
INTerfaceType	DCE
PARity	None
PassCheck	Pass
RECVtimer	64 (3)
RESptimer	Disabled
SOH	Exclude
SYN	^V (1)
SyncCharCount	4
UseDSRout	OnConnection, NoToggle (2)
UseDTRin	Ignore
XmitTimer	64 (3)
BReakAction	IGnore
FlowControlFrom	None (3)
FlowControlTo	None (3)

- (1) The Connection Service always displays this value as the printing character that represents the ASCII equivalent of the numeric value of the setting.
 - (2) Varies in different installations.
 - (3) These settings will allow transmission. Depending on the device's timing characteristics, however, performance may improve with some alteration.
-

Table 6-23 Configuration Parameters for
Sperry UTS Equipment in an SPMUX Environment

<u>Parameter</u>	<u>Setting</u>
DeVice	Host
BinaryData	OFF
BSCProtocol	UTS
BlockCheck	LRC
CarrierSense	ON
CharCode	ASCII
DataBits	8
DLE	^P (1)
DUpIex	Half (2)
INTErfaceType	DCE
PARITy	None
PassCheck	Pass
RECVTimer	64 (3)
RESpTimer	Disabled
SOH	Exclude
SYN	^V (1)
SyncCharCount	4
UseDSRout	OnConnection, NoToggle (2)
UseDTRin	AsDTR
XmitTimer	64 (3)
BReakAction	IGnore
FlowControlFrom	None (3)
FlowControlTo	None (3)

- (1) The Connection Service always displays this value as the printing character that represents the ASCII equivalent of the numeric value of the setting.
- (2) Varies in different installations.
- (3) These settings will allow transmission. Depending on the device's timing characteristics, however, performance may improve with some alteration.
-

Table 6-24 Configuration Parameters for Control Data Corporation MODE4C Equipment

<u>Parameter</u>	<u>Setting</u>
DeVice	Host
BinaryData	OFF
BSCProtocol	MODE4C
BlockCheck	LRC
CarrierSense	OFF
CharCode	ASCII
DataBits	8
DLE	^P (1)
DUPlex	Half (2)
INTErfaceType	DCE
PARITy	None
PassCheck	Pass
RECVtimer	64 (3)
RESptimer	Disabled
SOH	Exclude
SYN	^V (1)
SyncCharCount	4
UseDSRout	OnConnection, NoToggle (2)
UseDTRin	Ignore
XmitTimer	4 (3)
BReakAction	IGnore
FlowControlFrom	None (3)
FlowControlTo	None (3)

- (1) The Connection Service always displays this value as the printing character that represents the ASCII equivalent of the numeric value of the setting.
 - (2) Varies in different installations.
 - (3) These settings will allow transmission. Depending on the device's timing characteristics, however, performance may improve with some alteration.
-

Table 6-25 Configuration Parameters for
Burroughs BASIC Equipment

<u>Parameter</u>	<u>Setting</u>
DeVice	Host
BinaryData	OFF
BSCProtocol	BASIC
BlockCheck	LRC
CarrierSense	OFF
CharCode	ASCII
DataBits	8
DLE	^P (1)
DUPlex	Half (2)
INTErfaceType	DCE
PARItY	None
PassCheck	Pass
RECVtimer	64 (3)
RESptimer	Disabled
SOH	Exclude
SYN	^V (1)
SyncCharCount	4
UseDSRout	OnConnection, NoToggle (2)
UseDTRin	Ignore
XmitTimer	64 (3)
BReakAction	IGnore
FlowControlFrom	None (3)
FlowControlTo	None (3)

- (1) The Connection Service always displays this value as the printing character that represents the ASCII equivalent of the numeric value of the setting.
- (2) Varies in different installations.
- (3) These settings will allow transmission. In some installations, however, system performance may improve with some alteration.
-

6.2.5 Character-Synchronous Handshake Control Lines

This section describes the effects of configuration parameters on handshake control lines.

The effect of some parameters depends on whether the port is functioning as a DTE or as a DCE. For the CS/100, this is determined by the setting of the port's `INTERfaceType` parameter; for the CS/1, this is determined both by the `INTERfaceType` parameter and by the SIO board type.

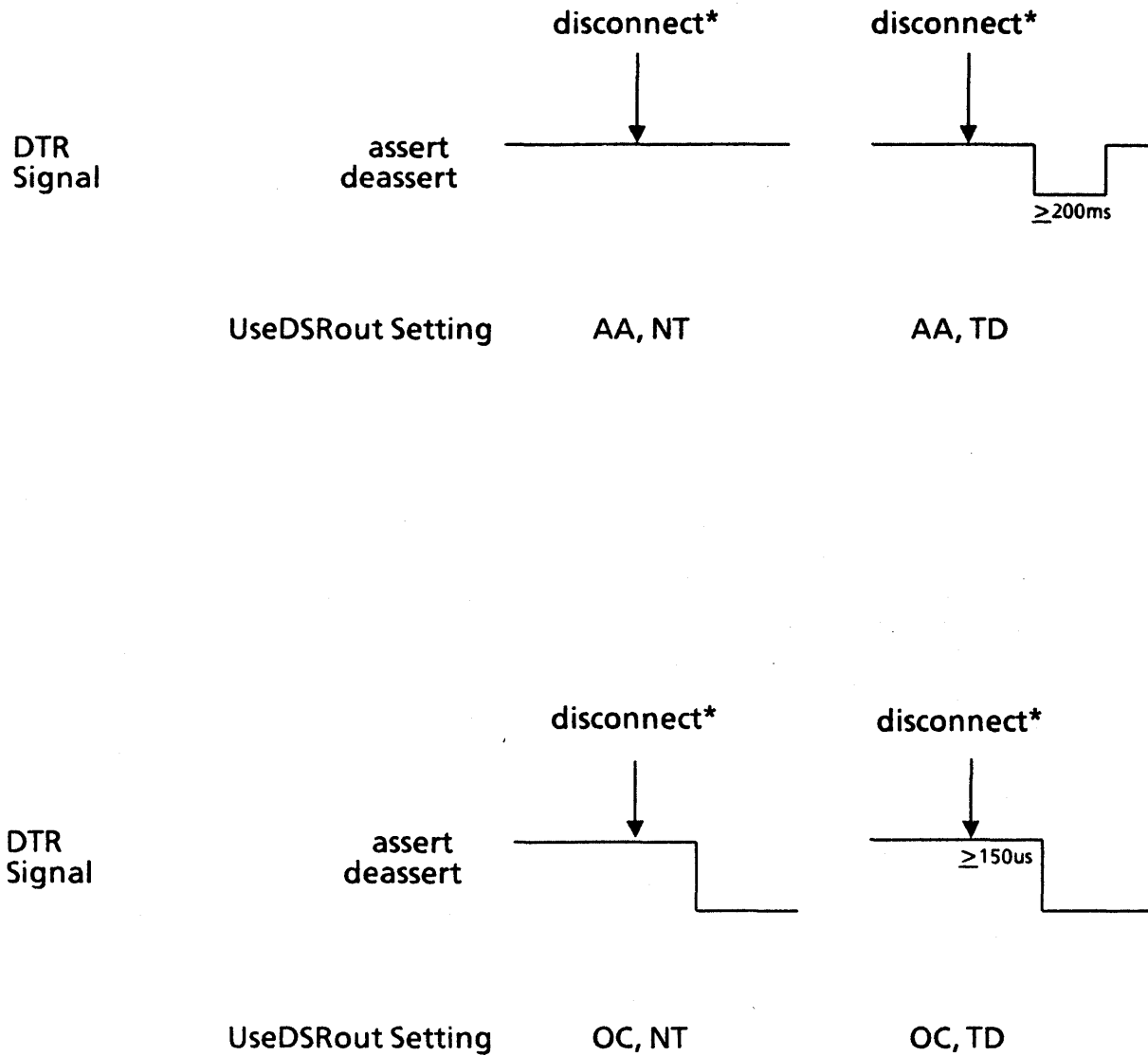
Table 6-26 summarizes the differences. The signal names in the table are relative to the modem.

Table 6-26 Effect of Parameters Dependent on Board Type and on Interface Type Parameter Setting

<u>Parameter</u>	<u>SIO-SM DTE Port</u>	<u>SIO-SM DCE Port</u>	<u>CS/100 * DTE Port</u>	<u>CS/100 * or SIO-ST DCE Port</u>
CarrierSense	sense DCD set RTS	sense RTS set DCD	sense DCD set RTS	sense RTS set DCD
UseDSRout	DTR	DSR	DTR	no effect
UseDTRin	DSR	DTR	no effect	DTR
FlowCtlFrom	not used	used	not used	used
FlowCtlTo	used	not used	used	not used

* The DCD signal from the modem is delivered to the DTR pin on the CS/100; the RTS signal to the modem is delivered from the CTS pin on the CS/100; and the DTR signal to the modem is delivered from the DCD pin on the CS/100.

Figure 6-3 illustrates the effect of the different UseDSRout parameter settings on the DTR signal. Note that this parameter has no effect on a port on an SIO-ST board or a CS/100 port configured as a DCE device.



* The disconnect must come from a remote port.

Figure 6-3 Effect of UseDSRout Parameter Settings

Table 6-27 illustrates the recommended settings of the UseDSRout parameter for use with different kinds of modems. This table assumes that the modem is connected to a port on an SIO-SM board or a CS/100 port configured as a DTE device. For the third-party, pass-through Connection Service currently available for synchronous transmission, always set the UseDTRin parameter to Ignore.

Table 6-27 Recommended Settings of UseDSRout

<u>Device Type</u>	<u>UseDSRout Setting</u>
Dial-in modem without unattended disconnect	AlwaysAssert, NoToggle
Dial-out modem without unattended disconnect	OnConnection, NoToggle
Dial-in modem with unattended disconnect	AlwaysAssert, ToggleonDisc
Dial-out modem with unattended disconnect	OnConnection, ToggleonDisc

6.3 Bit-Synchronous Configuration Parameters

This section describes the port parameters specific to bit-synchronous transmission. The parameters are appropriate for ports on a CS/1-SDLC.

Since the Connection Service commands are not available directly to a bit-synchronous port, parameters for the port are set remotely from an asynchronous terminal port on a different Communications Server on the Ethernet. On a hybrid CS/1 containing both bit-synchronous and asynchronous boards, parameters for a bit-synchronous port can be set from a port on an SIO-A board on the same CS/1.

The default parameter tables shipped with both character-synchronous and bit-synchronous systems include character-synchronous parameters only. In these parameter tables, the LineProtocol parameter is settable to either BYTESynchronous or BITSynchronous. Before any other bit-synchronous parameters can be displayed or altered, the LineProtocol parameter must be set to BITSynchronous. After this value is specified, the SHOWDefaultParameters command displays the bit-synchronous parameter list, and the SETDefault command can be used to alter bit-synchronous parameter values.

All bit-synchronous port parameters must be set with the SETDefault command, except those indicated otherwise in the table below. Table 6-28 is a summary of all bit-synchronous parameters, listed alphabetically. Upper case characters represent the minimum unambiguous abbreviation of each parameter.

Table 6-28 Bit-Synchronous Port Parameter Summary

<u>Parameter</u>	<u>Section</u>	<u>Parameter</u>	<u>Section</u>
AccessGroup	6.3.1	InitMacro *	6.3.1
AccessWord	6.3.1	InterAction *	6.3.1
AddressFilter	6.3.2	INterfaceType	6.3.2
AUTODisconnect	6.3.1	LineProtocol	6.3.2
BAud	6.3.2	MaxSessions *	6.3.1
BReakAction	6.3.3	PRIVilege *	6.3.1
BUfferSize	6.3.1	RECVtimer	6.3.2
CarrierSense	6.3.2	RESptimer	6.3.2
DUPlex	6.3.2	UseDSRout	6.3.2
FlowControlFrom	6.3.3	UseDTRin	6.3.2
FlowControlTo	6.3.3	XmitTimer	6.3.2
IdleState	6.3.2		

* May be displayed with SHOW, but not set with SETD.

6.3.1 Bit-Synchronous Port Transmission Parameters

The port transmission parameters for bit-synchronous ports are identical to the port transmission parameters for asynchronous ports. These parameters are described in detail in Section 6.1.1.

Note that all settable bit-synchronous port parameters must be specified with the SETDefault command, not the SET command.

6.3.2 Bit-Synchronous Port Physical Parameters

This section describes the bit-synchronous port physical parameters, usually set by the network manager for each port. The parameters and their possible values are listed in Table 6-29.

Following the table are definitions of each parameter, explanations of each possible value, and an indication of the default. If the default value is appropriate, the parameter does not have to be set.

Table 6-29 Bit-Synchronous Port Physical Parameters

<u>Parameter</u>	<u>Permitted Values</u>
AddressFilter	Disabled <number> (0-254)
BAud	50 75 110 134.5 150 200 300 600 1200 1800 2400 3600 4800 7200 9600 19.2K 38.4K 56K 64K
CarrierSense	OFF ON
DUPlex	Half Full XmitOnly RecvOnly
IdleState	LineMark SyncBytes
INTERfaceType	DCE DTE
LineProtocol	ASynchronous BYTESynchronous BITSynchronous
RECVtimer	Disabled <number> (1-255 sixteenths of a second)
RESptimer	Disabled <number> (1-255 sixteenths of a second)
UseDSRout	(AlwaysAssert OnConnection , NoToggle ToggleonDisc)
UseDTRin	Ignore AsDTR AsDCD
XmitTimer	Disabled <number> (1-255 sixteenths of a second)

The AddressFilter parameter determines the SDLC address. Only frames with the specified address or the broadcast address will be received. Setting the AddressFilter parameter to Disabled allows reception of all frames presented to the bit-synchronous interface.

The BAud parameter determines the baud rate of the port. If the SIO board is configured for external clocks, the setting of this parameter is ignored. If the SIO board is configured for internal clocks, the setting of this parameter determines the port's baud rate. The maximum load per SIO board is one 64K full-duplex port and one 9600 baud full-duplex port.

The CarrierSense parameter determines whether or not the system uses carrier sensing before line turnaround. The effect of this parameter depends on the settings of the DUPlex and INTERfaceType parameters (see Table 6-15 in Section 6.2.2).

The DUPlex parameter specifies the type of physical interface provided by the SIO board for the port. If DUPlex is set to Full, the SIO board provides a Bell 212-type interface. If DUPlex is set to Half, the SIO board provides a Bell 208-type interface. When the parameter is set to either XmitOnly or RecvOnly, the SIO board provides a one-way, Bell 208-type interface.

The IdleState parameter determines whether the quiescent state of the line is mark (HDLC/SDLC Abort) or synchronization (x'7e'). If the parameter is set to LineMark, the line returns to marking when the final frame is sent. If the parameter is set to Sync-Bytes, the line sends flag bytes between frames until CTS becomes false.

The INTERfaceType parameter specifies whether the port is acting as a DCE or DTE device. Refer to Section 6.2.2 for a description.

The LineProtocol parameter specifies whether bit-synchronous or character-synchronous transmission is used. The Communications Server automatically sets the value at boot time based on the SIO firmware present on the board and on the default value of the LineProtocol parameter. If synchronous firmware is present, and the default LineProtocol value is ASynchronous, the value is automatically changed to BYTESynchronous. For use with the SDLC pass-through service, this parameter must be set to BITSynchro-nous with the SETDefault command.

The RECVtimer parameter sets the reception error recovery timer. Refer to Section 6.2.2 for a description.

The RESptimer parameter is currently not used by the CS/1-SDLC, and the setting of the parameter is ignored by the system.

The UseDSrout and UseDTRin parameters for bit-synchronous operation are identical to the same parameters for character-synchronous operation. Refer to Section 6.2.2 for descriptions of these parameters.

The XmitTimer parameter sets the transmission error recovery timer. Refer to Section 6.2.2 for a description of this parameter.

6.3.3 Bit-Synchronous Session Transmission Parameters

The session transmission parameters for bit-synchronous ports are identical to the session transmission parameters for character-synchronous ports. These parameters are described in detail in Section 6.2.3.

Note that all settable bit-synchronous port parameters must be specified with the SETDefault command, not the SET command.

6.3.4 Sample Bit-Synchronous Configurations

This section contains samples of typical port configurations for use with various kinds of lines used with the CS/1-SDLC in the SDLC pass-through service:

Table 6-30 Parameters compatible with switched lines

Table 6-31 Parameters compatible with leased lines

Table 6-32 Parameters compatible with directly connected lines

Table 6-30 Configuration Parameters for
SDLC Switched Lines

<u>Parameter</u>	<u>Setting</u>
AddressFilter	Disabled
AUTODisconnect	(1)
DeVice	Host
CarrierSense	ON
DUPlex	Half
IdleState	LineMark
INTErfaceType	DTE
LinePRotocol	BITSynchrous
RECVTimer	64 (2)
RESpTimer	Disabled
UseDSRout	AlwaysAssert, ToggleonDisc (3)
UseDTRin	Ignore
XmitTimer	64 (2)
BREakAction	IGNore
FlowControlFrom	None (2)
FlowControlTo	None (2)

- (1) User-selectable.
 - (2) These settings will allow transmission. In some installations, however, system performance may improve with some alteration.
 - (3) Varies in different installations.
-

**Table 6-31 Configuration Parameters for
SDLC Leased Lines**

<u>Parameter</u>	<u>Setting</u>
AddressFilter	Disabled
AUTODisconnect	Disabled
DeVice	Host
CarrierSense	OFF
DUPlex	Full
IdleState	LineMark
INTErfaceType	DTE
LinePROtocol	BITSynchrouous
RECVTimer	64 (1)
RESpTimer	Disabled
UseDSRout	AlwaysAssert, NoToggle (2)
UseDTRin	Ignore
XmitTimer	64 (1)
BReakAction	IGNore
FlowControlFrom	None (1)
FlowControlTo	None (1)

- (1) These settings will allow transmission. In some installations, however, system performance may improve with some alteration.
- (2) Varies in different installations.
-

Table 6-32 Configuration Parameters for
SDLC Directly Connected Lines

<u>Parameter</u>	<u>Setting</u>
AddressFilter	Disabled
AUTODisconnect	Disabled
DeVice	Host
CarrierSense	OFF
DUplex	Full
IdleState	LineMark
INTErfaceType	DCE
LinePRotocol	BITSynchrouous
RECVTimer	64 (1)
RESpTimer	Disabled
UseDSRout	OnConnection, NoToggle (2)
UseDTRin	Ignore
XmitTimer	64 (1)
BREakAction	IGNore
FlowControlFrom	None (1)
FlowControlTo	None (1)

- (1) These settings will allow transmission. In some installations, however, system performance may improve with some alteration.
- (2) Varies in different installations.
-

6.3.5 Bit-Synchronous Handshake Control Lines

The effect of the settings of configuration parameters on the operation of handshake control lines is the same for bit-synchronous systems as for character-synchronous systems. Refer to Section 6.2.5 for detailed information.

6.4 CS/1-X.25 Configuration Parameters

The CS/1-X.25 provides the Connection Service via virtual ports rather than physical ports. These virtual ports support a subset of the port configuration parameters described in Section 6.1. Table 6-33 lists the parameters that apply to the CS/1-X.25 and indicates the section in which each parameter is described.

All the parameters listed may be set remotely by the network manager using the SETDefault command, although any parameters that correspond to X.3 parameters may be reset interactively by the host.

Table 6-33 CS/1-X.25 Port Configuration Parameters

<u>Parameter</u>	<u>Section</u>	<u>Parameter</u>	<u>Section</u>
AccessGroup	6.1.1	GlobalPassWord	6.1.5
AccessWord	6.1.1	GroupxPasswd	6.1.5
AUTOdisconnect	6.1.1	IdleTimer	6.1.3
BREakAction	6.1.3	InitMacro	6.1.1
BREakChar	6.1.3	InterAction	6.1.1
CRPad	6.1.2	LFInsertion	6.1.3
DataBits	6.1.2	LineERase	6.1.4
DataForward	6.1.3	LocalEditing	6.1.4
DATE	6.1.5	LocalPassWord	6.1.5
DeVice	6.1.1	MaxSessions	6.1.1
DOmain	6.1.5	MOde	6.1.3
ECHOData	6.1.3	NMPrompt	6.1.5
ECHOMask	6.1.3	Organization	6.1.5
ECMChar	6.1.3	PRiVilege	6.1.1
EOM	6.1.3	ReprintLine	6.1.4
ERase	6.1.4	VERBatim	6.1.4
FlowControlFrom	6.1.3	WelcomeString	6.1.5
FlowControlTo	6.1.3	WordERase	6.1.4

6.5 Configuration Parameters for Other Servers

Most servers that provide the Connection Service via virtual ports rather than physical ports require only minimal port configuration. Because a virtual port does not represent a single connector and physical line, most of the port parameters described in the previous sections are not applicable.

The CS/1-HSM, the CS/1-SNA, and the CS/100-488 use only four configuration parameters: AccessGroup, AccessWord, AUTODisconnect, and GroupxPasswd. Refer to Section 6.1 for descriptions of these parameters.

All these parameters must be set remotely by the network manager from a terminal port on a CS/1-A or CS/100-A.

APPENDIX A

CONNECTION SERVICE ERROR MESSAGES

This appendix provides an alphabetical list of all error messages generated by the Connection Service and describes the probable causes of each message.

The error code listed for each message is the number generated if the port's InterAction parameter is set to Brief, which causes the server to return errors as numeric codes rather than as text strings. For the convenience of those users who encounter only the Brief mode error numbers, Table A-1 at the end of the appendix lists the error messages by error number.

A.1 Text Messages**Aborted**

Error code: 50

This message appears if the user terminates the interactive setting of a port's default parameters by pressing the escape key before the system has stepped through all parameters. All parameters set prior to the escape take effect, but the system does not prompt for more values.

The interactive setting of all default parameters for a port is initiated by entering the SETDefault command without specifying any parameters.

Ambiguous, try one of: <command names>

Error code: 55

This message appears if the user types an incomplete command name. The system lists all possible commands that could be made from the incomplete entry. Reenter the command using an unambiguous abbreviation of the command name.

Ambiguous parameter name, try one of: <parameter names>

Error code: 46

This message appears if the user types an incomplete parameter abbreviation in one of the commands that sets or displays a parameter value. The system lists all parameter names that could be assumed from the incomplete entry. Reenter the entire command using an unambiguous abbreviation of the parameter.

Autodisconnect timer expired

Error code: -12

This message appears if the user's port has been inactive longer than the interval specified by the AUTODisconnect parameter of the destination port. The default value of the AUTODisconnect parameter is 60 minutes for all ports whose Device parameter is set to Host; the parameter does not apply to ports whose Device parameter is set to Terminal.

Broadcast is not enabled for that port

Error code: 78

This message appears if the user attempts to broadcast a message to a port whose InterAction parameter is set to BroadcastOFF.

Can't - diskette write protected

Error code: 28

This message appears if the user issues a command requiring information to be stored on the system diskette while a write-protect tab is in place on the diskette. First remove the write-protect tab from the diskette, then enter the command again.

If this message appears in response to the Name command, the system may have placed a protective lock on the clearing-house database. In this case, a subsequent attempt to enter the Name command results in a disk I/O error. To recover, reboot the server, using a system diskette that is not write-protected.

Can't - no memory

Error code: 37

This message appears if the system does not have enough memory available at the time a command is entered to complete execution of the command. In most cases, this is a temporary situation caused by an unusual circumstance, such as multiple users issuing simultaneous requests for a complex macro file. Wait until system activity has decreased and enter the command again.

If this message appears in response to the DO command, the specified macro file may contain too many complex display commands. If the system fills all available buffers while waiting for a display to complete, it terminates the process (i.e., places the port in Listening mode).

Can't DEFINE from a macro

Error code: 73

This message appears when a macro file that contains a DEFINE command is executed with the DO command. Macro files cannot contain the DEFINE command.

Macro files can, however, contain the DO command to call a different, predefined macro.

Can't REMoteSET this parameter

Error code: 75

This message appears if the user tries to use the REMoteSET command to change a parameter that can be changed only with the SET or SETDefault command.

The REMoteSET command can be used to change some but not all of the parameters that can be changed with the SET command. To display a list of all parameters that can be set with the REMoteSET command, enter the command followed by a question mark.

Can't save -- directory full

Error code: 30

This message appears if the user tries to add another configuration or macro file after all available disk space for these files is taken.

A Series/1 server can hold up to 64 configuration files and up to 64 macro files. A CS/100 can hold up to 32 configuration files and up to 32 macro files.

Can't SET yet -- no session

Error code: 77

This message appears if the user tries to set an active session parameter for a port with no current sessions.

When a port changes from Listening to Command mode, the system creates a working table of active port parameters by copying the port parameter portions of the port's default parameter table. When a connection with a remote device is established on that port, the server completes the active parameter table by copying the session parameters from the default parameter table. The SET command can be used only to change parameters that have an active value.

Can't SETD this parameter

Error code: 76

This message appears if the user tries to change the default value of the PRIVilege parameter.

For security purposes, the default value of the PRIVilege parameter is always User for all ports. In order to access higher privilege levels, the user must issue the SET PRIVilege command and enter the appropriate password. The higher privilege level remains in effect only as long as the port remains active.

Clearinghouse is out of memory

Error code: 19

This message appears if the system does not have enough memory available to process the command when a clearinghouse access request is entered.

In most cases, this is a temporary situation caused by an unusually high level of system use. Wait until demand for system resources is lower and reissue the command.

Clearinghouse name in use

Error code: 6

This message appears if the user specifies in the Name command a clearinghouse name that is already defined in the local clearinghouse.

To change the assignment of a name that has already been defined, first remove the name from the clearinghouse with the UNName command, and then redefine it with the Name command.

Clearinghouse name invalid

Error code: 2

This message appears if the user specifies an illegal clearinghouse name in the Name or Connect command. The local name field in a clearinghouse name can include up to 10 alphanumeric characters, the first of which must be an alphabetic character, or up to 18 numeric digits. For more information on clearinghouse names, see Section 3.1.

Clearinghouse name not found

Error code: 11

This message appears if the server is unable to locate in any clearinghouse on the network a name specified in the Connect or SHow CHN <name> command. A failure to locate the name can mean either that the name has not been defined or that the server on which the name is defined is not currently available.

Clearinghouse name table is full

Error code: 18

This message appears if the clearinghouse name table is already full when the user issues the Name command. A CS/1 that boots from a local disk drive supports up to 64 clearinghouse names. A CS/100 that boots from a local disk drive supports up to 24 clearinghouse names. An NCS/150 supports a combined maximum of 256 clearinghouse names for all its clients.

Clearinghouse received no response

Error code: 22

This message appears if a Communications Server that boots from an NCS/150 receives no answer to a clearinghouse access request sent to the NCS/150. The message could mean that the NCS/150 is turned off or disconnected from the network, or that the NCS/150 is momentarily busy handling other requests.

Clearinghouse value invalid

Error code: 16

This message appears if the user issues a command containing a logical name longer than 120 characters.

Directory empty

Error code: 31

This message appears if the user requests a display of the stored macro or configuration files before any files have been established.

DISKIO read error**Error code: 25**

This message appears if the system is unable to complete a diskette read process. The most likely cause of the read error is deterioration of the diskette medium. Try replacing the working diskette with a backup copy.

DISKIO seek error**Error code: 24**

This message appears if the system is unable to complete a diskette seek process. The most likely cause of the read error is deterioration of the diskette medium. Try replacing the working diskette with a backup copy.

DISKIO write error**Error code: 26**

This message appears if the system is unable to complete a diskette write process. The most likely cause of the write error is deterioration of the diskette medium. Try replacing the working diskette with a backup copy.

Drive door open or diskette missing**Error code: 27**

This message appears if an attempt to read or write to the diskette fails because the drive door is open or the diskette is not in place in the drive.

File not found or in use**Error code: 29**

This message appears if the NCS/150 fails to respond to a request from a client server for access to a configuration or macro file.

The message may mean only that another device on the network is currently accessing the file. If the message appears repeatedly, however, the requested file may not exist.

Illegal request -- wrong state

Error code: -1

This message appears if the user issues a command that has no meaning for the port in its current state. This message appears, for example, in response to the DEQueue command issued at a port that has no queued connection request.

Insufficient privilege

Error code: 36

This message appears when a user issues a command that requires a higher privilege level than is currently in effect at the local port. There are three privilege levels: User, Local Network Manager, and Global Network Manager. Section 3.2 describes the default privilege level required for each command.

Invalid <product type> command

Error code: 39

This message appears when the user issues a command that the Communications Server does not recognize. The message usually indicates a typing mistake, although it sometimes appears in response to a syntax error.

The message may also appear in response to a Connection Service command that is not available on the model of server that the user is interacting with. To display a list of all available commands, enter a single question mark.

Invalid DATE

Error code: 70

This message indicates a syntax mistake in the SET DATE command. The date entered must follow one of these formats:

yy/mm/dd hh:mm[:ss]
mm/dd/yy hh:mm[:ss]

Invalid remote command

Error code: 68

This message appears when a user in remote communication with a distant server issues a command that is not available in remote mode. Only a subset of the standard commands are available in remote mode. Specifically, commands used to create and manipulate new sessions are restricted. The REMoteSET, REMoteSHOW, RESume, SWitch, and Transmit commands are unavailable, and the Connect command may be used only to interconnect remote ports.

To display a list of available commands, enter a single question mark.

Invalid session number

Error code: 42

This message appears when the user specifies an inappropriate session number in a command that accepts a session number as an argument. Either the specified session number does not exist or it is not a valid session number.

Valid session numbers are the digits 1 through 8. Sessions are numbered sequentially, in the order in which they are created; each session retains its original session number even if sessions with lower numbers are subsequently terminated.

Invalid <command> syntax

Error code: 33

This message indicates a syntax error in the last command issued. The error could be with one of the fields in the command line or with the structure of the command line. For a syntax description of a command, enter the command name followed by a question mark.

Macro definition too long

Error code: 72

This message appears in response to the DEFINE command if the defined macro includes more than 256 characters.

If the commands to be included in the macro require more than 256 characters, split the contents into two or more macro files, and imbed the DO command in one of them to call the others.

Macros nested too deeply

Error code: 74

This message appears when a user executes with the DO command a macro that initiates a sequence of more than ten calls to other macros. Although the DO command may be embedded in a macro in order to call another macro, the nesting of macros is limited to ten.

Missing '=' after parameter <parameter name>

Error code: 43

This message appears in response to the SET, SETDefault, or REMoteSET command if the user omits the equal sign (=) between the parameter name and the parameter value. Refer to Section 3.2 for detailed descriptions of the syntaxes for these commands.

Missing <value> after parameter <parameter name>

Error code: 44

This message indicates that the parameter value field is missing in the SET, SETDefault, or REMoteSET command.

To display a list of all values that can be specified for a given parameter, enter this command:

```
set <parameter name> = ?
```

Name Server is out of memory

Error code: 19

This message appears if the system does not have enough memory available to process the command when a Name Server access request is entered.

In most cases, this is a temporary situation caused by an unusually high level of system use. Wait until demand for system resources is lower and reissue the command.

Name Server name in use

Error code: 6

This message appears if the user specifies in the Name command an internet name that is already defined in the local Name Server. To change the assignment of the name, first remove the name with the UNName command, and then redefine it with the Name command.

Name Server name invalid**Error code: 2**

This message appears if the user specifies an illegal internet name in the Name or Connect command. For more information on internet names, see Section 3.1.

Name Server name not found**Error code: 11**

This message appears if the server is unable to locate in any Name Server on the network a name specified in the Connect or SHow NAmes <name> command. A failure to locate the name can mean either that the name has not been defined or that the server on which the name is defined is not currently available.

Name Server name table is full**Error code: 18**

This message appears if the internet name table is already full when the user issues the Name command. A CS/1 supports up to 64 internet names. A CS/100 supports up to 24 internet names.

Name Server value invalid**Error code: 16**

This message appears if the user issues a command containing a logical name longer than 120 characters.

No access allowed**Error code: -13**

This message appears if a user is unable to provide the correct password after issuing a connection request to an access-controlled port. If the user's port was configured to allow access to the device, then this message does not appear because the user is not required to issue a password.

First ascertain the password needed to make the connection, then reissue the connection request. To set up the port permanently for unrestricted access to the destination device, set the AccessWord parameter of the source port to match at least one value in the AccessGroup parameter of the destination port.

No current session

Error code: 40

This message appears if the user issues a command that affects a session when no session exists. The RESume, SWitch, and DEQueue commands, for example, have no meaning unless a suspended or queued session exists on the port.

No memory resource

Error code: -2

This message appears if the system does not have enough memory available to complete execution of the last command entered.

In most cases, this is a temporary situation caused by an unusually high demand for system resources. Wait until system activity levels are lower and reissue the command.

No more sessions for this port

Error code: -9

This message appears in response to the Connect command if the source port is already connected to as many devices as allowed for that port.

The default maximum number of sessions for each port is two. This maximum can be changed with the MaxSessions parameter (refer to Section 6.1).

No other sessions

Error code: 41

This message appears if the user issues the SWitch command to change to another session when only one session exists on the port.

No response

Error code: -10

This message appears when a session has been terminated by the server at the host end because no activity has taken place on the circuit for the period of time specified by the AUTODisconnect parameter. The message may also appear if the server at the host end stops responding to packets from the server at the terminal end.

Parameter <name>: Value <value> is illegal:

Error code: 47

This message appears if the user specifies a value that is not available for the parameter being set. Some parameters accept numeric or string values, and some parameters accept only values from a list of system-defined options. To display a list of all settings available for a specific parameter, enter the SET command followed by the parameter name and a question mark.

Parameter <name>: Value <value> is out of range

Error code: 48

This message appears if the user specifies an illegal value for one of the parameters that accepts numeric values.

To display the acceptable range for a parameter value, enter the SET command followed by the parameter name and a question mark.

Parameter may not be SET, use SETD

Error code: 69

This message appears if the user tries to adjust a parameter with the SET command that can be changed only with the SET-Default command. The parameters that can be set only with SETDefault are InitMacro, DataBits, GlobalPassWord, Groupx-Passwd, LocalPassWord, NMPrompt, PROMpt, and WelcomeString.

Parameter <name> unknown

Error code: 34

This message appears if the user enters a word the server does not recognize in a place where the server expects a parameter name. This message could appear if, for example, the user inserts an address or parameter value at the wrong place in a command.

For a list of all parameters available, refer to Section 6.0. To see a screen display of the parameters available with a specific command, enter the command name followed by a question mark:

<command name> ?

Portid out of range**Error code: 59**

This message appears if the user specifies a port number that is not available on the server that implements the command. The CS/1 uses physical port numbers 0 through 31 and virtual port numbers 32 through 95. The CS/100 uses physical port numbers 0 through 13 and virtual port number 14. The GS/1 uses virtual port numbers 0 through 47.

Remote is busy**Error code: -5**

This message appears in response to the Connect command if the requested destination port is already part of another virtual circuit.

Remote is disabled or nonexistent**Error code: -4**

This message appears in response to the Connect command if the requested destination port does not respond to the connection request.

Usually, this message means that the destination device is turned off or disconnected. It can also mean that the port configuration of the destination device is not appropriate for the device.

If this message appears when the destination device is actually available, check the setting of the UseDTRin parameter on the destination port. Ordinarily this parameter is set to AsDTR for a host port. If, however, the host does not generate a DTR signal, the UseDTRin parameter should be set to Ignore or AsDCD.

Remote received bad address**Error code: -6**

This message appears if the user specifies an invalid port number as all or part of the destination address in a connection request.

Remote received bad parameters

Error code: -8

This message occurs only if a connection is made between an ESPL server and a non-ESPL server. When the connection is established, a set of parameters is exchanged between the two servers. If either server does not recognize one or more of the parameters, it sends this message to the other end of the connection.

Remote software incompatible

Error code: -3

This message appears if a user tries to interact with a remote server that is running a version of the communications software incompatible with the version running on the local server.

This occurs only if one or more servers on the network is running an obsolete version of software. Use the SHOW VERSION command on each server to determine which is running obsolete software.

Reserved timer expired

Error code: -14

This message appears if the user fails to complete a queued connection within five minutes of being informed that the queued connection is available. When this message appears, the user's port is removed from the connection queue and the connection is given to the next port in the queue, if any.

To complete a queued connection when it becomes available, the user issues the RESume command. If a different session is active on the user's port when the notification is received, the user must first issue the SWITCH command so that the queued session is current.

Rotary number out of range

Error code: 58

This message appears if the user specifies an illegal rotary number. Rotary numbers can be established in the range 128 through 135.

SET what?

Error code: 45

This message appears if the user omits the parameter name from the SET command. For a list of all parameters that can be set, enter the SET command followed by a question mark:

set ?

SHoW parameters for which port?

Error code: 71

This message appears if a user issues the SHoW PARAMeters command in remote mode without specifying a port number. Since a user in remote mode is communicating with a virtual network manager port, the SHoW PARAMeters command cannot assume the local port as the default.

SHoW what?

Error code: 51

This message appears if the user omits the keyword from the SHoW command. For a list of all variations on the SHoW command, enter the command followed by a question mark:

show ?

Sorry

Error code: 49

This message appears if the user fails to supply the correct password while trying to change privilege levels or connect to an access-controlled destination address. If the user failed to supply the correct password on the previous 1000 attempts to change privilege level, no password prompt appears; instead, this message appears immediately after the request.

Passwords must be entered in the correct case and must match exactly the password established by the network manager. The default value for all passwords on a new server is null ("").

String truncated

Error code: 54

This message appears if the user enters a string that is too long for the command in which it is included.

The local name field of a clearinghouse name can contain up to 10 alphanumeric characters or up to 18 all-numeric characters. The domain and organization fields of a clearinghouse name can contain up to 10 alphanumeric characters. Filenames, passwords, and prompts can contain up to 14 characters. The welcome string can be up to 80 characters long. The Broadcast, Echo, and Transmit commands accept strings up to 82 characters long.

Timeout failure

Error code: -11

This message appears if a server receives no answer to a request for information across the network. The message most often means that the server to which the request is directed is turned off or disconnected.

Unknown <product type> command

Error code: 38

This message appears if the server does not recognize the first word in a command.

The message usually indicates a typing mistake, but it can also mean that the user has entered a valid command that is not available on the local server. For example, a server running an early software version may not recognize the DEQueue command.

For a list of all commands available to the local port at its current privilege level, enter a question mark.

Unknown errors

Error code: -7

This message appears if the server is unable to complete the last command entered and is unable to identify the source of the problem.

A.2 Error Codes

Table A-1 lists all numeric error codes. Messages numbered -14 through -1 are errors reported by the Virtual Terminal Protocol. Messages 1 through 22 are errors reported by the Name Service. Messages 23 through 30 are errors reported by the DISKIO Service. Messages 31 through 59 represent other miscellaneous errors. Messages 60 through 66 are informational responses rather than error messages. Messages 68 to 77 are also primarily informational messages, but indicate that the command failed for the stated reason.

Table A-1 Brief Mode Error Codes

<u>Error Code</u>	<u>Equivalent Message</u>
-14	"Reserved timer expired"
-13	"No access allowed"
-12	"Autodisconnect timer expired"
-11	"Timeout failure"
-10	"No response"
-9	"No more sessions for this port"
-8	"Remote received bad parameters"
-7	"Unknown errors"
-6	"Remote received bad address"
-5	"Remote is busy"
-4	"Remote is disabled or nonexistent"
-3	"Remote software incompatible"
-2	"No memory resource"
-1	"Illegal request -- wrong state"
0	No error
1	(1)
2	"[Clearinghouse Name Server] name invalid"
3-5	(1)
6	"[Clearinghouse Name Server] name in use"
7-10	(1)
11	"[Clearinghouse Name Server] name not found"
12-15	(1)
16	"[Clearinghouse Name Server] value invalid"
17	(1)
18	"[Clearinghouse Name Server] name table is full"
19	"[Clearinghouse Name Server] is out of memory"
20	Not used

(continued)

Table A-1 Brief Mode Error Codes
(continued)

Error Code	<u>Equivalent Message</u>
21	(1)
22	"Clearinghouse received no response"
23	(1)
24	"DISKIO seek error"
25	"DISKIO read error"
26	"DISKIO write error"
27	"Drive door open or diskette missing"
28	"Can't - diskette write protected"
29	"File not found or in use"
30	"Can't save -- directory full"
31	"Directory empty"
33	"Invalid <command> syntax"
34	"Parameter <name> unknown"
35	(1)
36	"Insufficient privilege"
37	"Can't - no memory"
38	"Unknown <CS/1 CS/100 GS/1> command"
39	"Invalid <CS/1 CS/100 GS/1> command"
40	"No current session"
41	"No other sessions"
42	"Invalid session number"
43	"Missing '=' after parameter <name>"
44	"Missing <value> after parameter <name>"
45	"SET what?"
46	"Ambiguous parameter name, try one of: <names>"
47	"Parameter <name>: Value <value> is illegal"
48	"Parameter <name>: Value <value> out of range"
49	"Sorry"
50	"Aborted"
51	"SHow what?"
52	(1)
53	Not used
54	"String truncated"
55	"Ambiguous, try one of:"
56	"... failed" (2)
57	(1)
58	"Rotary number out of range"
59	"Portid out of range"
60	"Global Parameters saved"

(continued)

Table A-1 Brief Mode Error Codes
(continued)

<u>Error Code</u>	<u>Equivalent Message</u>
61	"Statistics saved"
62	" interconnection formed" (3)
63	" disconnected" (3)
64	Not used
65	"File replaced"
66	"@" (4)
67	Not used
68	"Invalid remote command"
69	"Parameter may not be SET, use SETD"
70	"Invalid DATE"
71	"SHow parameters for which port?"
72	"Macro definition too long"
73	"Can't DEFine from a macro"
74	"Macros nested too deeply"
75	"Can't REMoteSET this parameter"
76	"Can't SETD this parameter"
77	"Can't SET yet -- no session!"
78	"Broadcast is not enabled for that port"

- (1) Used only internally or in the VT Program Interface Service; does not appear in the standard Connection Service.
 - (2) Appears in conjunction with error code explaining failure.
 - (3) Appear in conjunction with the "Connecting ..." or "Disconnecting ..." messages.
 - (4) Listening mode symbol.
-

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